

Enhancing the safety of GP trainee prescribing: a literature review and evaluation of an educational intervention aiming to reduce errors and suboptimal prescribing

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Abstract

Introduction

Medication errors causes significant morbidity and mortality in healthcare systems throughout the world. In England, approximately 5% of prescriptions issued in primary care contain an error, with around one in 550 prescriptions containing a serious error. GP trainees have been highlighted as a particular cohort of prescribers who may benefit from additional support and training to enhance their prescribing.

A literature review was conducted to ascertain details of interventions which had been undertaken with GP trainees in the primary care setting, in order to reduce medication error and improve prescribing safety. More than 3000 articles were found through database searches, with fifteen articles forming the review cohort after exclusion processes. Most of the interventions reviewed were small-scale and limited in scope, with many focusing on exploring the impact of a specific teaching session or clinical experience. More meaningful changes in practice were apparent with a more comprehensive approach to prescriber education, or the delivery of personalised feedback. It was clear from the literature review that there is a need for further studies exploring prescribing safety interventions for GP trainees.

The REVISiT intervention was devised (a retrospective review of prescriptions issued by GP Trainees) and was evaluated as part of this thesis. The aim of the evaluation was to work towards identifying whether a pharmacist-led review of a series of prescription items issued by GP trainees during or nearing their final year of training is an effective means of improving prescribing safety for this cohort of prescribers.

Methods

Ten GP trainees and their trainers were recruited from the Nottingham GP Vocational Training Scheme. Each of the trainees had 100 sequential prescription items reviewed by a clinical pharmacist to identify prescribing errors, suboptimal prescribing and aspects of good practice. Prescribing data were pooled, and underwent descriptive statistical analysis to report the over-all medication error and suboptimal prescribing rate of the study participants. Prescribing data were reviewed to look for patterns of errors and suboptimal prescribing.

A detailed report was prepared for each trainee, outlining the 100 prescription items that had been reviewed. GP trainees and their trainers received the individualised report as part of a feed-back meeting, led by a clinical member of the research team. Both parties were then invited to take part in semi-structured interviews to gain their feedback regarding the review process. Further semi-structured interviews were undertaken one to three months after the first interview, to ascertain if there had been any changes in practice as a result of taking part in the study. All interviews were recorded, transcribed, and analysed for emergent themes.

Results

Ten GP trainees each had approximately 100 prescription items reviewed to highlight prescribing errors, and episodes of suboptimal prescribing. A total of 1028 prescription items were reviewed, which had been issued over the course of 1291 consultations. Ninety-two prescribing errors were reported, which represented an error rate of 8.9%. A total of 360 episodes of suboptimal prescribing were identified, representing a suboptimal prescribing rate of 35%.

The most common error was that relating to the dose or strength of a medication prescribed (n=30, 32.6% of all prescribing errors). Examples of this error included prescribing an inappropriate dose of antibiotics for the indication or age of the patient, or prescribing a dose of medication that was not in keeping with the narrative within a consultation. The second most common error type observed related to providing incomplete or inadequate information on the prescription (n=24; 26.1% of all errors). Examples of this error type included the provision of non-specific dosage instructions for potent steroid creams, and antibiotic eye drops where there could be confusion regarding their use.

Participants reported a range of reasons for wanting to engage with the study, including a perceived deficit in prescribing education, and a desire to receive personalised feedback on their practice. On receiving feedback, all trainees made plans for some practice changes, ranging from acting upon knowledge deficits at the level of an individual drug or drug class, to making a commitment to more diligent use of local guidance. In the follow-up interview, some participants were able to report actual changes they had made to their prescribing practice, such as amending the length of antibiotic courses to reflect local guidance. One trainer was able to report how they had changed the way in which they were supervising a new trainee, in order to enhance prescribing safety.

Discussion

Even though the study cohort was small and self-selected, the reported error rate of 8.9% was similar to other reported error rates associated with junior doctor prescribing in different settings. The types of errors were also similar to those reported in the literature.

The way in which feedback was delivered in the REVISiT intervention was largely in keeping with best practice in postgraduate education, and therefore facilitated appropriate behaviour change. which were sometimes able to be corroborated by trainer report.

Participants were, however, concerned that some of the suboptimal prescribing that had been reported to them was overly 'picky', and not be in keeping with 'real world practice.' One of the limitations of the study was that actual practice change was not able to be discerned: only reports of practice change.

Exploring the rationale behind error occurrence revealed the importance of adopting primary-care-specific prescribing knowledge, as well as appropriate consultation management techniques. Relating the findings of the study to error theory permitted exploration of the utility of the intervention beyond merely providing corrective feedback.

In common with other studies involving junior doctors, participants from the REVISiT study commented on the inadequacy of prior education in prescribing for preparing them to practice as doctors. Other systems-related issues that were highlighted included the effect of time-pressures on the quality of note keeping and prescribing, and frustrations with the way in which computer systems outworked the prescribing process.

Conclusion

Prescribing medication is a fundamental part of the care delivered to patients in primary care. Medication error continues to be responsible for significant unnecessary morbidity and mortality. Educational interventions have been shown to enhance prescribing safety in hospital and outpatient settings, but there remains a paucity of robust studies, especially in the domain of primary care, and specifically involving GP trainees.

Through the REVISiT intervention, 10 GP trainees received personalised feedback on a series of 100 prescription items. The process received positive feedback from the trainees and their trainers, and changes to practice were reported.

Although a natural follow-on from this study may be to explore the validity of the intervention through a larger scale, randomised controlled trial, this may not actually be a practical next step due to the pharmacist-resource that would have to be utilised. Findings from the REVISiT study have, however, already been used to enhance the teaching of safer prescribing, and have also formed the basis for development of a national prescribing assessment for GP trainees, which has recently been approved by the General Medical Council.

Further evaluation of the national prescribing assessment, and indeed exploring a robust prescribing evaluation for other clinicians in the primary care setting would be a useful next step with the lessons learned from the REVISiT study.

Publications and conference presentations related to the thesis

1. **Marsden K, Avery A, Knox R, Gookey G, Salema N and Bassi M. *Focus group study to explore ideas on potential interventions for reducing prescribing errors in general practice.* Pharmacoepidemiology and Drug Safety 2013. 22: p. 681**[1]

Published conference abstract relating to a qualitative study looking at translating the findings of the PRACtICe study into practice. I was part of the team delivering the above qualitative study (leading focus groups comprised of GP trainees and trainers, and being involved in transcript analysis) but I was not leading the team at this stage. Results from this focus group study informed the design of the REVISiT intervention – which this thesis is based on.

2. **Knox R, Salema N, Bell B, Marsden K, Gookey G, Swanwick G, Bassi M, Mehta R, Silcock N, Avery A. *Retrospective Review of Prescriptions issued by GPs in Training – a pilot study.* RCGP ASM 2015. Glasgow, UK**

Poster presentation at the RCGP National Conference in Glasgow, 2015 reporting on preliminary findings of the REVISiT study (which this thesis is based on). I led the research team delivering the REVISiT study

3. **Salema N, Bell B, Marsden K, Gookey G, Swanwick G, Bassi M, Mehta R, Silcock N, Avery A and Knox R. *The frequency and nature of prescribing problems by GPs-in-training (REVISiT): a retrospective review.* BJGP Open 2022; 6 (3): BJGPO.2021.0231. DOI: https://doi.org/10.3399/BJGPO.2021.0231** [2]

Peer-reviewed journal publication of the REVISiT study (which this thesis is based on). I led the research team delivering the revisit study.

4. **Knox R, Salema N, Bell B, Marsden K, Gookey G, Swanwick G, Bassi M, Mehta R, Silcock N, Rodgers S, McCartney K and Avery A. REVISIT, the next stage: developing plans for wider application of a retrospective review of prescribing of GPs in training. British Journal of General Practice 2018; 68 (suppl1): bjgp18X697337.**

   DOI: https://doi.org/10.3399/bjgp18X697337 [3]

Published conference abstract reporting on a qualitative study that took place after the REVISiT study: exploring the barriers and facilitators to a wider role out of the REVISiT intervention. I led the research team delivering this study.

5. **Knox R, Laing L, Negedu O, Bell B, Charly J-A, Salema N, Swanwick G, Gookey G, Boddy N, Mindi Bassi M, Rodgers S, Toh L, Armitage C, Ashcroft D and Avery A, *A pilot Randomised control trial of the REVISiT intervention – the first stages.* NIHR Greater Manchester Patient Safety Translational Research Centre Symposium. 2022: Leeds, UK. [4]**

Conference poster presentation outlining the early stages of a small-scale randomised controlled study of the REVISiT intervention.

6. **Knox R, Bell B, Salema N, Emerson K, Bodgener S, Rial J, Swanwick G, Charly J-A and Avery A. *Structured review of prescriptions for GPs in training…what about YOUR prescribing??* WONCA Europe 2022. London, UK**

Oral presentation (lecture format) at joint RCGP/WONCA-Europe conference outlining initial findings from an evaluation of the first national prescribing assessment for all UK GP trainees. The prescribing assessment is based on the principles of self-evaluation with quality assurance features. Guidelines to help GP trainees complete the assessment are based on findings from the REVISiT study. I led the team evaluating the prescribing assessment (and developing the prescribing assessment in partnership with the RCGP Workplace-based Assessment Team).

7. **Knox R, Bell B, Salema N, Emerson K, Bodgener S, Rial J, Swanwick G, Charly J-A and Avery A. *Evaluating the UK's first national prescribing assessment for GPs in training.* BJGP Open – Accepted for publication 30th May 2023. [5]**

Peer-reviewed journal acceptance - reporting on a detailed evaluation of the national prescribing assessment, which was developed using findings from the REVISiT study.

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ways in which the project could be taken forward. Latterly, both Kate and Ndeshi proof-read aspects of this thesis: thank you for your kind comments and feedback.

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Thank you to my in-laws, Jean and John Lister for a final spelling and grammar check (and for helping with school runs!) Thank you to my dad, Iain Knox and my sister, Ellen Knox for all your help and support over the years.

Finally a huge thank you to my amazing wife, Catherine, and my three wonderful children Eilidh, Ethan and Reuben for putting up with me, especially in the writing up period: THANK YOU!

Dedication

This thesis is dedicated to God, through whom all things are possible

I can do everything through him who gives me strength

Philippians 4:13, The Bible

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List of Abbreviations and Acronyms

ACE inhibitor	Angiotensin Converting Enzyme Inhibitor (class of hypertension medication)
AD	As Directed (prescription abbreviation)
AI	Artificial Intelligence
ARB	Angiotensin receptor blockers (class of hypertension medication)
BD	Take twice daily (prescription abbreviation from Latin *bis in die*)
BNF	British National Formulary
BNFC	British National Formulary for Children
CAG	Confidentiality Advisory Group
CBD	Case-based-discussion
CCG	Clinical Commissioning Group
CCT	Certificate for Completion of Training (required for a doctor to be placed on the GP or Specialist Register)
CINAHL	Cumulative Index to Nursing and Allied Health Literature (run by EBSCO - US Research database company)
CPD	Continuing Professional Development
CQC	Care Quality Commission
CVA	Cerebrovascular accident
DoH	Department of Health
eGFR	Estimated glomerular filtration rate
e-learning	electronic learning: learning through digital media
EMLA Cream	Eutectic Mixture of Local Anaesthetics
Embase	Medical bibliographic database run by the academic publisher, *Elsevier*
EMIS	Primary care computer system managed by *EMIS Health* (formerly Egton Medical Information Systems)
Emtree	Subject heading unique to Embase
EPS	Electronic Prescribing Service
ERIC	Education Resources Information Center - online library supported by US Department of Education

GI	Gastro-intestinal
GLP-1 Agonist	Class of diabetes medication: Glucagon-like peptide 1 agonist
GMC	General Medical Council
GP	General Practitioner (Family Medicine Physician)
HRA	Health Research Authority
HRT	Hormone Replacement Therapy
Ibu	Non-standard abbreviation used for ibuprofen
ICS	Inhaled Corticosteroid
INB	Abbreviation on prescription: If No Better
INR	International normalised ratio (blood test related to clotting time)
LABA	Long-Acting Beta Agonist (respiratory medication)
mcg	microgram
MEDLINE	Medical bibliographic database from the US National Library of Medicine
MeSH	Medical Subject Headings (in MEDLINE search)
MI	Myocardial Infarction
MME	Morphine milligram equivalent (dose calculation for morphine usage)
MR	Modified Release
MST	Brand of slow-release morphine sulphate
NHS	National Health Service
NICE	National Institute for Health and Care Excellence
NIHR	National Institute for Health and Care Research
NKDA	No Known Drug Allergies
NSAID	Non-steroidal anti-inflammatory drug
ON	Take one each night (prescription abbreviation from Latin *omni nocte*)
OSCE	Objective Structured Clinical Examination (assessment modality in clinical practice)
OTC	over-the-counter (medications)
Pcm	Non-standard abbreviation used for paracetamol
PCT	Primary Care Trust
PICO	Search strategy of 'Population, Intervention, Comparison, Outcome'

PIL	Patient Information Leaflet
PPI	Patient and Public Involvement or Proton Pump Inhibitor (depending on context)
PRACtICe Study	A Study Investigation the Prevalence and Causes of Prescribing Errors in General Practice
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
PRN	Take as needed (prescription abbreviation from Latin *pro re nata*)
PsychINFO	Abstract database related to psychology (American Psychological Association)
QDS	Take four times daily (prescription abbreviation from Latin *quarter die sumendus*)
RCGP	Royal College of General Practitioners
RCOG	Royal College of Obstetricians and Gynaecologists
RCT	Randomised Controlled Trial
REC	Research Ethics Committee
REVISiT Study	A Retrospective Review of Prescriptions issued by GPs-in-training (GP trainees)
RTP	Regional Training Provider (Provider of GP training for a region of Australia)
SGLT-2 Inhibitor	Class of diabetes medication: Sodium-glucose co-transporter-2 inhibitor
SABA	Short Acting Beta Agonist (respiratory medication)
SMART	Single Maintenance and Reliever Therapy (asthma treatment)
SPC	Summary of Product Characteristics
TB	Tuberculosis
TDS	Take three times daily (prescription abbreviation from Latin *ter die sumendus*)
U and E blood test	urea and electrolyte blood test (for renal function review)
URTI	Upper respiratory tract infection
UK	United Kingdom
UoN	University of Nottingham
USA	United States of America
UTI	Urinary tract infection

VTS	Vocational Training Scheme (provider of GP training in UK)
WHO	World Health Organisation
WPBA	Workplace-based-assessment

Chapter One: Introduction

The prescribing of medication is 'the most common patient-level intervention in the NHS.'[6] In 2021-22 there were 1.04 billion prescription items dispensed by primary care services in England alone.[7] This represents a 92% increase in prescribing activity since 2001-2 when the number dispensed was 550 million.[8] The PRACtICe study is the most comprehensive review of prescribing safety in English general practice to date.[9] This study reviewed more than 6000 prescription items from 1777 patients from 15 purposefully selected general practices across three different regions of England. Medication errors were found to occur at a rate of 5%, with one in 550 prescription items containing a severe error, such as prescribing an antibiotic to a patient with a documented allergic reaction to that antibiotic.[9] Although errors are not common, the total number of errors resulting from primary care prescribing is likely to be high because of the large number of prescription items generated. Extrapolation of PRACtICe study data would suggest that there may have been 52 million prescribing errors and 1.9 million severe errors associated with the prescription items dispensed in 2021-22.[7 9]

Elliott and colleagues undertook an analysis of the potential 'clinical and economic burden' associated with medication errors in England.[10] They estimated that across primary and secondary care, each year, adverse medication events were associated with between 712 and 1708 deaths, more than 180 000 bed-days in hospital, and had a cost of more than £98M.[10] It was also estimated that 38% of the medication error burden originated in primary care, which was responsible for 34% of the 'potentially clinically significant errors.' Elliot and colleagues caution that their estimate of cost was likely to be less than the actual economic burden of medication errors, as their investigation did not include the management of any long-term consequences.[10] Potential litigation costs were also not included.

Medication error is not limited to the English National Health Service. In their report, *Medication without Harm*, the World Health Organisation (WHO) commented that 'unsafe

medication practices and medication errors are a leading cause of avoidable harm in healthcare systems across the world.'[11] They estimated that the cost of the impact of medication errors is at least US$ 42 Billion annually,[11] and lament the unnecessary morbidity and mortality, which needlessly add to the burden of already overstretched healthcare systems. Indeed, the WHO made medication errors the focus of the 2022 *World Patient Safety Day*,[12] which had the aim of 'increasing public awareness and engagement, enhancing global understanding and working towards global solidarity and action by countries and partners to promote safety in healthcare.'[13]

Hodgkinson and colleagues concur with the WHO regarding the global importance of medication errors.[14] They conducted a systematic review and meta-analysis of 'medication harm across healthcare settings' and estimated that preventable harm from medication-related causes impacted one in 30 patients, with a quarter of this harm considered to be 'severe or life threatening.'[14]

Although safe prescribing is a global phenomenon, exploring the ways in which medication harm can be reduced requires careful investigation of local context. As part of the PRACtICe study, a root cause analysis was undertaken to explore the reasons why medication errors were occurring in general practice.[9] As would be expected, the reasons were multifactorial, and included systemic and environmental factors such as 'working conditions' and 'competing demands' as well as individual factors relating to prescriber knowledge and training.[9] GP trainees were highlighted as one of the cohort of prescribers who could benefit from additional support in prescribing safety.[9] Indeed, this group may not have experienced a systemic prescribing education as part of their medical school and junior doctor training.[15-18]

After the PRACtICe study had highlighted GP trainees as a specific prescriber cohort in need of further support with prescribing, focus groups were convened with GP trainees, GP trainers, pharmacists and members of the public to discuss ways of translating the findings

from the PRACtICe study, and also seeking further insight regarding GP trainees' experience of prescribing, and the training that they had received.[1]

GP trainees reported a feeling of unpreparedness with respect to prescribing. For example, one trainee commented 'before you start GP training…you've not prescribed any of these medicines before, you've probably not even heard of most of the medicines before, so you look through, I don't know, otitis externa and then you have no idea how to pick from any of these three pages of things. So you just pick one, do you know what I mean?'[1] Another trainee commented '…the first four months, you didn't know what the xxx you were doing because you were prescribing drugs you'd never heard of half the time.' When they started working in general practice, some trainees reported the lack of a formal induction with respect to a practice's prescribing system, also commenting on the fact that 'one practice could be very different to the next one.'[1] Trainees concurred with the literature regarding the lack of specific training they had received about safe prescribing practice during their actual GP training period. For example, one trainee contrasted the care with which she had meticulously practised skin biopsies when she was previously training to be a dermatologist, with the way in which GP trainees would just be expected to prescribe medication without specific training, which could potentially cause much more damage than could be caused by performing a skin biopsy.[1]

Due to the reported deficit in prescribing training, and the lack of confidence with respect to prescribing in primary care reported by GP trainees, a literature review was performed to explore the use of educational interventions to improve prescribing safety for this cohort of prescribers. Before reporting this review, it is important to place it in the wider context of key existing literature relating to safer prescribing interventions.

Consideration of interventions aimed at reducing prescribing errors

A recent systematic review of studies exploring prescribing error interventions in outpatient and ambulatory care settings found that 'Inadequate (prescriber) knowledge'[19] was a key contributing factor in error manifestation. It is likely that 'inadequate knowledge'[19] will be more of a feature for prescribers finding themselves in new clinical settings, such as GP trainees when they commence working in primary care.

Manias and colleagues conducted a systematic review of interventions aimed at reducing medication errors at in-patient medical and surgical settings.[20] Meta-analysis across 12 intervention types revealed positive findings with respect to approaches aimed at a systems level, such as alteration of computer processes, and also for those targeted to individual prescribers, such as education and pharmacist-led feedback.

Pharmacist-led educational interventions were the focus of a 2021 systematic review by Jaam and colleagues.[21] Ten of the 12 studies included in this review were able to demonstrate a significant reduction in prescribing errors as a result of practitioners undertaking an educational intervention. These interventions varied in intensity from a series of didactic lectures, to a more structured individualised feedback regime. The reviewers commented on the positive impact of individualised prescribing feedback.[21]

Several hospital-based studies have explored the impact of educational interventions on the prescribing behaviour of junior doctors.[22 23] Parker and colleagues investigated the use of 'pharmacist-led, video-stimulated feedback.'[22] Sixteen junior doctors based in the surgical assessment unit of a UK teaching hospital were video-recorded talking to a newly admitted patient about their medication history and discussing any additional medications that were going to be prescribed. The junior doctor then completed a medication chart, as they would do for any usual hospital admission, outlining the medication to be administered. The reviewing pharmacist watched the video recording, interrogated the patient notes, and

critiqued the medication card. The pharmacist then delivered a feedback tutorial to the junior doctor outlining any errors uncovered. The study team were able to demonstrate a reduction in prescribing errors on the unit from 19 errors per day before the intervention period to 11.7 errors per day after the intervention, which corresponded to a 38% decrease in prescribing errors ($p < 0.0001$).[22] The authors do not comment on the reported error rates beyond the immediate study period, although qualitative findings were very supportive of the authentic nature of the intervention, and its perceived utility. There was also no formal control group reported.

Gursanscky and colleagues undertook a small cluster randomised trial to ascertain the impact of 'targeted pharmacist-led feedback'[23] for junior doctors in the general medicine department of a tertiary hospital in Melbourne, Australia. Sixteen junior doctors took part in the study: four received pharmacist-led targeted feedback, four completed a one-hour e-learning module on safer prescribing, and eight doctors formed the control group, receiving no additional intervention.[23] The pharmacist-led feedback group received three 10-minute tutorials per week for four weeks. The tutorials discussed prescribing errors that had taken place recently in the general medical department, and were presented anonymously to the group. The group receiving pharmacist-led feedback experienced a significant reduction in prescribing errors from 0.58 errors per prescription pre-intervention to 0.37 errors per prescription post intervention ($p < 0.0001$).[23] In the same time period, the control groups prescribing error rate actually experienced a significant increase from 0.49 errors per prescription to 0.59 errors per prescription ($p < 0.0001$).[23] The group who undertook the e-learning package also experienced an increase in error rate from 0.58 errors per prescription to 0.63 errors per prescription, although this increase did not reach significance. Although this was a small study, the findings with respect to the role of targeted pharmacist-led feedback were encouraging, and the process evaluated well from the perspective of participants.[23]

A larger-scale controlled study involving prescribers in a hospital setting receiving feedback from pharmacists was undertaken by Lloyd and colleagues.[24] Seventy one of the seventy

seven participants were junior doctors (with the remaining participants being consultants or non-medical prescribers). Thirty-six prescribers were randomised to receive 'pharmacist-led, individualised constructive feedback'[24] on their prescribing data which had recently been reviewed over a five-day period. The 41 prescribers in the control group did not receive this feedback. Audit of prescribing activity immediately before the intervention, and three months following the intervention revealed a significant reduction in prescribing error rate for the intervention group (25% to 6.7% ($P < 0.05$)), and a significant increase in prescribing error rate for the control group (19.7% to 25.1% ($P < 0.05$)).[24]

Not all studies involving structured feedback have been able to demonstrate a reduction in prescribing errors. Reynolds and colleagues reviewed the prescribing of more than 70 junior doctors across two hospital sites in London.[25] Errors were identified by pharmacists as part of their routine ward visits, and fed back to prescribers after being discovered. Audit of this feedback process determined that a pharmacist had 'always attempted to contact the original prescriber and provide feedback in a professional manner'[25] 60% of the time, and had 'mostly'[25] attempted to do so in the remaining 40% of the time. Anonymised summaries of common errors were also sent to all participants in a weekly email. At the end of the study, there was an increase in the number of prescriptions which displayed the actual name of the junior doctor prescribing them (from about 10% to 50% of prescriptions).[25] The intervention also evaluated well from the perspective of junior doctors and pharmacist reviewers, with the former having a greater awareness of safer prescribing principles, and the latter having a greater awareness of the importance of appropriate feedback.[25]

Educational interventions seem to have utility for junior doctors (and indeed other prescribers) in hospital settings. Targeted feedback, or more intensive educational regimes were generally associated with more favourable outcomes.[21-24] It would now be prudent to perform a literature review to explore the use of educational interventions which have been used to improve the prescribing safety of GP trainees in the primary care setting. Although there are likely to be many transferable principles, there are clear differences between the primary and secondary care sector that could impact on the utility and effectiveness of an educational intervention.[1 26 27]

Literature review

A literature review was performed to ascertain details of interventions which had been undertaken with GP trainees in the primary care setting, in order to reduce medication error and improve prescribing safety. The review was informed by PRISMA (Preferred Reporting items for Systematic Reviews and Meta-Analysis) guidelines.[28] Funding restraints did not permit the involvement of an additional reviewer. A variety of search tools were employed, with search strategies adapted from the published literature on related topics.[29-32] MEDLINE, Embase, CINAHL and PsycINFO were searched using systematic approaches appropriate for the individual database. For example, appropriate *MeSH* headings and *Emtree* terms were employed for MEDLINE and Embase searches respectively. Searching was also extended to ERIC (Education Resources Information Center), the Cochrane database, and Google Scholar to include aspects of the Grey Literature. *Web of Science* cited reference searches were also undertaken from key source references, which also had their own reference list reviewed. One of the challenges of synthesising reviews relating to medical education is the range of intervention quality.[33 34] Such interventions are often limited in size and scope due to funding restraints. In the interests of not excluding potentially interesting and useful studies, an inclusive approach was adopted to the search strategy, which will be tempered by discussion of the quality of included interventions at the review stage. Inclusion and exclusion criteria are summarised in table one, and detailed search strategies are found in appendix one.

Table two frames the research question in the standard PICO format (population, Intervention, Comparison and outcome).[35] Initial scoping of the literature had suggested that comparator groups may not be a common feature of published work in this field, so a lack of comparator or control group was not used as an exclusion criterion for this review. Although alternative research framing tools are available, more comprehensive literature searching may be achieved by using the PICO approach.[35]

Table 1: Inclusion and exclusion criteria for literature review

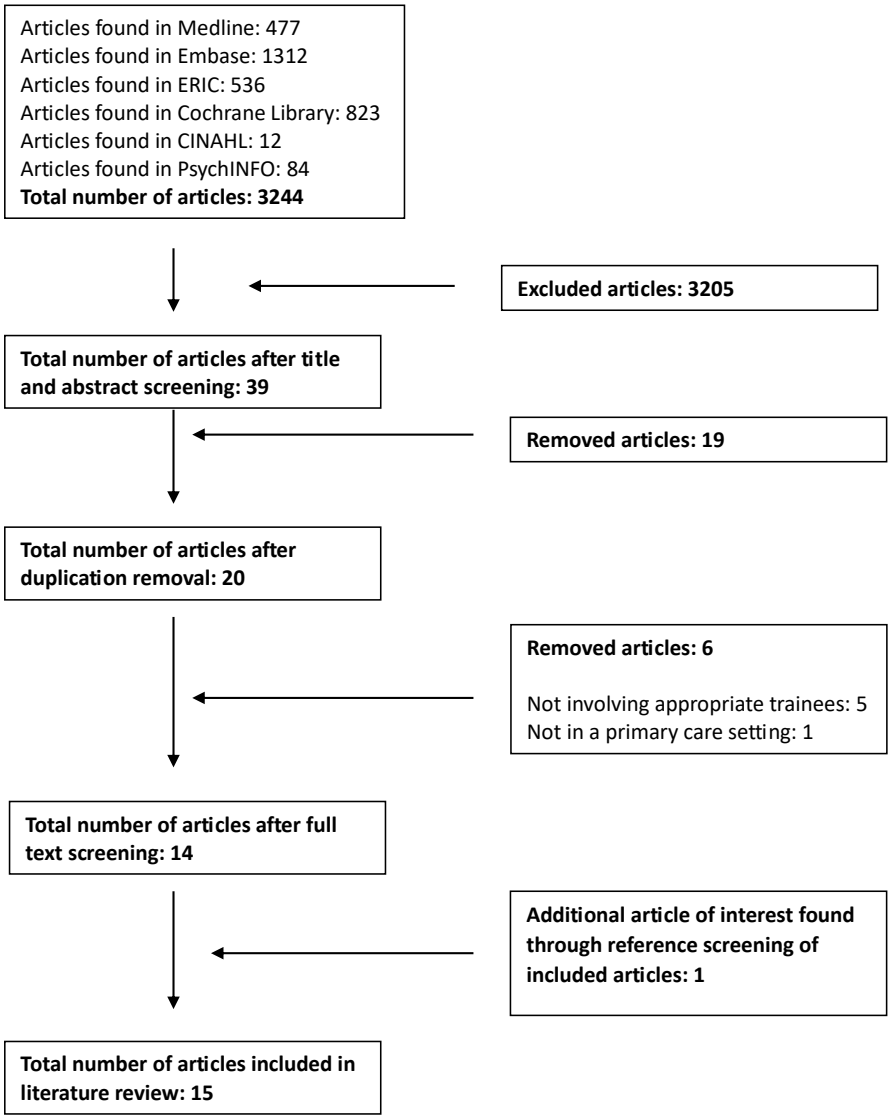
Inclusion criteria **Each of the below criteria must be met for inclusion in the literature review**		**Exclusion criteria** **If any of these criteria were met, the study was excluded from the literature review**
1	Taking place in a primary care setting.	Taking place in secondary care or an in-patient unit, or other non-primary care setting.
2	Involving GP trainees or doctors training to be GPs (or doctors training to be equivalent primary care physicians with different nomenclature e.g. family medicine physicians.)	Involving non-training-grade doctors, or doctors not training to be GPs (or equivalent primary care physicians).
3	An educational intervention which focused on, or included the aim of enhancing prescribing skills or prescribing safety.	Studies that did not include an educational intervention, or papers only reporting error rates or the importance of safe prescribing.
4	Written in English language.	Not written in English.
5	Published (or made available) between 1990 and May 2023.	Published (or made available) outside of the time frame 1990 to May 2023.

Table 2: Literature searching strategy relating to PICO framework

Review Title	The use of educational interventions to improve the prescribing of GP trainees
Population	GP trainees in a primary care setting
Intervention	Any educational intervention which focused on, or included the aim of enhancing prescribing skills or prescribing safety
Comparison	A comparable group of GP trainees not receiving the educational intervention (NB absence of a comparator group would not be used as an exclusion criterion for this literature review)
Outcome	Perceived or actual improvement in prescribing safety or competence

Searches were limited to material in the English language that was published or made available from 1990 to May 2023. A summary of search outputs can be found in figure one.

Figure 1: Summary of outputs from search strategy



Initial searches in MEDLINE revealed 477 titles, which underwent abstract screening limiting the results to 7. Full text screening limited the output from the MEDLINE search to five articles. Excluded articles had included material from secondary care, or interventions taking place in primary care which did not involve any junior doctors. Articles which focused on reporting error rates, or merely discussing the importance of prescribing errors, rather than exploring ways of reducing those errors, were excluded at abstract screening. Careful review of articles was necessary as many studies from the USA included a variety of junior doctors from different specialities, or family medicine trainees working exclusively at in-patient settings.

Similar searches in Embase revealed 1312 articles, which after abstract screening was reduced to 20. Articles which had previously been found through the MEDLINE search were also excluded at this point to avoid duplication. Full-text screening reduced the number of usable articles from the Embase search to nine. One additional article was found using the other search strategies detailed.

Summary of the included literature

A summary table of the included literature is displayed in appendix one.[36-50] Twelve of the reported interventions were from family practice clinics in the USA,[36-43 46 47 49 50] and the remaining three publications were from groups based in Australia.[44 45 48] Two of these publications were actually reporting on the same intervention: one focused on quantitative feedback,[44] and the other on qualitative findings.[45] Six publications were reported between 2021 and 2023:[36 38 40 43 46 47] one of these was from 2023,[43] and three were from 2022.[36 40 46] Seven publications were reported between 2002 and 2019,[37 39 41 42 44 45 50] one intervention was published in 1999[48] and one in 1994.[49]

Nine publications related to specific teaching sessions or programmes,[36-45] one intervention involved structured case discussions,[46] and the remaining four interventions had elements of individualised prescriber feedback.[47-50]

Interventions relating to teaching sessions or programmes

The interventions in this category were of varying quality, with some evaluating the impact of a short teaching session, and others considering a more comprehensive educational experience. Most had no control group in their intervention, and many relied on self-recruitment. Three interventions were aimed at reducing inappropriate prescription of proton pump inhibitors (PPIs),[36-38] one related to enhancing asthma management,[39] two interventions focused on enhancing diabetes management[40 41] and two related to opioid use.[42 43] Two papers reported on the same educational intervention to enhance antibiotic stewardship, with one reporting quantitative data, and the other qualitative data from a small number of participants involved in the study.[44 45] All of these interventions will now be discussed, starting with the three which looked at enhancing appropriate use of PPIs

Zhang and colleagues reported on the impact of engaging with a 10-minute presentation on 'evidence-based PPI deprescribing.'[36] All 46 GP trainees ('residents') based in one health centre in the USA watched the presentation, and completed questionnaires before and after the intervention. These demonstrated that trainees' immediate knowledge of PPI long-term use indications, patient assessment and side effects objectively improved after watching the presentation, as had trainees' perceived 'comfort' with the concept of PPI deprescribing.[36] Statistical significance for all of these improvements were not reported by the authors. Baseline PPI utilisation had been assessed for all patients at the health centre, and was found to have reduced from a time point immediately before the presentations, compared to a time point 3 months after the presentations.[36] A reduction in PPI prescribing of 13% was reported, but again, no significance was included. Importantly, there was no control group for this intervention, or reports of the levels of deprescribing that would be expected

in the clinic over a similar time period as a consequence of regular reviews that would have occurred.[36]

A similar educational activity was reported by Shahid and colleagues.[37] All residents at their primary care clinic received a training session regarding appropriate PPI usage, which was reinforced by the presence of posters in the building. Six months after the intervention period, they found that PPI usage had decreased by 4.6%: they also found that spending on PPIs had decreased by 38% over the same period.[37] Again, significance was not reported, and there was no control group. Shahid and colleagues did not report any trainee feedback data regarding the educational input, or what other instruction the trainees would have received about PPI usage.[37]

Lee and colleagues reported the impact of all the trainees in their clinic watching a 2.5-minute video on the appropriate use of PPIs; the trainees were also provided with an algorithm for appropriate PPI de-escalation.[38] In the week of the intervention, eight out of a possible 25 eligible patients received a trail of no PPI therapy. The group report the use of a proxy-control group, whose patients were age and sex-matched, with similar levels of comorbidities. This cohort's clinical records had been reviewed at an earlier point in the year. Only two of 51 eligible patients from the 'control' group had been given a PPI-free trial: this difference between 2/51 and 8/25 did not reach statistical significance.[38] No longer term follow-up data were reported, and it is questionable whether a 2.5 minute video would have a lasting impact on the prescribing behaviour of trainees.

Ables and colleagues report on a teaching programme undertaken at a family medicine clinic in the USA between July and October 1999, focused on up-skilling all their residents in appropriate asthma management.[39] Different modalities of 'formal' and 'informal' teaching were employed over the three month period with the aim of 'increasing residents' familiarity and comfort with' asthma guidelines and management protocols.[39] Patients with asthma who had been seen by residents in the six months after the education period had

their notes scrutinised for assessment of appropriate asthma management. These were compared with the notes of patients with asthma who had been seen by residents in the same period of the preceding year. One hundred and ninety-eight patient episodes were reviewed in the pre-intervention period, and 271 episodes were reviewed in the post-intervention period. The provision of appropriate medication had reduced from 100% compliance in correctly classified patients pre-intervention, to 76% post intervention. A greater proportion of patients were receiving appropriate asthma classification post-intervention, however, which could have impacted the perceived reduction in therapeutic quality. It is, however, important to reflect on the idea that providing teaching alone may not improve prescribing practice.

Of the two interventions which related to diabetes management, one was very focused,[40] and the other was broader in its approach.[41] Carson and colleagues wanted to improve family medicine residents' concordance with guidelines with respect to prescribing SGLT-2 inhibitors and GLP-1 agonists.[40] Residents at a single university practice underwent a 30-minute training session specifically targeted at the appropriate use of these medications. They then undertook consultations with patients who had been invited to the clinic to discuss their diabetes care, after being pre-screened by clinic staff as potentially benefiting from being prescribed SGLT-2 inhibitors or GLP-1 agonists. Eighteen out of the 51 patients who attended the appointment (18/51=35%) were started on the medication; no control data is available to be able to consider the significance of this figure.[40] Forty residents (40/46= 87%) stated that they were 'more likely' to prescribe the medication after receiving the educational intervention.[40] No long-term data were available beyond the immediate diabetes medication review appointment that was arranged. It would be useful to explore the longer-term impact of such an intervention, especially in a real-life clinical situation where patients had not been pre-screened and invited to attend a medication review appointment.

Spern-Hillen and colleagues recruited 341 primary care residents into a randomised trial involving a comprehensive diabetes education programme.[41] The intervention group

completed an interactive e-learning course featuring 18 different case-based scenarios focused around 'longitudinal patient encounters,'[41] and the control group received their training home programme's standard diabetes education. Participants then answered questions related to appropriate diabetes management of four simulated cases. Thirty two percent of those in the intervention group chose management options which would have resulted in all simulated patients achieving optimal glucose, lipid and blood pressure control, compared to only 9% of the control group.[41] Thirty four percent of the control group achieved more than 50% in a diabetes knowledge assessment, compared to 71% in the intervention group. Self-reported confidence with diabetes management was at an average level of 79.4% in the intervention group, compared with 43.9% in the control group. This result achieved statistical significance ($p < 0.001$).[41] No actual prescribing or patient outcome data was reported, but the authors note that in a small RCT involving 57 primary care physicians, the intervention group were less likely to prescribe metformin in the presence of renal impairment ($p=0.03$), and to have patients with slightly better glycaemic control ($p=0.04$).[51] Although longer-term data would be beneficial, and actual practice change would be useful to see in the trainee group, the use of a more structured educational intervention is likely to be more beneficial than a one-off short video presentation.

A structured approach was offered by Magin and colleagues, with the aim of enhancing GP trainees' antibiotic stewardship.[44] They recruited 90 GP trainees, who were based in two of Australia's 19 'Regional Training Providers' (RPT).[44] They also recruited 90 trainers from one of the RPTs. The group commented on the desire to include trainers in the study, based on their previous work in this field, which had emphasised the importance of role-modelling and the 'apprenticeship-style' relationship that exists between trainee and trainer.[44] Both trainees and trainers completed two e-learning modules: one focused on evidence-based clinical management of infection, and the other outlined best practice in clinical communication skills to enhance consultations involving antibiotic prescribing choices. Both parties then attended bespoke 90-minute workshops focused on strategies for translating guidelines to clinical practice in primary care. The trainers' workshop also included material focused around supporting their trainees develop better prescribing practice. Before the

intervention, all participants reviewed a series of 8 clinical scenarios for which they had to document their proposed management plan. Six of the scenarios related to situations where it would not be appropriate to prescribe antibiotics, and two scenarios related to situations where antibiotic prescribing would be indicated.[44] After the intervention, there were statistically significant reductions in trainees' intentions to prescribe antibiotics in four out of the six scenarios, with absolute reductions ranging from 12% to 24%. In the remaining two scenarios, there was a very low prevalence of pre-intervention intentions to prescribe (1.3% and 8%), and so, although there was indeed a reduction in reported prescribing intention, it would be difficult to achieve statistical significance with such a low pre-intervention score.[44]

Semi-structured interviews with seven of the trainees and seven of the trainers revealed that the intervention was positively received, with trainees believing it had 'improved their confidence in non-prescribing' and positively impacted their prescribing behaviour.[45] No actual prescribing data were reported, however, and the authors note that participant intention to prescribe antibiotics was 'considerably less' than actual documented prevalence of antibiotic prescribing among GP trainees in Australia.[45] For example, the pre-intervention intention to prescribe for the 'upper respiratory tract infection' scenario was 1.3%; the documented level of prescribing for similar scenarios among GP trainees was 21.6%.[44] This could be reflective of the cohort of clinicians recruited to the study, or also the gap between intended and actual practice.

Two studies concentrated on trainees' prescribing of opioid medication. One had a single component to the intervention,[42] and the other was multi-nodal in its approach.[43] Soran and colleagues reported on the impact of 14 first-year primary care residents individually attending a multidisciplinary pain clinic which aimed to deliver a 'patient-centred approach to the management of chronic pain.'[42] Residents saw patients alongside clinic physicians, and were also given the opportunity to present patients to the team. Before attending the clinic, the residents self-assessed their confidence with managing aspects of care that would be seen in the clinic; they completed the same self-assessment rating after attending the

clinic.[42] A Likert scale of one to five was used, with one indicating 'not confident' and five indicating 'very confident'. Self-reported confidence increased after taking part in the clinic for 'safely prescribing opioids' (2.5 to 3.4), 'recognising and managing concerning behaviours in patients on chronic opioid therapy' (2.5 to 3.5) and 'creating a treatment plan for chronic pain' (2.8 to 3.2).[42] Statistical significance levels were not reported for these values. Although attending such a clinic would probably be a valuable learning experience, no follow-up data were reported beyond immediately after attending the clinic, and no reports of actual practice change were reviewed. All primary care residents would rotate through the clinic at some stage in their training, but the data were limited to those attending the clinic in the first half of one year. No data were available to compare these residents to the remainder of the cohort, and there were no control data reported for the intervention.[42]

Ofei-Dodoo and colleagues reported on the impact of a 'multiactivity educational programme', which was designed to enhance residents' confidence in the safe prescribing of opioids.[43] After taking part in a 3-month formal teaching programme, residents took part in a two-station Objective Structured Clinical Examination (OSCE), after which they received formal debriefing. At three time points, residents were surveyed to ascertain their 'perceived level of comfort assessing and managing patients on opioids', their knowledge regarding 'best practices and guidelines for safe opioid prescribing' and their 'perceived concerns regarding prescribing controlled substances for chronic non-cancer pain.'[43] The survey time points were at baseline (before commencement of the formal teaching programme), 3 months (after completion of the OSCE), and six months after this point (9 months after completion of the first survey).[43]

The authors had used a validated self-reporting comfort scale, which would give residents a score of between 7 and 35: higher scores indicated greater comfort assessing and managing patients. There was a significant increase in reported comfort levels between baseline and 9 months (+5.10/35, $p<0.001$).[43] For perceived knowledge, the authors developed an 8-item questionnaire, from which residents were able to achieve a score of between 0 and 40.

Residents would answer questions such as how commonly they followed specific protocols when prescribing certain drugs. There was a significant increase in knowledge perception between baseline and 9 months (+4.9/40, $p<0.001$).[43] For the concern rating, the authors adapted a previously validated questionnaire, where residents would report their perceived concerns with 11 predefined scenarios (for example, a situation involving 'angry and demanding patients'), to produce a score between 0 and 44.[43] Again, the intervention was well received from this perspective: a significant reduction in perceived concern rating was recorded between baseline and 9 months (-5.28; $p<0.001$).[43]

Ofei-Dodoo and colleagues did indeed deliver a comprehensive educational package, which was well received by residents, even six months after the intervention had occurred.[43] However, no actual prescribing data were recorded, and there was no control group for the intervention. It is also notable that the team used self-reported perception of practice as a proxy for 'knowledge' rather than a more objective measure, although using the same opioid-related knowledge test could be problematic over a repeated time period. There was also no documentation regarding other influences on residents' prescribing that had occurred during the study period, and the effect of recall bias should also be considered, especially for self-reports of particular guideline usage.

An intervention focused around structured case discussions

Enhancing the safety and effectiveness of opioid prescribing was also the aim of Aquino and colleagues' study.[46] Over the course of a three-year period, 32 residents attended between one and three structured discussion sessions regarding opioid prescribing. These sessions were attended by up to three residents and three pharmacy students, along with a physician and pharmacy faculty member; social work students and medical students were also sometimes in attendance.[46] Patients were referred to case discussion meetings at the request of their primary care physician (usually a resident), or if their 'average monthly morphine milligram equivalent dose' (MME dosage) was deemed to be 'high'. At the end of

the discussion meeting, the resident in charge of a particular patient's care would receive written recommendations regarding best practice care for their patient.[46]

After the intervention period, the study team retrospectively reviewed the medical records of all patients seen during the three-year period who had been prescribed opioid medication. In doing so, they reviewed the care of 53 patients (an additional five patients being excluded from the review due to incomplete data).[46] They were able to assess whether physicians had followed recommendations that had been made in the structured discussion sessions. One hundred and seventy-two of the recommendations related to medication. Fifty-two of these recommendations had been followed through to fruition (52/172 = 30%).[46] As a comparison, where the recommendation had related to 'follow-up' (such as screening for depression or sleep apnoea), this had been followed through in 39 out of 51 instances (76% of the time.) The authors were also able to discern a slight decrease in the average MME dosage of all patients from 147.75 at the beginning of the study period to 133.05 at the end of the study period ($p=0.035$).[46] Reassuringly, where residents had followed recommendations for practice, this correlated with a resultant decrease in MME ($p=0.004$ for the total number of recommendations followed and $p= 0.013$ for the proportion of recommendations followed.)[46]

Seven of the 32 residents took part in semi-structured interviews to ascertain feedback regarding the intervention. All seven reported that it had been an 'effective use of [their] time,'[46] which had positively impacted patient care. Their prior experience of opioid-related education had mainly been lecture format, so they welcomed the chance for discussion that the 'peer-to-peer' sessions had provided. There was particular mention of the pharmacists and pharmacy students, who were able to add value to the sessions in such ways as 'suggesting specific dosages or medication substitutes.'[46]

Although there were suggestions of positive practice change, the intervention again lacked a control group. The authors themselves describe the reduction in average MME dosage as

'modest.'[46] It is possible that such a reduction would be expected through standard review processes that would have taken place over the three years. Also, there was no longer-term follow-up beyond the immediate post-intervention period, so any change in practice might not be sustained in the absence of peer-to-peer review sessions. The qualitative feedback, although positive, was obtained from a minority of responders who had self-selected; it is possible that more varied feedback would have been obtained if all participants had taken part in the process.

Interventions involving systematic prescriber feedback

Four of the interventions found in the literature review explored the value of providing individualised prescriber feedback as a means of executing practice change.[47-50] Two of the interventions were focused on antibiotic prescribing,[47 48] and the other two covered general prescribing behaviour.[49 50] The antibiotic studies will be discussed first, before moving to the ones examining general prescribing.

Westerhof and colleagues performed a detailed review of the antibiotic prescribing patterns of 30 family medicine residents based in a single clinic in Michigan, USA.[47] They then fed this data back to residents at an educational meeting run by a pharmacist and infectious diseases physician. Residents were also provided with a 'pocket guide' outlining evidence-based prescribing guidance. For the six months following this session, a primary care pharmacist reviewed all the antibiotic prescriptions issued by the residents, who received a summary of this individualised feedback every two weeks through email.[47] As well as highlighting areas for improvement, the feedback also commented on aspects of good practice that the residents had employed such as 'utilising watch-and-wait prior to prescribing an antibiotic'.[47]

Pooled data for the six-month period after the intervention was compared with the pre-intervention baseline prescribing data. Antibiotics were issued in a way that was fully compatible with guidelines at a rate of 38.9% pre-intervention. There was a significant increase in guideline concordant practice after the intervention (57% concordance, p=0.001).[47] This included changing behaviours on the prescribing of first line antibiotics, and appropriate duration of therapy.[47] Although these are positive findings, there was no control group to compare practice concordance with, and it is difficult to discern the impact of the initial prescribing feedback alone, in comparison with the continual individualised feedback over the six-month period. It would be interesting to provide a further audit of prescribing after the intervention period to ascertain if practice changes were embedded.

Zwar and colleagues conducted a randomised controlled trial involving 157 GP trainees in New South Wales, Australia. All participants were told that the purpose of the study was to 'examine methods of improving common general practice conditions.'[48] The control group received an educational intervention regarding the use of benzodiazepines, and were not informed of the antibiotic focus of the study. Both groups had a detailed review of practice at 3 time points, six months apart, which involved reviewing the prescribing data relating to antibiotic use in 110 sequential patients encounters.[48] Those in the intervention group had a review of their antibiotic prescribing data sent to them after the first review of practice. Six months later, if these trainees were still prescribing in a way that significantly deviated from gold standard, they received a practice visit from an experienced GP educator who would explore any 'barriers' that the trainee was experiencing that were preventing a change in prescribing behaviour.[48]

The final practice survey, which was one year after the initial survey, permitted comparison of prescribing data between the intervention and control groups. The former group were indeed prescribing significantly fewer antibiotics for encounters where the diagnosis was an upper respiratory tract infection (p=0.002).[48] The mean rate of prescribing for this indication was 19.7% in the intervention group (n= 78; range 16.0-23.4), and 31.7% in the control

group (n=79; range 27.4-36.0). This compared with a baseline prescribing rate of 25.0% in the intervention group (range 21.7-28.3) and 22.0% in the control group (range 18.1-28.3): so over the intervention period, the control group actually increased their prescribing rate for this indication, while the intervention group's prescribing rate declined.[48] The authors also reviewed GP trainees' diagnostic rates, in order to ensure that participants were not merely changing their diagnoses in order to hide inappropriate practice. There was, however, a decline in the total number of antibiotic prescriptions for all indications across both the intervention and control groups, with the intervention group showing a greater decline in overall mean prescribing rates. The intervention group's prescribing rate declined from 18.2% to 15.8%; the control group's prescribing rate declined from 17.9% to 17.1%. The greater decline in the prescribing rate seen in the intervention group was described by the authors as 'approaching significance' (p=0.08).[48]

The results of this 'intensive educational intervention'[48] are encouraging, especially given the long follow-up period, but the study was not without its limitations. GP trainees were self-selected, and there was also no discussion of the difficulties of maintaining appropriate participant blinding throughout the study period. The authors also discuss the difficulty of managing data when not every participant prescribed antibiotics for all the review items they were planning to provide feedback on. For example, more than 30% of the GP trainees at each survey point had no consultation relating to tonsilitis, even though 110 presentations were reviewed on each occasion.[48]

The final two interventions described in the literature review offered a more general review of GP trainee prescribing.[49 50] Shaughnessy and D'Amico report on the impact of 12 residents in a primary care clinic receiving individualised prescribing feedback over a 2 year period.[49] On a weekly basis, all prescriptions that had been issued by residents were reviewed by a clinical pharmacist to determine if 'prescription-writing errors' had been made.[49] Areas for scrutiny by the pharmacist included the dosage of medication, directions given regarding the medication's use, appropriate quantities prescribed, whether the

prescription contained inappropriate 'omissions' and if there were 'unfulfilled legal requirements.'[49]

As the study took place in the era of paper prescriptions, review was facilitated by using carbon-copy prescriptions, which were filed centrally when the top copy of the prescription was given to the patient for redemption at the pharmacy. The pharmacist reviewed all of the centrally-filed prescriptions on a weekly basis, returning the paper copy to the resident with details of any prescribing errors, and a 'brief note', which provided 'suggestions for how the prescriptions should have been written, and also gave an explanation of why the error [was] important.'[49] Residents received feedback within 10 days of having written a prescription, which also included 'hints and comments', and aspects of positive feedback including the comment 'No Errors!' where appropriate.[49]

Over the course of two years, 4 540 prescriptions were reviewed. The residents had a baseline prescription error rate of 14.4%. Over the course of the two-year period, this decreased to 6.0% (p=0.0002).[49] Although this is a positive result, there was no control group. Residents underwent this feedback process during the first two years of their residency: it would be interesting to ascertain the impact of other aspects of residency training and experience that prescribers would naturally undertake at this time.

Winder and colleagues reported on a 'pharmacist-led educational and error notification intervention' involving 24 family medicine residents at a clinic in Oklahoma, USA.[50] During the summer of 2011, a primary care pharmacist conducted a detailed retrospective review of prescriptions issued by the residents during the month of March. Prescribing errors were reported where it was determined that there had been 'the use of drugs or doses inappropriate for the individual patient' or a 'failure to communicate essential information' or a 'transcription error.'[50] This initial prescribing audit served as a baseline error description for the intervention, and was also used in the first stage of the intervention itself: an interactive teaching session exploring common errors that had just been uncovered, along with general training on best practice guidelines.[50]

For the three months immediately following the teaching session, residents had all their prescriptions scrutinised by the pharmacist on a daily basis.[50] The residents received daily notifications from the pharmacist through the e-prescribing system, which outlined details of any errors, along with 'recommendations for how to correct the error, and an offer of assistance from clinical pharmacists.'[50] Depending on the severity of the error, verbal feedback was also provided to the residents.[50]

In addition to the individualised feedback, a weekly newsletter was also emailed to all participants, outlining 'common errors' that had been identified that week, along with recommendations for best practice.[50] The newsletters also included reminders from the initial training event, and contact details for the clinical pharmacy team.[50]

After the 3-month intervention period was completed, a detailed prescribing error assessment was completed for the residents. This took place one year following the pre-intervention baseline assessment (so that prescribing from a similar period of the year could be compared). There was a significant decline in error rate from 20.9% pre-intervention to 14.9% post intervention ($p=0.002$).[50]

Although there was not a formalised control group in the study, the authors reported that 14 of the 24 residents participated in the educational intervention (but all 24 had prescribing scrutinised at the pre and post intervention points).[50] Further analysis of the pre and post intervention error rates dividing the cohorts into the 14 that did take part in the educational intervention and the 10 that did not, showed that both groups saw a decline in error rate between the two time points. The former showed a decline from 19.5% to 12.4%, and the latter from 22.8% to 18.5%.[50] Although the decline was greater in the intervention group, the difference did not reach statistical significance. However, when different types of prescriptions were analysed, there was a significant difference in the prescribing error rate for prescriptions involving children: residents who had engaged with the educational

intervention had an error rate that was 36% lower than those that had not, for this cohort of patients (p=0.01).[50]

With all the participants being in one family medicine clinic, and part of the intervention involving weekly emails with details of prescribing errors, it is difficult to imagine that there would not have been communication between the two groups of prescribers. The study would have benefitted from a formalised control group to mitigate for the effects of other aspects of training, or simply the gaining of experience in the family medicine clinic.

Summary of the literature review

A literature review was performed to explore the current use of educational interventions to improve the prescribing of GP trainees in the primary care setting. Although the review was conducted using PRISMA principles, it would have benefitted from the involvement of a second reviewer.[28] Published literature searches were utilised, but the formal involvement of a specialist librarian may also have improved the quality of the review.[28] The review did not include articles that were written in a language other than English, which could have limited the scope of results.[28]

However, the review uncovered important findings with respect to the available literature. Most of the interventions reviewed were small-scale and limited in scope, with many focusing on exploring the impact of a specific teaching session or clinical experience. In late 2023, Naseralallah and colleagues published a systematic review of interventions to reduce prescribing errors in the outpatient and ambulatory care setting.[19] Naseralallah and colleagues also commented that studies involving interventions to reduce prescribing error 'were of poor quality and none used a randomized design'.[19]

In common with findings from complementary literature reviews,[19 21] the review reported in this dissertation found that more meaningful changes in practice were apparent with a more comprehensive approach to prescriber education, or the delivery of personalised feedback. It is, however, clear from the literature review that there is a need for more robust studies exploring prescribing safety interventions for GP trainees.

Considering an educational intervention for GP trainees to enhance prescribing safety

Cantillon and Jones conducted a systematic review to explore whether 'continuing medical education' is beneficial in general practice as a whole.[52] The most effective methods seemed to be 'linked to clinical practice', involved 'interactive educational meetings' and employed 'multiple educational interventions.'[52] The use of 'lectures' and 'unsolicited printed material' were found to be least effective.[52] Appropriate use of significant event audits was found to be beneficial, as was the use of 'pre-planned and personalised feedback.'[52] This contrasted with employing 'unsolicited and non-personalised' feedback, which was largely ineffective.[52]

Although not designed to give individual prescriber-feedback, part of the process of the PRACtICe study involved feeding back prescription error data to individual practice teams. This allowed detailed discussions to facilitate root cause analysis. For example, a prescription error was discussed relating to a co-amoxiclav prescription which had been issued without adequate dosing instructions. A GP from that practice was surprised that such an error had occurred, as they were under the impression that their computer system would have prevented the generation of such a prescription. Actually seeing that the computer system they were using had produced a prescription of this kind, would logically be more likely to induce a practice change than receiving generic feedback regarding the possibility that computer systems may permit errors of this type.

GP trainees from the post-PRACtICe study focus group sessions were asked about their feelings regarding being provided with personalised feedback regarding their own prescribing.[1] Specifically, they were asked about the concept of a specially trained pharmacist reviewing a series of prescriptions to highlight prescribing errors and areas for improvement. Participants were cautiously supportive of such an intervention, if it was conducted in an appropriate manner. For example, one participant commented that they thought it would be 'very informative' but probably 'quite worrying' to have mistakes highlighted to them.[1] Another trainee commented on the utility of such an intervention as they were 'sure quite a lot of the errors that [GP trainees] make are never picked up by anybody.'[1] Another trainee commented on the value of having such an intervention in their final year of training when they are not subject to detailed de-briefs as they were in previous years: 'trainers will just say 'oh tell me if you've got a problem' or you won't know that your particular prescribing was an error or was a problem and therefore you'll never get that picked up.'[1] Another trainee discussed the value of their trainer giving them some detailed prescribing reviews when they migrated from 15-minute to 10-minute consultations: they were surprised that prescribing errors uncovered were in drugs they were very familiar with prescribing, but had started to take less care with because of the reduction in consultation time that was being undertaken: 'The errors didn't come from where I wasn't sure about the drug, that was the thing that I looked up most. The errors came from when I was really happy about the drug and I just 'oh, just have some brufen' you know, like and that's where the errors came.'[1] GP trainees were very clear that any review of prescribing should be an educational experience and not a 'punitive exercise' or be associated with 'hand slapping'.[1]

As already discussed, several recent studies based in secondary care settings have explored the utility of pharmacists giving personalised feedback to junior doctors.[22 53-56] Such interventions have generally been well received.

Weallans and colleagues recently conducted a systematic review of effective feedback use in postgraduate medical education.[57] They reviewed 51 studies, and as a conclusion

presented 'common principles of effective and ineffective feedback in clinical supervision':[57] which correspond well with other summary data presented in the medical education literature.[58-61] Weallans and colleagues' common principle summary is shown in table three.

Table 3: Common principles of effective and ineffective feedback in clinical supervision[57]

Effective feedback is:	***Ineffective feedback is:***
Given in the context of an educational alliance	*Delivered in a disrespectful or threatening manner*
Specific	*Making generalisations*
Based on first-hand observations	*Focused on hearsay or inference*
Focused on behaviour	*Focused on personality*
Descriptive in language	*Judgmental or evaluative language*
Stating what was done well and areas for improvement	*Only focused on positive or negative aspects*
Provided as actionable amounts of information	*Excessive or scarce in the amount of information*
Provided in a timely manner after performance	*Provided in an untimely manner*
Seeking the supervisee's self-assessment first	*Not eliciting the supervisee's self-assessment*
Providing suggestions for improvement	*Not providing suggestions for improvement*
Exploring the supervisee's view of feedback	*Assuming the supervisee's view of feedback*
Developing an action plan for improvement	*Not linked to an action plan for future action*

When developing a review of prescribing for GP trainees, it would be important to take these feedback principles into account when planning the way in which prescribing data would be fed back to GP trainees. Although an appropriately powered, randomised controlled trial of a prescribing review process could provide definitive data regarding its utility, the first stage in complex intervention evaluation is to assess the 'feasibility and acceptability' of such an intervention.[62]

Planning the REVISiT intervention

To explore the 'feasibility and acceptability'[62] of GP trainees receiving personalised prescribing feedback, it was decided that 10 GP trainees would have 100 sequential prescription item reviewed by a pharmacist. Feedback would then be delivered to the trainees in keeping with best practice principles.

After consultation in the research group, the figure of 100 was chosen as a pragmatic and achievable medication review number. It is similar to the average number of prescription items that were reviewed for each trainee in Winder and colleagues' 'pharmacist-led educational and error notification intervention' (n=114).[50] Zwar and colleagues had reviewed '110 consecutive patient encounters'[48] for their antibiotic-focused prescribing-feedback study: although the number of prescription items they reviewed at each stage was actually less than this, as not every 'patient encounter' contained a prescription.[48] As well as providing individualised feedback regarding the 10 trainees' prescribing, all data collected could be pooled to describe the prescribing pattern and error profile of the recruited cohort.

Although the trainee would be the practitioner undergoing a prescribing review, their trainer would also be recruited to the study to facilitate achievement of feedback regarding the utility and feasibility of the process. Such recruitment takes into consideration the pivotal role that GP trainers play in educating trainees.[44 63 64]

To gain meaningful feedback about the review process, semi-structured interviews would be performed with both the GP trainee and their trainer. This method permits the exploration of 'thoughts, feelings and beliefs' and also permits a researcher to 'delve deeply into personal and sometimes sensitive issues.'[65] It would therefore be a useful tool to gain meaningful feedback regarding the review process: permitting the adaptation of questions to the individual prescriber (or their supervisor). Participants would be interviewed

immediately following the feedback tutorial, and then again one to three months later, to ascertain reports of any practice change.

Recruiting 10 GP trainers and 10 GP trainees was a pragmatic decision based around what would be feasible to achieve with the resources available, and what had been able to be achieved in other studies. Deckx and colleagues were able to achieve data saturation for evaluation of their antibiotic prescribing intervention, after the recruitment of seven GP trainees and trainers.[45]

As the review pharmacist would have to perform a detailed review of many consultations to be able to review 100 sequential prescription items, the team were keen to explore what other aspects of prescribing practice could be reviewed at the same time. This included where trainees had made any recommendations that their patients obtain 'over the counter' (OTC) medication (rather than prescribing that item), and when they had conducted a medication review during a consultation, but did not actually issue the medication or medications that were reviewed.

In 2018, NHS England published definitive guidance for Clinical Commissioning Groups (CCGs) regarding the need for primary care teams to not prescribe medications that their patients could obtain themselves 'over the counter' in pharmacies or other settings.[66] CCGs had already been encouraging GPs into this practise, and the 'Pharmacy First' scheme had been operational in several areas of the UK.[67] OTC medications still have the potential to cause harm.[68] Where GP trainees had made recommendations that their patients should obtain OTC medications, the review pharmacist would scrutinise this recommendation in the same way that actual prescribed items would be scrutinised.

The process of 'repeat prescribing', whereby a patient can request items of regularly-used medication without having to receive a clinical review at each request, was an area of concern for several of the GP trainees in the post-PRACtICe study focus groups.[1] The safety

of the repeat prescribing process relies upon clinicians conducting appropriately robust medication reviews. This is increasingly challenging in an age of multimorbidity and polypharmacy.[69] To maximise the educational potential of the REVISiT intervention, where the study pharmacist reviewed a consultation containing a 'medication review', the items reviewed would be scrutinised to the same level as if they had been prescribed.

Summary

This chapter has discussed the concept of medication error, and the need for healthcare providers to reduce medication error rates. GP trainees were highlighted as a particular cohort of prescribers who may benefit from additional support to reduce their prescribing error rates. The literature was reviewed to explore educational interventions which had been used to enhance safer prescribing by GP trainees. There was limited evidence to inform the best way of enhancing prescribing safety in this group, but appropriate use of personalised feedback was an approach with potential. The REVISiT intervention was summarised, whereby a cohort of 10 GP trainees would have 100 sequential prescription items reviewed by a pharmacist. Aspects of prescribing concern would be fed back to the GP trainees, who would be interviewed to ascertain the impact of the intervention. GP trainers would also be recruited to the study, to enhance the feedback process, and to gain further insight regarding the feasibility and utility of the intervention. The next chapter will describe the process of the REVISiT intervention in detail.

Chapter Two: Methods

This chapter will begin by describing the aims of the study and the intended study outcomes. The means by which the outcomes were to be achieved will then be described, with rationale for why the methodology was used. The actual methods employed will then be outlined.

Study aim

The aim of the study is to work towards identifying whether a pharmacist-led review of a series of prescription items issued by GP trainees during or nearing their final year of training is an effective means of improving prescribing safety for this cohort of prescribers.

Primary Objective

To assess the feasibility and value of undertaking a pharmacist-led review of a series of one hundred prescription items issued by GP trainees during or nearing their final year of training.

Secondary Objectives

1. To describe the prevalence of prescribing errors and suboptimal prescribing in a cohort of GP trainees during or nearing their final year of training.
2. To evaluate the use of medication reviews by a cohort of GP trainees during or nearing their final year of training.

3. To evaluate the use of over-the-counter medication recommendations by a cohort of GP trainees during or nearing their final year of training.
4. To identify gaps in knowledge, skills and attitudes with respect to safer prescribing in a cohort of GP trainees during or nearing their final year of training.
5. To provide information on the learning needs of GP trainees that can be fed into the development of educational resources to enhance prescribing safety (such as e-learning materials).
6. To explore the views of GP trainees on the utility of having a pharmacist-led review of a series of 100 of their prescription items, followed by a tutorial and report outlining the review.
7. To explore the views of GP trainers responsible for the GP trainees involved in the study, with respect to the utility and value of the exercise.
8. To provide sufficient information to allow for a successful bid to evaluate a larger intervention study based on prescribing review.

Study Configuration and design

The study comprised a single-centre pilot project. A clinical pharmacist reviewed one hundred sequential prescription items issued by ten GPs trainees at or near their final year of training. A report was prepared detailing the review of prescription items, which was fed back to the GP trainee and their trainer at a designated tutorial. GP trainees and their trainers were interviewed regarding the intervention shortly after taking part in the feedback tutorial, and then one to three months following this tutorial.

The study employed mixed methodology. Descriptive statistics were used to interrogate the prescribing data at the level of an individual prescriber, with prescribing data also being pooled for all ten prescribers. Qualitative methods were required to analyse participant interviews.

The review of prescribing data was performed by the pharmacist in such a way that the GP trainee and their trainer would be able to identify individual cases, so that corrective action could take place if necessary, and that specific learning could be derived from the review. However, only non-identifiable data left the practice for the creation of individualised reports and pooling of data for analysis.

The act of a pharmacist reviewing prescribing data could be in keeping with the routine audit work of a practice pharmacist.[70] However, a pharmacist entering the practice in a research capacity to both provide feedback to an individual prescriber and to collect pooled prescribing data, would not be in keeping with this work. Patient consent would therefore normally have to be obtained in order for records to be accessed, otherwise this would be in breach of the common-law duty of confidentiality.[71] The study team and I were embedded in the Medicines Safety and Effective Healthcare Research group in the University of Nottingham. This research group had experience of detailed prescribing review, such as was required for the PRACtICe study.[9] There was concern regarding the practicalities of obtaining individual consent and also the detriment to patient safety that may arise as a result of only being able to partially complete a prescribing audit of an individual's prescribing. It was therefore decided to apply to the national Confidentiality Advisory Group (CAG) so that patient records could be accessed by the pharmacist conducting the review without obtaining individual consent from each of the patients whose records were being accessed. The CAG are able to make recommendations to the Health Research Authority (HRA) regarding research projects that require access to healthcare records without individual patient consent.[72] This is through enacting Section 251 of the National Health Service Act 2006, which permits 'the common law duty of confidentiality to be set aside for defined purposes where it is not possible to use anonymised information and where seeking consent is not practicable.'[71]

Study Title

The study was given the title of 'The REVISiT study': a **R**etrospective r**ev**iew of Prescription items **ISs**ued by GPs **i**n **T**raining. At the time of the study, doctors training to be GPs were commonly referred to in England as 'GP (Associates) in training.' Currently, their nomenclature is 'GP trainees',[73] and they will be thus referred for the remainder of the report. Within the medical community, they are also known as 'registrars', and they are sometimes identified by such terminology in quotations within the qualitative section of this report

Study team

A multidisciplinary study team was assembled from members of the University of Nottingham's Medicine Safety and Effective Healthcare Research Group. Members of the team are outlined in Table four, and included researchers, GPs, pharmacists, specialist pharmacist advisors, a statistician, a GP trainer advisor and a PPI member. The study team met monthly with meetings chaired by RK. Core members of the team (RK, NS, KM, GG) met frequently between the main monthly study meetings to ensure appropriate progression of the study.

Table 4: Members of the study team

Member	Initial	Affiliation (during study period)	Role
Professor Anthony Avery	AA	UoN	Designated Principal Investigator (DM supervisor for RK)
Dr Richard Knox	RK	UoN	Leader of study team
Dr Ndeshi Salema	NS	UoN	Study researcher (pharmacist)
Ms Kate Marsden	KM	UoN	Study researcher
Mrs Gill Gookey	GG	NHS Rushcliffe PCT	Study pharmacist
Dr Brian Bell	BB	UoN	Study researcher (quantitative)
Mr Rajnikant Mehta	RM	UoN	Study statistician
Mrs Mindy Bassi	MB	NHS Nottingham PCT	Pharmacy Advisor
Mr Glen Swanwick	GS	UoN	PPI
Dr Nick Silcock	NSi	Wollaton Park Medical Practice, Nottingham	GP trainer advisor
Ms Rosie Hunt	RH	UoN	Study Administrator

Funding

The study received funding from the NHS Nottingham City Primary Care Trust (PCT) Flexibility and Sustainability process, and was also supported by the NIHR Greater Manchester Patient Safety Translational Research Centre. Confirmation of funding from NHS Nottingham City PCT is shown in appendix two.

Ethical review

Ethics approval was obtained from the NHS Ethics Committee (East Midlands Nottingham 1 REC reference 13/EM/0430 – see appendix two). Local NHS Research and Development

approval was also confirmed with Nottinghamshire, Derbyshire, Leicestershire and Lincolnshire Clinical Commissioning Groups (CCGs).

Approval was also obtained from the National Confidentiality Advisory Group (CAG 9-03(PR2)/2013 –.) Documentation of this approval can also be found in appendix two. The CAG were satisfied that there was a 'valid public interest in assessing the quality and safety of prescribing and identifying and rectifying any particular shortfalls' of the prescribing by the GPs in training.[74] They also concurred with the study team that 'seeking consent would not be practicable due to the potential effect that incomplete ascertainment could have on the validity of the study findings.'[74] They were also in agreement that it would not be feasible to anonymise the data before the pharmacist in question reviewed the prescribing due to the comprehensive way in which the pharmacist would need to interrogate the computer records in order to ascertain the appropriateness of prescribing.[74]

Individual patients were given the opportunity to decline to take part in the research. When a GP trainee and their trainer were recruited, information regarding the project was sent to practices to be displayed in the practice waiting room, giving details of who to contact within the practice to obtain further information. Appendix two contains the patient information poster, as well as the patient information leaflet that would be available to interested patients and gave them the means to opt-out of the study if they wished. As a further stipulation of taking part in the study, the research team received written confirmation from each practice's Caldicott Guardian that they were aware of the project, happy for it to take place in their practice, and that the practice had suitably advertised the existence of the project to their patient population. An example of such a letter is shown in appendix two. The research team also confirmed that the practice had submitted an appropriate IG toolkit return.[74] Such a return ensures that organisations with access to NHS patient data are practising appropriate data security measures. The IG toolkit was still in place when the study was performed: from April 2018 it was superseded by the 'Data Security and Protection' Toolkit.[75]

Recruitment

Ten GP trainees at or near their final year of training were recruited to the study along with their GP trainer. Although the study was reviewing the prescribing of the GP in training, as the study was educational in nature, the support of their GP trainer would be necessary, and the trainer might also be able to provide useful feedback regarding the process. Trainers and trainees were also offered a £50 voucher for taking part in the study.

Recruitment was through the Nottingham GP Vocational Training Scheme (VTS). Email communication was made with GP trainees and trainers associated with the Nottingham scheme. Interested parties engaged in more detailed discussion with one of the study team before recruitment was finalised. Although approval had been achieved to enable recruitment throughout the East Midlands region (involving VTS schemes in Derby, Leicester and Lincoln) sufficient GP trainees and their trainers were recruited through the Nottingham scheme.

The following inclusion and exclusion criteria were employed:

Inclusion criteria:

- General practices in the CCGs recruited to the study.
- GP trainees at or near the final year of their training.
- GP trainers who were supervising GP trainees at or near the final year of their training.

Exclusion criteria

- General practices not in the CCGs recruited to the study.
- General practices with insufficient space to enable a pharmacist to review patient records.
- GP trainees not wishing to be a part of the study.
- GP trainers not wishing to be a part of the study or disagreeing with their trainee taking part in the study.

At the point of recruitment, one of the researchers from the team (NS or KM) explained the purpose of the study and obtained informed consent from the GP trainee and their trainer. Detailed participant information leaflets were prepared and can be found in appendix two. It was explained that entry into the study was entirely voluntary and would not affect the training that they received through the VTS. Participants were also able to withdraw from the study at any time if they no longer wished to be a part of the study. In keeping with research protocol, it was also explained to participants that data collected up to the point of study withdrawal would not be erased. Two copies of the consent form were signed by each participant. One copy was kept by the participant and the other was stored in a secured filing cabinet at the University of Nottingham. Basic demographic information was collected regarding each GP trainee including their age, gender and ethnicity. Other background information pertinent to the study was also collected at this point, including place and date of graduation, how long they had been practising as a doctor, which prior medical jobs they had completed before the current training post in the practice, and whether they were currently working part-time or full time.

Once recruited into the study, the GP trainee was assigned a 4-digit numeric code, and the practice they were based at was assigned a 2-digit numeric code. Live study documentation relating to participant contained the relevant codes. The study team kept a separate, secured 'codebreaking' document.

Before data collection could commence, the study team confirmed that the Caldicott Guardian in the recruited practice was satisfied that the research was taking place in keeping with the practice's IG toolkit return. The study team also then liaised with the CAG Security Review Team, to ensure that the practice's IG toolkit return had been satisfactory.[75]

The prescribing review – summary

A CCG pharmacist was utilised to perform the prescribing review process (GG). This pharmacist had previously been a review pharmacist on the PRACtICe study and was therefore experienced in detailed prescribing review.[9]

Once the GP trainee and their trainer had been recruited to the study, lead-in time of approximately two months was required before the pharmacist could begin to collect prescribing data. This allowed sufficient time for the GP trainee to have prescribed at least one hundred prescription items. The lead in time was decided after careful consideration by the study research team, which included a GP trainer (NSi).

The CCG pharmacist was given full access to the electronic patient records to complete the review. In their role as a CCG pharmacist, they would have been familiar with many of the practices in the area, and were enabled to access all practices in the study area through their NHS-NHS agreement. A standardised search on the computer system was performed for the pharmacist to access 100 sequential prescription items which had been issued by the trainee as a result of a specific patient encounter.

Recorded encounters between the GP trainee and a patient could have been either a face-to-face or telephone consultation. Both the issuing of 'acute' and 'repeat' medications was

included in the analysis. For the purposes of this study, however, where a trainee had authorised the issue of a repeat medication without having a consultation with the patient, this prescription item was not included in the prescribing analysis. This process would have typically been a part of a practice's 'repeat prescribing' process, and any evaluation of these prescriptions may be more reflective of practice processes than of the prescribing patterns of a GP in training.[76-78] It was decided that prescriptions for devices and dressings would also not be included in the review: one request for multiple different dressing types for a single patient may feature disproportionately in a trainee's 100 prescription-item review.

Where a trainee had recorded the fact that a medication review had been performed as part of one of the consultations being reviewed by the study pharmacist, however, the study pharmacist reviewed those medications as if they had been prescribed. The results of this review were fed back to the GP trainer and trainee, in addition to the one hundred prescription items. Although they had not prescribed these medications, the result of having performed a medication review would be that the patient would be able to request further medication, usually without clinical review, in keeping with a practice's repeat-prescribing policy.[77] The study team therefore decided that specific feedback regarding any safety concerns with re-authorised repeat medication would be a useful addition to the strict prescribing review of the one hundred prescription items.

Details were noted down by the review pharmacist regarding each of the one hundred prescription items, including name of drug, strength, dose instructions and quantity, along with the age and sex of the patient who had had each medication prescribed. Patient identifiable data, such as date of birth or NHS number, were not removed from the GP practice. The pharmacist produced a separate code breaking list, which would allow the GP trainee and their trainer to discover the identity of a patient who had been prescribed the individual medications being interrogated. This would permit the practice team to review a specific patient's medication considering information presented to them through the review. The code breaking list was not removed from the GP practice, but stored securely in the practice, in keeping with local information governance processes.

The analysis of each prescription item was performed by a detailed interrogation of the computer entry from the time of issuing the prescription. This could also include interrogating any supplemental information that the trainee would also have had access to, for example blood test results and past medical or allergy information that had been recorded on the system. The purpose of the interrogation of the computer records was to assess the appropriateness of the medication prescribed for the clinical situation being recorded, along with a review of the dose, dosage instructions, quantities prescribed and arrangements for any necessary medication review. The review pharmacist was not asked to make comments on the process by which the diagnosis was made. For example, if the GP trainee had recorded a clinical history of shingles and entered the diagnosis of shingles, the review pharmacist would be scrutinising the prescription item that had been issued to that patient for shingles, rather than considering whether shingles was actually the correct diagnosis. If, however, the clinical situation recorded seemed incongruous to the diagnosis provided, the review pharmacist could flag the appropriateness of a medication for discussion at a review panel comprising up to three clinical members of the research team (RK, NS and AA). For example, if the clinical entry had merely said 'runny nose' and the diagnosis of 'chest infection' had been given (with a resultant prescription for amoxicillin), the review pharmacist might flag the situation for review regarding whether the correct drug had been issued.

For each prescription item reviewed, the pharmacist would ascertain if there had been any deviation from standard prescribing practice. Local and national prescribing guidelines were reviewed where appropriate. For an individual item, it was possible that multiple issues could be recorded. For example, a prescription item could have an error relating to the dose of medication, and also the duration of the course of the medication.

To make the decision regarding whether there had been any deviation from standard prescribing practice, the pharmacist referred to detailed 'case-law' that had been created as part of the PRACtICe study, and iteratively evolved throughout the REVISiT study. Where a

prescribing situation did not meet pre-existing case-law, a decision regarding whether and how to document such a deviation from standard practice, was deferred at the immediate point of review, and made by a panel of two GPs (RK and AA), who were also sometimes joined by a separate pharmacist from the study team (NS).

The definition of a prescribing error was the same as that used in the PRACtICe study and is detailed below:

"A clinically meaningful prescribing error occurs when, as a result of a prescribing decision or prescription writing process, there is an unintentional significant

- reduction in the probability of treatment being timely and effective or
- increase in the risk of harm when compared with generally accepted practice".[79]

This definition had been developed through a Delphi process involving pharmacists, physicians, surgeons, nurses and risk managers.[79] It is now a commonly accepted definition of prescribing error, which has been adopted in other studies.[80] For the purposes of this study, prescribing errors were categorised using the same subcategories that were adopted in the PRACtICe study. These are displayed in table five.

Table 5: Categories of prescribing errors[9]

Error category		explanation	Example
1	Unnecessary drug	Medication is not required for the clinical situation that has been described in the notes	*Helicobacter* eradication treatment prescribed to a patient who is *Helicobacter* negative
2	Incorrect drug	Incorrect drug chosen for a clinical situation that has been described	Very potent topical steroid cream prescribed in a young child without documented justification
3	Duplication	Prescribing the same medication (or type of medication) in a clinically concerning time frame	Prescribing a medication containing paracetamol, when the patient has an active 'repeat' medication also containing paracetamol (without documentation regarding this duplication)
4	Allergy error	Prescription of a drug, where the clinical system has recorded an active allergy to that medication	Prescribing an antibiotic containing penicillin to a patient with a clear 'penicillin allergy' notification, without any documentation of this within the consultation
5	Contraindication error	Prescribing a drug that is contraindicated according to the BNF	Prescribing diclofenac to a patient who has documented contraindications, without clear documentation of risk discussion with patient
6	Interaction error	Prescribing a medication that interacts with another medication	Prescribing clarithromycin and warfarin without documenting the necessary discussion and risk mitigation
7	Dose/ strength error	Prescribing too high or too low a dose for the clinical situation	Inaccurate conversion of opioid medication doses
8	Formulation error	A drug prescribed in the incorrect formulation when this might lead to increased risk of patient harm	Prescribing an immediate release formulation of a drug like Tacrolimus, when a sustained release medication is indicated
9	Frequency error	Prescribing a medication too many times (or not enough times) in a day	*Naseptin* cream prescribed twice daily for 7 days instead of four times daily, for recurrent epistaxis

Table continues on next page

Error category		explanation	Example
10	Timing error	An error relating to the recorded administration time of a medication, resulting in decreased treatment effectiveness	*Simvastatin* prescribed as 'daily' rather than specifying it is to be taken at night
11	Information incomplete	Insufficient information contained on prescription	Oral corticosteroids prescribed 'as directed' rather than 'take 6 daily for 5 days'
12	Generic / brand name error	Prescribing a medication generically that where brand prescribing is advised by the BNF for safety reasons	Prescribing a generic version of an anti-epileptic medication for a patient with epilepsy
13	Omission error relating to failure to prescribe concomitant treatment	Not prescribing medication that should be prescribed concurrently with another medication	Prescribing an NSAID to an older person (over 65 years of age) without appropriate ulcer protection medication.
14	Inadequate documentation in medical records	Prescription of a drug without documented evidence of an indication for that drug	Prescribing diazepam without any documented evidence for its indication
15	Quantity error	Prescribing the wrong quantity of drug for the indication documented	Prescribing a large quantity of drugs (e.g. greater than three months) that are either high-risk or have a significant potential for abuse (e.g. opioid medication)
16	Inadequate review	Error relating to inadequate review of medication's safety or efficacy, or inadequate prescribing for review of a clinical situation	Not prescribing a *statin* despite entering results of a cardiovascular risk assessment that would suggest the need to prescribe a *statin* (and no documented discussion regarding patient refusal of medication)
17	Duration error	Prescribing a medication for a longer or shorter duration than is necessary or safe	Prescribing oral terbinafine for a nail infection for greater than six months without arranging a review

During the PRACtICe study, the research team had determined that there were situations which did not meet the strict definition of an error, but which nevertheless 'represented less than ideal practice'.[9] Such situations were recorded as 'suboptimal prescribing'. We adopted the same principle of reporting suboptimal prescribing, using the same subcategories as the error subcategories displayed in table five. The study team were mindful that the REVISiT review was being developed as an educational tool to enhance the process of safe prescribing for GP trainees. An inclusive approach was therefore adopted, in order to record any deviation from gold standard practice that did not meet the threshold of an 'error', within the category of 'suboptimal prescribing.' However, the study pharmacist was still guided by pre-existing case law from the PRACtICe study, with any novel reporting of putative suboptimal prescribing requiring confirmation by the independent panel.

For example, in the subcategory of 'dose/strength', an error could be the prescription of the antiviral drug aciclovir at the dose used to treat cold sores, when the higher dose necessary to treat shingles was the one that was required. The correct drug had been prescribed, but at a dose which might not be clinically effective. An example of suboptimal prescribing in this category could be the prescription of the antibacterial nose spray *Otomize* at a dose of 'two sprays, three times daily' rather than the recommended 'one spray, three times daily.' The addition of an extra spray of *Otomize* would be unlikely to cause additional harm or reduction in effectiveness of treatment but is not adhering to prescribing guidance. A condensed version of the full 'case law' which resulted from the PRACtICe and REVISiT studies (after all case discussion meetings) is shown in appendix three.

The definition of a monitoring error was the same as that adopted in the PRACtICe study. This definition had been developed by Aldred *et al*. in their analysis of medication monitoring errors in care home residents.[81]

"A monitoring error occurs when a prescribed medicine is not monitored in the way which would be considered acceptable in routine general practice. It includes the absence of tests

being carried out at the frequency listed in the criteria, with tolerance of +50%."[81] The PRACtICe study documentation provides further clarification: "This means for example, that if a drug requires liver function tests at 6 monthly intervals, we would class as an error if a test has not been conducted within 9 months. If a patient refused to give consent for a test, then this would not constitute an error".[9] Details of monitoring error examples can be found in the case law documentation in appendix three. In common with situations involving 'prescribing errors', concerns regarding monitoring which did not meet the threshold to be considered as a monitoring error were classified as suboptimal monitoring. For example, when there had been a dose increase of an ACE inhibitor, without any arrangement for checking kidney function blood tests within two weeks, this was considered to be a monitoring error. If bendroflumethiazide was prescribed to a patient who had had their kidney function checked 13 months ago (when the guidance says it should be checked within 12 months), and there was no mention of blood monitoring, this would be 'suboptimal' monitoring.

A category of 'legal problem' had also been reported in the PRACtICe study. These were prescriptions 'associated with legal issues…which did not fall into (their) definitions of error.'[9] Reviewing prescription item with a view to uncovering 'legal problems' falling outside the previously described error and monitoring categories was therefore a part of the prescribing review process adopted in this study. An example of a 'legal problem' is where medication for multiple members of the same household (such as head lice treatment) was prescribed on one prescription for one member of the household.

When scrutinising medication records and recording errors, a series of principles were established in the PRACtICe study, which are outlined in table six.

Table 6: Principles of error reporting from the PRACtICe study[9]

1. More than one error could be recorded per prescription item.
2. If an overdose involved the addition of more than one prescribed item, e.g. a mixture of 50 mg and 100 mg tablets, the error was counted only once.
3. To avoid duplication of errors in the database, any drug interaction error was recorded against the second of the two drugs prescribed.
4. Potential errors from dispensing practices were judged in the same way as those from non-dispensing practices.
5. The use of Latin on prescriptions was judged not to be a problem as it was assumed that these instructions would be converted to English by a pharmacist or dispenser.
6. If a case involved a dosing error and a frequency error, this was recorded as just one error: a 'dose/strength' error.
7. No error was recorded if lack of information made it impossible to make a valid judgement on whether or not an error has taken place.

All the above principles were adopted for this current study, except for number five. As the study was primarily aimed at enhancing safe prescribing practice, the study team decided that the use of Latin short codes on prescriptions, such as 'BD' for 'take twice daily', should not be recommended. This is because of the potential for misinterpretation of such abbreviations by both patients and professionals.[82 83] At the time of the study, electronic prescribing was being introduced to general practices in the East Midlands. Anecdotal observations from clinical members of the study team suggested that sometimes electronic prescriptions would be dispensed to patients with a direct transcript of the details recorded on the practice computer system, rather than an interpretation by the dispensing pharmacist. Latin short codes may therefore remain on prescriptions even if the prescriber had assumed that the dispensing pharmacist would translate them for the patient. The REVISiT pharmacist had also done some data collecting for Franklin and colleague's study exploring the impact of the early stages of uptake of electronic prescribing in pharmacies. That study had found a greater number of prescription labelling errors in prescriptions that

had arrived in pharmacies through electronic transmission, in comparison with those arriving on a standard paper prescription.[84]

As well as reviewing the sequential series of one hundred prescription items, the pharmacist also made note of any recommendations for 'over-the-counter' (OTC) drugs that the GP trainee had made during the consultations that were reviewed. Review of the appropriateness of these recommendations followed the same process as if the medication had been prescribed. Findings regarding the GP trainee's recommendations for OTC medication was reported back to the GP trainee and trainer in the same report that contained details of the one hundred prescription-item review. Unless this OTC medication was actually prescribed, the presence of a recommendation for such a medication was not included in the tally of the one hundred items being reviewed.

Full details regarding the one hundred prescription items would be fed back to the GP trainee and their trainer through a formal review meeting (the *feedback tutorial*) once a detailed, personalised report had been compiled. The PRACtICe study had found that one in 550 prescription items contained a 'severe error'. These were errors which had a high probability of being able to cause significant harm to patients.[9] Uncovering such an error might necessitate immediate feedback in order to mitigate the impact of harm. Were the review pharmacist to uncover such an error, they were directed to immediately report this to the GP trainer, or the on-call GP for the practice if the trainer was not available, in addition to making note of the error for study purposes as previously described.

The review process also permitted the pharmacist to make note of any areas of good practice that the GP trainee was displaying (for example, excellent documentation of medication indication on the prescription item). Areas of good practice were not classified in the same way as errors and suboptimal prescribing were, in order to permit the pharmacist to have more scope for positive reinforcement and encouragement. This was in

keeping with the feedback principle of 'stating what was done well' as well as exploring 'areas for improvement.'[57]

The prescribing review – process

Data collection by the review pharmacist was facilitated by the completion of three different types of data collection forms – form zero, form one and form two. None of these forms required the inclusion of data that could directly identify patients, prescribers or practices. Once completed, the forms were then transported to the offices of the Division of Primary Care in the University of Nottingham for secure storage and processing as outlined in the methods section 'prescribing review – data preparation'. Examples of the data collection forms can be found in appendix four. Details of the content of each of the forms, along with how they facilitated the data collection process are outlined below.

Form zero – Practice and GP-in training registration form

This form was used to collect details regarding an individual GP trainee. One form was completed for each GP trainee. The first part of the form contained information that had already been collected by the researcher who had undertaken the consent process. The remaining details were able to be completed by the review pharmacist once the review of all one hundred prescription items had taken place. It was possible that a review could contain more than one hundred prescription items: if a final consultation was being reviewed which would take the item review tally to one hundred, but that consultation contained multiple prescription items, all the prescription items in that final consultation would be reviewed, even if it took the review tally to more than one hundred. Full details of form zero are found in table seven.

Table 7: Content and detail of Form zero

	Item	Description	Rationale
1	Initials of pharmacist completing review	This was pre-populated to 'GG' – but the form was designed in this way to facilitate the possibility that another pharmacist may be involved with the study if GG was not available.	Details of which review were conducted by which pharmacist would be important to document in case inter-rater reliability needed to be evaluated.
2	Practice ID Code	This was the 2-digit numeric code that was assigned to the practice by the research team when the GP trainee was recruited	For purposes of practice identification (without actual documentation on this form of the name of the practice)
3	Type of clinical system currently used in the practice	The pharmacist was given the option to choose between one of the four systems known to be mainly used in the region (EMIS web, EMIS LV, *SystmOne* or Vision). There was also the option to write a 'free text' option if another, less commonly used system was employed by the practice.	The way different clinical systems present data to a prescriber can vary: this could have an impact on a prescriber's prescribing.
4	Availability of Practice Formulary on the clinical system	The option of 'yes' or 'no' was given.	At the time of study inception, not every practice had opted to have a formulary embedded in the clinical system: the presence of a formulary may facilitate good prescribing practice.
5	Date that the GP trainee was consented into the study	The form was designed to facilitate entry of a date in the format dd/mm/yyyy	This was to ensure that appropriate lead-in time had been adhered to before consultations were reviewed.

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	Item	Description	Rationale
6	GP trainee ID Code	This was the 4-digit numeric code that was assigned to the GP trainee by the research team when they were recruited	For purposes of study participant identification (without documentation of the actual name) – as some training practices host more than one trainee, it was possible that multiple trainees from a single practice could be recruited. Documentation of both the GP trainee and their practice is important in case practice-specific prescribing issues were identified.
7	GP trainee sex	The option of 'male' or 'female' was given	Demographic data collected regarding the GP trainee. There is some evidence to suggest that behaviour change as a result of experiencing errors could be influenced by gender.[85]
8	Stage in training of the GP trainee	The choice given was 'ST1', 'ST2', 'ST3' or 'ST4'	Although most of the people recruited are likely to be ST3 – it is important to confirm which stage of training the trainee is currently at, as this could influence prescribing
9	Date that the GP trainee entered the practice	The form was designed to facilitate entry of a date in the format dd/mm/yyyy	This could be useful to help ascertain the amount of experience that the trainee had with the prescribing processes of the practice
10	Date of the first consultation reviewed by the pharmacist	The form was designed to facilitate entry of a date in the format dd/mm/yyyy	It is important to be able to confirm that this was at least 2 months after the date of consent into the study to ensure appropriate lead-in time
11	Date of the final consultation reviewed by the pharmacist	The form was designed to facilitate entry of a date in the format dd/mm/yyyy	This would be useful to ascertain the length of time that it took a GP trainee to prescribe 100 prescription items

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	Item	Description	Rationale
12	Length of time that the GP in training had been at the practice before the first prescription item was reviewed by the pharmacist	Calculated by the difference between entry 10 and entry 9	This could be useful to help ascertain the amount of experience that the trainee had with the prescribing processes of the practice
13	Length of time taken for the GP in training to prescribe the 100 prescription items that were reviewed	Calculated by the difference between entry 11 and entry 10	This would be useful to ascertain the length of time that it took a GP trainee to prescribe 100 prescription items. This information would be useful for planning subsequent studies.
14	Number of consultations reviewed to identify the 100 prescription items		This would give an indication of the prescribing rate of the trainee, which could be influenced by multiple factors such as practice demographic.[86]
15	Please indicate if there have been any changes in the type of clinical system during the period of data collection for this GP in training	The option of 'yes' or 'no' was given – A subsequent follow-up question stated 'If Yes – when did the practice stop using the old clinical system (option of entering a date in the format of dd/mm/yy) – and then a further follow-up question: 'if yes, what clinical system was in use before the change to the current clinical system' (with options for question completion like the original clinical system question posed as question three form zero).	If there had been any change in the conditions under which the GP trainee was prescribing, which had taken place while the prescription items under review were being prescribed – this would be important to know.
16	Please indicate if there have been any changes in the availability of a practice formulary on the system during the period of data collection for this GP trainee	The option of 'yes' or 'no' was given – A subsequent follow-up question stated 'if yes, when was the practice formulary added on to the practice's clinical system (option of entering a date in the format of dd/mm/yy) – and then a further follow-up question: 'if yes, what length of time were consultations conducted without a practice formulary being available on the clinical system	If there had been any change in the conditions under which the GP trainee was prescribing, which had taken place while the prescription items under review were being prescribed – this would be important to know.
17	A general summary of the prescribing	Space for free-text comment	Providing a space for the review pharmacist to give any feedback to the prescriber that could be useful to help with good prescribing in general. This part of the form was completed by the review pharmacist at the end of reviewing the 100 prescription items

Form one – prescribing record sheet

After completing the necessary components of form zero, the review pharmacist performed the computer search to identify all the consultations performed by the GP trainee which had resulted in their prescribing of 100 sequential prescription items. For each of these consultations, the review pharmacist would complete a 'form one' proforma (see appendix four).

The first part of form one required the pharmacist to complete basic information relating to the consultation: the date the consultation had taken place, the age of the patient at that date, the sex of the patient, and then whether a medication review had taken place during the consultation. Note of the patient ID code was also made on the form, so that the GP trainee and their trainer would be able to identify the patient. As previously stated, the file containing the code-breaker document to enable the ID code to be matched with a specific patient was not removed from the practice, and kept securely within the practice computer system.

The second part of form one required the pharmacist to record details of all the medication that had been prescribed in that consultation. For each medication, the following details were recorded exactly as they had appeared on the patient record: name and form, strength, dose instructions, and the quantity of medication that had been prescribed. For example 'Paracetamol (solid oral), 500mg, take two tablets four times daily, 28 tablets.' The pharmacist then noted if the drug prescribed was 'branded' or 'generic'. In the paracetamol example, this would have been designated as generic, whereas if the GP trainee had specifically prescribed '*Panadol'* this would have been designated as branded. Next the 'status' of the drug was recorded as outlined in table eight.

Table 8: Drug status as recorded on form one

Drug status	Abbreviation	explanation	Example
New acute	NA	A medication that was newly issued by the GP trainee during the consultation as an acute medication.	Issuing a new prescription for the antibiotic *amoxicillin* at the end of a consultation where a chest infection was diagnosed.
Re-issued acute	RA	An acute medication that was issued by the GP trainee during the consultation, which had previously been issued by a different clinician.	Issuing a prescription for *amoxicillin* at the end of a consultation by selecting 're-issue' on an *amoxicillin* prescription that had previously been issued to the patient in a previous consultation.
New repeat	NR	Adding a new medication to the 'repeat medication' section and issuing this medication.	Adding the anti-hypertensive drug, *amlodipine* to the repeat prescription area (and issuing this) after diagnosis of hypertension.
Amended repeat	AR	Amending one of the medications in the 'repeat medication' section and issuing this medication.	Changing the dose of *amlodipine* after a hypertension review appointment, and then issuing a prescription with the new dosage instructions.
Re-issued repeat	RR	Issuing one of the medications from the 'repeat medication' section without making any amendments to the repeat medication entry.	Issuing a repeat prescription for the emollient, *Cetreben* because the patient requested this to be issued from her repeat medication during the consultation.

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Drug status	Abbreviation	explanation	Example
Not prescribed	NP	The medication was not prescribed during the consultation. This status would be used for all the 'repeat prescribing medication' in the 'repeat prescribing' section of the clinical notes, if the GP in training had indicated that a medication review had taken place during the consultation.	During the consultation under review, the GP in training indicated that a medication review had taken place (by entering an appropriate 'Read code')[87]. This would imply that she had reviewed the appropriateness of all the medications in the 'repeat medication' section of the medical notes, permitting the patient to request those medications without further clinical review until the next medication review. If *amlodipine* was the only medication on the repeat system, the appropriateness of amlodipine would be reviewed by the pharmacist reviewer as if amlodipine had been prescribed.
Over the counter	OTC	An over-the-counter medication had been recommended by the GP trainee in part of the consultation notes	In a consultation regarding a five-year-old child with a fever, recommendation was made to give the child some *Calpol*.

After entering the drug's status, the review pharmacist then made note of the number of prescribing errors, suboptimal prescribing episodes or aspects of good prescribing that the prescription item was potentially associated with. For each potential prescribing or monitoring concern (error or suboptimal), the review pharmacist completed a Form Two to describe the concern. For each aspect of good prescribing, the pharmacist completed a Form Three to document that. If there were no prescribing concerns related to a given prescription item, and no areas of good practice to highlight, no further forms would be completed for that prescription item.

Form two – details of prescribing and monitoring issues

For each of the potential concerns regarding prescribing that were uncovered by the review pharmacist, a separate 'Form two' was completed by the pharmacist. For example, if a prescription for 10mg of amlodipine had two potential prescribing errors and one potential monitoring error, the review pharmacist would complete three separate form twos.

After completing basic identification information such as the date of data collection, the code of the GP trainee, and the code which would identify the patient, the review pharmacist entered details of the prescription item of concern: drug name, strength, dose instructions and quantity prescribed. Next to these details the pharmacist entered their 'initial judgement' regarding whether the issue highlighted was a prescribing error, monitoring error, legal problem, or suboptimal prescribing. They would then enter their initial judgment on the error/issue classification, for example 'unnecessary drug' or 'incorrect drug' (full details of the error/issue classification can be found in table five).

The pharmacist entered a free-text description of the potential issue, explained why this was a problem and then made a recommendation on how to avoid similar problems in the future. The pharmacist then made a judgement regarding the priority of feeding back the potential issue (low, medium or high). This priority decision would help to order the feedback report that was generated for the GP trainee.

The pharmacist indicated if their initial judgement had been based on the pre-existing case-law, or if the judgment needed to be confirmed by the review panel. If judgement had been made based on pre-existing case law, no further action would be needed, but a second member of the research team (NS) would review all forms before finalisation to ensure that case law had been adhered to.

If a panel decision was required, further sections of form two permitted the review panel to enter details of when the pharmacist's initial judgement was reviewed, and the outcome of this review: namely if the initial judgment had been amended, and if so, what it had been amended to. There was also space on the form to allow comments from the review panel, which could again be useful when feeding back to the GP trainee. Once the review panel had made a decision regarding a particular prescribing situation, this was added to the pre-existing case law so that the same type of prescribing concern would only have to be considered once by the panel, and the pharmacist would be empowered to make future decisions utilising this new judgment.

Form three – details regarding aspects of good prescribing

If the pharmacist had indicated on Form one that a prescription item had an aspect of good prescribing associated with it, the pharmacist completed a 'Form three' to describe this good prescribing episode. Separate copies of form three were completed for each episode of good prescribing that was associated with a prescription item.

After completing basic identification information such as the date of data collection, the code of the GP trainee, and the code which would identify the patient, the review pharmacist entered details of the prescription item: drug name, strength, dose instructions and quantity prescribed. The pharmacist then wrote free-text comments regarding the example of good prescribing, outlining why it was an example of good practice.

Good practice reporting was not subject to case law restriction and so was not required to be sent to review at the panel meeting.

The prescribing review – data preparation

Once the prescribing review of an individual GP trainee had been completed, data collection forms were transported to the Division of Primary Care in the University of Nottingham. Each prescribing review form set comprised one Form Zero and multiple copies of Form One, Form Two and Form Three. These forms were securely stored and all data from them were transcribed onto a *MS-Access* database by a member of the team (RH). Veracity of transcription was then confirmed by a different member of the team (NS), who checked that the contents of each data collection form had been transcribed onto a *MS-Access* database.

The *MS-Access* database had been designed to be able to produce a report summarising the prescribing data for each GP trainee who had been reviewed, as well as to be able to export pooled data from all the ten GP trainees. Despite testing the database, and multiple iterations of re-design, the report functionality did not work to the satisfaction of the research team; it was therefore decided to store and manipulate the data using *MS-Excel*.

Data from the *MS-Access* database were transcribed to an *MS-Excel* file and a member of the research team (NS) confirmed the veracity of the data by cross-checking with the original forms zero, one, two and three. The *MS-Excel* file contained the pooled data from all ten GP trainees. Data relating to each individual GP trainee was manually exported to a pre-designed feedback report, which formed the basis of the feedback tutorial led by a clinical member of the research team, and attended by the GP trainee and their trainer. Before the report was delivered to the GP trainee and their trainer, the review pharmacist reviewed the content of the report.

The prescribing review – feeding back to the GP trainee and their trainer

Once the review had been completed and the prescribing review report had been created, a member of the research team (NS or KM) liaised with the GP trainee and their trainer to arrange for the feedback from the prescribing review to be delivered by a clinical member of the research team (AA, RK or NSi) in a face-to-face meeting (the *feedback tutorial*.) The feedback report was the focus of the tutorial: the trainer and trainee were given the opportunity to discuss the report with the research team member. The research team member had studied the report before the tutorial, and was therefore able to guide participants through the report, and also able to provide context to how decisions about prescribing events had been made. Using the code-breaking document created by the review pharmacist, and securely stored in the practice, the trainer and trainee were also then able to review the individual clinical note entries that the feedback report referred to. After the feedback tutorial had been completed, the research team member completed brief field notes to assist the team member who would be conducting the follow-up interviews. Examples of these field notes can be found in appendix eight. An example feedback report is shown in appendix five. Table nine outlines the content of the feedback report.

Table 9: Outline of the content of the feedback report

Section		Description
1	Introduction	• Basic description of the REVISiT study • Summary of the pharmacist-led review process. • Summary of the report structure and function • Overview of definitions of prescribing error, monitoring error, suboptimal prescribing and legal problem
2	Overview of prescribing observed	• Details of the number of consultations that the pharmacist had reviewed to be able to review the 100 prescription items – and details of the number of these consultations that resulted in an item being prescribed. • The date range of the consultations (the date of the first consultation that was reviewed and that of the last one reviewed). • The total number of prescription items that the pharmacist reviewed. • The total number of 'prescribing events' that had been reported - breaking this down to the total number of prescribing errors, monitoring errors and suboptimal prescribing). • Details regarding medication review: - The number of consultations reviewed where the trainee had reported conducting a medication review. - The number of medications that the trainee had reviewed but not issued during those medication reviews. - The number of prescribing events that were associated with the medications that the trainee had reviewed but not issued. • Details regarding over-the-counter medication: - The number of consultations that the trainee had recommended the patient some over-the-counter medication. - The total number of recommendations for individual over-the-counter items. - The number of prescribing events which would have been associated with these over-the-counter recommendations, had the medication been prescribed.

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Section		Description
3	Summary of prescribed prescription items	• The number of prescription items that had been prescribed from each of the fifteen chapters of the *British National Formulary*.[88] • A list of all the medicines that the GP trainee had prescribed, and a frequency count of the number of times they had each been prescribed. • A breakdown of the prescription items by prescription type (drug status) – the number of new acute items, re-issued acute items, new repeat items, amended repeat items and re-issued repeat items. • Examples of good prescribing practice that had been noted by the review pharmacist. • A detailed outline of all the prescribing events that had been uncovered by the review pharmacist (and confirmed with pre-existing case-law or ratified by the review panel). The prescribing events were ordered by 'error category' (as outlined in table four), with prescribing errors being presented first, followed by episodes of suboptimal prescribing.
4	Medication review items	• Details regarding the number of prescription items that the trainee reviewed but did not issue to the patient. • Description of reviewed items at the level of BNF chapter. • Details regarding the actual medications that were reported to have been reviewed by the trainee during a medication review, and a frequency count of those medications. • Examples of good practice uncovered by the review pharmacist relating to medication reviews. • A detailed outline of all the prescribing events that had been uncovered by the review pharmacist (and confirmed with pre-existing case-law or ratified by the review panel) relating to the medication review items. The prescribing events were ordered by error category (as outlined in table four), with prescribing errors being presented first, followed by episodes of suboptimal prescribing.
5	Over the counter (OTC) medicines	• Details regarding the number of OTC recommendations that the trainee had made during the consultations that were reviewed. • Description of OTC medications at the level of BNF chapter. • Details regarding the actual OTC medications that were recommended, and a frequency count of those recommendations. • Examples of good practice uncovered by the review pharmacist relating to OTC recommendations. • A detailed outline of all the prescribing events that had been uncovered by the review pharmacist (and confirmed with pre-existing case-law or ratified by the review panel) relating to OTC recommendations. The prescribing events were ordered by error category (as outlined in table four), with prescribing errors being presented first, followed by episodes of suboptimal prescribing.

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Section		Description
6	General comments	Any general comments that the review pharmacist had made during the review, which the pharmacist thought could be useful for summary feedback purposes.
7	Final comments	A thank you message to the GP trainee, and a reminder that follow-up interviews would be arranged to seek feedback regarding the review process.

Qualitative data collection

To gain meaningful feedback about the review process, semi-structured interviews were performed with both the GP trainee and their trainer. This method permits the exploration of 'thoughts, feelings and beliefs' and also permits a researcher to 'delve deeply into personal and sometimes sensitive issues.'[65] It would therefore be a useful tool to gain meaningful feedback regarding the review process: permitting the adaptation of questions to the individual prescriber (or their supervisor). The interviewer would also have to be cognisant of the potential for distress when discussing error or the potential of clinical mistakes.[89-91]

All interviews were conducted face-to-face in a private room within the participant's workplace and recorded using a digital audio-recorder. Conducting the interview in a familiar workplace setting could help to put the interviewee at ease,[92] and also facilitate appropriate scheduling.

Initial interview with GP trainer and trainee

Once the feedback tutorial had taken place between the GP trainee, GP trainer and a clinical member of the research team, a different member of the research team (KM) contacted the trainer and trainee to arrange the individual follow-up interviews, which were to be conducted within 1-3 weeks of the feedback tutorial taking place. The interviewer had received appropriate training to conduct the interviews.

The purpose of these interviews was to receive immediate feedback regarding the utility of the review process, and to begin to explore how the review process could be improved while the feedback tutorial meeting was still fresh in the minds of the participants. The interview guides were collaboratively developed by all members of the research team, with informal piloting taking place in research meetings. Care was taken to use questions which were 'open ended, neutral and clear.'[93] The interview commenced with a 'context-setting' question before moving on to areas requiring greater consideration by participants.[93] The questions were ordered so as to guide the participant through the REVISiT study so they could proffer thoughts and feelings about the different stages of the process. Full guides can be found in appendix six, and an outline of the two guides are displayed as table ten and eleven. The interviewer was given the freedom to ask clarification and follow-on questions as appropriate. Regular meetings between the research team members permitted discussion of the guide as the interview process progressed.

Table 10: Summary of structured interview guide for initial interview with GP trainee

Section		Detail
1	Initial question	• *Why did you decide to take part?*

2	Results of the prescribing review	• *How did you find the report?*
		• *Were you surprised by any of the results?*
		• *Were there any themes that came out for you – e.g.*
		  - *Not using anti-microbial guidelines*
		  - *Any recurrent errors*
		  - *Not documenting actions*
		  - *housekeeping*
		• *Were the results important for you?*
		• *What was the most important thing you got out of this report?*
		• *Did you find the feedback on the good prescribing helpful?*

3	Giving the feedback	• *What did you think about the feedback session?* • *Were there any benefits with someone coming to explain the report?* • *Would you have preferred to get the report before the feedback or as we have done it?*
4	The process	• *Did you find the process supportive?* • *What was the most useful part of this process for you?* • *What would you have changed about the process?* • *What will you now change as a result of this report?* • *Would you recommend this process to other trainees?*
5	Training	• *Can you tell me what sort of training you have received on prescribing e.g. GP training scheme, GP practice, F1/F2 placements, Medical School?* • *Do you think this process should be part of the GP training?*
6	Further comments	• *Do you have any further comments about this project?*

Table 11: Summary of structured interview guide for initial interview with GP trainer

Section		Detail
1	Initial question	• *Why did you decide to be part of this project?* • *What did you think about the project?*
2	Results of the prescribing review	• *What did you think about the report?* • *Did you disagree with any of the issues raised?* • *Were you surprised by any of the results?* • *Were there any themes that came out for you – e.g.* - *Not using anti-microbial guidelines* - *Any recurrent errors* - *Not documenting actions* - *housekeeping* • *What have you found out about the trainee that you didn't know before?* • *What was the most important thing you got from this review?* • *What will you do differently now in terms of training?* • *What do you expect the changes to be for the trainee?* • *Did you find the feedback on the good prescribing useful?*
3	Giving the feedback	• *What did you think about the feedback session?* • *Were there any benefits with someone coming to explain the report?* • *Would you have preferred to get the report before the feedback or as we have done it?* • *Was it useful to have an outsider do the feedback session – could trainer have just done it with the report?* • *What do you think about the pharmacist doing the feedback instead of a GP?*
4	The process	• *Did you find the process supportive for the trainee?* • *What was the most useful part of this process for you?* • *What would you have changed about the process?* • *What will you now change as a result of this report?* • *Would you recommend this process to other trainees?*
5	Training	• *What do you think about the feasibility of doing this kind of review as part of the VTS? (With a doctor or a pharmacist)* • *What problems do you foresee?* • *Do you think this should be part of the training role?* • *How could the process be improved?*
6	Further comments	• *Do you have any further comments about this project?*

At the end of the interview, the researcher thanked the participant for taking part, and then reminded them regarding the anonymity of the data they had provided. The participant was then invited to contact the researcher if they had any further questions, and then reminded that the researcher would be in contact with them in a couple of months to arrange the follow-up interview.

The digital recorder was then returned to the Division of Primary Care, University of Nottingham. The audio file was downloaded onto a secure file on the University local server, and securely sent to an authorised transcriber. The transcriber had signed a confidentiality agreement relating to the project and was instructed to transcribe the interviews verbatim.

Follow-up interview with GP trainer and trainee

One to three months following the initial interview with the trainee and trainer, the researcher (KM) contacted both parties to arrange the follow-up interview. The follow-up period was chosen to allow the potential for meaningful behaviour change to have occurred,[94] while being mindful of the limited duration of GP training and the potential difficulties of following up participants when they had changed work location.

The purpose of this second set of interviews was to explore if there were reports of longer-lasting changes that had been put in place as a result of having gone through the prescribing review process. Again, the interview guides were collaboratively developed by all members of the research team and informally piloted in research meetings. Full guides can be found in appendix six, and an outline of the two guides are displayed as table 12 and 13. The interviewer was given the freedom to ask for clarification and pose follow-on questions as appropriate. Regular meetings between the research team members permitted discussion of the guide as the interviews progressed.

Table 12: Summary of structured interview guide for follow-up interview with GP trainee

Section		Detail
1	Introduction	• *Can you think of any specific areas of your prescribing practice that have changed as a result of the prescribing review?*
2	Specific factors relating to the feedback received	• *At the last interview you said that ……. which were the issues that you felt were important – have you now altered that behaviour?* • *The review stated that ……. Have you altered your way of prescribing since then?*
3	Other reflections on prescribing practice	• *Are there any other prescribing decisions that you now make differently in other areas?*
4	Reflections on the feedback tutorial	• *What learning needs did the tutorial with one of our research team identify for you?* *Prompt: Were you aware of these beforehand?* • *Have you acted on addressing these learning needs yet, if not do you plan to do so?* • *Are there any kinds of prescribing habits you need to be aware of early on in your first placement for common errors to be found.*
5	Reflections on the prescribing review - personal	• *How has your knowledge of prescribing been influenced by the prescribing review?* *How have your attitudes to prescribing been influenced by the prescribing review?*
6	Reflections on the prescribing review – general	*Do you think such medication reviews would be useful as a standard for GPs in Training?* *How do you think the medication review process could be improved or changed?*
7	Other recent prescribing education received (potential confounding factors for perceived utility of the review)	*Have you received any other educational input (e.g. tutorials, e-learning) regarding prescribing since the tutorial with the pharmacist/member of the research team?*
8	Final comments	*Do you have any other comments?*

Table 13: Summary of structured interview guide for follow-up interview with GP trainer

Section		Detail
1	Introduction	• *On reflection what do you now think about the one hundred prescriptions review?* *Prompt: Did you think it provided you and the registrar with useful information?*
2	Specific factors relating to the feedback received	• *At the last interview you said that ……. which were the issues that you felt were important – has the trainee now altered that behaviour?* • *The review stated that …. Has the trainee changed their way of prescribing since then?*
3	Other reflections on prescribing practice	• *Have you seen any other improvement in their prescribing?* • *Has it altered any of your practices?*
4	Reflections on the feedback tutorial	• *Did the tutorial with one of our research team identify any learning needs for the registrar?* *Prompt: Were you aware of these beforehand?* • *Have these learning needs been addressed?*
5	Reflections on the prescribing review – for your trainee	• *How do you think that your trainee's knowledge and attitudes of prescribing have been influenced by the prescribing review?*
6	Reflections on the prescribing review - personal	• *Has your own knowledge, skills or attitudes towards prescribing been influenced by being a part of this review process?* • *Have you changed any of your teaching practices as a result of this review?*
7	Reflections on the prescribing review – general	• *Do you think such medication reviews would be useful as a support for GP trainees?* *Prompt: In what ways could this be done?* *Prompt: What about having peer review of medication prescribing audits* • *What did you think of the practice pharmacist's role in this review process?*
8	Contextual questions about the trainer and practice	• *How long has this practice been a training practice?* • *How long have you been a trainer?* • *Do you use EPS (electronic prescribing) and if so, was it being used when the audit took place?*
9	Final comments	• *How do you think the medication review process could be improved or changed?* • *Do you have any other comments?*

At the end of the interview, the researcher thanked the participant for taking part, and reminded them regarding the anonymity of the data they had provided. The participant was then invited to contact the researcher if they had any further questions, and asked whether they would like to receive a copy of the study report when completed.

The digital recorder was then returned to the Division of Primary Care, University of Nottingham. The audio file was downloaded onto a secure file on the University local server, and securely sent to an authorised transcriber. The transcriber had signed a confidentiality agreement relating to the project and was instructed to transcribe the interviews verbatim.

Qualitative data analysis

The completed transcriptions were returned from the transcriber in *MS-Word* documents. These were securely stored on a computer server within the University of Nottingham that was only accessible by members of the study team. All *MS-Word* files were given appropriate titles outlining the participant number, whether the transcript was from a trainer or trainee interview, and whether the interview was the initial or follow-up interview. Veracity of transcription was confirmed by one of the researcher team (KM or NS) listening to the audio file and cross-checking with the appropriate *MS-Word* document. At this stage, any personal identifiers such as names were removed from the transcription to ensure the preservation of anonymity.

Once all of the transcriptions were completed, copies were distributed to members of the study team (NS, KM and RK) to begin the process of thematic analysis.[95 96] Although the use of a semi-structured interview may favour a deductive approach to analysis, inductive methods were also employed in order to ensure appropriate theme development from the data.[97-99] The software package, *NVivo* (QSR International Pty Ltd, version 11, 2015) was

used to help organise the data. Braun and Clarke describe a six-stage method of thematic analysis, which is summarised in Table 14.

Table 14: Braun and Clarke's Six Phases of Thematic Analysis[96]

Phase Number	***Phase description***
One	*Familiarising yourself with the data*
Two	*Generating initial codes*
Three	*Searching for themes*
Four	*Reviewing themes*
Five	*Defining and naming themes*
Six	*Producing the report*

After reviewing individual transcripts to familiarise themselves with the data (phase one), the study team began the process of code generation, meeting together to discuss themes that were emerging (phases two and three). Once all the initial transcript coding meetings had taken place, a final analysis meeting was held between NS, KM and RK to confirm emergent themes, which had been developed based on the words and phrases used by interview participants (phases four and five). During Stage Four, it was important to refer back to initial coding to ensure emergent themes did indeed align to the data set. Subthemes also become apparent as the analysis progressed. During Stage Five, Braun and Clarke discuss the importance of being able to identify 'the story that each theme tells'[96] as well as considering how the themes combine into an 'overall story that you are telling about your data, in relation to your research question.'[96]

Braun and Clarke include 'producing the report' as the final stage of thematic analysis (phase six). They state that the aim of this stage is to 'tell the complicated story of your data in a way which convinces the reader of the merit and validity of your analysis.'[96] Braun and

Clarke caution that their six-phases are merely 'guidelines' which 'will need to be applied flexibly to fit the research question and data.'[96] Indeed, when outworking the final stage, it became apparent that one of the emergent themes did not include all of the data that would facilitate an appropriate narrative for that theme. A further analysis meeting was held between KM, NS and RK at that point to agree final inclusion for that theme.

The prescribing review – data pooling for quantitative analysis

Once the prescribing reviews had taken place for all ten GP trainees, the resultant data were collated for further analysis. We recorded the pooled prevalence of all the prescribing events reported across the ten GP trainees. Prescribing events were also reported at the level of BNF chapter. Statistical analyses were performed with *STATA* (Version 13), *SPSS* (Version 26) and *MS-Excel*. Categorical data were summarised with frequency counts and percentages, means and standard deviations were calculated for continuous variables (mean ± SD).

Chapter Three: Results – Quantitative

This chapter will report on the quantitative findings of the study. Firstly, a summary of recruitment will be presented, along with an outline of how the study progressed with those recruited. Quantitative data will then be presented which will describe all the medications issued by the GP trainees recruited, along with the associated prescribing errors and suboptimal prescribing identified by the study process. Details of medication reviews that had been performed by the GP trainees, and also any recommendations they had made regarding over-the-counter medication will then be presented. The critique of medication review and over-the-counter recommendations will then be summarised.

Background data regarding recruitment subjects

Ten GP trainees and their trainers were recruited to the study from the Nottingham Vocational Training Scheme. Each of the recruited pairs was based in the same practice setting throughout the study. Although the study design would have permitted more than one trainee to have been recruited from a given practice, each trainee was based in a different practice. Table 15 outlines the characteristics of the 10 practices where the GP trainees were working during the study period.

Five of the practices (5/10 = 50%) were using the *EMIS Web* computer system, and five (5/10 = 50%) were using *TPP SystmOne*. No practice migrated their computer system during the study period. Five of the practices (5/10 = 50%) had a formulary embedded in the computer system: no change to this status was apparent during the study period. Two of the 10 practices (2/10: 20%) were dispensing practices. The list sizes ranged from 6 700 to 13 443 (mean list size 9 392, SD 2 499). In 2014, the average list size of a GP surgery in England was 7 171.[100] The Deprivation Score associated with each practice is also reported in table 15 This score is based on the Index of Multiple Deprivation (IMD) score (2010)

which was used to rank every 'Lower layer Super Output Area' (LSOA) in England.[101 102] For purposes of IMD score ranking, England was subdivided into 34 482 LSOAs. Higher IMD scores indicate greater relative deprivation. The average deprivation scores associated with the 10 practices was 16.4 (SD of 9.5). Two of the practices had deprivation scores in the highest quintile of deprivation, and three of the practices were in the lowest quintile of deprivation.

Table 16 displays demographic and contextual information regarding the ten GP trainees recruited. Equal numbers of male and female GP trainees were recruited (5/10 =50%). Three trainees (3/10 = 30%) were within the age range 25-29, four (4/10 = 40%) were aged between 30 and 34, two (2/10 = 20%) were between the ages of 35 and 39 and one (1/10 = 10%) was between the ages of 40 and 49. Five trainees (5/10 = 50%) were of White British ethnicity, two trainees (2/10 = 20%) were of British Indian ethnicity, one trainee (10%) was of British Pakistani ethnicity, one trainee (10%) was of Asian (other) ethnicity and one (10%) reported being of mixed ethnicity. Five trainees had graduated from medical school in 2010 (5/10 = 50%); the remaining five trainees graduated in 2004, 2005, 2007, 2008 and 2009 respectively. Eight trainees (8/10= 80%) graduated in the UK, five of these had attended the local University of Nottingham Medical School. Two of the trainees (2/10 = 10%) had graduated from non-UK medical schools: one from a university in Sudan, and another from a university in Pakistan. All the trainees (10/10 = 100%) had completed the earlier stages of their general practice training with the Nottingham Vocational Training Scheme. Nine (9/10 = 90%) were in their final (ST3) year of training and one (1/10 = 10%) was in the penultimate ST2 year. Eight of the trainees (8/10 = 80%) were training on a full-time basis, and two of the trainees (2/10 = 20%) had a part-time working pattern. Seven of the trainees (7/10 = 70%) were supervised by GP Trainers who were male, and three (3/10 = 30%) were supervised by GP Trainers who were female.

Table 15: Characteristics of the ten practices where the recruited GP trainees were working at the time of data collection

Practice Code	Clinical Commissioning Group (CCG)	IT system used	Embedded formulary available?	List Size	Deprivation score	Deprivation quintile (England)	Dispensing Practice?
1101	Nottingham City	*SystmOne*	No	7 138	17.4	3	No
1201	Nottingham West	EMIS Web	Yes	13 443	10.5	4	No
1301	Nottingham North and East	EMIS Web	No	9 214	13.9	3	Yes
1401	Nottingham City	EMIS Web	No	9 147	24.1	2	No
1501	Rushcliffe	EMIS Web	Yes	8 293	7.3	5	No
1601	Nottingham City	*SystmOne*	No	8 032	37	1	No
1701	Nottingham West	EMIS Web	No	7 224	17.8	3	No
1801	Rushcliffe	*SystmOne*	Yes	13 346	7.5	5	No
1901	Rushcliffe	*SystmOne*	Yes	6 700	7.6	5	Yes
2001	Nottingham West	*SystmOne*	Yes	11 387	19.3	3	No

Table 16: Background information regarding the recruited GP trainees

GP code	Gender	Ethnicity	Age	Date of graduation	Place of graduation	Stage of training	Part-time or Full time	Location of ST1 and ST2	Gender of trainer
1101	Male	White British	35-39	2010	Leicester	ST3	Full-time	Nottingham	Male
1201	Female	White British	30-34	2007	Nottingham	ST2	Full-time	Nottingham	Female
1301	Female	White British	30-34	2008	Newcastle	ST3	Full-time	Nottingham	Male
1401	Male	British Indian	25-29	2010	London	ST3	Part-time	Nottingham	Male
1501	Male	White British	40-49	2010	Nottingham	ST3	Full-time	Nottingham	male
1601	Female	Mixed	30-34	2005	Sudan	ST3	Part-time	Nottingham	Male
1701	Male	Asian Other	25-29	2010	Nottingham	ST3	Full-time	Nottingham	Female
1801	Female	British Indian	25-29	2009	Nottingham	ST3	Full-time	Nottingham	Male
1901	Male	British Pakistani	35-39	2004	Pakistan	ST3	Full-time	Nottingham	Female
2001	Female	White British	30-34	2010	Nottingham	ST3	Full-time	Nottingham	Male

Details regarding data collection for the trainees

Table 17 outlines the parameters of prescribing review for each of the ten trainees. The mean time that GP trainees had been in their respective practices before one of their prescription items was reviewed was 19.6 weeks (SD= 7.0; Range 9.1-27.7). To achieve the desired target of one hundred prescription items, the pharmacist had to review an average of 129.1 (SD = 32.4; Range 73-180) consultations, which had taken place over an average period of 1.8 (SD= 1.0; Range 0.7-2.5) weeks. The actual number of prescription items reviewed for each trainee ranged from 99 to 109 (mean = 102.8; SD 3.1). This meant that the average number of prescription items issued in each consultation was 0.85 (Range 0.58-1.40; SD 0.24). The actual percentage of trainees' consultations where a prescribing episode occurred ranged from 40% to 72.6% (mean 51.8%; SD 10.52%). The total number of consultations that were reviewed by the pharmacist over the course of the project was 1291, and the total number of prescription items reviewed was 1028.

Details regarding the patients whose consultations were reviewed

Table 18 outlines the gender and age distribution of the patients whose consultations were reviewed, and of those patients whose consultations resulted in prescription items being issued which were then reviewed by the study pharmacist. Data collection revealed that 60.7% of the consultations reviewed (n=783) were with female patients, and 39.3% of the consultations (n=508) were with male patients. Most of the consultations related to patients in the 15- 64-year age category (n=776; 60.1%). The age and gender distribution for the proportions of consultations which resulted in prescription items being issued were similar to the age and gender distribution of all the reviewed consultation.

Table 17: Parameters for GP trainee review

GP Number	Date enter practice	Number of weeks in practice before review commence	Date of last consultation reviewed (earliest date)	Date of first consultation reviewed (latest date)	Number of weeks of consultations reviewed	Number of consultations reviewed	Number of prescription items reviewed	Average number of prescription items per consultation	Actual number of consultations where an item was prescribed (% of all consultations)
1101	06/08/14	9.1	09/10/14	28/10/14	2.5	180	105	0.58	72 (40.0)
1201	06/08/14	11.1	23/10/14	04/11/14	2	132	99	0.75	65 (49.2)
1301	06/08/14	13.3	07/11/14	21/11/14	2	168	109	0.65	71 (42.3)
1401	06/08/14	17.0	03/12/14	10/12/14	1	105	106	1.01	71 (67.6)
1501	06/08/14	17.1	04/12/14	12/12/14	1	112	100	0.90	52 (46.4)
1601	06/08/14	23.1	15/01/15	20/01/15	0.7	73	102	1.40	53 (72.6)
1701	06/08/14	23.3	16/01/15	28/01/15	2	125	102	0.82	64 (51.2)
1801	06/08/14	27.7	16/02/15	24/02/15	1	118	102	0.86	64 (54.2)
1901	06/08/14	27.7	16/02/15	03/03/15	2	161	100	0.62	75 (46.6)
2010	06/08/14	26.9	10/02/15	11/03/15	4	117	103	0.88	56 (47.9)
Totals (where appropriate)						**1291**	**1028**		

Table 18: Patient characteristics

Characteristic	All Patients whose consultations were reviewed (percentage of total category data)	Patients who had items of medication prescribed during a consultation that was reviewed	Comparison number (and percentage) for English population of patients registered with a GP in April 2015[103]
Gender			
Female	783 (60.7%)	409 (63.6%)	28,381,133 (49.8%)
Male	508 (39.3%)	234 (36.4%)	28,629,340 (50.2%)
Total	1291 (100%)		57,010,473 (100%)
Age			
0-14 years	214 (16.6%)	98 (15.2%)	9,850,641 (17.3%)
15-64 years	776 (60.1%)	389 (60.5%)	37,395,264 (65.6%)
65-74 years	128 (9.9%)	67 (10.4%)	5,322,622 (9.3%)
75 years and over	173 (13.4%)	89 (13.8%)	4,441,946 (7.8%)
Total	**1291 (100%)**	**643 (100%)**	**57,010,473 (100%)**

Characteristics of prescribed prescription items reviewed

This section provides information regarding the 1028 prescription items that were issued by the 10 GP trainees. Firstly, summary data relating to the formulation and prescription type will be presented. The range of medication prescribed will then be presented. All 15 chapters of the British National Formulary (BNF) will be listed, with the number of items originating from each chapter being detailed.[88] These data will be presented at the level of individual GP trainee, and with all the data pooled. Further categorisation will then be presented at the level of BNF chapter subsection level (for example 'antibacterial drugs' or 'analgesics').

Presentation of prescription items reviewed by formulation and prescription type

Table 19 outlines the formulation type of all the 1028 prescription items. Most of the medications prescribed were of the solid oral formulation (n=681, 66.2% of all prescription items). Topical preparations (such as emollients or steroid creams) were the second most prescribed formulation type (n=173, 16.8% of all prescription items). Liquid oral preparations (such as paediatric antibiotics) were the third most prescribed preparations (n=68, 6.6% of prescription items).

Table 20 presents the prescription items by prescription type. Most of the items prescribed were a new acute medication (n=666, 64% of all items prescribed). The second most issued prescription type was a re-issued acute medication (n=84, 8.2% of items). Commencing a new repeat medication was the third most common prescription type (n=65, 6.3% of items).

Table 19: Distribution of the different types of formulation for prescribed prescription items

Formulation type	Number of items (% of total)
Solid oral	681 (66.2)
Topical	173 (16.8)
Liquid oral	68 (6.6)
Inhalers	48 (4.7)
Eye/ear	30 (2.9)
Vaginal	12 (1.2)
Devices	11 (1.1)
Injections	3 (0.3)
Rectal	2 (0.2)
Total	**1028 (100.0)**

Table 20: Distribution of prescribed prescription items by prescription type

Status of drug	Number of items (% of total)
New acute	666 (64.8)
Re-issues acute	84 (8.2)
New repeat	65 (6.3)
Amended repeat	3 (0.3)
Re-issued repeat	210 (20.4)
Total	**1028 (100.0)**

Categorisation of prescription items by BNF category

Table 21 outlines the fifteen chapters of the BNF, with a corresponding tally of the number of prescription items reviewed from each of these chapters. The BNF chapter with the greatest number of reviewed items was chapter four: Central Nervous System, with 201 items (19.6% of all items reviewed). Chapters eight and fourteen contained the fewest reviewed items (one each: 0.1% of the reviewed items.)

Table 21: Number of prescription items prescribed by the ten GP trainees, categorised by which chapter of the BNF it can be found in

Chapter of the British National Formulary	**No. of items n (%)**
Chapter 1: Gastro-intestinal system	112 (10.9)
Chapter 2: Cardiovascular system	121 (11.8)
Chapter 3: Respiratory system	65 (6.3)
Chapter 4: Central nervous system	201 (19.6)
Chapter 5: Infections	183 (17.8)
Chapter 6: Endocrine	46 (4.5)
Chapter 7: Obstetrics, gynaecology and urinary tract disorders	39 (3.8)
Chapter 8: Malignant and immunosuppression	1 (0.1)
Chapter 9: Nutrition and blood	9 (0.9)
Chapter 10: Musculoskeletal and joint diseases	66 (6.4)
Chapter 11: Eye	16 (1.6)
Chapter 12: Ear, nose and oropharynx	40 (3.9)
Chapter 13: Skin	125 (12.2)
Chapter 14: Immunological products and vaccines	1 (0.1)
Chapter 15: Anaesthesia	3 (0.3)
Total	**1028 (100.0)**

Table 22 displays the number of prescription items that each GP trainee prescribed from each of the fifteen BNF chapters. This figure is also represented as a proportion of their prescribing. For example, Trainee 1101 prescribed seven items from BNF Chapter One

(Gastro-intestinal system): as this trainee had a total of 105 prescription items reviewed, these seven items represented 6.7% of their total prescription items. These data are also demonstrated pictorially in the stacked bar chart in figure two. Here it can be seen, for example, that trainee 1101 prescribed their highest medication count from BNF chapter thirteen, Skin (32 prescription items: 30% of their total) and had no medication prescribed from chapters eight (Malignancy and Immunosuppression) and fourteen (Immunological products and vaccines).

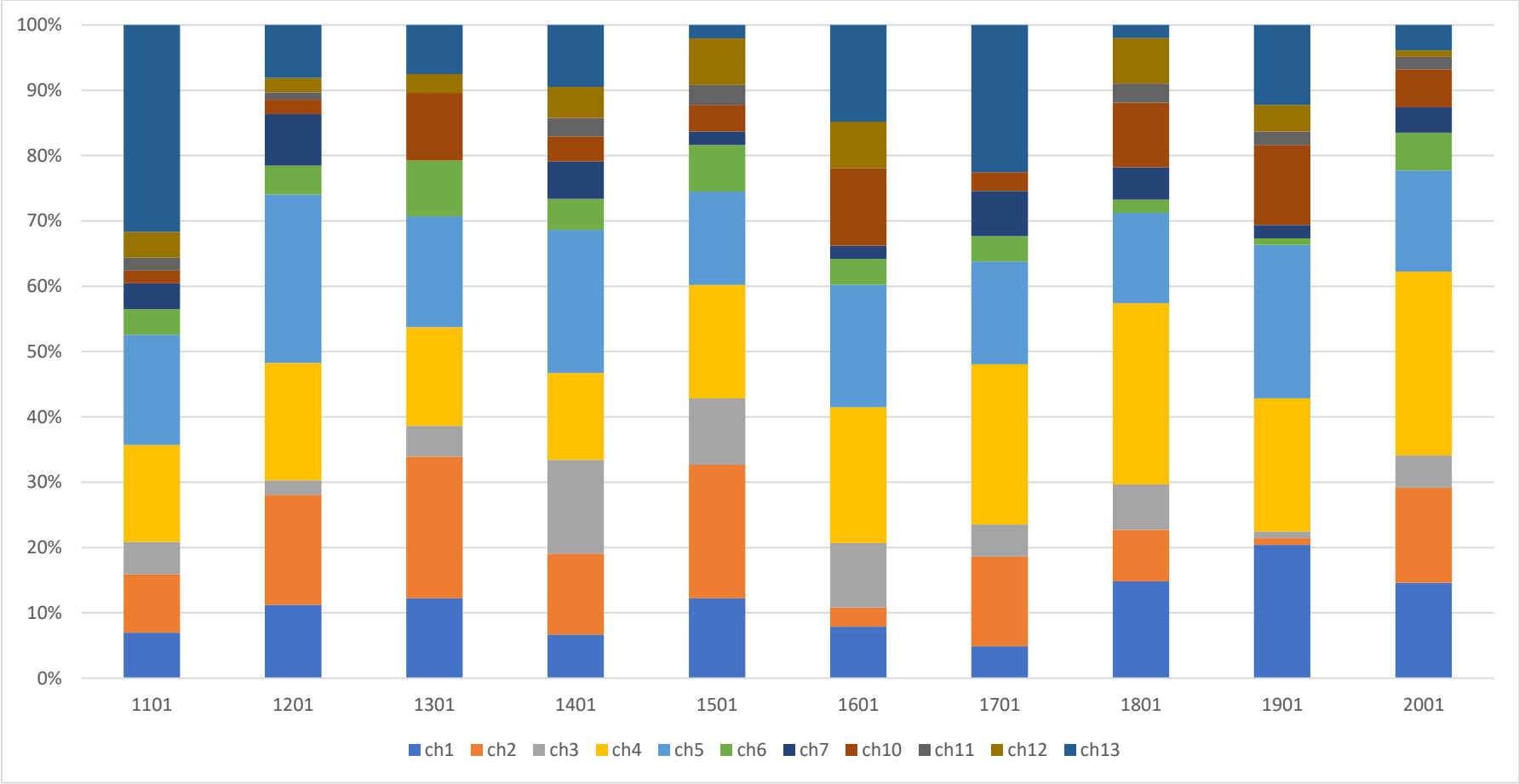
These data suggest that trainees were prescribing a range of medication represented by different BNF chapters. Trainees prescribed medication from between nine and 13 of the chapters. One trainee (1701) prescribed medication from nine of the chapters, four trainees (1201, 1301, 1601, 2001) prescribed from eleven of the chapters, two trainees (1401 and 1801) prescribed from twelve of the chapters, and three trainees (1101, 1501, 1901) prescribed from thirteen of the chapters. All trainees prescribed at least one medication from Chapters one (Gastro-intestinal system), two (Cardiovascular system), three (Respiratory system), four (Central nervous system), five (infections), six (Endocrine), ten (Musculoskeletal and joint disease), and thirteen (Skin).

Table 21 demonstrates that Chapters Four and Five were the chapters whose medications were prescribed the most commonly by trainees, being responsible for 201 and 183 prescription items respectively (19.6% and 17.8% of all 1028 prescription items). Table 22 and figure two show that total prescription numbers relating to medication from these two chapters were ranked as the first, second or third most frequently used chapters for all ten trainees. Most other chapters demonstrated wider variation in ranking position. For example, Chapter Two was responsible for the third highest number or prescription items (121 items: 11.8% of the total). More than 21% of trainee 1301's prescribing came from this chapter (23 items; 21.1%) whereas trainee 1901 only prescribed one item from this chapter (corresponding to 1% of their prescribing).

Table 22: Distribution of prescription items issued by BNF Chapter for each GP trainee demonstrating spread of individual trainee prescribing

	Number of items issued by individual GP trainees (% of their total prescribing)										
BNF Chapter	**1101**	**1201**	**1301**	**1401**	**1501**	**1601**	**1701**	**1801**	**1901**	**2001**	**Total items for each chapter**
One	7 (6.7)	10 (10.1)	13 (11.9)	7 (6.6)	12 (12.0)	8 (7.8)	5 (4.9)	15 (14.7)	20 (20)	15 (14.6)	112
Two	9 (8.6)	15 (15.2)	23 (21.1)	13 (12.3)	20 (20.0)	3 (2.9)	14 (13.7)	8 (7.8)	1 (1)	15 (14.6)	121
Three	5 (4.8)	2 (2.0)	5 (4.6)	15 (14.2)	10 (10.0)	10 (9.8)	5 (4.9)	7 (6.9)	1 (1)	5 (4.9)	65
Four	15 (14.3)	16 (16.2)	16 (14.7)	14 (13.2)	17 (17.0)	21 (20.6)	25 (24.5)	28 (27.5)	20 (20)	29 (28.2)	201
Five	17 (16.2)	23 (23.2)	18 (16.5)	23 (21.7)	14 (14.0)	19 (18.6)	16 (15.7)	14 (13.7)	23 (23)	16 (15.5)	183
Six	4 (3.8)	4 (4.0)	9 (8.3)	5 (4.7)	7 (7.0)	4 (3.9)	4 (3.9)	2 (2.0)	1 (1)	6 (5.8)	46
Seven	4 (3.8)	7 (7.1)	0 (0)	6 (5.7)	2 (2.0)	2 (2.0)	7 (6.9)	5 (4.9)	2 (2)	4 (3.9)	39
Eight	0 (0)	0 (0)	1 (0.9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1
Nine	2 (1.9)	0 (0)	2 (1.8)	1 (1.0)	1 (1.0)	1 (1.0)	0 (0)	1 (1.0)	1 (1)	0 (0)	9
Ten	2 (1.9)	2 (2.0)	11 (10.1)	4 (3.8)	4 (4.0)	12 (11.8)	3 (2.9)	10 (9.8)	12 (12)	6 (5.8)	66
Eleven	2 (1.9)	1 (1.0)	0 (0)	3 (2.8)	3 (3.0)	0 (0)	0 (0)	3 (2.9)	2 (2)	2 (1.9)	16
Twelve	4 (3.8)	2 (2.0)	3 (2.8)	5 (4.7)	7 (7.0)	7 (7.0)	0 (0)	7 (6.9)	4 (4)	1 (1.0)	40
Thirteen	32 (30.5)	17 (17.2)	8 (7.3)	10 (9.4)	2 (2.0)	15 (14.7)	23 (22.5)	2 (2.0)	12 (12)	4 (3.9)	125
Fourteen	0 (0)	0 (0)	0 (0)	0 (0)	1 (1.0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1
Fifteen	2 (1.9)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (1)	0 (0)	3
Total for each trainee	**105 (100)**	**99 (100)**	**109 (100)**	**106 (100)**	**100 (100)**	**102 (100)**	**102 (100)**	**102 (100)**	**100 (100)**	**130 (100)**	

Figure 2: Breakdown of Trainee prescribing by BNF Chapter



Characterisation of prescription items by BNF Section title

BNF chapters are subcategorised into sections, which contain drugs of a particular class such as 'corticosteroids' (BNF Section 3.2) or 'diuretics' (BNF Section 2.2).[88] Table 23 outlines all of the BNF sections that were represented by the 1028 prescription items reviewed. These data are not presented at the level of individual GP trainee due to the small numbers of prescription items represented in some of the sections. Antibacterial drugs (section 5.1) was the category of drugs that was responsible for the greatest number of prescription items reviewed (178 items: 17.3% of the 1028 total), with analgesics being the second most recorded drug category (92 items: 8.9% of the 1028 total).

Table 23: Frequency of all medications prescribed, grouped by BNF Section

BNF section	Section title	No. of items n	%
5.1	Antibacterial drugs	178	17.3
4.7	Analgesics	92	8.9
1.3	Antisecretory drugs and mucosal protectants	75	7.3
4.3	Antidepressant drugs	66	6.4
10.1	Drugs used in rheumatic diseases and gout	50	4.9
13.4	Topical corticosteroids	49	4.8
3.1	Bronchodilators	42	4.1
13.2	Emollient and barrier preparations	40	3.9
2.6	Nitrates, calcium-channel blockers, and other antianginal drugs	28	2.7
2.5	Hypertension and heart failure	25	2.4
2.12	Lipid-regulating drugs	20	1.9
1.6	Laxatives	19	1.8
6.3	Corticosteroids	19	1.8
7.3	Contraceptives	19	1.8
2.4	Beta-adrenoceptor blocking drugs	17	1.7
4.1	Hypnotics and anxiolytics	17	1.7
3.2	Corticosteroids	16	1.6
10.3	Drugs for the treatment of soft-tissue disorders and topical pain relief	16	1.6
2.9	Antiplatelet drugs	15	1.5
12.1	Drugs acting on the ear	15	1.5
13.10	Anti-infective skin preparations	14	1.4
12.2	Drugs acting on the nose	13	1.3
1.2	Antispasmodics and other drugs altering gut motility	12	1.2
2.2	Diuretics	12	1.2
6.1	Drugs used in diabetes	12	1.2
7.2	Treatment of vaginal and vulval conditions	12	1.2
12.3	Drugs acting on the oropharynx	12	1.2

Table continues on next page

BNF section	Section title	No. of items n	%
4.8	Antiepileptic drugs	11	1.1
11.3	Anti-infective eye preparations	10	1.0
4.6	Drugs used in nausea and vertigo	9	0.9
13.9	Shampoos and other preparations for scalp and hair conditions	9	0.9
7.4	Drugs for genito-urinary disorders	8	0.8
6.2	Thyroid and antithyroid drugs	7	0.7
6.4	Sex hormones	6	0.6
11.8	Miscellaneous ophthalmic preparations	6	0.6
13.6	Acne and rosacea	6	0.6
3.4	Antihistamines, hypersensitisations and allergic emergencies	4	0.4
9.6	Vitamins	4	0.4
13.7	Preparations for warts and calluses	4	0.4
1.7	Local preparations for anal and rectal disorders	3	0.3
2.8	Anticoagulants and protamine	3	0.3
3.3	Cromoglicate and related therapy, leukotriene receptor antagonists, and phosphodiesterase type-4 inhibitors	3	0.3
4.10	Drugs used in substance dependence	3	0.3
5.3	Antiviral drugs	3	0.3
9.2	Fluids and electrolytes	3	0.3
15.2	Local anaesthesia	3	0.3
1.1	Dyspepsia and gastro-oesophageal reflux disease	2	0.2
4.9	Drugs used in parkinsonism and related disorders	2	0.2
5.2	Antifungal drugs	2	0.2
9.1	Anaemias and some other blood disorders	2	0.2
13.8	Sunscreens and Camouflagers	2	0.2
1.4	Acute diarrhoea	1	0.1
2.11	Antifibrinolytics drugs and haemostatics	1	0.1
4.11	Drugs for dementia	1	0.1
6.5	Hypothalamic and pituitary hormones and anti-oestrogens	1	0.1
6.6	Drugs affecting bone metabolism	1	0.1
8.3	Sex hormones and hormone antagonists in malignant disease	1	0.1
13.12	Antiperspirants	1	0.1
14.4	Vaccines and antisera	1	0.1
	Total	**1028**	**100**

Pooled summary prescribing data for GP trainees is not available, but data for all Primary Care prescribing in England is published by NHS Digital.[104] Table 24 presents the ten most prescribed medication groups (by BNF section) for all Primary care (England) in 2015. The table permits comparison with data from the REVISiT study. For example, the most prescribed medication group for all primary care was BNF Section 2.5 (hypertension and heart failure medication): this was the tenth most prescribed medication group in the REVISiT study. Antibacterial drugs were the most prescribed medication group in the REVISiT study, accounting for 17.3% of all prescription items: they were only the eight most prescribed medication group nationally, accounting for 3.6% of all prescription items in this data set.[104]

Table 24: Comparison of the ten most commonly prescribed drug type (by BNF section) in England (2015 pooled primary care data) with REVISiT data

Prescribing rank order from national prescribing data (lower number = more commonly prescribed)	BNF section	BNF Section title	Number of items prescribed	% of total items		Corresponding rank order from REVISiT data	Corresponding % of total items from REVISiT data
1	2.5	Hypertension and heart failure	70,774,554	6.5		10	2.4
2	2.12	Lipid-regulating drugs	69,731,383	6.4		11	1.9
3	4.7	Analgesics	68,802,397	6.3		2	8.9
4	4.3	Antidepressant drugs	61,021,611	5.6		4	6.4
5	1.3	Antisecretory drugs and mucosal protectants	60,758,088	5.6		3	7.3
6	6.1	Drugs used in diabetes	49,109,354	4.5		25	1.2
7	2.6	Nitrates, calcium-channel blockers, and other antianginal drugs	47,812,419	4.4		9	2.7
8	5.1	Antibacterial drugs	39,363,789	3.6		1	17.3
9	2.9	Antiplatelet drugs	37,312,486	3.4		19	1.5
10	2.4	Beta-adrenoreceptor blocking drugs	35,947,962	3.3		15	1.7

Identification of prescribing errors

Now that the range of medication prescribed by the 10 GP trainees has been outlined, details regarding the prescribing errors uncovered by the process will be presented. All errors reported were in keeping with the case law created by the PRACtICe study, or as a result of a decision by the REVISiT study's prescribing review panel. Table 25 outlines the number of medications issued by each of the 10 GP trainees, along with the number of prescribing errors which resulted from issuing those medications. The average number of prescribing errors that were documented for each GP trainee was 9.2 (range 2 - 15; SD 4.02). The average rate of prescribing error for each GP trainee was 8.9% (range 2.0% – 14.7%; SD 3.86). Convention dictates reporting error rate in this manner, even though an individual prescription item may contain more than one error, and so the theoretical maximum error rate is greater than 100%.[9]

Table 25: Prescribing error summary data for each GP trainee

GP trainee number	Number of consultations reviewed	Number of consultations where one or more prescription items were issued	Number of prescription items reviewed	Number of prescribing errors	Prescribing error (as a percentage of total items reviewed)
1101	180	72	105	14	13.3%
1201	132	65	99	8	8.0%
1301	168	71	109	11	10.1%
1401	105	71	106	8	7.5%
1501	112	52	100	2	2.0%
1601	73	53	102	15	14.7%
1701	125	64	102	11	10.8%
1801	118	64	102	4	3.9%
1901	161	75	100	9	9.0%
2001	117	56	103	10	9.7%
Totals			**1028**	**92**	**8.9% (average)**

Table 26 provides information relating to the individual drugs involved with each of the prescribing errors. Their location within the BNF is displayed, so that drug categories can be seen. For each of the medications where an error was classified, the table also outlines the total number of times that a prescription item for that medication was reviewed as part of the project. This therefore provides information regarding the proportion of times that a particular medication had an error identified. Further details are also provided to indicate the numbers of GP trainees who were observed to have an error associated with a particular medication, and the number of patients who were issued with such medications. The actual errors that were uncovered will now be discussed in more detail.

The BNF chapter which contained medications with the greatest number of reported errors was Chapter 5: Infections. Medications in this chapter were responsible for 28 of the 92 errors reported (30.4%). The medication with the greatest number of reported errors from this chapter was amoxicillin, which had thirteen errors associated with it. These related to 13 different prescribing incidents involving 13 different patients. So amoxicillin prescriptions contained a prescribing error in 21.7% (13/60) of the episodes that it was prescribed during the study period. Seven of the ten GP trainees had at least one error relating to amoxicillin. Twelve of the 13 errors related to prescribing an inadequate dose of antibiotic for the age of the child being reviewed.[105] One error related to an inadequate quantity of amoxicillin liquid being prescribed for an elderly patient, with the amount of medication only due to last three days rather than the required seven days of the course of medication.[105]

Where errors were reported more than once for the other antibacterial medications outlined in table 26, more than one GP trainee had prescribed that medication with an error present. Of the three errors reported for clarithromycin prescriptions, one GP trainee had two separate errors relating to dosages (one dose being too low for an adult and another being too high for a child).[105] The remaining error relating to clarithromycin concerned inadequate follow-up where a patient had also been receiving warfarin. Guidance at the time would have recommended that the GP trainee highlight the potential interaction with warfarin and arrange appropriate INR monitoring and review.[106]

Two GP trainees had errors relating to co-amoxiclav prescriptions. One error related to an inadequately low dose being prescribed for a child,[105] and another related to a prescription of co-amoxiclav where at the time of prescribing, there was a sensitivity to co-amoxiclav recorded in the patient's notes. The review pharmacist noted that by the time the review was undertaken, this sensitivity had been removed by a different GP, but the review panel concurred that an error should still be recorded as the sensitivity alert would have been active at the time of prescribing, and this should have promoted a conversation with the patient, which should have been documented.

Two trainees had errors relating to erythromycin prescriptions. One error was due to prescribing an inadequate dose for a four-year-old child, and the other error related to providing inadequate quantity of medication to an adult.[105]

Four antibiotics had single errors associated with their use. Trainee 1601 prescribed flucloxacillin at a dose that was insufficient for the age of child to be treated.[105] Trainee 1501 included correct dosing instructions for a twenty-eight-day course of ciprofloxacin, but only prescribed sufficient medication for fourteen days. Similarly, trainee 2001 provided dosing instructions for phenoxymethylpenicillin of '1x5ml spoon 4 times/day for 10 days' but only supplied sufficient medication for five days. Metronidazole had been prescribed by trainee 1301 for a patient with diverticulitis, along with a prescription for co-amoxiclav. Guidance at the time would have advised a prescription for co-amoxiclav alone, or a prescription of ciprofloxacin and metronidazole.[105]

Two prescriptions for the antifungal drug, terbinafine, were issued by two different GP trainees, 1201 and 1701. Both medications were commenced without waiting for confirmation of infection as mandated by local antimicrobial guidance.[105] One of the three prescriptions issued for the antiviral medication, aciclovir was issued at the wrong dose. Trainee 1701 had prescribed aciclovir at a dose of 200mg five times per day, rather than

800mg five times per day. The former dose is used for treating *Herpes simplex*; the latter is used for treating *Herpes zoster*, which the patient was described as experiencing.[105]

The chapter with the next highest number of prescribing errors was Chapter 4: central nervous system. The medications within this chapter were implicated in 27 of the 92 errors (29.3%). Three GP trainees issued six prescriptions for paracetamol, each containing an error. Trainee 1601 issued three prescriptions for children with dose instructions of 'as directed', trainee 1901 issued a similar prescription with the same error type. Trainee 1701 issued two prescriptions for paracetamol tablets with the dose instructions '1-2 4 times/day' which the panel were concerned could be misinterpreted if directly transcribed to the medication packet.

This error was repeated by trainee 1701 for a prescription of co-codamol, and was also apparent on two co-codamol prescriptions issued by trainee 2001, and one prescription issued by trainee 1301. Trainee 2001 also made a similar error when issuing a prescription of co-dydramol. The two remaining errors relating to co-codamol were of the 'incorrect drug' category. Trainee 1701 had issued a prescription for one hundred co-codamol tablets to a patient with worsening arthritis. The same patient already had paracetamol listed on their repeat medication, which had last been issued two months previously. There was no documented conversation with the patient about avoiding concomitant use of medications containing paracetamol. Trainee 1401 prescribed a patient 100 co-codamol tablets at a dose of 'one to be taken four times a day'. The patient notes stated 'ibu not enough for pain…try pcm and ibu regularly with co-codamol when needed.' There was therefore the concern that the notes implied paracetamol could be taken in addition to co-codamol.

Sustained release morphine (in the form of *Zomorph* or *MST*) was issued five times by three GP trainees, resulting in three medication errors. The error recorded in GP trainee 1401's prescribing related to inadequate documentation. Twice daily 5mg doses of *MST* were prescribed for a patient who had been using oral morphine for neck pain. No

documentation of the patient's current use of immediate release morphine was documented, so there was no way of assessing if the very low starting dose of *MST* would provide sufficient analgesic cover. The review of trainee 1701's prescribing uncovered two medication errors for two different patients prescribed *Zomorph*. Trainee 1701 issued a third prescription for *Zomorph* which did not contain an error. Their first error related to a patient requesting analgesia for an acutely painful ankle. The patient already had repeat medication that included paracetamol and tramadol. There was no documentation regarding whether the patient should continue using tramadol in addition to the *Zomorph*. If the patient was to have stopped their regular tramadol, the dose of *Zomorph* prescribed was insufficient to give an equivalent analgesic effect to their prior tramadol use.[107] If the patient was to continue using the tramadol as well as the newly prescribed *Zomorph*, the use of two strong opioids in this situation would not usually be recommended. The other error from this trainee's prescribing also related to *Zomorph* being issued when there was continuing repeat prescribing of tramadol, with no documentation of appropriate discussion. Trainee 1801 issued a prescription for *Zomorph* which did not contain an error, but an error was contained within an opioid medication prescribed by that trainee for the same patient as outlined below.

A prescription for immediate release oral morphine liquid was issued on two occasions in the study period, resulting in three prescribing errors. Trainee 1801 issued a prescription to a patient with chronic pain with the dose instructions of '4ml as directed', with no indication of the maximum frequency that this dose could be used. Similarly, trainee 1101 issued a prescription of oral morphine with instructions of 'take 2.5-5ml as required' again with no indication of the intended frequency. A second error was coded for this prescription relating to the dose. The patient was experiencing pelvic pain in pregnancy and had previously been taking codeine phosphate. The dose of codeine that she had been taking was equivalent to 1.5-3mg of morphine;[107] the dose of oral morphine being prescribed was 5-10mg, and the documentation did not indicate that such a dose increase was intended. Note was also made by the review team that morphine crosses the placenta, so extra care needs to be taken when prescribing opioids in pregnancy.[108 109]

Three medication errors related to the prescribing of diazepam. These errors were all reported in the review of GP trainee 1601 and related to two prescriptions of diazepam. The first error related to inadequate dosage instructions. A patient, who was slowly weaning down their use of diazepam, and had previously been prescribed 'one tablet, twice daily and an extra one PRN' was prescribed 66 tablets with the instructions 'take one as needed.' This was considered to be an error due to inadequate information, and the potential for diazepam as a drug of abuse. The second prescription for diazepam contained two errors. The first again related to inadequate dosage instructions ('take one as needed'). The second error related to the absence of documentation regarding the rationale for prescribing diazepam in the consultation. This consultation was with a patient whose first language was not English, and who required an interpreter.

Unclear dosing instructions were responsible for the errors involving the tricyclic antidepressants *Alegron* and amitriptyline. Fifty-six 10mg tablets of *Alegron* were prescribed by trainee 1101 '2 tablets at night/day' which could be interpreted in different ways. Documentation in the notes did not clarify the prescriber's intention. In a different consultation, 168 10mg tablets of amitriptyline, were prescribed '2N and increase every week as needed'. Trainee 1401 had documented that the patient was currently taking 30mg of amitriptyline but did not amend the repeat medication template before issuing a script that had previously been issued. No mention was made of the need for further dose adjustments, or if there was a maximum dose that the patient should take.

Incorrect dosing was the reason for the error involving *Migraleve*. Twenty-four *Migraleve* pink tablets were prescribed by trainee 1601 'take two at onset, take two few hours later inb'. The product licence for this drug states that only two *Migraleve* pink tablets can be taken in a 24-hour period.[88] Incorrect drug choice was the reason behind the error involving trainee 1101's prescription for gabapentin. Their patient was experiencing musculoskeletal chest pains, which is not an indication for gabapentin.[88]

Chapter 13 (Skin) was the section of the BNF with the third highest number of reported prescribing errors (n=12; 13% of all errors). Three medications betamethasone valerate, *Dermovate* and *Canesten HC* were each the subject of two errors, reported in the prescribing of two different GP trainees. The other six medications from this chapter that were prescribed by trainees during the study period were each the subject of one error.

Trainee 1301 prescribed the potent topical steroid cream, betamethasone valerate, without adequate dosing instructions regarding frequency and area of use. Trainee 1901 prescribed the same cream for a two-year-old patient, where there had been no documented use of a less potent agent.[110] Similarly, the very potent steroid, *Dermovate*, was prescribed by trainee 1701, where the documentation would suggest that a less potent steroid cream should have been prescribed first.[110] This was also the same reason for the error in trainee 1101's prescription for the potent topical steroid, *Locoid*. In another consultation, Trainee 1101 prescribed *Dermovate* 'as directed', without providing clear dosing instructions. The error involved in trainee 1201's prescription of *Eumovate* was the absence of a concomitant emollient prescription, or appropriate emollient discussion.[110] Inappropriate prescribing of topical steroid was the reason for the error involving hydrocortisone. Trainee 1101 prescribed this medication as treatment for an infant with seborrheic dermatitis, when treatments such as olive oil and baby shampoo had not been discussed.[111]

Trainee 1101 and 1601 prescribed *Canesten HC* for the indication of vaginal thrush, without co-prescribing an intervaginal or oral antifungal agent. The *Canesten HC* would have provided symptom relief, but would not have adequately treated the vaginal thrush.[112] Note was also made that 1101's patient was 31 weeks pregnant. Trainee 1201 had prescribed some clotrimazole as treatment for a rash under a patient's breasts and on their abdomen. However, they issued a previous acute medication which stated, 'apply twice daily to groin area'.

The topical antifungal treatment, *Loceryl* was prescribed to a patient with discoloured toenails, without waiting for laboratory confirmation of a fungal infection.[105] One of the trainees who had prescribed terbinafine from chapter five, was the same trainee who prescribed *Loceryl*. Trainee 1701 erroneously prescribed *Solaraze* (diclofenac 3%) to be used by a patient with need of a topical anti-inflammatory agent. *Solaraze* is used for treatment of actinic keratosis.[88]

Chapter 3 (Respiratory system) had the fourth highest number of reported prescribing errors (n=6; 6.5% of all errors). Prescribing salbutamol was associated with three errors, each one was reported in the prescribing of a different GP trainee. Trainee 1601 issued an acute prescription for salbutamol, as well as issuing a repeat prescription for a *Ventolin* inhaler for the same patient. There was therefore a duplication in prescriptions, which could cause unnecessary confusion. No documentation was apparent regarding the duplication. Trainee 1301 conducted a telephone conversation with a patient requesting a repeat issue of their salbutamol inhaler because they had lost theirs. Although the issuing of such an inhaler seemed appropriate, no follow-up was arranged despite the patient having been issued with thirty-three salbutamol inhalers over the past twelve months, which could indicate poor asthma control.[113] Trainee 2001 issued a prescription for *Salamol Easi-breathe* along with a spacer device. This salbutamol inhaler is breath-activated, and cannot be used in conjunction with a spacer device. If use through a spacer device was required, a standard salbutamol metered-dose inhaler should have been prescribed.[88]

Two trainees each prescribed a prescription for *Clenil* which contained an error. Trainee 1101 switched a patient from *Flutiform* to *Clenil* at a time when their asthma was uncontrolled. The resultant *Clenil* prescription contained a steroid with only half the equivalent potency of the original *Flutiform*:[88] there was no documentation to explain this dose reduction. Changing from *Flutiform* to *Clenil* would also result in the loss of a long-acting beta agonist (LABA), the reason for which was also not documented. Trainee 1601 issued a prescription of *Clenil* to a patient awaiting spirometry with a presumed diagnosis of COPD. *Clenil* prescription was not first line management for the treatment of COPD.[88]

The other medication from this chapter that was associated with an error was *Spiriva Respimat*. Prescribing guidance at the time stated that this medication should only be prescribed if alternatives had been used, due to a risk of excess mortality with the use of *Spiriva Respimat*.[114] The notes from the patient reviewed by trainee 1401 did not show any prior alternative medication use.

Chapter one (Gastro-intestinal system) had the fifth highest number of prescribing errors (n=5; 5.4% of all errors). Two trainees each issued one prescription for the proton pump inhibitor, omeprazole which contained an error relating to dosing. Trainee 1101 had documented that a patient should 'increase omeprazole to 40mg" but the prescription issued was for "Omeprazole 20mg capsules – take one daily." Trainee 1801 had also planned for their patient to have an increase in dose from 20mg to 40mg, due to heartburn symptoms not being controlled on the 20mg dose. The prescription issued was, however "omeprazole 20mg capsules – take one daily (for indigestion to protect the stomach)". Looking at the drug status for these two prescriptions, trainee 1801 had re-issued a repeat medication, without altering the text or dose of the repeat medication, but trainee 1101 had issued a new acute medication. The other proton pump inhibitor medication highlighted in table 26 is Lansoprazole. This medication only had one error associated with it, from trainee 2001's review, which also related to a mismatch between the intended and prescribed dose.

The error associated with trainee 1301's prescription for *Peptac* related to inadequate dosing. The error relating to trainee 2001's prescription for *Pro-Banthine* related to unclear dosing.

Chapter 10 (Musculoskeletal and joint diseases) had the sixth highest number of prescribing errors (n=4; 4.3% of all errors). Trainee 1301 prescribed naproxen to a patient who had active asthma without documenting a discussion regarding the possibility of NSAIDs exacerbating asthma in some patients.[88] Trainee 1901 prescribed *Voltarol Emulgel* to a

patient who had previously experienced breathlessness after taking oral ibuprofen, and had a 'moderate allergy' to ibuprofen coded in their notes documenting this reaction. Trainee 1701 prescribed diclofenac to a patient with morbid obesity and hypertension, without documenting a discussion regarding the increased risk of thrombotic events for such patients taking diclofenac.[88] The trainee had also prescribed diclofenac for the same indication two months previously, and the patient had been taking the medication regularly. Trainee 1901 prescribed 20 tablets of colchicine to a patient without noting on the prescription that the maximum number of tablets that should be taken in one course of medication is 12.[88]

Chapter 6 (Endocrine) and Chapter 11 (Eye) each contained medications which were responsible for three medication errors (n=3; 3.2% of all errors). Only one medication from chapter 11 was prescribed by GP trainees. Trainee 1401 prescribed chloramphenicol to three different patients without providing adequate instructions on how the medication should be used, and in which eye. From chapter 6, one prescription of *Premarin*, *Desmotabs* and alendronic acid was issued during the study period, and each of these prescriptions contained an error. Trainee 1201 conducted a medication review and issued a prescription for *Premarin* to a 60-year-old patient, without documenting a discussion about the risks of continuing HRT in this age group.[88] Trainee 1301 prescribed *Desmotabs* to an 8-year-old child with dosage instructions of '200mcg – two to be taken at night.' The appropriate starting dose in this age group is 200mcg.[88] Patient notes contained documentation regarding starting medication at this lower dose, and then increasing to 400mcg if there was no effect, but the prescription did not represent this documented conversation. Trainee 1301 commenced alendronic acid for a new patient who had recently arrived from abroad, without documenting a discussion regarding the need to co-prescribe calcium and vitamin D.[88]

Chapter 2 (Cardiovascular system) and Chapter 12 (Ear, nose and oropharynx) each contained medications responsible for two errors (n=2; 2.0% of all errors). Trainee 1401 issued a prescription for propranolol with ambiguous dosing instructions 'take one when

needed, can increase to two or three if required'. Trainee 1501 prescribed *Tildiem Retard* without an appropriate risk review of the patient's clinical situation. Trainee 1101 prescribed a treatment course of *Naseptin* with the instructions of 'apply twice a day' when the correct instructions would have been to apply 4 times daily to each nostril for 10 days.[88] Trainee 2001 prescribed *Sofradex* without indicating how this should be used.

One medication from Chapter 9 (Nutrition and blood) was prescribed on three occasions during the study period. One error related to this medication (colecalciferol) was recorded in trainee 1101's prescriptions relating to inadequate dosing instructions.

Table 26: Details regarding medications prescribed with errors

Chapter and section of the BNF	Medication associated with an error	Number of times this was prescribed	Number of errors	Number of trainees issuing error medication	Number of prescription items with error(s)	Proportion of prescription items with error(s)
Chapter 1: Gastro-intestinal system Total errors: 5						
1.1 Dyspepsia and gastro-oesophageal reflux disease	*Peptac*	2	1	1 (1301)	1	1/2 (50%)
1.2 Antispasmodics and other drugs altering gut motility	*Pro-Banthine*	1	1	1 (2001)	1	1/1 (100%)
1.3 Antisecretory drugs and mucosal protectants	Lansoprazole Omeprazole	41 28	1 2	1 (2001) 2 (1101,1801)	1 2	1/41 (2.4%) 2/28 (7.1%)
Chapter 2: Cardiovascular system Total errors: 2						
2.4 Beta-adrenoreceptor blocking drugs	Propranolol	8	1	1 (1401)	1	1/8 (12.5%)
2.6 Nitrates, calcium channel blockers, and other antianginal drugs	*Tildiem Retard*	1	1	1 (1501)	1	1/1 (100%)
Chapter 3: Respiratory system Total errors:6						
3.1 Bronchodilators	Salbutamol *Spiriva Respimat*	30 1	3 1	3 (1301,1601, 2001) 1 (1401)	3 1	3/30 (10%) 1/1 (100%)
3.2 Corticosteroids	*Clenil Modulite*	10	2	2 (1101,1601)	2	2/10 (20%)

Table continues on next page

Chapter and section of the BNF	Medication associated with an error	Number of times this was prescribed	Number of errors	Number of trainees issuing error medication	Number of prescription items with error(s)	Proportion of prescription items with error(s)
Chapter 4: Central nervous system Total errors: 27						
4.1 Hypnotics and anxiolytics	Diazepam	8	3	1 (1601)	2	2/8 (25%)
4.3 Antidepressant drugs	Amitriptyline *Allegron* Citalopram	16 1 29	1 1 1	1 (1401) 1 (1101) 1 (1301)	1 1 1	1/16 (6.3%) 1/1 (100%) 1/29 (3.4%)
4.7 Analgesics	Paracetamol Co-codamol Co-dydramol Migraleve Zomorph/MST Oral morphine Tramadol	26 19 1 3 5 2 7	6 5 1 1 3 3 1	3 (1601,1701,1901) 4 (1301,1401,1701, 2001) 1 (2001) 1 (1601) 2 (1401, 1701) 2 (1101,1801) 1 (1601)	6 5 1 1 3 2 1	6/26 (23.1%) 5/19 (26.3%) 1/1 (100%) 1/3 (33.3%) 3/5 (60%) 2/2 (100%) 1/1 (100%)
4.8 Antiepileptics	Gabapentin	8	1	1 (1101)	1	1/1 (100%)
Chapter 5: Infections Total errors: 28						
5.1 Antibacterial drugs	Amoxicillin Flucloxacillin Phenoxymethylpenicillin Clarithromycin Erythromycin Co-amoxiclav Ciprofloxacin Metronidazole	60 27 18 18 6 7 1 4	13 1 1 3 2 2 1 1	7 (1101,1201,1301, 1601,1801,1901,2001) 1 (1601) 1 (2001) 2 (1201,2001) 2 (1301,1601) 2 (1101,1901) 1 (1501) 1 (1301)	13 1 1 3 2 2 1 1	13/60 (21.7%) 1/27 (3.7%) 1/18 (5.6%) 3/18 (16.7%) 2/6 (33.3%) 2/7 (28.6%) 1/1 (100%) ¼ (25%)
5.2 Antifungal drugs	Terbinafine	2	2	2 (1201,1701)	2	2/2 (100%)
5.3 Antiviral drugs	Aciclovir	3	1	1 (1701)	1	1/3 (33.3%)

Table continues on next page

Chapter and section of the BNF	Medication associated with an error	Number of times this was prescribed	Number of errors	Number of trainees issuing error medication	Number of prescription items with error(s)	Proportion of prescription items with error(s)
Chapter 6: Endocrine Total errors:3						
6.4 Sex hormones	*Premarin*	1	1	1 (1201)	1	1/1 (100%)
6.5 Hypothalamic and pituitary hormones and anti-oestrogens	*Desmotabs*	1	1	1 (1301)	1	1/1 (100%)
6.6 Drugs affecting bone metabolism	Alendronic acid	1	1	1 (1301)	1	1/1 (100%)
Chapter 9: Nutrition and blood Total errors: 1						
9.6 Vitamins	Colecalciferol	3	1	1 (1101)	1	1/1 (100%)
Chapter 10: Musculoskeletal and joint diseases Total errors: 3						
10.1 Drugs used in rheumatic diseases and gout	Colchicine Diclofenac sodium Naproxen	1 3 30	1 1 1	1 (1901) 1 (1701) 1 (1301)	1 1 1	1/1 (100%) 1/1 (100%) 1/1 (100%)
10.3 Drugs used for the treatment of soft-tissue disorders and topical pain relief	*Voltarol Emulgel*	5	1	1 (1901)	1	1/1 (100%)
Chapter 11: Eye Total errors: 3						
11.3 Anti-infective eye preparations	Chloramphenicol	10	3	1 (1401)	3	3/10 (30%)
Chapter 12: Ear, nose and oropharynx Total errors: 2						
12.1 Drugs acting on the ear	Sofradex	3	1	1 (2001)	1	1/3 (33.3%)
12.2 Drugs acting on the nose	Naseptin	1	1	1 (1101)	1	1/1 (100%)

Table continues on next page

Chapter and section of the BNF	Medication associated with an error	Number of times this was prescribed	Number of errors	Number of trainees issuing error medication	Number of prescription items with error(s)	Proportion of prescription items with error(s)
Chapter 13: Skin **Total errors: 12**						
13.4 Topical Steroids	Betamethasone Valerate *Dermovate* *Eumovate* Hydrocortisone *Locoid* *Canesten HC*	7 2 11 8 1 8	2 2 1 1 1 2	2 (1301,1901) 2 (1101,1701) 1 (1201) 1 (1101) 1 (1101) 2 (1101,1601)	2 2 1 1 1 2	2/7 (28.6%) 2/2 (100%) 1/11 (9.1%) 1/8 (12.5%) 1/1 (100%) 2/8 (25%)
13.8 Sunscreens and camouflages	*Solaraze*	1	1	1 (1701)	1	1/1 (100%)
13.10 Anti-infective skin preparations	*Loceryl* Clotrimazole	1 6	1 1	1 (1701) 1 (1201)	1 1	1/1 (100%) 1/6 (16.7%)
Chapter 9: Nutrition and blood **Total errors: 1**						
9.6 Vitamins	Colecalciferol	3	1	1 (1101)	1	1/1 (100%)
Totals		**496**				**92**

Table 27 summarises the types of prescribing error responsible for each of the 92 errors. The most common error was that relating to the dose or strength of a medication prescribed (n=30, 32.6% of all prescribing errors). Examples of this error included prescribing an inappropriate dose of antibiotics for the indication or age of the patient, or prescribing a dose of medication that was not in keeping with the narrative within a consultation. The second most common error type observed related to providing incomplete or inadequate information on the prescription (n=24; 26.1% of all errors). Examples of this error type included the provision of nonspecific dosage instructions for potent steroid creams, and antibiotic eye drops where there could be confusion regarding their use.

Table 27: Summary of error type for all the documented prescribing errors

Types of prescribing errors	**No. of events n (%)**
Unnecessary drug	5 (5.4)
Incorrect drug	7 (7.6)
Duplication	5 (5.4)
Allergy error	1 (1.1)
Contraindication error	3 (3.3)
Interaction error	1 (1.1)
Dose/strength error	30 (32.6)
Formulation error	2 (2.2)
Frequency error	1 (1.1)
Information incomplete	24 (26.1)
Omission error relating to failure to prescribe concomitant treatment	5 (5.4)
Inadequate documentation in medical records	3 (3.3)
Quantity error	3 (3.3)
Inadequate review	2 (2.2)
Total	**92 (100.0)**

Identification of suboptimal prescribing

A total of 360 episodes of suboptimal prescribing were identified from the 1028 items reviewed; this represented a suboptimal prescribing rate of 35%. As was the case with error rate, the convention is to report suboptimal error rate in this way, even though an individual prescription item may contain more than one episode of suboptimal prescribing.[9] Table 28 outlines the number of episodes of suboptimal prescribing for each of the ten GP trainees. The range of the number of episodes of suboptimal prescribing reported for each GP trainee was 17 to 83 (mean 36, SD 17.9). The range of the suboptimal prescribing rate was 16.5% to 81.3% (mean 35.0%, SD 17.5). Table 28 also demonstrates the previously reported prescribing error rate for each of the trainees. Two trainees had error rates and suboptimal prescribing rates that were both above the average rates (1101 and 1601). Two trainees had error rates and suboptimal prescribing rates that were both below the average rates (1201 and 1801). Four trainees had suboptimal prescribing rates that were below the average rate, and error rates that were above the average rates (1301, 1701, 1901, 2001). One trainee had a suboptimal prescribing rate that was below the average rate, and an error rate that was above the average rate (1401).

Within the 360 episodes of suboptimal prescribing, there was one episode of a 'legal problem'. Although 'legal problem' was initially envisaged to be a separate category to prescribing error and suboptimal prescribing, for ease of reporting, the legal problem was included within the suboptimal prescribing category. Indeed, a legal problem would be in keeping with the definition provided for suboptimal prescribing, namely situations which did not meet the strict definition of an error, but which nevertheless 'represented less than ideal practice.'[9] The actual episode of legal problem was one of the forty-one episodes of suboptimal prescribing uncovered in trainee 1101's review. Eight packets of malathion aqueous liquid had been included in a single child's prescription, with the aim of providing enough malathion for treating an entire family. The trainee should have provided an individual prescription for each member of the family to ensure that accurate medication records are maintained for all parties.[115]

Table 29 categorises each of the trainee's suboptimal prescribing into the seven subcategories that were reported back to trainees. Full details of suboptimal prescribing examples can be found in the case law in Appendix three.

Most of the suboptimal prescribing came under the category of 'instructions' (n=132; 36.7% of all suboptimal episodes). Forty-nine of these (49/132 = 37.1%) came from the prescribing of trainee 1601. Most of these episodes related to the way in which this trainee's prescription instructions contained additional wording which could cause confusion. For example in a prescription for the analgesia *Zapain*, the instructions were 'take take one or take two tablets take four times/day when required'. For ibuprofen gel, the instructions were 'apply Take Three times/day'. For *Difflam* mouth wash, the instructions were '15ml every take three hours'. For the inhaler, *Clenil*, the instructions were 'inhale take two puffs twice a day'. As these additional words were consistent throughout trainee 1601's prescribing, there were multiple episodes of suboptimal prescribing for this trainee. Other examples of suboptimal prescription instructions from other trainees included prescribing low-risk medications such as emollients 'as directed', not documenting the eye of use for chloramphenicol eye drops in a young adult, prescribing medication such as steroid tablets without specifying that they should be taken in the morning, and providing additional prescribing information for an antibiotic like 'take two hours after food' when the prescription's information leaflet would contradict such information by saying 'take with food.'

The next most common subcategory of suboptimal prescribing related to trainees prescribing the incorrect formulation or quantity of a medication. Examples of this category include prescribing a seven day course of antibiotics, when a shorter (or longer) one would usually be recommended;[105] providing six months' worth of medication to an individual travelling, when only three is permitted according to NHS regulations;[116] prescribing branded medication or capsules, when a generic or tablet form would be more cost effective;[117] prescribing nine months of an oral contraceptive pill, when a supply of six

months had been documented in the notes; prescribing a combination of two low-dose tablets or patches to make a higher total dose when the higher total dose is available in a patch or tablet of its own;[88] and prescribing repeat-medication for different durations within the same consultation (for example prescribing 56 days of one medication, when all of the other repeat medications were aligned to a 28-day supply). The legal problem related to multiple malathion prescriptions was also included in this subcategory.

Providing inadequate documentation was the next most frequent variety of suboptimal prescribing. Fifty-one episodes of this were recorded, which was 14.2% of all suboptimal prescribing. In some cases, this referred to use of the computer system. For example, writing up a home visit in the notes retrospectively and entering comment regarding a hand-written prescription for antibiotics in the free-text of the consultation notes, rather than in the medication section; writing an allergy in the free-text of the consultation without providing an appropriate allergy Read code; and prescribing a medication that had been prescribed multiple times before, but not removing an erroneous allergy Read code. Other examples of this category of suboptimal prescribing included issuing medication without documenting anything relating to that medication in the consultation notes. Examples of medications that were issued in this way included salbutamol, nicotine replacement therapy, emollients, paracetamol, *Daktacort*, senna and benzydamine mouth wash.

The right drug and right dose category were the next most frequent subcategories of suboptimal prescribing, with fifty episodes each (50/360= 13.8% of all suboptimal prescribing). Examples from the right drug category included prescribing second line antibiotics when the first line medication would be appropriate; prescribing medication such as antibiotics or emollient which would be appropriate choices, but not contained within local formularies; prescribing low-risk medication off-licence (for example giving ketoconazole to a nine year old, when it is only licenced for use in patients over the age of twelve);[88] co-prescribing a topical and systemic NSAID in a low-risk patient; and prescribing delayed antibiotics for a low-risk patient presenting with a viral upper respiratory tract infection. Examples of suboptimal dosing included providing too low a dose of medication

(for example 500mg doses of paracetamol being prescribed to an adult rather than 1g doses); prescribing unnecessarily high doses of a low-risk medication (such as 30mg of lansoprazole, when 15mg would suffice)[88] or 4 puffs of a salbutamol inhaler rather than two, or two to three sprays of *Otomize* to the ear rather than one spray);[88] prescribing an effective dose that is different from what the local formulary outlines (for example prescribing the antibiotic cefalexin three times daily for a urine infection when the formulary states a twice daily dose)[105] or deviating from other prescribing guidance (for example prescribing prednisolone 40mg daily for five days for a COPD exacerbation, when local and national guidance recommend 30mg daily for 7 days).[88]

The next most frequently observed suboptimal prescribing related to inadequate review of a patient or their medication. An example of this related to a five-year-old consulting with viral wheeze being issued with two *Clenil Modulite* inhalers (100 mcg – one puff twice daily). Seven inhalers had been issued to the patient over the course of the year, which at the stated dose would be sufficient for more than three years of use. No details regarding the current use of *Clenil*, or the possibility of a dose increase, were documented in the consultation. Another example of inadequate review was where a trainee had recorded that a medication review had taken place, but the consultation notes did not mention any items relating to the medication that was then issued. Medications that were issued after such a review included bendroflumethiazide, lansoprazole and the oral contraceptive pill, *Marvelon*.

Six episodes of suboptimal prescribing related to an omission concern, where additional expected therapy was not prescribed. This represented 1.6% of all suboptimal prescribing. Examples of this included prescribing analgesic medication such as codeine or tramadol without discussion or issue of a medication such as paracetamol.[107] Another episode of suboptimal prescribing related to the absence of a prescription for salbutamol for a patient who had been prescribed the reliever inhaler, *Symbicort* 400, who did not have a salbutamol inhaler on their repeat medication list, and who had not been prescribed a reliever medication for more than a year.[88]

Table 28: Details regarding the suboptimal prescribing of GP trainees

GP trainee number	Number of consultations reviewed	Number of consultations where one or more prescription item was issued	Number of prescription items reviewed	Number of episodes of suboptimal prescribing	Suboptimal prescribing (as a percentage of total items reviewed)	Prescribing error rate
1101	180	72	105	41	39.0%	13.3%
1201	132	65	99	31	31.0%	8.0%
1301	168	71	109	31	28.4%	10.1%
1401	105	71	106	40	37.7%	7.5%
1501	112	52	100	28	28.0%	2.0%
1601	73	53	102	83	81.4%	14.7%
1701	125	64	102	34	33.3%	10.8%
1801	118	64	102	31	30.0%	3.9%
1901	161	75	100	24	24.0%	9.0%
2001	117	56	103	17	16.5%	9.7%
Totals (where appropriate)			**1028**	**360**	**35.0% (average)**	**8.9% (average)**

Table 29: Subcategories of suboptimal prescribing

GP trainee	Drug	Form/ quantity	Dose	Instructions	Documentation	Omission	Review	Total	Suboptimal prescribing rate
1101	5	4	2	28	2	0	0	41	39.1%
1201	3	8	2	7	7	1	3	31	31.3%
1301	7	5	4	9	6	0	0	31	28.4%
1401	7	5	11	11	6	0	0	40	37.7%
1501	2	12	2	6	6	0	0	28	28.0%
1601	7	7	7	49	10	0	3	83	81.4%
1701	8	9	3	4	6	4	0	34	33.3%
1801	5	5	6	9	4	1	1	31	30.4%
1901	5	3	12	3	0	0	1	24	24.0%
2001	1	5	1	6	4	0	0	17	16.5%
Totals	**50**	**63**	**50**	**132**	**51**	**6**	**8**	**360**	**35.0% (average)**

Exploration of factors which could have an influence on prescribing errors and suboptimal prescribing.

Numbers recruited were too small to be able to meaningfully perform inferential statistics. Descriptive statistics are, however, presented for error and suboptimal prescribing rate, with respect to gender and computer system used. Fifty percent of participants were male (and 50% female), and 50% of participants were based in practices which used SystmOne, with the other 50% employing EMIS Web. Any interpretation of these descriptive statistics should be caveated with the impact of compounding factors, which would likely have an influence of the validity of conclusions from a data set of this size.

Table 30 presents the error rate and suboptimal prescribing rate for each of the ten GP trainees, along with their gender, and the name of the IT system used in the practice they were located within during the study. Table 31 presents the pooled prescribing error rates and suboptimal prescribing rates for male and female GP trainee participants, and then for those using Emis Web and *SystmOne*.

Table 30: Prescribing error rate and suboptimal prescribing rate for each GP trainee presented with trainee gender and practice computer system used

GP trainee participant number	Gender	IT system used	Prescribing error (as a percentage of total items reviewed)	Suboptimal prescribing (as a percentage of total items reviewed)
1101	Male	*SystmOne*	13.3%	39.0%
1201	Female	EMIS Web	8.0%	31.0%
1301	Female	EMIS Web	10.1%	28.4%
1401	Male	EMIS Web	7.5%	37.7%
1501	Male	EMIS Web	2.0%	28.0%
1601	Female	*SystmOne*	14.7%	81.4%
1701	Male	EMIS Web	10.8%	33.3%
1801	Female	*SystmOne*	3.9%	30.0%
1901	Male	*SystmOne*	9.0%	24.0%
2001	Female	*SystmOne*	9.7%	16.5%

Table 31: Summary of Prescribing error rate and suboptimal prescribing rate for male v female prescribers, and users of Emis Web v users of SystmOne

Classification of prescribing issue	% of prescribing associated with that prescribing issue (all participants) N=10	% of prescribing associated with that prescribing issue for male prescribers n=5	% of prescribing associated with that prescribing issue for female prescribers n=5	% of prescribing associated with that prescribing issue for users of Emis web n=5	% of prescribing associated with that prescribing issue for users of *SystmOne* n=5
Prescribing error	**8.9%** (range 2.0% -14.7%; SD 3.86)	**8.5%** (range 2.0% -13.3%; SD 4.2)	**9.3%** (range 3.9% – 14.7%; SD 3.9)	**7.7%** (range 2.0% - 10.8%; SD 3.4)	**10.1%** (range 3.9% – 14.7%; SD 4.2)
Suboptimal prescribing	**35%** (range 16.5%-81.3%; SD 17.5)	**32.4%** (range 24% - 37.7%; SD 6.4)	**37.5%** (range 16.5% - 81.4%; SD 25.2)	**31.7%** (range 28.0% - 37.7%; SD 4.0)	**38.1%** (range 16.5% - 81.4%; SD 25.5)

The data in table 31 shows that the average prescribing error rate for the five male participants was 8.5%: lower than that for the five female participants (9.3%). Likewise, the average suboptimal prescribing rate for the five male participants was lower than that of the female participants (32.4% v 37.5%). It should be noted that there was overlap of standard deviations. The data in table 31 also shows that the prescribing error rate was higher among GP trainees who were using *SystmOne* (10.1% v 7.7%), as was the suboptimal prescribing rate (38.1% v 31.7%). Again, there was overlap of standard deviations.

The use of medication reviews by the GP trainees

As the study pharmacist reviewed the consultations containing medications which had been prescribed, note was also made of consultations which were Read-coded as containing a medication review. Some of the medication that was reviewed by the GP trainees was actually then issued during the review consultations. These medications have already been presented as part of the prescribing data. Any medication which had been reviewed by the GP trainee, but not actually prescribed, was then scrutinised to the same standard as if it had been part of the 100 prescription-item review.

Table 32 outlines the number of consultations that had been Read-coded by the GP trainees as having included a medication review. The number of medications that were reviewed, along with data relating to suboptimal and erroneous review are then presented. All the GP trainees conducted at least one medication review during the study period. The number of a trainee's consultations containing a medication review ranged from one to fifteen, with a medication review therefore being a feature of between 1.2% and 12.8% of their consultation set (average 5.1%, SD 4.3%). The total number of consultations containing a medication review was 63, and the total number of medications reviewed by all ten GP trainees was 259. One hundred and six of these medications were then issued by the trainees during the medication review consultation. This left 153 medications which were reviewed, but not issued by the trainees. Scrutiny of these medications revealed six episodes of error, and 50 episodes of suboptimal review. This represents a cohort suboptimal review rate of 32.7% and a cohort review error rate of 3.9%.

Table 33 presents the six review errors by their subtype, and the particular GP trainee's consultations that the review errors were found within. Five of the errors related to inadequate review of the repeat medications as a whole. Trainee 1101 had reviewed the medication dosulepin, at a dose of 75mg, three at night. This is a relatively high dose of medication, which the BNF recommends for use only 'in some circumstances (e.g. hospital use).'[88] This particular patient was no longer under the care of the mental health team, and

dosulepin had not actually been mentioned in the clinical notes for the preceding ten years. A community pharmacy medication review from a few months before the trainee's medication review had commented on the patient's poor compliance with medications, indicating that the patient often forgot to take their Dosulepin, and would also sometimes take more than three tablets in one day. Trainee 1101 also reviewed the medication ramipril in a different consultation. This patient had a high cardiac risk, but was not prescribed a statin medication. A clinical entry prior to the medication review stated 'unclear why not on statin. I will discuss next week' but no mention of this discussion is contained within the medication review consultation.

Trainee 1501 saw a patient for a medication review three days after they had been discharged from hospital where they had been recovering from a myocardial infarction. The trainee correctly prescribed the secondary medication that had been initiated in hospital, but did not continue prescribing the nicotine replacement patches that were also initialled in hospital. The patient was previously documented as being a heavy smoker, but no documentation of smoking or smoking cessation was included in the medication review consultation.

Trainee 2001 reviewed a patient who had a history of a cerebrovascular accident (CVA) and was receiving the medication aspirin. Prescribing guidance would have recommended clopidogrel as the preferred drug choice over aspirin alone for patients post CVA.[88] Trainee 2001 also conducted a medication review for an 81-year-old lady with good renal function and a history of hypertension. The reviewed medication included ibuprofen at a dose of 400mg, three times daily. No mention was made of co-prescribing a gastro-protective medication such as lansoprazole, which in a patient in this age group would be recommended.[88] Trainee 2001 also had a review error relating to medication instructions. Paracetamol had been included in the review medication section, with the dosing instructions of 'take 2 4 times/day'.

Table 34 provides further details on the 50 episodes of suboptimal review, by categorising these episodes in the categories that were presented to the trainees for feedback. Most of the suboptimal review (35/50; 70%) related to inadequate review of the patient. Table 35 outlines the sort of issues that were described as inadequate review, and gives examples of these issues. Six episodes of suboptimal review (6/50; 12%) related to dosing instructions. Examples in this category included the use of Latin short-codes and 'as directed'. Five episodes of suboptimal review (5/50; 10%) related to the form or quantity of the medication. Examples of this included issuing more than one inhaler or device (such as a salbutamol inhaler) when the review details may suggest that one should suffice, and non-alignment of collection-day total (for example one medication in a review-set having sufficient quantity to last 56 days, while the others on the same repeat list having only 28 days). Four of the suboptimal review episodes (4/50 = 8%) related to the dose of medication. An example of this was prescribing the diuretic, furosemide as 'one daily' rather than directing use to the morning.

Table 32: Summary of recorded medication reviews

GP trainee number	Number of consultations reviewed	Number of consultations where a mediation review had been conducted	Number of medications reviewed	Number of medications reviewed and NOT prescribed	Number of episodes of suboptimal reviewing (and demonstrated as a percentage of items reviewed)	Number of episodes of review errors
1101	180	4	13	10	5 (50)	2 (20)
1201	132	9	52	27	12 (44)	0 (0)
1301	168	2	6	2	1 (50)	0 (0)
1401	105	2	5	2	2 (100)	0 (0)
1501	112	14	60	38	7 (18)	1 (3)
1601	73	1	1	0	N/A	N/A
1701	125	4	10	6	2 (33)	0 (0)
1801	118	5	13	6	1 (17)	0 (0)
1901	161	7	12	7	2 (29)	0 (0)
2001	117	15	87	55	18 (33)	3 (5)
Totals	**1291**	**63**	**259**	**153**	**50**	**6**

Table 33: Summary of medication review errors

GP trainee	Number of errors relating to 'Instructions'	Number of errors relating to 'Review'	Total number of medication review errors
1101		2	2
1201			
1301			
1401			
1501		1	1
1601			
1701			
1801			
1901			
2001	1	2	3
Totals	**1**	**5**	**6**

Table 34: Categories of suboptimal review

GP trainee	Form/ quantity	Dose	Instructions	Review	Total number of episodes of suboptimal review	Total number of medications reviewed and not prescribed
1101	2	1	1	1	5	10
1201	2		2	8	12	27
1301				1	1	2
1401				2	2	2
1501		1	2	4	7	38
1601					0	0
1701		1		1	2	6
1801		1			1	6
1901			1	1	2	7
2001	1			17	18	55
Total	**5**	**4**	**6**	**35**	**50**	**153**

Table 35: Examples of suboptimal review category

Type of suboptimal review	Examples of such review
Medication no longer required	• Testing strips for a particular device that was no longer used. • *Fortisip* nutritional supplement (advice from dietetics to change this not acted on) • Medication not redeemed for several years (e.g. Emollients, hay fever medication, mefenamic acid) • Ferrous Fumarate remaining on repeat list despite normal Hb recorded in notes and no recent redemption.
Monitoring not completed	• lack of digoxin levels in a patient with an EGFR of 30
Planned change in medication not actioned	• Planned change in antidepressant medication documented, but original medication remaining on repeat list.
Incorrect medication not changed	• Aspirin remaining on repeat profile despite its use for primary prevention alone no longer being recommended, or its use in AF being superseded by anticoagulant therapy.
Not adequately reviewing compliance	• Collection history for a drug suggesting that a patient had not been taking their prescribed dose every day (examples of asthma and depression)
Duplicate medication on repeat list	• *Vagifem* pessary 25mcg on repeat as well as estradiol 10mcg pessary which are the same product in different strengths. (*Vagifem* 25mcg pessaries had been discontinued by the manufacturer)

Recommendation of Over-the-Counter medications

As part of the study process, note was made of any recommendations that the GP trainees had made for their patients to buy over-the-counter (OTC) medications. The data from table 36 demonstrates that nine out of the 10 GP trainees made at least one recommendation for OTC medication during the consultations that were reviewed. For those nine, the number of individual recommendations made ranged from three to forty-two (mean 14.9; SD 11.0) A total of 134 recommendations for OTC medication were made in 102 consultations. Consultations where an OTC recommendation was made represented 7.9% of all consultations reviewed (102/1291).

Table 37 outlines the range of OTC recommendations that were made. Most were specific recommendations such as 'folic acid or 'chloramphenicol' but some were more non-specific such as 'drowsy antihistamines' or 'topical NSAIDs'. The medication with the most recommendations was paracetamol (65/134 = 48.5% of all recommendations). This recommendation was sometimes in the form of the brand *Calpol*. The second most common OTC recommendation was for ibuprofen or the less specific OTC NSAID (41/134 = 30.6% of all recommendations.)

Two episodes of error were reported. The first concerned a recommendation for Ibuprofen to be purchased as treatment for a headache. The patient was asthmatic, with no previously documented use of NSAIDs. The consultation containing the recommendation did not contain warning to the patient regarding the possibility of increased breathlessness.[88] Indeed, it was noted that the patient returned three days after this consultation with a presenting complaint of increased breathlessness, but it was unclear if the recommended NSAIDs was implicated. The second reported error related to a recommendation for the use of topical NSAIDs on an area of impetigo on a person's face. The use of topical NSAIDs is not recommended on broken skin.[88]

The three episodes of suboptimal recommendation related to concomitant use of more than one type of antihistamine, and use of ibuprofen in an asthmatic patient where previous use of NSAID had been apparent, but no documentation of the potential interaction was made during the consultation.

Table 36: Summary of Over-the-Counter recommendations

GP trainee number	Number of consultations reviewed	Number of consultations where an OTC recommendation occurred	Number of actual OTC recommendations	Number of episodes of suboptimal recommendation (demonstrated as a percentage of OTC recommendations)	Number of episodes of recommendation errors (demonstrated as a percentage of OTC recommendations
1101	180	9	12	1 (8.3)	0 (0)
1201	132	8	9	0 (0)	0 (0)
1301	168	9	14	0 (0)	0 (0)
1401	105	2	3	0 (0)	0 (0)
1501	112	7	10	0 (0)	0 (0)
1601	73	0	N/A	N/A	N/A
1701	125	12	18	1 (6)	0 (0)
1801	118	10	13	0 (0)	0 (0)
1901	161	34	42	0 (0)	1 (2)
2001	117	11	13	1 (8)	1 (8)
Totals	**1291**	**102**	**134**	**3**	**2**

Table 37: Details of the types of over-the-counter recommendations

BNF Chapter	Medication	1101	1201	1301	1401	1501	1601	1701	1801	1901	2001	Total
1	Gaviscon		1								1	**2**
1	Imodium		1									**1**
3	Cetirizine	1		1								**2**
3	*Piriton* or chlorpheniramine	1						2				**3**
3	'Drowsy antihistamines'								1			**1**
4	Aspirin							1				**1**
4	Paracetamol or *Calpol*	7	4	7	1	5		4	9	22	6	**65**
4	Co-codamol 8/500							1				**1**
9	Oral Rehydration salts		1									**1**
9	Folic Acid			1								**1**
10	Ibuprofen or OTC NSAID	2	1	5	2	3		3	3	16	6	**41**
10	Topical NSAIDs							3				**3**
11	Chloramphenicol					1						**1**
11	*Viscotears*									1		**1**
13	*Difflam* mouth wash					1		2				**3**
13	Olive oil	1	1					1		3		**6**
13	*Ear Calm*							1				**1**
Total		**12**	**9**	**14**	**3**	**10**	**0**	**18**	**13**	**42**	**13**	**134**

Celebrating good prescribing technique

As part of the review process, the study pharmacist was directed to highlight aspects of good prescribing that would benefit from being fed back to the trainee. Such good prescribing was not subject to the same case-law and panel scrutiny that prescribing errors and suboptimal prescribing underwent. Indeed, the aim was not to form a tally of such practice, but more to highlight aspects of good practice through the medium of specific examples. Table 38 summarises the categories of good prescribing that were fed back to trainees and demonstrates that each trainee had areas of good practice to be celebrated. Full details of all aspects of good prescribing fed back to trainees is shown in Appendix Seven.

Table 38 demonstrates that the most commonly highlighted good practice related to the use of good documentation (n=16, 29% of good practice highlighted). Examples of this included trainee 1101 clearly documenting the fact that they had discussed side effects and potential interactions when they commenced their patient on gabapentin. As well as documenting possible concerns with the patient's warfarin, they also noted that they would contact the anticoagulation team to update them on a change of medication. Such comprehensive documentation would help colleagues to understand what had happened in the consultation, and how prescribing decisions had been defended.

The second most highlighted area of good practice related to good instructions on the actual prescription (n=12, 21% of good practice highlighted). An example of this was trainee 1501 clearly indicating on the prescription how their patient should taper down, and then stop their dose of the antidepressant, Citalopram. The trainee had also prescribed the correct number of tablets that would be needed to follow these instructions.

Prescribing the 'right drug' was celebrated in 11 out of the 56 episodes of reported good practice (n=11, 20%). Trainee 1801's provision of the progesterone only pill, *Cerazette* was

an example of this. The patient had newly consulted with migrainous symptoms and had been started on sumatriptan. The trainee had noticed that the patient was currently receiving a combined oral contraceptive pill, and so changed this to *Cerazette* because of the new diagnosis of migraine.

The next most common area of good practice to be highlighted (n=6, 11%) related to formulation or quantity. Examples of this included where a trainee had correctly supplied the amount of medication that would be required for a child to complete a ten-day course of penicillin liquid.

The fifth most highlighted good practice area related to medication dose (n=5, 9% of good prescribing practice). Examples of this included the correct dosing of paracetamol and antibiotics in very young children.

The next most highlighted area of good practice was jointly the two categories of review and follow-up, both with three examples highlighted (n=3; 5% of good practice highlighted). Trainee 1401 had conducted a medication review which included aspirin. The trainee noted some non-adherence with the medication: the patient had not realised they were supposed to be taking this medication. Clinic letters confirmed that the patient needed to continue with aspirin for two years. Trainee 1701 had prescribed ramipril and correctly highlighted that the U and E blood monitoring was overdue. The trainee then documented arrangements for completing this blood test.

Table 38: Highlighting good prescribing practice

GP trainee number	Number of episodes of good prescribing recorded	Right drug	Right instructions	Right documentation	Right dose	Right formulation/ quantity	Right review	Right follow-up
1101	7	3	2	2				
1201	5			2	1	1	1	
1301	6		1	3		2		
1401	5	2		1			1	1
1501	4		4					
1601	6		2	2	2			
1701	5	2		1	1			1
1801	8	2	3	1		1	1	
1901	4	1		2		1		
2001	6	1		2	1	1		1
Totals	**56**	**11**	**12**	**16**	**5**	**6**	**3**	**3**

Summary of Quantitative results

Ten GP trainees each had approximately 100 prescription items reviewed to highlight prescribing errors, and episodes of suboptimal prescribing. A total of 1028 prescription items were reviewed, which had been issued over the course of 1291 consultations. Ninety-two prescribing errors were reported, which represented an error rate of 8.9%. A total of 360 episodes of suboptimal prescribing were identified, representing a suboptimal prescribing rate of 35%.

Over the course of reviewing the 1291 consultations, it was noted that the GP trainees had performed 63 medication reviews: a total of 259 medications were reviewed as part of this process. There were six review errors and 50 episodes of suboptimal review relating to the 153 medications that were reviewed and not issued. This represented a review error rate of 3.9% and a suboptimal review rate of 32.7%.

The GP trainees made 134 recommendations for over-the-counter medication. Three episodes of suboptimal recommendation and two episodes of recommendation error were reported. This represented a recommendation error rate of 1.5% and a suboptimal recommendation rate of 2.2%.

Chapter Four: Results - Qualitative

Semi-structured interviews were conducted with the GP trainees and GP trainers who were part of the study. These interviews were audio-recorded, and professionally transcribed. Transcripts were then reviewed by the study team for the purpose of thematic analysis.[95 96] This chapter outlines the themes generated from review of the transcripts.

Summary of process that led to the production of transcribed interviews

Once the medication review process was completed, each of the 10 GP trainees and trainers attended a feedback tutorial led by a clinical member of the research team, where they received a report summarising the prescription items that had been prescribed by the trainee. An example of a feedback report received by one of the trainees can be found in appendix five. The report presented areas of good practice that had been highlighted in the review, and described details of prescribing errors and suboptimal prescribing. The report then presented details of any medication reviews that had been performed, and any recommendations for over-the-counter medication that had been recorded. Individual cases could later be scrutinised by the trainee and their trainer by referring to the code-breaking document that had been securely stored in the practice by the review pharmacist.

Table 39 summarises details about the feedback tutorial. This took place between 82 and 103 days after the date of issue of the most recently reviewed medication (mean 91.5 days, SD 7.5). This equates to between 2.7 and 3.4 months (mean 3.0 months, SD 0.2). When looked at in relation to the most distant date of issue of medication, the time to the feedback tutorial was between 90 and 132 days (mean 104 days, SD 12.8) or between 3.0 and 4.3 months (average 3.4 months, SD 0.4). The time lag between the most recently issued prescription and the tutorial was due to the time needed to conduct the review,

process the results, ensure veracity of data and identify a mutually agreeable date for the feedback tutorial. In the absence of an automated database, all reports had to be manually created by a member of the research team.

The feedback tutorial itself was not recorded, but short field note reflections were completed by the member of the research team leading the tutorial in six out of ten of the tutorials. This permitted details about the feedback tutorial, such as duration, to be shared between the different members of the research team before they completed subsequent feedback tutorials. It also provided a means of communication between the member of the research team undertaking the feedback tutorial, and the member of the team conducting the follow-up interview, in case this may help direct specific questioning. For example, where trainee 1601 had multiple episodes of suboptimal prescribing related to additional copies of the word 'take', in the feedback tutorial, it became apparent that this was due to the way that the trainee thought that the computer system would 'translate' a Latin short code. As this was a relatively recent addition to the practice computer system, the trainer wondered whether other clinicians' prescriptions would have also been affected in a similar way. Field notes can be found in appendix eight.

All the GP trainees took part in a semi-structured interview to make a formal record of immediate thoughts about the feedback process. Table 40 demonstrates that this took place between one and 18 days after the feedback tutorial (mean 9 days, SD 8.3). Nine of the 10 GP trainers took part in a similar semi-structured interview between two and eight days after the tutorial (mean 5 days, SD 2.5). One of the trainers (trainer 1801) declined to take part in any follow-up interview citing a lack of time as the reason for non-engagement. All the interviews took place face-to-face, in the practice that the feedback tutorial had taken place in.

All the GP trainees took part in a follow-up interview. Table 41 shows that this took place between 32 and 100 days following the initial interview (mean 67 days, SD 9.6), which was

35-112 days following the feedback tutorial (mean 76 days, SD 10.8). It had been envisaged that this second interview should take place between one and three months after the intervention. With a month having an average duration of 30.4 days,[118] this second interview took place between 1.1 and 3.7 months after the feedback tutorial (mean 2.5 months, SD 0.8). All the interviews took place face-to-face, in the trainee's place of work at the time of the interview (which was not always the practice that the review had taken part in, as some trainees had moved work location after the review had been completed).

As had been the case with the initial interview, nine of the ten GP trainers took part in a follow-up interview. Table 41 shows that this took place between 32 and 106 days following the initial interview (mean 76 days, SD 23.3), which was 35-113 days following the feedback tutorial (mean 81 days, SD 24.5). This equates to the second interview with the GP trainer taking place between 1.1 and 3.7 months after the feedback tutorial (mean 2.7 months, SD 0.8).

Table 39: Timing of the feedback tutorial in relation to the end of the review process

Trainee	Date of first consultation reviewed	Date of last consultation reviewed	Date of feedback session	Time between first consultation reviewed and feedback session (days)	Time between first consultation reviewed and feedback session (months)*	Time between last consultation reviewed and feedback session (days)	Time between last consultation reviewed and feedback session (months)*	Clinical member of research team who led the feedback session
1101	09/10/14	28/10/14	**29/01/15**	112	3.7	93	3.1	RK
1201	23/10/14	04/11/14	**04/02/15**	104	3.4	92	3.0	AA
1301	07/11/14	21/11/14	**13/02/15**	98	3.2	84	2.8	AA
1401	03/12/14	10/12/14	**05/03/15**	92	3.0	85	2.8	RK
1501	04/12/14	12/12/14	**04/03/15**	90	3.0	82	2.7	NSi
1601	15/01/15	20/01/15	**29/04/15**	104	3.4	99	3.3	RK
1701	16/01/15	28/01/15	**28/04/15**	102	3.4	90	3.0	NSi
1801	16/02/15	24/02/15	**21/05/15**	94	3.1	86	2.8	RK
1901	16/02/15	03/03/15	**12/06/15**	116	3.8	101	3.3	RK
2001	10/02/15	11/03/15	**22/06/15**	132	4.3	103	3.4	RK

(* it was assumed that a month had an average duration of 30.4 days)[118]

Table 40: Timing of first interview in relation to date of feedback session

Trainee	Date of first interview (trainee)	Time from feedback session (days)	Date of first interview (trainer)	Time from feedback session (days)
1101	**10/02/2015**	12	**04/02/2015**	6
1201	**18/02/15**	14	**12/02/15**	8
1301	**26/02/15**	13	**16/02/15**	3
1401	**23/03/15**	18	**13/03/15**	8
1501	**12/03/15**	8	**12/03/15**	8
1601	**30/04/15**	1	**05/05/15**	6
1701	**30/04/15**	2	**30/04/15**	2
1801	**03/06/15**	13	**Refused**	N/A
1901	**15/06/15**	3	**15/06/15**	3
2001	**25/06/15**	3	**25/06/15**	3

Table 41: Temporal relationships for second (follow-up) research interviews

Trainee	Date of second interview (trainee)	Time from first interview (days)	Time from feedback session (days)	Time from first feedback session (months)*	Date of second interview (trainer)	Time from first interview (days)	Time from feedback session (days)	Time from feedback session (months)*
1101	**21/05/2015**	100	112	3.7	**21/05/2015**	106	112	3.7
1201	**20/05/15**	91	105	3.4	**28/05/15**	105	113	3.7
1301	**11/05/15**	74	87	2.9	**11/05/15**	84	87	2.9
1401	**16/05/15**	54	72	2.4	**16/05/15**	64	72	2.4
1501	**10/06/15**	90	98	3.2	**10/06/15**	90	98	3.2
1601	**09/07/15**	70	71	2.3	**08/07/15**	64	70	2.3
1701	**14/07/15**	75	77	2.5	**14/07/15**	75	77	2.5
1801	**14/07/15**	41	54	1.8	**Refused**	N/A	N/A	N/A
1901	**27/07/15**	42	45	1.5	**19/08/15**	65	68	2.2
2001	**27/07/15**	32	35	1.1	**27/07/15**	32	35	1.1

(*It was assumed that a month had an average duration of 30.3 days)[118]

Summary of emergent themes

Qualitative data were grouped into five emergent themes, each with subcategories, which are outlined in table 42. The themes will briefly be summarised now, before a more detailed exploration is presented with example quotations from each subtheme.

Table 42: Summary of themes

Number	Theme	Subcategories of theme
1	**Feedback process**	a. Reasons for engagement b. Experience of the feedback session c. Structure of the feedback report d. Content of the feedback report e. The concept of Good Prescribing
2	**Prescribing event contributors**	**a. Resources** ai. Guideline deviation aii. Socio-technical factors aiii. Time pressure and consultation management **b. Rationalisations for prescribing behaviour** bi. Pragmatic prescribing bii. Systemic influences
3	**Impact on trainee and practice**	a. Awareness of issues b. Change in behaviour intended c. Change in behaviour implemented
4	**Feedback on the project and intervention**	a. Personal reaction to the project b. How the process has benefitted individual trainees c. Repurposing the feedback report d. Would participants recommend the project?
5	**Future ideas for the project**	a. When to undertake the review b. Who should feed back the findings of the review? c. To provide the feedback report before or during the feedback tutorial meeting? d. Who should coordinate a prescribing feedback process? e. Further development of the REVISiT process.

The first theme related to *the feedback process* itself. This theme explored thoughts and feelings about specific components of the project, as well as exploring reasons for engagement in the whole process. The second theme related to factors which may have contributed to the occurrence of prescribing events (errors and suboptimal prescribing). This theme is subdivided into two subthemes: available resources and rationalisations for prescribing behaviour. The third theme sought to explore the impact that the study had had on the trainee and practice they were situated in. This theme included identifying if participants agreed with the summary presented, and also how the trainee (and wider practice team) had changed behaviour or intended to change behaviour as a consequence of taking part. The final theme presented potential future ideas for how the process could be improved or augmented, and whether alternative mechanisms might be able to bring about similar outcomes.

Theme one: the feedback process

This theme explored thoughts and feelings about specific components of the project, as well as exploring reasons for engagement in the whole process. It is presented as five subthemes: reasons for engagement, experience of the feedback session, perception of the structure of the feedback report, perceptions on the content of the report, and exploration of the concept of 'good prescribing'.

a. Reasons for engagement

Trainees reported a range of reasons to explain why they signed up to the study. In general, the concept of receiving feedback was welcomed by trainer and trainee alike.

> *I thought it would be really helpful for someone to tell me what I'm doing right and what I'm doing wrong.*
>
> Trainee 2001

> *Any feedback is always good.*
>
> Trainee 1301

> *I saw it as a good opportunity to sort of have feedback and constructive criticism in terms of my prescribing.*
>
> Trainee 1201

> *it's always good to get feedback about one's performance.*
>
> Trainer 1601

Linked to receiving feedback, correction of bad habits before they became ingrained practice was also a consideration.

> *So if you've picked up bad habits or just a particular way of doing something – it might not necessarily be wrong or harmful, but there might be a better way of doing it.*
>
> Trainee 1501

> *I'll be a GP soon so I'm thinking if I've got any bad habits or any suboptimal prescribing things, so it's better to be corrected now, rather than being like, you know, more senior with carry on doing it.*
>
> Trainee 1601

Several trainees commented on their desire to have specific and detailed feedback regarding prescribing practice as this was not something that they thought they had received before. Although some elements of prescribing practice would be discussed in routine daily debriefing sessions, this would not generally be the focus of those discussions.

> *It's something that will be, that's kind of scanned through on debriefs, but it's never directly looked in to….so normally kind of in debrief people just say, 'oh yeah you gave antibiotics', but they'll never say, 'oh yeah you gave a steroid cream' or they'll never say, 'oh what did you specifically say to a patient?'* Trainee 1101

> *It's something you don't really talk about much in debriefs*
>
> Trainee 1301

Indeed one trainee commented that as one becomes more senior, the number of consultations that are debriefed will decrease, which decreases the opportunity for any *ad hoc* prescribing feedback.

> *When we've got more senior, we don't do debriefing each single consultation….the trainers now they just checking maybe one or two, you know, in my twenty-two patients see every day*.
>
> Trainee 1601

A lack of prior specific prescribing training in general was also commented on by trainees.

> *…we don't get any formal sort of prescribing training I suppose during the actual GP VTS. Probably the last piece of formal training we'd get would be on the undergraduate course.*
>
> Trainee 1501

> *I thought it would be a good, well firstly we don't have very much in terms of teaching, particular - prescribing at least not while I was in med school. It's not something they really spend a great deal on, it's something you almost kind of take up as you go through house officer years and yeah, I mean therefore it's, and it's a place where there's lots of errors.*
>
> Trainee 1701

> *I mean I think it's something that we don't get taught very much about*.
>
> Trainee 1301

It's not something that is really looked at in any other part of our training, you know, we might have lectures about prescribing errors and all that sort of stuff but to have the opportunity to have a one-on-one assessment or a review of my own prescribing I thought was a good opportunity and one not to be missed.

Trainee 1201

As well as the lack of specific prescribing training, the effect of the potential isolation of a general practitioner, and the difference to hospital practice was also mentioned.

I mean we rely on pharmacists to catch a lot of errors in hospital.

Trainee 1701

it's useful to have somebody look at what you're prescribing because in general practice you can be quite isolated actually.

Trainee 1501

Realisation of the perceived need for a detailed review of prescribing was made more attractive to some participants by the fact that someone else would be doing the actual prescribing review (the research pharmacist).

If somebody's going to do the hard work for me and looking through what I've been prescribing, then it almost seemed like a win-win. Somebody was going to do all the hard work for me and tell me, give me some interesting things to ponder.

Trainee 1501

I do prescribing reviews with registrars at least once during their attachment anyway if I can and this does seem to be an extension of that and seems to be much more detailed

Trainer 1501

Some trainees reported the influence of others (either fellow trainees or their own trainer) was a factor in their decision to take part in the study.

One of my colleagues was taking part in it from W practice and he suggested that it be a useful thing to do and that's why I took part.

Trainee 1401

Because my last trainer asked me to! [laughing]

Trainee 1301

Although trainees sometimes received encouragement from their trainers to sign up to the study, trainers also commented on the encouragement they had received to ratify their trainees' interest in taking part.

My registrar agreed to do it and I wanted to support it.

Trainer 1701

*I think (*trainee*) had already agreed to do it.*
Interviewer: Right.
So I got roped in as well.
Interviewer: And you were happy with that?

That's fine yeah.

Trainer 1301

Perceived tangential benefits of taking part were also reported by participants, mainly relating to fulfilling related parts of the training requirement of a GP trainee.

I can do lots of lovely learning logs for my e-portfolio out of this.

Trainee 1501

I knew that my registrar needed to do a quality and safety project, so the timing of it was really just fortunate really because she was looking for something to do. She'd already started a different project which is still ongoing and we kind of needed something that we could get our teeth into before she finished. So that was the kind of primary driving force for it actually.

Trainer 2010

b. Experience of the feedback tutorial

The feedback tutorial was very well received by trainees and trainers. Trainees commented on the utility of the session, and the way in which sessions were conducted in an open, non-judgmental style.

The feedback session was really, really good….It was relatively painless, so it was just yeah very easy to be involved in.

Trainee 1201

Oh I enjoyed it. I thought it was really useful….There was no 'oh, your prescribing is terrible. You need to report to the GMC immediately'.

Trainee 1501

Yeah, it was helpful. I didn't feel like it was – like he was very nice, and he didn't make me feel completely stupid!

Trainee 2001

I thought it was very useful. So he took me through the whole feedback, in fact took me through errors and good points individually, and I was able perhaps give him small amounts of feedback for each one as to what my thinking was behind it.

Trainee 1801

It was a very nice informal chat. I mean a lot of it was obviously going through what was the kind of various things trying to pick out anything in particular from here.

Trainee 1701

Trainers commented on the sensitive way in which the feedback was delivered, and commended the perceived pedagogical utility of the feedback sessions.

…it was gentle. It was well received. It was well managed. It was educational in the wider terms of the word. So we had time to look through issues that were raised, talk about them, understand why they were issues and understand why those sorts of errors or those sorts of things happened as well.

Trainer 1101

I thought T (*clinical member of the research team*) *ran it very well. It was in appropriate depth, depth, lasted appropriate amount of time and it didn't go on for too long. And I thought he was quite pragmatic in his feedback… he didn't knock (*GP trainee's*) confidence, you know, when some of the things came up, he said, you know, we probably all do this from time to time, you know, but perhaps you could try and do it a slightly different way.*

Trainer 1201

I mean the process was very good, it was very thorough, and it wasn't critical, you know, any areas that were identified there was an explanation for it and I think it was very clear what the feedback and the learning points would be.

Trainer 1501

…it was methodically done, and it was specific and sensitive and M was sort of open to receiving feedback. So that makes it easier.

1601 trainer

I thought it was a really useful session. There were a number of concerns raised that you might have felt quite criticised if you'd read it without the feedback, so it was given in a very positive, constructive manner, which I felt was really useful. A received the feedback in a very positive, constructive way. So the whole session, I felt, was a really useful session.

Trainer 1901

One trainer commented that sometimes the trainee couldn't remember details of the cases discussed, which made the session more difficult.

I felt sometimes it was a, it was difficult if the registrar couldn't actually remember the, you know, sometimes she could remember the case, but sometimes she couldn't.

Trainer 1301

One of the trainees had also commented that they had found some of the detail of events difficult to recall.

There were quite a lot of suboptimal stuff which looking back is quite difficult to know in what context some of the stuff was done and written.

Trainee 1401

The importance of having their trainer present in the feedback session was commented on by several trainees, both from a supportive perspective during the session, and for post session discussion and learning.

It was good to have my trainer there as well because then we talked about stuff afterwards.

Trainee 1401

It was kind of quite interesting to do it with (trainer) as well because obviously he's very experienced and been doing it a long time and he didn't say very much but to watch his reaction to some of them and I think he probably makes some of the same mistakes or, you know, as I do and I think probably he learnt something from it as well.

Trainee 1301

It was useful having my clinical supervisor present because obviously I debrief all of my patients with her. I think she found it a useful tool as well, even just from a personal point of view.

Trainee 1201

c. Structure of the report

Participants expressed great satisfaction with the way in which the report was laid out, commenting that this facilitated efficient retrieval of information from the review.

Nicely laid out…. I didn't find it difficult to get the details out of it at all…. It was very easy to find your way round as to understand what was going on…

Trainer 1101

You could read it and pick it up and know what it was talking about.

Trainee 1301

…it was quite clearly labelled in the sort of traffic light format.

Trainer 1401

…the report was laid out so efficiently actually, and it was clearly put into groups of different types of prescribing errors and omissions, etc, it was very easy to go through quickly with the GP.

Trainee 1801

…it was all very clear and there wasn't too much to read through.

Trainer 1501

The specific order of the report was commented on by one trainee:

I think I liked the fact that you had the good things and then it was divided into sections.

Trainee 1101

Although the detail presented in the report permitted trainer and trainee to be able to find all the specific examples of prescribing events that were identified, one trainer wondered whether it would have been better to just present general trends in prescribing events with an example in each theme.

So whether you know rather than listing all 100 things, you know, whether a sort of if there's themes that emerge, whether there could be a, some feedback about the theme with a, with one example of where this has occurred. And whether that would actually be less threatening.

Trainer 1301

Indeed, this trainer's trainee commented that they were expecting the report to be more thematic and less detailed.

I wasn't expecting such a detailed report anyway.

Interviewer: *Oh, weren't you?*

So I guess it just depends how it's delivered.

Interviewer: *That's interesting. What were you expecting?*

I don't know to be honest. I think more general themes of feedback.

Trainee 1301

The overall feel of the report and the impression it gave was also commented on by trainees and trainers.

…it looked very smart, and I think that helps to feel that someone had done an appreciable bit of work on it, and it was very nicely presented.

Trainer 1101

I was really impressed with the report that was produced; it was more than I was expecting. I mean this is really professional, really formal.

Trainee 1201

I view it as a very high-quality report.

Trainee 1501

d. Content of the report

The level of detail to which the prescribing review was taken was commented on by several trainers and trainees, who saw this thoroughness as an advantage of the process.

> *I guess I was surprised at, you know, the detailed analysis that had taken place….The level of detail was probably not something we would have done at the practice level.*
>
> Trainer 1301

> *I was surprised by the detail with which the analysis was done*.
>
> Trainer 1401

> *It looked at things in a lot more detail, not just what they were prescribing but what instructions were given.*
>
> Trainer 1501

> *I was just really impressed with how thorough it was. I wasn't expecting such a thorough big booklet. It must have taken hours to do.*
>
> Trainee 2001

Both parties were generally in agreement with the findings of the report, especially at the level of the more serious errors that were reported. Comment was made, though about the potential for learning from suboptimal prescribing episodes also.

I thought the classification was fine and I think so on the top-level ones I think both the registrar and myself were in agreement that it was, you know, improvements could be made and that it had been suboptimal in some way or another.

Trainer 1701

Apart from a few things which were kind of slightly I think misconstrued from the notes, yeah it was all appropriate.

Trainee 1101

I think I was surprised more at the – I mean one surprise was that there weren't many more serious infringements. …There were very few. Not because he's no good but because I just think we get into bad habits and sometimes these do filter through into prescribing errors that are sometimes picked up by the pharmacist. But there were lots of smaller errors that I wouldn't have thought of as errors that actually in reality is something that we should be more specific about.

Trainer 1501

There was, however, concern that the classification of an 'error' may have been overzealous in certain circumstances, but also the admission that if suboptimal practice was found, this would have to be reported in some way.

…we thought probably it was a little bit of a harsh report in some areas that we didn't think it was too bad.

Trainer 1901

Bit picky really maybe.

Trainer 1301

I think quite a few of the so-called errors were rather sort of minor ones and not quite sure if commenting itself on that is useful.

Trainer 1601

…they were errors any of us could make and error in the broadest possible sense. In other words some of them I would not regard as an error… what I mean, it's not actually cut and dried.

Trainer 1701.

…it may be she was reissuing a prescription, you know if it was a repeat prescription, it would have been something initiated by somebody else and she's just reissuing it. Which seems a bit unfair then to judge her for prescribing on stuff that actually is somebody else's.

Trainer 1301

…some if it was felt to be a little bit kind of almost nit-picky for certain things, but obviously from an objective point of view then like you have to pick up what you see as incorrect.

Trainee 1701

One trainer thought that the report would have benefitted from comparison data *to say something like '9 out of 10 of our, of trainees tend to do this' and you've done this.* (Trainer 1201)

e. Good prescribing

Several participants commented that it was useful to be able to see elements of good prescribing, to provide a balance for the prescribing errors and suboptimal prescribing that were reported.

> *I mean I think there was a lot of good prescribing and when you're learning, but even as an experienced GP I think it's useful to know what you're doing well, as well as just the mistakes you make, and I think it just balances out the fact.*
>
> Trainer 1501

> *Yeah, I think – yeah, I think it was quite nice to get the positives as well as the areas for improvement.*
>
> Trainee 1901

> *Very, very useful because it put the whole thing in balance, and he was really quite chuffed that it had been picked out as good prescribing. And there were some good bits in there that he – there were some things where he had particularly documented on that he was following guidance and this why a prescription was like this. There were some bits where he'd put really a very detailed instructions on the prescription as to what was to happen, all very clear and things which were picked out. You know it was nice to see, when you're getting criticised for some things it's quite nice to balance that with…*
>
> Trainer 1101

Trainer 1101 went on to say that having positive reinforcement for good prescribing was even more important when negative prescribing was reported which was a similar theme to

the positive prescribing that had also been reported. Having the feedback that good practice in a certain area was actually achievable by the trainee, may help to make that good practice more consistent.

> *..because it shows you you can do it, but I think as with everything you don't do it when you're more under pressure….You do it when there's plenty of time and you're – don't you and then you don't and I guess what it shows is the importance of actually doing it every time and performing at that good level all the time isn't it, even if you're under pressure, because the risks then – there are risks if you don't.*
>
> Trainer 1101

The desire for positive reinforcement was also shared by trainer 1101's trainee

> *Yeah, especially with media reports and things of overprescribed antibiotics, it's nice to know that I don't, hopefully don't do that unnecessarily.*
>
> *…she thought my note keeping was good and that was quite nice to know. She did think it was quite clear and she could more often than not follow what I was doing. And yeah, so that's quite nice to know.*
>
> Trainee 1101

Several trainees commented that although nice to see, they tended to concentrate on the negative feedback and where they could improve practice, rather than focusing on positive feedback.

> *…but I think you never really take on board any good feedback, you always focus on the negative.* Trainee 1301

…yes, I did find it useful. It was nice to have some positive feedback. I must say I probably focused on the errors because I took those as a learning opportunity. But it is useful to see what is …um… what is useful and what is praised really.

Trainee 1801

*I think because of the nature, because of our nature, (*trainee*) and I are very similar, and I think because of our nature we probably were just looking for things that we did wrong rather than…..The good things were there but actually let's just move onto what we did wrong because that's what we're more interested in.*

Trainer 2001

Some participants also thought that it would have been better to have provided more emphasis on good prescribing in the report.

Yeah, I think it's always good to put some good stuff in. It did seem to be a bit brief, compared to the list of things that weren't so good. But yeah, maybe a bit more of the good stuff would have been nice.

Trainer 1301

Oh yeah, I forgot this was there. Yeah, that was good, but the thing is, there's a lot less of this. Trainee 1401

Theme Two: Prescribing event contributors

This theme explored why prescribing events might have happened, and is divided into two subsections: 'resources' and 'rationalisation for prescribing behaviour.'

2a: resources

In this subtheme, factors contributing to the occurrence of prescribing events which were contingent on the use of resources were explored. This subtheme is further divided into three sections: guideline deviation, socio-technical considerations, and factors relating to a lack of time or lack of experience with time management.

2ai: Guideline deviation

Trainees commented on a lack of awareness of certain guidelines, or aspects of certain guidelines, which then led to inappropriate prescribing. These assertions were confirmed by trainers.

> *I think there are a few points where I'd prescribed a drug, but it might not have been the first line or the one that was recommended as first line in terms of the guidelines. So it sort of flagged up to me that I need to be familiar with the guidelines in whatever Trust I'm working in and that's quite important*.
>
> Trainee 1201

There was one where I'd prescribed Citalopram over the recommended dose for somebody over 65, which again I'm sure I probably had come across at some point but had completely –

Interviewer: And what's that for?

For depression and anxiety and I'd put the dose up to 30 I think whereas it should have stayed at 20 for over 65s. That was picked up immediately and it's been changed and in fact one of our other registrars did an audit on it since and it wasn't just me.

Trainee 1301

I think it made her reflect on how well she was adhering to for instance local guidelines. It made her realise that she probably didn't know the detail of some of the prescribing guidance for a particular medication.

Trainer 1301

…maybe I need to be up to date for example steroids prescription, they usual prescribe steroid tablets for asthma, COPD the same dose, 40 milligrams once a day for 5 days. Interestingly COPD is 30 milligrams…30 milligrams for one week or two weeks, but for asthma still 40 and this is why interesting didn't notice that so before.

Trainee 1601

Some trainees discussed how they had deliberately deviated from guidelines due to advice they had received from local clinical experts.

So there was one about using Canesten pessaries in pregnancy. I think that was the main one I was picked up, which was apparently the guidelines recommend something slightly different, give them the one 500 milligram pessary to give or the 5

100 milligram pessaries over a period of time. Now I remember starting and no one being particularly sure what to do regarding that, so we asked a midwife and they said it's normally treated with a 500-milligram pessary. So -

Interviewer: So there's disagreement?

Yeah, and they said well, it wasn't so much disagreement as in so far as it was, we were seeking help because we weren't a hundred percent sure, and the midwife said this is what we treat it with. Therefore you can prescribe that and it will be fine….so it was interesting to see that actually that apparently was a guideline, and it was different.

Trainee 1701

I think there was a comment about the use of colchicine in – as the BNF suggests no more than 12 tablets in one go, but we've recently been to a course organised by our local rheumatology consultant, and he said there is no such upper limit. Of course, the BNF does say 12 tablets, but it's limited to 12 tablets because majority of people, after having had 12 tablets in a short period, will develop diarrhoea, and that's the reason why BNF says that. Trainee 1901

Trainee 1901 went on to explain what they might do in the face of 'expert' guidance disagreeing with the BNF.

You can be really strict and say, 'Right, you can't have more than 12 tablets.' I think I'll still be guided by the recent evidence. The evidence suggests that, you know, you can have more than 12 tablets, and there is no definitive – it's not a contra-indication, if you like, or it's not a definitive – it's not a red line that you can't cross. So I think guidelines are there to guide your practice, but it's not a definite yes or no. There is a lot of grey area. And so I would be guided by the recent evidence. The evidence suggests that, no, there is no upper limit.

Trainee 1901

Trainee 1901 further caveated the personal use of a medication outside of guidance by the need to apply thorough documentation, which in the case discussed was not thorough enough to allow the review pharmacist to understand the documented clinical decision making.

> *Of course, these are guidelines, designed primarily to avoid those potential side-effects, but if you are careful and you've clearly documented, and you explain to the patient, I think that's – and, again, I think it comes down to that, really – that if you're going against the standard, if you're going against the BNF advice, I think I should be more careful as to explain, or mention in the notes as to why I am not following a local guideline or a BNF guideline and what's my perspective, what's my – what's the reason, what's the logic behind it.*
>
> Trainee 1901

Comments were made regarding the continued use of prescribing habits which were appropriate in former clinical settings, and the difficulty of changing one's own prescribing habits.

> *I mean there was I getting a few extra days compared to what the formulary things were saying before, the things like chest infections, because I was doing them for seven days rather than the five days. So I had to change that as well. I think that was probably a hangover from kind of previous work in hospital, previous - posts and things like that. So because you tend to do what you're kind of used to doing.*
>
> Trainee 1701

> *But it's interesting to see how people's personal prescribing habits, um, are difficult to amend I think with time, even if you tell them about local guidelines sometimes they're not keen to follow them because perhaps they've been following a certain*

prescribing habit for the past ten or twenty years, and not so keen to amend their ways [laughs].

Trainee 1801

You obviously pick up a lot of habits in hospital that you maybe then carry into general practice, which are maybe not appropriate habits. I think you also have to acknowledge that prescribing in hospital is different to prescribing in general practice. I don't necessarily know why that is, but it is different in hospital.

Trainee 1501

Exploring certain issues such as the cost of individual medication items was not something that some trainees had an awareness of before working in primary care.

…there are a few where I think I'd prescribed like capsules rather than tablets – or the other way round – and there was a big price difference and I had no idea, so things like that which are just if you didn't know, you might never know because of the way that the computer is set up you tend to just go for the first one. Unless you've actually clicked on the other one it wouldn't tell you the price of it.

Trainee 1301

Some trainees had simply prescribed the wrong medication due to a lack of awareness of the medication itself, rather than the clinical guidelines per se.

There was one thing mentioned here about how I'd accidentally prescribed diclofenac gel three percent, which is Solaraze treatment for actinic keratosis, but what I'm intending to be for rheumatological things, so rather than using the 1.6 percent gel which is what I should have been, the Voltarol type gel, I prescribed the

Solarize….Which is the three percent gel…I had already recognised that and we'd done a significant event on it in the practice anyway.

1701 trainee

Note was also made of the repetition of errors in the same theme, which would only be corrected once the error had been highlighted.

…I do think that certain trends appeared, for example, the penicillin V for tonsillitis, there might be three or four of them in here with the same error because that was a mistake in my knowledge that was. So the same mistake happened several times but, um, then again, another one with Otomize ear spray I was prescribing the wrong dose of that because that was again an omission in my knowledge rather than a mistake on that day…

Trainee 1801

2aii: Socio-technical factors

This subtheme related to use of the computer system, and other physical prescribing aids that were employed by the trainees.

Many of the trainees took advantage of pre-set information in the computer system, which was often generic in nature and so lacked specificity.

And partly it's due to systems on the computer. Say, for example, if I click penicillin V it automatically comes up with 56 tablets as a rule set. So it will be – it will have to change it to make it ten days. Trainee 1801

One of the trainees had had a prescribing event reported relating to the way in which a paracetamol prescription had been issued. There had been concern that the particular use of digits within the prescription instruction could lead to an unintentional overdose of medication. The trainee reported that this was simply the way in which the practice system was defaulting to issue a prescription of paracetamol.

> *So on SystmOne a lot of ours is like a default that it goes onto so when you type in the drug prescription it comes up with, for example, Paracetamol 'take 1 – 2 4 times / day', and you just click on that quick link and then it prints out a prescription. But he was saying that it's not a very good way of writing it and in fact we probably should change our default on the SystmOne because it's just a bit – it could look like you're prescribing between one and twenty-four which obviously you're not but then I can see what he means why it would be easy to misinterpret.*
>
> *Interviewer: So it wasn't you writing that, it was just following what the system had on there.*
>
> *Yeah.*
>
> Trainee 2001

Sometimes the practice computer system had assigned pre-set information to certain drugs, which would have to be changed if the drug was being prescribed for a different purpose.

> *…if you choose clarithromycin, it says specifically for Helicobacter pylori treatment, and obviously usually I don't use it for that purpose, because obviously you prescribe for chest infections a lot more frequently than H-pylori eradication. So you purposefully have to delete the Helicobacter part and type in chest infection.*
>
> Trainee 1801

Trainee 1801 then had the realisation *maybe we shouldn't be trusting the* (computer) *system quite as much as we do.*

One of the trainees explained that once you had progressed past a certain stage in the prescribing process, it could be difficult to change a system pre-set without going back to the beginning of the process.

> *…I always say to patients, obviously put it in your right ear, but the system doesn't give that and you actually can't edit it either because the – well you can probably generically but I can't edit it once I go into it because it just comes up as 'eardrops' for example and then I can say 'use one to two times a day' but I suppose I could state which ear but it's just a default again on the setting of the system.*
>
> Trainee 2001

Another trainee concurred with the inflexibility of drug selections on their computer system.

> *…but it's a bit of a difficult one, that one, because that is in the drop-down menu, 'one drop to be used in affected eyes' and there's another one you have 'one drop to be used in affected ear' and you just hope that you tell the person – obviously if it's a person who's not compos mentis or can't use it then you'd state specifically but I think that's another thing that I'll keep an eye on now.*
>
> Trainee 1401

One trainee explained how they had prescribed insufficient medication for a 28-day course of antibiotics, because the system had defaulted to providing an insufficient quantity of tablets, and the trainee had not made a final check of the prescription before issuing.

On the system. I wrote in 28-day course, twice daily and it automatically populated 28 (tablets) and I didn't check that. So not that I disagree with that because we said amongst ourselves, the importance of really re-checking the actual printed out prescription afterwards, to make sure that it's definitely come out with what you initially thought you'd prescribed.

Trainee 1501

The trainee went on to conclude that *it's very easy electronically for you to just not click something, or click something and it completely changes what comes up on the prescription.*

Lack of awareness of how a computer system would interpret prescription instructions was the reason behind the suboptimal prescribing relating to phrases such as 'take take one or take two tablets take four times/day when required'. Trainee 1601 explained that the computer system had been set to translate 'QDS' as 'take four times daily'. If the trainee wrote additional instructions like 'take QDS', this could then cause confusion.

For example one of the things they say about when I prescribing things to be repeated like take, take, have you seen that in this?

Interviewer: Yes.

So that's when I prescribe something for example you are to take one tablet QDS, so they are going to take one tablet, take one tablet four times a day, does it make sense?

Interviewer: So that's translation -

Translation of my QDS or TDS yeah. So that's why -

Interviewer: So it came out as take, take -

The take date and then take, you know, QDS is just automatically be take one four times a day. So when I write this and usually I don't check it's my mistake should

have, you know, what I've written, but because definitely I put like quickly, take one tablet four times a day for one week. And then when it's, you know, translated it just really like -

*Interviewer: So as a consequence of that, has anything happened? Because I gather that (*GP Trainer*) was surprised at that as well, wasn't he?*

Yeah because no one noticed that because maybe I'm the only one I write QDS or TDS and then we translate it they know.

Trainee 1601

Practice computer systems were often set up to provide prescribing alerts when the system detected the possibility of a drug interaction or caution. Trainees commented that sometimes these alerts seem to appear too frequently to be of discerning use.

There are so many interactions that can go with this and that and I think that's partly the SystmOne we were on. In fact we were literally just talking about it, because every time you type anything in they come up with a whole host of interactions with this drug and that drug but a lot of them you don't have to necessarily take on board, they're just telling you about everything and I think it's difficult finding that balance with the ones that you have to take seriously and the ones that you can be like OK, that's not too important.

Trainee 2001

The use of a physical prescribing aid, a hard copy of the British National Formulary, was implicated in errors relating to incorrect dosing of paediatric antibiotics. This book is updated twice a year,[88] but some trainees were referring to out of date copies, which therefore did not contain the most up to date prescribing guidance.

I do remember that this was flagged up by Dr F actually that prescribing a right dose for amoxicillin to young children, that's occurring because of using an out-of-date children's BNF. So because the dose has changed on there.

Interviewer: Oh really.

So Dr F was aware that the dose in the old BNFs, so the one a year older than that one, would have been 125 TDS for whatever – for a one- to five-year-old, whereas the new BNF is double the dose. So I thought I was following the guidelines by looking it up in the BNF, and that's the recommended dose, that's fine.

Interviewer: But only a year out of date.

So it's a year out of date, so.

Interviewer: That's really –

So I imagine that's probably a mistake that might be commonly encountered, all my colleagues, so.

Trainee 1801

There were certain other things, as well, like the recent change in doses of antibiotics.

Interviewer: Right.

I think that was very well picked-up because, again, I was using an older version of BNF, so it was a couple of years old and that, of course, wasn't reflective.

Trainee 1901

2aiii. Time pressure and consultation management

This subtheme related to the trainees' use of time, specifically referring to providing appropriate documentation within a consultation, or on a prescription.

Trainees reported the time pressure that they were under in order to consult in an efficient manner. Sometimes this time pressure would have a detrimental effect on the amount of documentation that was made regarding their consultation.

> *…the other thing I learnt, was documentation, which I discussed after the feedback with my clinical supervisor, and she was just like, you know, we're under so much time pressure that sometimes, you know, you don't necessarily document everything. I mean in terms of pill checks and all that sort of thing, I know that I'm always asking the relevant questions but because I speak to the patient as opposed to typing at the same time, I wait for them to leave and then I type it up, just because from a rapport point of view I think it's a lot better and patients prefer it. But that does then mean that you might miss off things in terms of your documentation, whether it be because you're rushing or just that it slips your mind with everything that you've asked them in that consultation. So it did sort of reinforce the fact that in this day and age documentation is really important, unfortunately, because it can come back and bite you.*
>
> Trainee 1201

> *I'll give you one example where I had prescribed someone Betnovate for dermatitis, and they had written a comment that, you know, that was a prescribing error because you should start with a low-dose steroid. Betnovate, of course, is not a low-dose – sorry, no – low-potency steroid. It's a high-potency steroid. So…due to shortage of time, of course, I didn't document that, but it's obvious from the notes, and obvious from the history, as well, that they have attempted something milder in*

the past. So, again, I think that's the limitation, but also probably I think it's reasonable because, you know, if you were being judged by someone else, then – and someone else is looking at your notes, it's probably a good idea – good practice to make mention of the fact that they have already tried the lower-potency medicines before you order the next one.

Trainee 1901

I guess again it all comes down to kind of pragmatically when you're kind of running kind of half an hour behind, writing that you definitely didn't tell someone to take Paracetamol or not to take Paracetamol with Codeine is kind of that extra two seconds just shave off the end sort of thing.

Trainee 1701

Trainees and trainers acknowledged the need to write more detailed instructions, and also to be careful about the way in which certain instruction short-cuts could be misinterpreted.

There were quite a few other things like with ear drops and eye drops, one to be used in the affected eye and it says quite a few times 'affected eye not stated' but you just kind of assume that the patient would know which eye is affected.

Like certain things, I could see two or three can increase for this one, propranolol, 'take one when needed, can increase to two or three if required' and it's written 'propranolol prescribed with a dose but no frequency'. I can kind of understand that for some people it might not be as clear.

Trainee 1401

I think the other theme that came out is that you need to be careful. That a lot of the errors come through rushing through things, just doing it quickly and routinely without thinking about it and the extra 5 seconds it takes to write, or less than that to type '2' rather than writing the 'two' when you're doing it or just to check that what you've actually selected from the drop down box is what has appeared in the box when you've – you know there are selection errors, there were errors due to sloppy, just accepting what had been put, what the computer had put in without really thinking about it. Just you know I think both of us G and I – we talked about it afterwards – felt that actually we just need to be a bit more careful and just make sure that what we've prescribed is what we thought we'd prescribed, and the instructions are clear. There was the one prescription where he'd put 'take 1 4 times a day' but we used numbers, so it looked like 'take 14 times a day'.

Yeah, take 1 4 times a day and if you'd written one and four it would also have been fine.

Interviewer: Yes, but just the numerals would make it –

Putting numerals in there had made it actually a potential risk.

Interviewer: Yeah.

If anyone had been foolish enough to take 14 a day, but you know the potential was there for a risk. So that sort of thing. It's just a matter of looking at what you're doing

Trainer 1101

One of the trainees commented on the difficulties of documenting a complex management plan in the notes.

I think that doesn't always show up as clearly as it should in your notes, I think. Well in my notes anyway!

Trainee 1401

Another trainee commented on the benefits to patients of being as thorough with prescription instructions as they had been with their in-consultation discussions.

> *I suppose it highlights to me that what I say to a patient and they gain from it which I think what I said and I just print off the script. Whereas in actual fact it'd be more beneficial for the patient if what I said I also wrote down on the script*.
>
> Trainee 1101

Providing appropriate documentation is a complex task. One of the trainees reported that they had been told in the feedback session they were providing too much detail in their prescription instructions. The trainee defended their actions by stating what they would prefer to receive from a clinician if they were a patient themselves.

> *I mean I think (*review pharmacist*) said I give a lot of information actually when I prescribe. Sometimes too much because she said it would run to several labels and I don't really care. I view that as the pharmacist's problem!*
>
> *Interviewer: [laughing]*
>
> *It's my only real way to make sure I have definitely given the information about how to use these tablets is if I put it on the prescription. I can tell patients, but I know that patients don't take – you know, I'm a patient sometimes too and I know you don't take everything in that you're told, it's too much information.*
>
> Trainee 1501

Having to manage a consultation where there are multiple patient requests was another reason behind the perception of inadequate documentation. Trainee 1101 explained that there had been a consultation review which had seemed as if they had prescribed gabapentin for costochondritis. In fact, the gabapentin had been prescribed as an additional

request from the patient, which was totally unrelated to the main part of the consultation, which had been focusing on the patient's costochondritis.

> *There was something about that I'd prescribed gabapentin for somebody with costochondritis. I hadn't prescribed the gabapentin for the costochondritis, I'd actually prescribed the gabapentin as one of their ongoing, regular acutes for their chronic pain, but I hadn't documented in the notes that was what was for.*
>
> *Interviewer: Right.*
>
> *But it looked like the consultation I was seeing them for something totally different and as the patient was leaving said 'oh can I have some more gabapentin'. I just printed out their usual gabapentin, but there was a comment on there about why you did gabapentin for costochondritis. There's no chance I'd have done that, but that's the way it kind of come across.*
>
> Trainee 1101

One trainee discussed the use of prescribing as a tool to end a consultation. In which case, there may not be as much thought to the actual prescribing process as the situation should have merited.

> *I think it was more, it was more the practicalities of it and just being aware that, I know it sounds daft, but of the implications of your prescribing, because it is something that you just, you end up doing with most consultations and I think sometimes it's something that you do as a way to end a consultation almost…. So it's a transaction, isn't it? And not always consciously but it's often the way that your consultation is brought to a close is and here's the prescription. So I think, certainly I think if you're time pressured or you're running late and things, you probably don't give it as much thought as perhaps you should do. So I think from that point of view it*

has made me go away and think rather than an area that I think I have to go and study or learn about, just an area to reflect on perhaps.

Trainee 1301

2b: Rationalisation for prescribing behaviour

When trainees were discussing some of the errors that were made, there seemed to be two rationalisations that were offered to explain why events had occurred. One was described as 'pragmatic prescribing', or prescribing to a patient preference or situation, and the other related to systemic influences on the trainee.

2bi: Pragmatic prescribing

Trainees reported the difficult balance between following guidelines and wanting to do the best for the individual patient in front of them. For example, trainee 1301 discussed the drive to not prescribe medications which could be purchased over-the-counter without a prescription. Where a parent said that they would not be able to afford medication that the trainee knew would help a febrile child, it would be difficult to refuse such a request.

They are demanding like even paracetamol and ibuprofen they don't buy them over the counter… you know, they ask for it just for they can't pay for it, got a sick child, got fever, not going to say no, just give it.

Trainee 1601

Trainee 1701 discussed a situation where they had provided more medication than recommended for a patient who was going abroad for a few months. Even though they had

been previously unaware of the guidance limiting the total duration of medication issue, they were concerned that such a limit could have an adverse effect on their patient's diabetes control.

> *If their diabetes…it's poorly controlled you want them to actually maintain that control and not run out of their drugs halfway through…..*
>
> *…[If] they're not going to get the medication out there, which most diabetics probably wouldn't unless they're really on the ball, then they come back with more problems to us as a result of poorly controlled diabetes.*
>
> *I mean obviously we know what our contractual obligations are, so obviously we follow that don't we? But it kind of depends if you perceive there are going to be lots and lots of problems with it, then.*
>
> Trainee 1701

Similarly, trainee 1101 reflected on their issue of multiple doses of anti-scabies medication on one child's prescription.

> *I did that as a pragmatic approach to ensure the whole family would then treat and in the best interests of the patient they would then benefit from it. But that's deemed as an illegal error, which I can see is true. And then we discussed, all three of us discussed how probably something that's commonly done and it's probably a time thing as well that you'd have to get each patient to come in to again give this prescription.*
>
> Trainee 1101

Some trainees discussed where the preferred medication is known about, but a patient had requested something different which the prescriber can see a rationale for.

> *I now no longer prescribe gastric protection version of naproxen and prednisolone. The only exception recently has been a patient who said that they do not like the plain version, they simply don't like it, they found it difficult to actually swallow for some reason versus the gastric resistant version. So I acquiesced in that case, but otherwise*.
>
> Trainee 1501

One trainee caveated this approach with the need for adequate documentation explaining that the prescribing decision was based on patient preference, and that the patient was aware why the guidelines may disagree with that preference.

> *Also vaginal thrush [if] the patient asks for only the cream rather than pessaries and they say this is suboptimal as [I should have] prescribed the cream and the pessaries together…..So maybe when I prescribe something like that [I need] to be clear [they] take it as [a] patient request….just [write] in the notes why I did that.*
>
> Trainee 1601

Some trainees discussed the challenges of patients insisting on a particular prescription, such as antibiotics. There was a feeling that issuing a prescription, or at least discussing a delayed prescription was the only way out of such situations.

> *Sometimes the battle in GP is that you only have ten minutes and some patients come in with a very, very rigid idea of what they want out of a consultation and sometimes they might be pushing and pushing and pushing for antibiotics and you're*

stuck between a rock and a hard place because you're not going to get them out of the door unless you bend to their will.

Trainee 1201

Maybe it was a patient who's been difficult or maybe it was a patient who was insistent, and the middle ground was either give them antibiotics, don't give or reach the middle ground which is give a delayed script.

Trainee 1401

2bii Systemic influences

This subtheme explored where trainees' prescribing had been informed by the practice of other healthcare professionals or groups. Understandably, trainers were a strong source of such influence.

*Because I know that (*trainer*) learnt a lot from doing it. He said that he, you know, some of the things that I was regularly doing he does exactly the same.*

Trainee 1101

Yeah, and he was quite open about it that, you know, there were things that he probably does that I was doing as well and perhaps maybe wouldn't have picked me up on them because they were things that he did as well.

Trainee 1301

Other expert prescribers were also mentioned by trainees. For example, trainee 1301 discussed the practice of dermatologists to allow patients to continue with preferred emollients, rather than sticking rigidly to the local emollient formulary.

> *I think a lot of the dermatologists, they say actually patients have got to have an emollient that they feel comfortable with and want to use so that they'll actually use it and I kind of take that approach.*
>
> Trainee 1301

Trainees were also influenced by what seemed to be the 'norm' in their practice, or by prescribing behaviour that had been promoted in previous practices where they had worked.

> *I think the ones that I was surprised about was certain ones for certain things, like we've got in our practice amitriptyline 10mg, two nightly and increase every week as needed. That's a practice thing, it's just something that we use commonly in the sub-heading.*
>
> Trainee 1401

> *So steroids. In previous practices it was like 'oh, you must give the gastric protective version', OK fine. That's a bit more expensive but fine, if it causes trouble for people having it without a PPI then I'll do that and then I was told 'no, if it's very short term, it doesn't have to be gastric protection. If it was longer term then maybe you want a PPI then that will be the best option'. So that's made me think a bit about my prescribing.*
>
> Trainee 1501

One trainee talked about the challenges of altering instructions on a repeat medication, as this would be akin to challenging a colleague's prescribing practice. It would be likely that most of the other prescribers in a practice would be more experienced practitioners than the GP trainee.

> *So you don't challenge I suppose what's on there and what are the instructions and what's the indication. Do they really need this? Is it dangerous for them to be having it? You do question it less on repeat….Should I change the instructions if I don't agree with the instructions? It's difficult, isn't it? You sort of feel like you're challenging somebody else's prescribing practice almost if you do that.*
>
> Trainee 1501

This trainee went on to say that if they were conducting a medication review, then maybe everything should actually be challenged where appropriate. They also discussed the reality of being able to challenge every repeat item requested during a busy surgery. Where a prescription was considered to be low risk, such as the laxative *Fybogel*, the opportunity and need to change inadequate dosing instructions, or discuss the actual need for the medication, was not thought to be a priority. For higher risk medications, the risk-benefit was thought to favour more in-depth analysis at the expense of consultation time.

> *…if it's part of a medication review then yes, I suppose you should be doing that actually, you should be challenging other people's prescribing but in this case where it's a repeat, that's a bit harder isn't it telling somebody 'oh, why are you getting this on repeat?'. In a busy practice you don't always challenge that unless it's something that flags up in your head as oh, I don't like that prescribing if somebody comes in, you know, we've got patients on phenobarbital and instantly your gut goes oh, don't like phenobarbital, why are they on that? How much have they been having? So it*

does trigger that. Something like Fybogel, if they need some Fybogel, they need some Fybogel, it's on repeat, click.

Trainee 1501

Theme Three: Impact on trainee and practice

This theme sought to explore how the report and feedback tutorial had impacted the trainee, and also whether there was subsequent impact for the practice in which they were situated. The theme sought to identify if the trainee agreed with the events outlined in the report, whether they intended to change any behaviours, and what behaviours they had already changed as a result of the feedback process. This theme is divided into three subthemes: awareness of issues, change in behaviour intended and change in behaviour implemented.

3a. Awareness of issues

This subtheme looked at the concept of participants being made aware of potential prescribing issues, specifically where it was mentioned that practice may not be changed as a result of those issues being highlighted. The utility of having issues reported to a prescriber so that informed choices could be made about the merits of behaviour or practice change was highlighted in the interviews.

Well I think it's always interesting isn't it to have the opportunity to reflect on detail and then whether you then choose to change the way you behave I suppose is up to the individual.

Trainer 1301

I mean we all agree that some of it perhaps wasn't always completely realistic and, you know, that we do all do some of these things which are not so good…..But being aware of it is important.

Trainer 1201

One of the trainers discussed the prescribing of 'off licence' medication. Although it may be useful for a trainee to be aware that a particular medication they are prescribing is off licence, if such prescribing is accepted and useful practice, then feedback would not change the fact that it would be prescribed again in the future.

Well there were things like being off licence, which we as GPs use drugs out of licence frequently. So I think it's good to have it pointed out, but it wouldn't necessarily have changed my practice and therefore presumably not the registrar's practice.

Trainer 1701

Where there was patient preference to provide clotrimazole cream alone, rather than in combination with a pessary, trainee 1601 explained that they would still just provide the cream, but are now more cognisant of the treatment benefits of providing combination therapy.

And other things also about the prescribing for, you know, thrush and combination of the pessaries and you know the cream, usually I just give it according to the patient what they want, but best practice prescribe both. So a few points we discussed last time which yeah I'm putting on board.

Trainee 1601

Prescribing of emollients in line with local formularies rather than patient preference was another area where trainees may not change their practice.

> *Yeah, I think so. I mean I might go with if it was the first time they've ever had one to pick one from the formulary, but I think if it's somebody who's well managed with something else, I think trying to swap them to something that's on the formulary when actually they're quite settled and happy on it and using it, I think I'd still be happy for them to carry on with that.*
>
> Trainee 1301

Indeed the trainer of trainee 1301 was similarly non-committal regarding the concept of practice change in this area

> *…to some extent an emollient's an emollient, but I take the point that we should try and stick to the formulary.*
>
> Trainer 1301

Consideration of the amount of detail which is contained within prescription instructions was another area where trainees had received feedback. If this had been the case, in the follow-up interview, they were asked whether their practice had been changed to be more specific in their instructions. Trainee 1401 was asked if they would be more specific about whether a medication should be applied to a left or a right ear, for example. They replied that they had only changed practice in certain instances: where they believed that a patient could potentially be more confused about which ear the cream should be applied to.

> *To be honest, not all the time, but with – especially with patients that I think would be OK, but I think – especially with patients that I think might struggle, I am just*

putting 'left' or 'right', so – especially with – we've got a lot of elderly patients, and I think they might forget when they get home or they might not be sure, so I just put – I keep using 'affected ear', but I just put 'left', rather than re-write the whole thing.

Trainee 1401

Reconciliation of repeat medication prescribing, so that all a patient's medication was issued for the same duration was another issue that was highlighted in some trainees' reviews. One of the trainers did not think that sort of issue should be highlighted in a trainee review.

So for example there was a criticism that the quantity of medication issued didn't always match to tie medications up. So somebody might say be given gabapentin 100 capsules which was obviously roughly if they're going to take it three times a day would be roughly, but just over a months' supply. Whereas their other medication might come as exactly a 28-day supply. I don't really regard that as an error, but it wasn't called an error it came into some other category. So little bits and pieces….But you could argue that actually, you know, what I mean, it's not actually cut and dried that that's necessarily wrong.

Trainer 1701

Another aspect of repeat prescribing practice was actually discussed by the same trainer at the level of their practice meeting. Trainee 1701 had prescribed co-codamol in an acute setting, but had left the patient with an active repeat medication of paracetamol. Although this discussion had been had with other prescribers in the practice, it was uncertain if practice would be changed as a result, as this may be best left to individual clinical judgment. The issue of the lack of documentation by trainee 1701 in this circumstance was also highlighted, which would also serve as a reminder to other clinicians regarding best practice should they wish to leave paracetamol on the repeat medication section when prescribing another paracetamol-containing medication as an acutely issued item.

So that's the sort of thing which we've actually discussed as a practice because that is the way we often operate, because the thing is that obviously your patient may well be trying that out, but may go back to paracetamol if for some reason the co-codamol doesn't suit them.

Interviewer: So you're offering options?

Yes. So we've had a discussion about it, whether or not people change their practice is another matter, but I think it's good to be challenged and obviously that's probably a judgement depending on the patient. So there are some patients you might well think they definitely understand what I'm saying to them or others where maybe you might think well actually he needs to be absolutely clear I definitely need to discontinue this, you know, the paracetamol so it's absolutely clear to anybody that they shouldn't be taking the two at the same time. And obviously the other missing bit was the documentation which again R was fairly confident he would have talked to the patients about, but hadn't necessarily actually written it down in the notes.

Trainer 1701

Trainee 1801 had also raised a prescribing issue with their practice team regarding the continued prescribing of erythromycin rather than clarithromycin. This trainee was unsure whether amended prescribing would be enacted as a result of their feedback to the practice team. Further exploration of this issue with their trainer was not possible in the study due to the trainer not having enough time to take part in any follow-up interviews.

So I did discuss the erythromycin/clarithromycin discussion briefly, and it was a bit of perhaps, um, backdated prescribing habits essentially from some of my colleagues who prefer erythromycin rather than clarithromycin from a personal historical point of view. I've flagged it up to say that it's not up to date with the local guidelines, and

they're happy with me prescribing clarithromycin, but in terms of whether they are changing their personal prescribing I'm not sure to be honest with you so.

Trainee 1801

3b: Change in behaviour intended

This subtheme looked at where participants reported that they intended to change their behaviour as a result of the feedback received, but had not yet had the opportunity to realise the behaviour change.

Some of the trainees discussed the need to be providing more detailed consultation notes, to provide a record of what was told to the patient, and to ensure that other colleagues could see what had happened during the consultation.

There's certain things I should be probably documenting a bit better, but then certain things it's about time as well and the fact is you can't write everything you say to the patient. I think it's the balance and I think with certain things it's better to be a bit more careful.

Trainee 1401

I can see from the notes why it'd be seen that I did give gabapentin for the costochondritis, but so now I'm kind of aware that because somebody reading those notes wouldn't be able to appreciate what I'm doing.

Trainee 1101

Some of the trainees discussed specific medication errors or suboptimal prescribing that had been highlighted during the review. Trainee 1101 discussed the legal issue of prescribing more than one person's scabies medication on one prescription, and suggested that their prescribing behaviour would be different if the situation arose again.

> *I haven't had the chance actually to prescribe any of the stuff for scabies or anything like that…So I haven't done that, but I think in the future I would do. I'd kind of make sure that I did it as individual scripts for each patient.*
>
> Trainee 1101

Trainee 2001 said that they would consider additional anticoagulation monitoring when certain antibiotics were prescribed, and would also consider prescribing NSAID medication with greater caution in patients with asthma. They commented that they had already been aware of the latter prescribing issue, but had just 'forgotten' about it in the prescribing event that was reported in the review.

> *I think the INR and antibiotics definitely would be a big thing that I'll change as a consequence of it….*
>
> *It highlighted to me again the asthma and NSAIDs, but I did know that anyway, I'd just forgotten it on one occasion! So yeah, there's definitely things I would change from it.*
>
> Trainee 2001

One of the trainees thought that they would take greater advantage of the possibility of delayed antibiotics, rather than just prescribing antibiotics as a way out of a difficult consultation.

…but I think certain things, especially with the delayed antibiotics, I'll be looking at that a bit closer and I think it's a bit difficult because I personally think that certain people in my situation would just prescribe the antibiotics. So I think clinically I probably use delayed antibiotics a lot more and I think that's better, but not for notes it wasn't as good as it should have been. And certain cases, yeah, it's right, I agree I should have not given them at all, but I don't know why I did at that time. Maybe it was a patient who's been difficult or maybe it was a patient who was insistent, and the middle ground was either give them antibiotics, don't give or reach the middle ground which is give a delayed script.

Trainee 1401

A greater emphasis on the use of local guidelines was another area where behaviour change was intended.

…different guidelines can vary location to location as well. So the importance of checking local guidelines and if there is an ambiguity between your personal opinion about what's right and, for example, the system or a colleague saying some different, rather than trusting a senior colleague perhaps just refer to the guidelines and that will tell you the accurate answer.

Trainee 1801

Even though trainers had not received specific feedback about their own prescribing, several reported an intention to change their own practice as a result of hearing the feedback to their trainees. The importance of adhering to local guidelines, as well as writing more detailed instructions for patients on their prescriptions was mentioned by some of the trainers.

…and one of the things that I learnt was really to write more instructions on the actual prescription. Instead of putting 'one BD' or 'one TDS', actually putting down '1, three times a day for chest infection' or whatever.

Trainer 1501

I think just giving clearer instructions when we're writing medication and thinking a little bit more about the patient or the home in that we put clear instructions, how long for, frequency, clear doses….

So I picked that up and also some things sticking with the local guidelines as well.

Trainer 1401

Trainer 1101 discussed the issue of multiple patients' scabies medication on the same prescription, and concluded that they would also consider changing practice in this area. Although before taking part in the study, they had been aware of the issue, having it highlighted as a 'legal' concern had caused them to engage in further reflective practice.

I think I probably would issue them separately now. Because it's not the right way of doing it. So we ought to do the right, do it the right way. So I think I probably would issue a separate prescription for each person. Or tell them to go and buy it, which is the alternative, because it would probably be cheaper than the £8 per person particularly for the adults.

I think I probably would prescribe it as I should do; legally.

Yeah well, I did know I guess but I think it wasn't actually knowledge to me, but actually discussing it and putting it as a legal error and saying ok that is actually something wrong, I guess highlights, increases your, escalates your concern about it doesn't it?

Trainer 1101

In some instances, discussions had also taken place at a practice level, with other prescribers keen to learn about issues that had been picked up as part of the reviews.

> *It was good feedback and people were really interested about it, actually. I think – yeah, there was quite lot of discussion, and everybody went, 'Oh, xxxx, really?' about – 'Oh, yeah, we must remember that about lansoprazole, and we must remember that about childhood doses of amoxicillin.' And being specific about prescribing of Calpol. Think they were the main ones that stuck in my mind.*
>
> Trainer 1901

There were also some systems changes that were being explored as a consequence of taking part in the review.

> *So we came up with a few things that we wanted to have a look at. The Stockley's Drug Interactions I'd not heard about. I'd written down that we were going to have a look and see if that's actually integrated into SystmOne or not, I don't know…..*
>
> *Then we spoke about, at the moment on SystmOne, for things like codydramol, paracetamol, co-codamol, it just says, 'take 1 to 2 4 times a day' and it doesn't say 'take 1 or 2 tablets, maximum 4 times a day'. It doesn't say that so that could be interpreted –*
>
> *Interviewer: So that could be a bit confusing.*
>
> *Yeah. So that's a system change that we want to undertake. So that's not so much the registrar, it's more of a system.*
>
> Trainer 2001

Even at the follow-up interview this practice change remained as 'intended' rather than realised, due to logistics within the practice.

So we're all up for it but we just haven't – there hasn't been an opportunity where all the partners have been here, because of annual leave, so hopefully that will get…

Trainer 2001

Trainers also discussed the way in which they intended to change their teaching, or approach to supervision because of taking part in the study.

…I think it will influence me in my, in the way I look at, you know, oversee them and perhaps review their medication in a different way.

Trainer 1701

I guess I would be encouraging my registrars, again, to use repeat prescribing much more.

Trainer 1901

3c. Change in behaviour implemented

This subtheme captured behaviour change that was reported to have happened as a result of participation in the project.

Several trainees reported that they were now more comprehensive in their documentation of details relating to a consultation.

Yeah I am more clear in my documentation on when I'm prescribing things….I'm probably more accurate in my instructions for use on steroids and emollients……I definitely have changed my prescribing of steroid creams now…….And I always document discussed things like fingertip rules and things like that with the patient. I don't always write it on the prescription, but I document that I discussed it with the patient.

Trainee 1101

I guess I put more detail in and if the patients are really, really pushing for a particular medication I will state that it's at the patient's request, but I advised against it.

Trainee 1201

But I think, before, in the notes, the issue was that I was writing 'Delayed antibiotics', but not saying when to use it or – so now I usually write, 'Delayed antibiotics. Wait this amount of time' or, 'Use if persists beyond 72 hours', for example.

Trainee 1401

Several trainees also reported that their prescription instructions were more specific and detailed.

Yes, so being a little bit more clear with instructions and trying to make sure that the, obviously I avoid the Latin abbreviations now, because obviously the patient wouldn't understand what that means at all. And just realising that what I write on a prescription is quite definitive. So if the patient doesn't understand it, they're left a little bit…

Trainee 1801

These were some things which are quite obvious and there were other things as well, for example prescribing pain killers for children – rather than just prescribing as advised or as on the box, I'll write clear instructions.

Trainee 1901

I think generally, after doing the study, I think I have been a bit more specific in the things I prescribe. For example, when I give co-codamol, before, I just used to tell the patient, 'Don't use with paracetamol', but with certain patients, I'm now using that box to say, 'Do not use with paracetamol.'….Or, 'Do not take with this' or…do you know what I mean?....I think the study's made me think a bit more about using that box a bit more effectively, maybe.

Trainee 1401

One trainee also reported a greater readiness to amend the prescribing instructions relating to previously issued acute or repeat items, rather than just leaving the previously written information unchanged.

More so in issuing, re-issuing either acute or repeat medicines that weren't initiated by me. So when a request comes in from a patient to have another prescription for something and that comes via our medicines management route and if does end up in my inbox for whatever reason, I'm much more conscious of actually making changes to the instructions on there. So you know it may simply say AD, you know, as directed, is maybe all that's in the box. And if I'm able to I'll actually try and put a bit more meat on that depending on what the initial prescription was to give some proper instruction. So I am making changes now, saying well I'm actually issuing this and signing this, just because it wasn't initiated by me, ultimately if something goes

wrong on the last prescription and I've just left it as was, I'm the one who signed it. So what would I put on if I'd been initiating it? So I am making changes then in most cases.

Trainee 1501

Trainee 1501 also explained their more 'questioning' approach to prescribing as a result of being part of the review. Their mindset was now to challenge their own prescribing decisions that may have just been habitual rather than evidence-based. This challenge also extended to where they had received a prescribing request from a secondary care colleague. If they were unsure of the rationale behind the prescribing decision, trainee 1501 explained that they would seek clarification from the requester in the first instance.

And there is a very much, I've had a letter telling me to, so I'd better just prescribe that. I think there's more a 'hang on a minute, let's have a little look at this'. This is actually what we should be prescribing. So there's a lot more, I think I'm doing a lot more trying to challenge myself a lot more on either stuff I habitually prescribe and why am I, or I've been told to prescribe something that maybe doesn't seem to be in line with guidance. There's just a, look into that a little bit more even if it's just dropping a quick phone call, email or letter back to whoever asked for it initially.

Trainee 1501

Other trainees reported a greater diligence with the repeat prescribing process: taking care to ensure that similar medications are not inadvertently issued as an acute request.

So checking the acutes versus the regular, making sure I'm not doubling up on prescriptions. Things like patients with muscular or joint problems are prescribed

codeine or dihydrocodeine too without realising that co-codamol is already on their regular prescriptions.

Trainee 1801

Trainee 1501 reported taking greater care during the process of prescription issue, to try to avoid inadvertently issuing too few tablets for the required duration for example.

I certainly now am very aware that when I select a drug, I'm very careful to check how many actual capsules or tablets it brings up. And is that actually the right amount for a number of days course I was intending to give. So yes, very much so I'm checking that

Trainee 1501

One trainee reported a greater diligence, but also commented that *It's made me more nervous about prescribing!* (Trainee 2001). Trainees also reported a greater readiness to consult guidelines. Sometimes the project had opened their eyes to guidance they had previously been unaware of.

…more diligent in terms of checking what's first line in antibiotics….I'm probably more likely to check, to double check in terms of BNF or the protocol.

Trainee 1201

So in terms of following the guidelines I'd not been following the guidelines in terms of I was giving a one-off pessary with the cream, and I believe it's actually supposed

to be 100 milligram pessary spread over five days. Although at the time I wasn't aware that such a guideline existed until after, after the thing.

Trainee 1701

Some trainees reported a change in practice regarding access of guidelines, in order to be sure that the most up to date version was being consulted.

I think there was something about the antibiotics guidelines which have changed and that was because I was using an old BNF and I was consulting the people before, so I think that's changed as well. So I'm kind of more cautious about those….I think what I've started doing now is using online BNF rather than the copy BNF.

Trainee 1901

Changes were also reported that were specific to individual drugs (or drug families) which had been the subject of prescribing events in the review.

Trainee 2001 reported that they now ask patients about asthma symptoms when prescribing or recommending NSAID therapy, and are also cognisant of the need for anticoagulation monitoring when prescribing certain antibiotics to patients on warfarin. They reported that these were not areas of prescribing practice they had routinely employed before being a part of the study.

I've also actively been really conscious of all the patients on…antibiotics and warfarin, which was an interaction that I wasn't particularly familiar with before. So that has definitely changed what I've done, definitely.

Interviewer: Excellent, yeah. So yes, it was the antibiotics, the course length wasn't it?

Yeah, and then just checking the INR afterwards, like depending on the situation and what antibiotics they were on.

The other big thing and I did know this anyway, but it wasn't something that I routinely asked about, was whenever I prescribe anti-inflammatories, I always ask about reflux, especially in older people, but I always used to forget about asthma and that was another thing that it pointed out to me. So now I ask that all the time. So there are a few things that it has really made me much more aware of, which is good.

Trainee 2001

Trainee 1801 was able to recount a specific clinical situation from the day of the follow-up interview, where they had remembered to prescribe a 10-day course of penicillin for tonsilitis rather than the default seven-day course. They also reported that they had corrected the way in which they prescribed *Otomize* ear spray.

Absolutely quite a few specific points I would say I've changed. So even today for example my prescribing of penicillin V for tonsillitis. I remembered that it's a ten-day course, not a seven-day course and made that amendment from 56 tablets up to 80 tablets accordingly and very little changes like that which are obviously clinically relevant, but can be overlooked quite easily just from an educational point of view…

…So I think it was the Otomize ear spray that I was prescribing incorrectly. I was recommending two to three sprays per dose as opposed to one spray per dose. So that's certainly something that I've corrected.

Trainee 1801

Trainee 1501 reported no longer prescribing high dose citalopram to patients over the age of 65, and also reducing their tendency to prescribe gastro-resistant prednisolone.

I've already changed my prescribing.

Interviewer: So you've actively changed your prescribing habits?

Yeah, I am now not prescribing gastric resistant versions if it's short-term use only for prednisolone.

Interviewer: You did mention at the last interview is it citalopram?

Yeah.

Interviewer: And about the dosage of that.

Yeah so, I haven't done that again.

Trainee 1501

Trainee 1901 was more generic about how they had changed their practice as a result of the study, but were still confident that their practice had actually changed.

I have made certain changes, so, you know, antibiotic doses, the lansoprazole doses…advice about over-the-counter medicines. So things like that, it's already reflecting in my entries.

Trainee 1901

Trainee 1601 recounted how they had previously prescribed prednisolone at the same dose for the same duration for a flare-up of both asthma and COPD, when different regimes are now recommended. They went on to say that other trainees and one of the GP partners were also prescribing the same treatment regimes, and had now changed practice because of trainee 1601's feedback to them.

For example the…prescribing in asthma flair up or COPD flair up, I used to do the same dose for the same duration. Now following the guidelines which is different

between asthma and COPD. And I talked to the colleagues as well and I found that a few of the doctors were doing the same like for example…30 milligrams 5 days for both. So it was good like you know -

Interviewer: So they've taken it on board as well?

Yeah, the other registrars and one of the partners

Trainee 1601

Indeed, trainers reported a change in prescribing practice because of supporting their trainee through the review process. Several commented that they were now writing clearer and more comprehensive dosing instructions for medication.

….the main one is actually writing more clear, using instructions on the actual prescribing instead of in the old days when we just used to write 'one BD' and 'one TDS', I'm writing more you know use this cream once a day at night for your feet and this cream once a day for your face and so on. So that is actually on the prescription rather than expecting patients to just sometimes remember

Trainer 1501

I've probably, certainly I think I've been trying to be clearer in my dosage instructions, using less abbreviations.

Trainer 1201

Definitely. It has definitely altered my practice…I'm much more cautious, certainly, if I'm doing prescriptions for things like ibuprofen and Calpol for children, to write on not 'as directed'.

Trainer 1901

Trainers reported taking more care with the prescribing process in general, and specifically in areas such as antibiotic dose and duration.

> I *suppose in terms of my antimicrobial prescribing I've been a little bit more thoughtful about the length of the course, particularly with tonsillitis, you know, the guidance – it will be changed again next year but at the moment, you know*.
>
> Trainer 1201

> *I'm much more cautious about making sure I've got the correct dose – I don't under-prescribe antibiotics for children. Because I think it's very easy to put '125', and it mightn't be the right dose; it should be on the higher dose…..So, definitely, and I think I'm much more cautious about making sure that the duration of the prescription fits the course that I had intended.*
>
> Trainer 1901

> *So I'm sure that my prescribing has got safer. I'm more careful, I've been particularly careful about checking the electronic prescriptions before sending them off because its, I think that's in some ways easier, that's a definite potential risk.*
>
> Trainer 1101

Trainers were also able to talk about changes they had made to their teaching or supervision practice because of taking part in the study.

> *I guess it helps me when I'm looking at their prescribing and being critical, 'cause whenever I do a debrief with them, I will always try to look at their prescribing and*

make sure that that's what I would have prescribed. So I guess I try to be more critical about it. Making sure size of course fit the dose, making sure that they've documented potential side-effects and the sort of things that have been raised. So I think – I think I've always been quite alert to novices coming through – about their prescribing. Is it an area of risk? So I think I've always been quite alert, but maybe not quite as picky as was brought up here.

Trainer 1901

One of the trainers had started supervising a new trainee, and reflected on how their induction with respect to prescribing had been amended.

*…since we've had this feedback….I've had another, I've had (*name of trainee*) join me as an ST1, so she's a new registrar into the thing, she hasn't done any general practice. So I have been much, much clearer about teaching with (*name of trainee*) about prescribing I think and watching over errors and potential places.*

Trainer 1101

Theme Four: Feedback on the project and intervention

This theme explored how participants reacted to the study, whether they thought it was of value, and whether they would recommend the intervention to others. There are four subthemes to this section: personal reaction to the project, how it has benefitted individual trainees, how the report or findings had been 'repurposed', and whether participants would recommend the project to others.

4a: Personal reaction to the project

The concept of the project was generally well received by trainers.

> *I've enjoyed it….I think it's been really good…. As a practice we've come away with quite a few things*. Trainer 2001

> *I thought it was a very useful exercise.*
>
> Trainer 1701

> *I thought it was really good.*
>
> Trainer 1501

Trainees were also very positive about the project, with some commenting that they would like to go through the process again later in their career.

I think, since graduating, this was probably one of the best quality-improvement projects that I was involved in. It's just – I think as a GP, unlike hospital medicine, where you get scrutinised quite a bit on the medication.

Trainee 1901

I thought it was useful and easy to do.

Trainee 1301

Overall I thought it was very positive.

Trainee 1501

It was good to get some feedback and I'd do it again in a year's time if that was an offer.

Trainee 1701

It's been useful for me to pick up on things and it's actually made me realise that it's probably good to do an audit of your scripts just generally, even when I'm qualified or – just because you might slip into bad habits, and you probably might not know unless somebody looks at them. So it might not be that I do 100 in the future; it might be a bit less, or maybe 20/30, and just see if there's anything that can be picked up.

Trainee 1401

Where errors were perceived to have been over-zealously reported, concern was raised by trainers that correcting such errors would not be compatible with 'real-world' practice.

I mean we all agree that some of it perhaps wasn't always completely realistic and, you know, that we do all do some of these things which are not so good.

Trainer 1201

But, really, in the real world, if we're going to do that, we don't write down every single suggestion about – or every single thing we tell the patient. So I guess, in the real-world general practice, if we're not going to get any ambers or reds, we'd need half an hour with each patient… that I think this is real world, and if they looked at one of us, who'd been doing it a lot longer, they might not find as many of those good points. [Laughing] Because we tend to tell the patients but don't always document in the same way as a registrar would about everything they've told the patient.

Trainer 1901

The potential effect of seeing possibly 'overcritical' review was also a concern to some trainers.

It could potentially be threatening.

Trainer 1401

However, trainers seemed to report the benefit for their trainees of receiving detailed feedback in the way it was presented, with trainees also supporting this.

But being aware of it is important.

Trainer 1201

…could have been perceived as quite critical, but that's not to say it's not a useful piece of reflection to do.

Trainer 1301

And I guess it highlights, it reminds a trainee, and it reminds a GP to think about what they're actually writing and making sure it's clear and understandable to somebody else looking at the prescription. So as I say I thought it was a, you know, that struck me as a helpful thing to do.

Trainer 1301

There were a number of concerns raised that you might have felt quite criticised if you'd read it without the feedback, so it was given in a very positive, constructive manner, which I felt was really useful.

Trainer 1901

it's good to have the original feedback as to calibrate yourself as to what you might be doing and some tweaking to be done.

Trainer 1601

it's good to see because I think there are so many things that you don't really take notice of that probably you should.

Trainee 1301

Participants also spoke about the benefit of exposing their unconscious incompetence.

*But actually the exercise itself in terms of somebody else looking at our prescribing, somebody experienced like (*the review pharmacist*), does highlight errors that we may not have originally thought of. So I think overall it was useful.*

Trainer 1501

Yeah, yeah, because you want to know what you're doing wrong, definitely, because sometimes you do things, and you don't even know that you're doing it.

Trainee 2001

Things I thought were going to be a problem weren't a problem and things that I didn't realise were a problem, were a problem.

Trainee 1201

The ease with which the process had taken place from the perspective of the participant was also mentioned, as was the general perceived benefit of having taken part in a focused review of a particular area of clinical practice.

Well, I think we probably had a very good process, but it's been costly in terms of time from your point of view rather than ours….

…so I think we've done very well out of it, and it's been very thorough and extremely well done really

Trainer 1101

It's made me more aware of what I'm saying and doing and what I'm recording on the screen and what I'm communicating to the patient, I think.

Trainee 1801

You know, it's enabled him, and me, to sort of focus more on the most efficient and correct way of prescribing.

Trainer 1401

4b: How the process has benefited individual trainees

Trainees discussed how much they had learned from the process in general.

I think it was pretty useful.

Trainee 1901

So I personally found it incredibly useful, and I think that as a result I've made changes in my prescribing and obviously it's pinpointed some specific errors.

Trainee 1801

Highlighting those, my accuracies on specifics of use of medication.

Understanding that from a different viewpoint how my notes can be read and interpreted.

Trainee 1101

Trainees and trainers discussed the benefit of having the opportunity to be able to reflect on personal practice.

I think it's useful. I think it's useful for well all of us but particularly for GP registrars to reflect on their prescribing and I think this is a good vehicle for doing that.

It reminds them about guidelines, it reminds them about possible interactions, things that they may not have noticed. It just increases your awareness generally of prescribing issues. A good practice, you know, making sure the dosage instructions are clear, that kind of thing really.

Trainer 1201

I mean in terms of more for me to learn, is there a reason why I seem to prescribe lots of this and no-one else does? Why is that then? Am I missing something? Is my practice out of date or actually does everybody else need to be updated? [laughing]

Trainee 1501

Trainers reported a general impression that their trainees had benefitted from being a part of the study.

…he learns from experience, that's one of his main learning modes. So I would be very surprised if he didn't, and I know he said to me he's found it valuable. He says there are a few lessons there that are worth remembering aren't there?

He certainly has fed back to me that he felt it was a worthwhile experience and that he's learnt from it, and he's been much more careful since.

Trainer 1101

He took away some learning points from the initial report, and after the initial survey, and he's implemented them into his clinical practice now, and he's done very well in all of his exams and assessments so, you know, it's helped him in this final year of his

training. So he's got a few more months with us before he becomes an independent GP from August. So I think the process helped him.

Trainer 1401

Although a general impression of benefit from the study was reported, it was unusual for trainers to offer specific examples, possibly because they do not routinely scrutinise their trainees' prescribing to the same level as the study did. In some cases, trainers were able to specifically corroborate a change in prescribing behaviour in their trainee. For example, trainer 1501 fed back about a prescribing audit that was completed by their trainee.

I think that would be difficult for me to measure to be honest. I'm not aware of there being any major prescribing incidents since then. I'm not sure that I've looked carefully enough to identify a lot of the level of errors that we were talking about in the report.

Trainer 1101

And I wouldn't say I you know really reviewed Dr T's prescribing to that level since. So I'm not aware of any problems that have arisen, I've not come across any prescribing issues in debriefs.

Trainer 1301

I don't, you know, we discuss cases in debrief and we look at prescribing in general, but I wouldn't be able to look at things in this detail.

Trainer 1401

*Yeah I mean I think we talked about it and I think we talked about actually doing it as part of an audit and I know (*trainee*) has looked at particular areas regarding length of prescribing of antibiotics and certain sort of cost effectiveness in changing some of the prescription habits he had before and I think that's, and then he was re-audited and I think when we went through it that is reviewed. He has improved in those areas. So from that point of view it's instigated a change there.*

Trainer 1501

4c: Repurposing the feedback report

This subtheme explored whether there had been any additional benefits reported from taking part in the study beyond the immediate educational ones that had been envisaged.

One trainer discussed the utility of being able to refer back to the report in routine consultation debriefs they conducted with their trainee.

Things like the wording of prescriptions being careful to put numbers and not put numbers and words together, because he found himself having to correct that again a few weeks after that original interview and we talked about that when we were debriefing, he pointed out to me that we'd done that. So we mentioned that that was in the report. So that came up in our discussions I can remember that. Trying to think when, there've been a few occasions we've referred back to it.

Trainer 1101

Several trainees discussed their appraisal process, and the fact that they were pleased to be able to include the report, and the fact they had taken part in the study in their portfolio of achievements.

And that will be really useful because I'll be looking at – obviously it will come under like looking at enhancing professional knowledge, safety and practice and it could even come under an audit for me…. So it counts as an audit, it is really useful on your portfolio, and you can – it's just – I think it's – and it helps improve your safety.

Trainee 1401

So I found that useful and then I went through the report again and put a few notes as you've seen in my portfolio and things I learnt, things I'm going to keep an eye on it, which I'm doing now.

Trainee 1601

No, no. Yeah, the past week we've had to do our submitting for our appraisal thing.

It's nice to have a document that I can actually say this is what's been done of my prescribing,

Trainee 1101

One trainee also discussed how they would include details of the study in their *curriculum vitae* when applying for jobs in the future.

I think it's also quite a nice thing to put on your CV as well. I think it's a good thing that you've had your medication, you know, prescription use analysed and reviewed. It's a really good thing to have.

Trainee 1101

Another trainee discussed the benefits of repurposing the contents of the report into a teaching session on safe prescribing which they prepared for clinical colleagues.

> *It was interesting because I had the chance to present that as a quality improvement project in our meeting, clinical meeting.*
>
> *Interviewer: What, the practice here?*
>
> *Yeah.*
>
> *Interviewer: Oh really?*
>
> *So I did that, and I did it –*
>
> *Interviewer: What did they say?*
>
> *I did it as a quiz actually.*
>
> *Interviewer: You did it what?*
>
> *As a quiz. So what I did was –*
>
> *Interviewer: Really?*
>
> *I shared the whole thing but with covering the outcome, so of course I had positives and negatives or suboptimal prescribing or what you would classify as a mistake or an error in prescribing. So it was interesting actually. A lot of my colleagues would have done the same thing actually.*
>
> Trainee 1901

One of the trainers mentioned how they were pleased to be able to include the report in a presentation to the Care Quality Commission (CQC) who were about to visit their practice for assessment purposes.

We've got CQC coming on Tuesday, so this has been really useful.

Interviewer: Oh, really? Are you going to use it?

Yeah.

Interviewer: Oh, that's excellent.

I put it in my presentation, 'cause I have got to do the presentation on behalf of the practice, so I'm putting this in as one of the things that we've done about patient safety.

1901 Trainer

One of the trainees talked about how they had shared the report with their boyfriend, but did not reveal the outcome of their conversation regarding this.

Yes, I took it home and showed my boyfriend!

Trainee 1301

4c: Would participants recommend the project?

All parties commented that they would recommend the project to other trainees.

Yeah, definitely,

Trainer 1101

I'd recommend it to all GPs I think.

I think it will benefit all trainees to do.

Trainee 1101

Oh yeah, definitely. Yeah, yeah.

It's a quality improvement initiative, it's hopefully tweaking any sort of suboptimal areas of practice, so it's got to be good.

Trainee 1501

I thought it was really useful.

Interviewer: Oh good.

I would definitely recommend it.

Trainer 1701

One trainer commented that they hadn't really been too sure what exactly to expect before starting the project, but having now completed it, they would have no concerns in recommending others do the same.

Because initially I didn't know what it was going to be like and I thought well, let's go for it, let's see what happens, but actually yeah, I think it's a good idea to roll it out to more people.

Trainer 1401

Some commented that taking part had not involved much effort from a participant's perspective.

> *Yeah, yeah. I mean it's not very demanding from my point of view because you're just doing what you're doing and then you're having some feedback.*
>
> Trainee 1301

> *Yeah, definitely. It's not been onerous.*
>
> Trainer 2010

The fact that taking part could be included as an appraisal portfolio activity was also a positive consideration for trainees.

> *I think if it was offered to everybody, I think it'd be really good, 'cause it ticks loads of things for the portfolio, it counts as an audit, which is quite good.*
>
> Trainee 1401

Trainees and trainers commented on the educational benefits of taking part in the study, such as receiving personalised feedback. One trainee commented that feedback on prescribing may be less likely to occur in a primary care setting, when compared with the experience they had received in secondary care posts.

> *Yes I think getting specific prescribing feedback is a good part of the training.*
>
> Trainer 1601

I think it's a definitely a way of actually getting your prescriptions looked at in a way that doesn't really happen at any stage of your training.

Trainee 1701

There are certain habits you pick up, and you don't realise that you have been doing the same mistake over and over again.

Trainee 1901

…in hospital you get a much more continuous feedback from the pharmacist and from the doctors as well. In general practice I think you are, unless it was a very gross error which sometimes a pharmacist or the dispenser might pick up, these things remain unnoticed for years on and you develop a habit without realising that you're doing certain things. I think doing an audit after a little while is very useful. I really would recommend it for GPs as well as trainees.

Trainee 1901

Participants also speculated why certain people may not want to take part in a study of this nature. Trainer 1301 cautioned its use with an *under-confident trainee,* who may run the risk of becoming *overwhelmed* by the process. Similarly, trainee 1401 wondered if some people may not *like their work being criticised*, but balanced this with *but I think if you'd made a mistake or if there's something you can improve then it's good.* Trainee 1101 speculated that some people may not like the idea of such a project because of a fear they may *get in to trouble* for a putative error. They then commented that such fears may be unfounded (*….Not that they probably have done anything…)* but the irrational fear of getting into trouble may still be a barrier for participation for some. Indeed, trainee 1101 then went on to say that they had spoken with trainees from other practices who hadn't taken part in the study specifically because they were worried about how the feedback process would be handled.

So if you had a sort of under-confident trainee who got a bit overwhelmed by the erm, perceived sort of errors or issues then, you know, you could, I can think of some trainees who might then be a bit sort of overwhelmed by it all really.

Trainer 1301

…it just depends on the person…some people don't like their work being criticised, but I think if you'd made a mistake or if there's something you can improve then it's good.

Trainee 1401

I think the worry with a trainee perhaps why they don't want to do it is because they're worried something will be found out about that they've done - something really bad and they're going to ultimately be found out…. Yeah the normal worry that they're going to find out (that I) prescribed something - it was really bad and it's going to be - I'm going to get in to trouble...

….Not that they probably have done anything –

…I think people worry about it. When I'm talking to my colleagues about it, that's why some of them didn't want to do it….

Trainee 1101

Theme Five: Future ideas for the project

The final theme sought to collate participants' views regarding the future of this project, and is presented as five subthemes. The first subtheme explored when such a prescribing review should take place in the GP training period, the second presented thoughts regarding who

should feed back the findings of a review. The third subtheme explored the question of whether the feedback report should be presented to the trainee before the feedback tutorial meeting, or at the time of that meeting. The fourth subtheme sought to explore how such a feedback process should be coordinated. The final subtheme presented further ideas for development of the REVISiT process.

5a: When to undertake the review

There were mixed opinions among the participants regarding this area of consideration. One trainer discussed trainees undertaking a prescribing review in the ST1 year, where they might be beginning to form habits, which could be more difficult to change once they had become embedded practice.

> *I wonder about sort of ST1 even because they are working, most of the registrars by the time they've been in general practice a couple of months are working independently…. so I guess in an ideal world maybe as early as possible, as soon as you've got enough prescriptions to make it worth looking at…. you know he actually will be forming habits now which it gets harder to get out of doesn't it, once you've got into the habits, ways of doing things.*
>
> Trainer 1101

One of the trainees wondered about the wisdom of completing the review in the ST1 placement, due to the amount of supervision that they already receive at this time.

> *I don't know how beneficial it would be because you're having – you're getting debriefed for any patient, anyway, so your trainer's going to look at that,*
>
> Trainee 1401

Another one of the trainers thought that the ST2 year would be better placed for such a review as this would still be fairly *early* in their training process, but they might have become more embedded in the world of general practice, seeing more *complicated patients* and also *more open* to receiving feedback.

> *Ideally the early attachment…..Either Year 1 or definitely Year 2….Yeah, because what you want to do is instil good habits early….And also they don't see as many complicated patients early on in their job, so that's why I hesitate whether first or second year, but definitely before the third year. So maybe the best year might be the second year because they've got a bit more confidence in themselves, they've been used to training process and getting feedback and then in the second year they may be more open to it. So I guess second year would be the better option.*
>
> Trainer 1501

One of the trainees thought that the review would be best completed in either the ST1 or ST2 year. They commented that most of their placements were in hospital during these two years. They commented that it was in hospital that they had picked up *bad* (prescribing) *habits.* After completing a prescribing review, they would then be able to *take better practice back* to their other hospital training posts.

> *You certainly need to be doing enough prescribing for it to be beneficial. And you do, you probably pick up obviously in your ST1, ST2 certainly the way the Nottingham program works is when you're principally doing hospital posts. You obviously pick up a lot of habits in hospital that you maybe then carry into general practice, which are maybe not appropriate habits. Would it be appropriate to tackle that in ST1, ST2? Possibly, then you could maybe take better practice back into your hospital post as*

well. I think you also have to acknowledge that prescribing in hospital is different to prescribing in general practice. I don't necessarily know why that is, but it is different in hospital.

Trainee 1501

Most of the trainees thought that a prescribing review would be best placed in the ST3 year. They would be more senior by this point, with a greater mix of patient case load. Although being more embedded in general practice by this stage, there is still time within the ST3 year to recognise and correct inappropriate prescribing habits before the completion of training. During the earlier parts of training, consultations may be longer, with greater opportunity for comprehensive note taking. As the trainee progresses to ST3 year, consultations become shorter, and they must decide how to manage their time within those consultations as they prepare for practice beyond their training years.

So you've got more time per patient, as well, so I think, if I look back, my notes in ST1 and ST2 were really, you know, detailed notes and explanation that I give. When you come to real life, although ST3 still is not real GP, you—.

Interviewer: Because now you're on the ten minutes, aren't you?

Absolutely. Because you have to pick and choose as to what's appropriate/what's not. What would suffice?

… I think it should be in the last year, probably in the first half of the last year, because you are now working as a senior registrar, someone who's now down to ten minute consultations, so the time constraints are there and like when you're ST2 or ST1 and you've got twenty minutes or fifteen minutes per consultation, you've got more time and less chances of error when you're doing that. And then you will see more patients as well, so you automatically have a broader range of patients.

Trainee 1901

Whereas ST3 you've got a little more knowledge, you perhaps think or do know the guidelines or think you know the guidelines at least, therefore that's the opportunity to address those omissions, I think. And a little bit later on in the career would be a little bit tricky to break those habits may be.

Trainee 1801

So I think middle of ST3 is a good time because you're going to finish and nobody's going to look at – you know, you're not going to get your prescriptions looked at, but you should also have streamlined…..while in ST3, not every single patient I go through with my trainer.

Trainee 1401

Many trainers also thought that the review should take place in the final year of training. Although appreciating that this year is already very busy, it was thought that it is really only by this stage that the trainees have enough primary care experience behind them to make a review worthwhile. Trainers also commented about the training relationship that exists between both parties during ST3, and the support that trainees would be able to receive as a result of this. There was disagreement between participants about whether the review should take place towards the beginning, or towards the end of the year.

I think in terms of continuity between me and the registrar, ST3 would be the ideal because we could see them and continue.

Trainer 1201

I think ST3 is a good time to do this kind of analysis because then they've got plenty of experience in general practice behind them. There is a lot of other things going on

in ST3 as well, but I think the value of it comes more in ST3 and probably towards the back end of ST3.

Trainer 1401

…earlier in the ST3 year would be a good time to do it so that they've got the security of then putting into practice the things that they've learnt while they're still trainees and they've still got people around because I think they have a bit of an idea that when they get to the end of ST3, that's it then, they need to know everything and actually that's obviously not correct, it's an ongoing process.

Trainer 2001

…or it needs to be in their final year which in some ways might be too late, but again needs to be early on in their final year.

Trainer 1201

Some participants thought that it didn't really matter when the review took place in the training period, as there were advantages and disadvantages of it taking place at any stage.

Erm, I think it has values at all points

Trainer 1201

I don't think it would matter when you did it because I think having feedback on your prescribing would always be helpful.

Trainee 2001

Some of the participants also spoke of the benefits of undertaking a prescribing review more than once. This would be to see if new prescribing habits had actually been embedded, and also in recognition of the possibility that different errors may be picked up at different stages in training. Most of the participants who advocated two reviews suggested that one should take place in the early years of training, and one in ST2 or ST3, but one participant suggested a review of practice about three months after a first review in the ST3 year. There was a realisation from participants that conducting more than one review would have greater resource implications.

> *I guess it's useful to follow up and kind of re-audit and see again a useful, I think useful both from a safety point of view and from my own point of view, because I imagine in a year's time there'd probably be different mistakes from what there are now.*
>
> Trainee 1701

> *I think if it's beginning of the training would be good to be aware, you know, just kind of telling us what to do and right way before we get used to the bad habits, you know, bad practising. And then maybe another follow up at the end. I don't know that's possible.*
>
> Trainee 1601

> *…if there is a mechanism where ideally let's say if they can have feedback in let's say their first four months, towards the first four months prescribing habits, then maybe one in the third year.*
>
> Trainer 1601

> *Or maybe like looking at it in like the first month that you're there and then looking at it again three months later and seeing whether you've taken on board –*

Interviewer: If your mistakes are the same or you've got new mistakes!

Yeah, exactly.

Trainee 1201

This could be done – I don't think resources would allow it, but this could be done in ST1,…ST2…to see if changes have been made or actually you've picked up a bad habit and you keep on repeating it and you don't learn from it. So that would be interesting, do I learn from what I picked up in ST1? Do things evolve and good things that I change, do those persist? Obviously taking into account the fact that prescribing changes as time goes on. What was a guideline yesterday is now pooh-poohed and the guideline changes today. But overall do I carry that on? So that would be one thing, do I carry things forward from ST1? I think whether resources would allow that because obviously you're then talking about a huge population of people and data, but that would be useful.

Trainee 1501

5b: Who should feed back the findings of the review?

Participants discussed the value of having someone external to the practice delivering the feedback session. This could give the impression of *external validity* (trainer 1101) and also of *a more formal process* (trainee 1501). Trainer 1101 recounted significant event meetings that they had attended with neighbouring practices. Although such meetings had been quite *anxiety provoking,* they were often *much more memorable.* The trainer suggested part of the value of such meetings were that they brought *in conflict the two different ways of working in two different practices and you actually got a degree of peer review without having any of that mutual obligation to each other.*

I think feedback is always going to be more powerful if it comes from outside, outwith your organisation, isn't it? Because that gives us a degree of external validity and things and when we have, for example when we have a significant event meeting, if we discuss in practice then that gives a certain amount of – you know it's good to do and we learn things from it, but we always learn much more if we say have a shared significant event meeting with a neighbouring practice and we then discuss it together because that brings in conflict the two different ways of working in two different practices and you actually got a degree of peer review without having any of that mutual obligation to each other…

And it does make it more powerful…

And you remember those feedback sessions maybe because they're a little bit higher anxiety provoking, I don't know, but you do remember those sessions that we have had significant feedback, a significant event discussions with neighbouring practices, they're always much more memorable and therefore you've obviously learnt from them much more…

Trainer 1101

*Yeah, probably because you feel it's a more formal process so therefore, I don't know, you feel that it's gold standard of prescribing that you're being informed about, whereas if it was me and (*trainer*) talking about it, we might think well, I'm just telling you what my beliefs are about this particular way of prescribing. So I think it is useful to have an external provider*

Trainee 1501

Trainee 1801 mentioned that some of their errors were due to adopting the prescribing practice of senior colleagues within the practice, or because of the way in which the practice computer system was set up. The trainee commented that *it was easier to explain those things to an independent GP rather than explaining it to a GP who works in the same practice; they might not be quite as understanding.*

…because he was independent and because he was separate from the practice, I was able to explain a lot of the reasoning behind my prescribing in it based on advice I'd received from senior partners here, and also describing the computer system to him as well in term of the wording which is on the system, the numbers, the doses, etc, which are pre-set on the system. So it was easier to explain those things to an independent GP rather than explaining it to a GP who works in the same practice; they might not be quite as understanding.

Trainee 1801

One of the trainers cautioned the use of an external party conducting the review, in the situation of an underperforming trainee. In this case, an external agent could have the effect of making the situation *feel a lot more threatening.* (Trainer 1901)

Especially – I mean, I might not find it threatening but you've got to think about the novice and the fact that I, as their trainer, have to do references and write an e-portfolio. So if somebody who comes in from the outside that we've never really met before is sort of giving something that's a bit critical about their practice, I think it could feel somewhat more threatening for them. I mean, Doctor A's prescribing on the whole was pretty good, but imagine you've got somebody who'd got real issues and, you know, it could just – in an under-performing, difficult situation, it could just make the situation feel a lot more threatening, actually.

Trainer 1901

Involvement of a pharmacist in the feedback session was also discussed by participants. Taking advantage of their expert knowledge, especially in areas of pharmacy practice that the trainee may have less familiarity with, was thought to be a key benefit of the process. One trainee discussed the importance of their involvement in this sort of activity in terms of

fostering greater interprofessional working relationships. They felt that even though they were *all part of the same team and we all should be working together,* the reality was that *at the moment it feels like we work very separately.* (Trainee 1201). This trainee contrasted this more distant working relationship, with the closer team environment they had experienced with a pharmacist while working in the Intensive Care Unit in hospital.

> *…really my kind of opinion is that we're all part of the same team and we all should be working together, and they've got specialist knowledge, we've got a generalist knowledge, but we could certainly benefit from their expertise.*
>
> *I think it would be really useful to have closer links and associations with pharmacists. I mean they know their stuff, they know the BNF backwards and forwards and we don't. We know, you know, the vast majority of it but we don't know it in the depth and the detail that they know it and I've often – like I've been on a, I used to work on ITU and we'd have pharmacy ward rounds and that was really beneficial because they'd pick up on errors that we'd made or they'd question things that we'd done and it was just really useful because I think sometimes when you are stressed, you're rushed and you're pressured, you can make mistakes and if there was a way of being able to access a pharmacist on…Yeah, sort of on the phone or just to double check something, that would be really valuable and I think it might also serve to sort of build a good relationship between doctor and pharmacists because at the moment it feels like we work very separately.*
>
> Trainee 1201

> *I think that would have been quite good to have a pharmacist's opinion because they're obviously, you know, things like I mentioned about kind of what's written actually on the prescription, on the box that or the packaging that goes with the patient, something I probably kind of miss and things and there's practical elements*

of pharmacy that I'm not aware of. And they'll be able to say well there's no point in doing that because this is what we do at the pharmacy.

Trainee 1101

Some participants were unsure if a pharmacist alone would be able to provide the necessary context and pragmatism with respect to giving feedback.

It depends on the skills and knowledge of the pharmacist in terms of the application of what they've got towards general practice. Do you know what I'm trying to say? You know it was the pragmatism which I think helped.

Trainer 1201

Others were more than happy to receive feedback from primary care pharmacists, who they believed would have the necessary understanding of the challenges facing prescribers in primary care.

I still believe that pharmacists who are attached to a practice and who have regular encounters with GPs would know why – or, you know, would understand why a GP went against a certain standard of prescribing.

Trainee 1901

Yes, I think that would be quite appropriate and we use pharmacists here to give us feedback and they attend our meetings, and we get sort of opportunistic feedback from chemists about prescribing issues.

Trainer 1601

Some participants were unsure about this, and still preferred the idea of the presence of another GP in the feedback sessions.

> *…part of the reason why the GP was good to talk to was the fact that he was very much on board at understanding our point of view when you're dealing with patients and whatnot, so appreciative of things like time constraints in a ten-minute consultation, and when it comes to giving instructions how difficult it is sometimes to phrase things and how simple mistakes can happen. For example, I wrote – I think I wrote QDS down on one of my prescriptions instead of four times a day. He was understanding that actually that can happen in a consultation. We're used to typing that and whereas perhaps a pharmacist wouldn't be quite as able to empathise with that because they don't work in that clinical GP setting.*
>
> Trainee 1801

> *Because even though the pharmacist has looked through stuff, it's very easy to look through somebody's notes and say 'this is what you should have done' but clinically, certain decisions may make sense more clinically looking at the context rather than – like I think the GP understood about the delayed antibiotics, so if somebody is just looking strictly at the notes they may not be able to understand why something may have been done, if that makes sense?*
>
> Trainee 1401

> *Another GP can go 'I think you're barking up the wrong tree completely' or 'yeah, I know where you're coming from, I do that in my practice'. So I think that discussion actually with a peer versus the gold standard is quite a useful one.*
>
> Trainee 1501

One of the trainers cautioned this approach as appearing too much like the practice within an echo chamber. Maybe the challenge that could be applied from receiving gold standard feedback should be encouraged.

> *I suppose the bit that (*clinical member of the research team conducting feedback tutorial*) brings to the discussion is the fact that he's also making those same decisions as we are day in day out. So when I say to him well, Daktacort is only licensed for seven days, but actually I would use it for fourteen days without a qualm, which is what our registrar had done, (*clinical member of the research team conducting feedback tutorial*) said so do I.*
>
> *… maybe that's a bad thing. Maybe we ought to be saying there well all of us are doing this wrong. Yeah I don't know. Sorry.*
>
> Trainer 1701

Two of the trainers concluded they did not really mind who gave the feedback, as long as it was delivered in a constructive and professional manner.

> *It's not so much who gives you the feedback, it's just how they do it. I think it needs to be somebody that you feel you do respect their opinion, but I think if it's somebody that gave it to us constructively the way R did, it wouldn't have made any difference to me.*
>
> Trainer 2001

> *It was useful to have somebody else facilitating the discussion…it enabled us to have more of a discussion than we may have done otherwise.*
>
> Trainer 1501

5c: To provide the feedback report before or during the feedback session

There was mixed opinion whether participants would have liked to receive the report before the feedback tutorial. Most of the comments cautioning the pre-arrival of the feedback document were based on concern over how a presentation of multiple errors would be received, without the context that was provided in the feedback session.

> *I think I would have panicked that there was so much detail in it.*
>
> Trainee 1301

> *…If there had been a major issue with his prescribing, I think actually it wouldn't have been a useful situation to have had it in advance.*
>
> Trainer 1901

> *When I looked at it and it was like oh my xxx, look at all these prescription errors, that was quite a bit like oh xxx, you know, this is awful. But the chap who was giving the debrief and the feedback made it quite clear to start with that the way that you'd categorised it wasn't saying oh you've made an awful mistake or whatever, he was sort of saying even soft things, even minor things would have been flagged up, that's just the way that we've categorised it. So that instantly sort of put me at ease with respect to that. … But I can imagine some colleagues who are quite sensitive would potentially see a whole list of errors and just, you know…*
>
> Trainee 1201

Some of the trainers would have liked to see the feedback report before the meeting, in order to help to prepare for the meeting.

Yeah. Yeah, that would be useful to just have a flick through before that meeting because I was trying to flick through and read it during the feedback. So yeah, that would be useful.

Trainer 1401

I think on the day seemed fine because it was all very clear and there wasn't too much to read through….but I guess the only advantage beforehand is that we might have highlighted, if there was a theme we might have highlighted certain areas that we particularly wanted to concentrate on. Trainer 1501

One of the trainers who had suggested pre-arrival of the report, then caveated this request with *I don't know how much realistically how much I would have looked at it in advance.*

Trainer 1201

Two of the trainees commented that it would have been useful to receive the report beforehand due to the amount of detail in the report, or the short length of the feedback tutorial. For trainee 1101, the feedback tutorial had been timetabled for one hour due to practice constraints: most of the other feedback tutorials were between 90 and 120 minutes.

But I'd prefer I think to have it beforehand…. Because we were limited with time as well to do it just because we had to fit it in at 8 in the morning and then we started like the surgery at like, you know, just after 9. So you kind of try and cram it in a little bit…..Because if….everyone's got a copy and then they could all bring their own points oh I'd like to discuss page 6 or whatever and go through that. That might be a bit better.

Trainee 1101

…it was quite a lot to take in and I think the only thing I would say is it would be really useful if I'd got this before.

Trainee 1401

5d: How should a feedback process be coordinated?

Trainees and trainers were supportive of the process being part of the routine vocational training programme that all trainees were a part of.

I think prescribing reviews should be done as part of routine GP training anyway.

Trainer 1501

I think it's definitely useful and feasible yeah.

Trainer 1201

I think if it could be done it would be really useful, actually. Yeah, I think it would be useful for people to have because I think any ways to improve your prescribing is useful.

Trainee 1401

I think it should be part of what we're training yeah.

Trainee 1101

There was a realisation that such a widescale role out would have huge resource implications, which may therefore make realisation of such a goal very difficult.

That's quite a lot – so it's 5 day's work for somebody to produce a report and then there's the – assuming that all the reports work and everything is sort of automated once you've data entered to produce a report. It's still 5 days of somebody's time to actually do a report. That's quite a commitment isn't it in terms of funding that for each registrar I guess. And I would have thought that would be prohibitive, but I don't know.

Trainer 1101

…if you've got the time and resources and people to do it, but (it would) be difficult, it's hundreds, but if that's possible yeah why not?

Trainee 1601

I mean I don't know that it would be practical to do it, it would be clearly very expensive to do it for every registrar.

Trainer 1701

Mmm, I mean I can imagine it would be difficult to implement on a large scale to every GP taking part in the VTS, but it would be useful from my point of view. I think it – I've certainly learnt a lot from it, and it would be useful. So it's whether they can make means to accommodate it; that's a different matter.

Trainee 1801

Linked to resource considerations was the role of the pharmacist in conducting the review. Participants benefitted from the detailed review conducted, which may not be as comprehensive and useful if conducted by practitioners with different skill sets.

> *They are very precise and so that feedback is very helpful and because they are so precise.*
>
> Trainee 1301

> *Pharmacists have that sort of mind, don't they?.....I mean I suspect that if I was to go through a hundred prescriptions I wouldn't find anything like the number of potential errors that she has brought out. I think that would be the same for any trainer or a doctor reviewing somebody else's. So I think in many ways a pharmacist is the best person to do it, but it's resourcing it isn't it?*
>
> Trainer 1101

One trainee had the idea that the review process could be sold to GPs to help inform their continual professional development. The trainee commented that people were very used to having to pay for educational courses, and the prescribing review could be a useful part of revalidation confirmation.

> *Yeah you could sell it.*
>
> *Interviewer: That's true.*
>
> *People need, people need to do their revalidation, you know, you pay £120 whatever for a course one day, that'd be great to put your portfolio -*
>
> *Interviewer: Wow.*
>
> *Don't you think, I think you could do that.*

Interviewer: That's a brilliant idea.

Like I say, look for a hundred pound or whatever we'll come in and analyse your last 100 prescriptions and produce -

Interviewer: £100 it'll have to be more than [that] it's 3 days' work isn't?

Well yeah but you could say there you go and we'll, we could do it and it's all part of your CQC thing I don't know. There you go that's a business idea.

Interviewer: It is, isn't it?

I want in on it and - but you could do that though. You could say to a GP look we'll analyse your, for this amount of money -

Interviewer: And you can use it for -

You'll then have a report which ok is part of your revalidation.

Trainee 1101

There was also the suggestion that generic learning could be developed from prescribing review data. One of the trainees was not sure of the value of such learning, however, if it was compared with detailed individualised feedback.

But maybe looking at something like this, you know, on an anonymised fashion to get her registrars to look at the, a few examples you know, maybe that would be a good session that VTS could run.

Trainer 1701

I mean I don't know if the goal out of this might be to initiate some kind of formal prescribing training during VTS. I'm not sure that that would be all that valuable….Because I think it needs to be based upon what you've actually done.

Trainee 1501

5e: Further development of the REVISiT process

This subtheme explored how the review process could be amended to make it more effective, and whether participants could think of any comparable alternative mechanisms of receiving effective prescribing feedback.

One trainee thought that the process would have benefited from exploring trainees' personal perceptions of their own prescribing prior to conducting any review.

> *I guess perhaps have an interview at the beginning before you even do the audit and ask the prescriber, you know, do you, where do you anticipate your shortfalls will be or are you concerned about any particular areas of your prescribing and anything that you're not confident about. And then see whether that's a true reflection in the actual study.*
>
> Trainee 1201

Discussion was had regarding the number of prescription items that should be reviewed as part of the process. One trainer wondered whether it might be better to conduct *occasional snapshots of, say, ten prescriptions.* The benefit of executing several such *snapshots* was discussed, and then caveated with *but I don't know statistically whether ten prescriptions or 20 prescriptions would be meaningful.* (Trainer 1901). One trainee had a realisation that if the project was extended to more trainees, where might you have to *draw a line* with respect to the number of prescription items being reviewed may have to be at fewer than 100. That trainee then commented: …*But I just felt that 100 was a good number.* (Trainee 1901). One trainee thought that for a comprehensive review process, it would actually be necessary to review more than 100 prescription items.

The only thing I could think of is just doing, like looking at a bigger number of prescriptions or

Interviewer: Oh really?

Because a hundred really, in terms of how many prescriptions we sign and we do a day, is not very many.

Trainee 1201

One trainer thought that a more useful approach would be to perform a *targeted* review, maybe focusing on chronic disease management.

Whether you could categorise the data collection to have targeted prescribing and chronic disease management for example as opposed to sequential first hundred maybe six of chronic, patients with chronic disease where medication reviews are done.

Interviewer: Ah right.

That might actually add to it because chronic disease management where a lot of the form of prescribing and possibly polypharmacy occurs would be an area to target at.

Trainer 1601

One trainee thought that the report would have benefitted from greater benchmarking, so that they could more easily compare their prescribing with that of their peers.

I suppose in terms of benchmarking, more in terms of categories. Was I over-prescribing in a certain area, for example antibiotic prescribing? Am I as a whole over- or under-prescribing in some circumstances with certain groups of drugs? I

don't think I'm particularly anxious about is my prescribing practice better or worse, it's more about –

Interviewer: The types?

If there's a type, an area of prescribing that I am significantly different to the vast majority because then the question would be more why am I over- or under-prescribing in an area and is it right, actually, is everybody else wrong in what they're doing? I don't know but I wouldn't be able to find out unless there was that benchmarking.

Trainee 1501

In recognition of the resource implications of using a pharmacist to conduct the review, several participants wondered whether trainees conducting a self-review of prescribing would be a useful alternative. One trainee commented that such a review could be discussed with their trainer *as would happen with other audits* (trainee 1601). The importance of providing appropriate guidance to trainees for conducting such an audit was mentioned by trainer 1501, who also cautioned that the success of such an initiative would depend on *how critically registrars will look at it themselves.* One trainee speculated that if the actual REVISiT project was a prescribing review that trainees had to complete themselves, then *far fewer people would have volunteered to do it.* (Trainee 1701)

I think it's useful having somebody external look at it. So if, but it's really whether resources are there to do that. The only other way is having an audit pack that the registrars can do themselves is the other, so having a pro forma that they can follow which is more clear and straightforward, would be the other way round that, but obviously that is going to be dependent on how critically registrars will look at it themselves. Whereas the advantage of an external person looking at it is they're more likely to be more objective and critical.

Trainer 1501

Whether prescribing audit could become part of their log or their learning log that one thing they do is prescribing audit in the first four months, in the last four months, maybe a self-help way of -

Interviewer: A self-help way? What they do their own audit?

They do their own audit and -

Interviewer: Oh right.

And discuss it with the trainers as would happen with other audits.

Trainee 1601

if it was something we would have to do ourselves then I suspect far fewer people would have volunteered to do it.

Trainee 1701

One trainee wondered whether a pragmatic approach may be that a pharmacist conducted an initial review of prescribing, with the trainee also present during the review process. Having been a part of this initial review, the trainee would then be better equipped to perform a re-audit self-review later in their training programme.

Maybe it would be worth going through it yourself with somebody, don't know whether that would be beneficial? So maybe if, although you get the report. I don't know whether you know if you were sat there with the person who's actually doing the audit and you could look at it yourself in a self-reflective way?

Interviewer: Oh I see at the time?

Yeah. Whether that -

Interviewer: Oh gosh that's interesting.

Whether that would be worthwhile doing?....

…Do you know what I mean? So you're sat there together analysing it.

Interviewer: Yeah. That's an interesting one.

Yeah.

Interviewer: Yeah.

You know whether that would then teach you the skills so you could then re-audit yourself?

Trainee 1101

Other pragmatic suggestions included one trainee reviewing the prescribing of a different trainee, and having their own prescribing reviewed reciprocally. Although this would not provide the expert input from a pharmacist, having a third party involved in the review could help make the process more objective. Incorporating such a review into the locality teaching process was another similar suggestion from a trainer. They mentioned that such teaching sessions already reviewed participants' examples of case-based-discussions (CBDs) by means of watching video recordings of trainees conducting CBDs. Reviewing prescribing data in such a locality session was thought to be *extremely benign* in comparison with watching videos of CBDs.

Well the other option I guess the other option is one registrar looking at it, another registrar's review. So then they can look at it more critically and then get together. So as a locality that could be done in locality groups

Trainer 1501

So we have locality to trainers. So I think there are about maybe fifteen trainers in our locality, we're actually quite a big locality, but we meet maybe four times a year something like that and we do, we already expose ourselves to our colleagues' ridicule if you like, because we do things like show a video of one of CBDs for example

and we get peer review. So actually that's a lot more challenging to actually sit down and look at some prescribing data would be by comparison extremely benign and yeah could be very happy to do that. And it could be a good way because I realise that what you're doing you probably couldn't afford to do on a long-term basis for every registrar.

Trainer 1701

Some participants also went on to say that self-review of prescribing would be a good exercise for post CCT-GPs also.

No, no I mean I think the only thing as I said if there was a pro forma set up then it wouldn't be a bad idea for GPs to do that as well. Obviously you can't have - somebody else doing it for them, but it's not bad for GPs to look at our own prescribing as part of that, may not be a bad thing.

Trainer 1501

Something maybe to be implement like part of the, you know revalidation or yeah maybe something they can take.

Trainee 1601

Summary of qualitative results

Participants reported a range of reasons for wanting to engage with the study, including a perceived deficit in prescribing education, and a desire to receive personalised feedback on their practice. There was a perception that receiving feedback about prescribing errors could have been challenging and deflating for trainees, but the lived experience of the actual feedback tutorials was very positive, with educational benefit being perceived by both trainers and trainees. The feedback report was thought to have an intuitive structure, and was easy to follow. Participants were generally in agreement with the contents of the report, especially regarding the higher-level prescribing errors. There was a general perception that some of the lower-level prescribing issues reported were inconsequential to practice. Most of the participants were pleased that errors and suboptimal prescribing had been balanced with the reporting of trainees' good practice. Some parties, however, reported ignoring the aspects of good practice, preferring to focus on where areas for improvement could be found. Some parties also commented on the deficit of good practice reports in comparison to the adverse prescribing events identified.

Trainees offered a range of explanations for the occurrence of prescribing errors and suboptimal prescribing. Sometimes trainees were unaware of appropriate guidance, or had deliberately chosen to follow alternative advice or prior practice. The way in which the practice computer system had been set up, including the ease at which non-specific or inappropriate prescribing directions could be inadvertently employed was another explanation offered from participants. As one trainee reported, this was *literally a clicking problem.* (Trainee 1401). The misuse of other resources, including out-of-date paper copies of the BNF was also implicated in some prescribing events. Time pressure, and the difficulties of effective consultation management was another area of consideration for trainees. Two further rationalisations were proffered by trainees regarding the occurrence of certain prescribing events. Pragmatic prescribing described where trainees might acquiesce to patient preference, or perceived patient preference, when official guidance may disagree with this approach. When adopting this prescribing behaviour, the need for comprehensive documentation was apparent so that adequate explanation of the

prescribing decision would be evident to all parties. Trainees were also impacted by systemic influences, including their trainer and other senior colleagues in the practice, and other external experts.

The importance of being made aware of potential prescribing events was reported by trainers and trainees, even when they related to issues where a change of prescribing practice would not be decided upon. On receiving feedback, all trainees made plans for some practice changes, ranging from acting upon knowledge deficits at the level of an individual drug or drug class, to making a commitment to more diligent use of local guidance. Similarly, trainers reported a desire to change their own prescribing practice, mainly relating to providing more detailed prescription instructions for patients. Some trainers also reported plans for a greater focus on medicine safety when supervising future trainees, and also reported a desire to make changes to practice processes at a systems-level where the review had uncovered less than ideal practice. In the follow-up interview, some participants were able to report actual changes they had made to prescribing practice, such as amending the length of antibiotic courses to reflect local guidance. One trainer was able to report how they had changed the way in which they were supervising a new trainee. Although cognisant of their trainees' perceived practice changes, it was difficult for most trainers to confirm an actual practice change due to the lack of a follow-up systematic review of prescribing. One trainee had conducted a prescribing audit, however, which was able to demonstrate practice change.

Most parties were very positive about their involvement in the project. Where they perceived that error classification had been overzealous, however, trainers were concerned that this would not actually reflect real-world practice. Trainers and trainees generally reported benefit from involvement in the study, and would recommend it to fellow trainees, and to GPs in general. Aspects of the feedback process had been repurposed in practice education events, and CQC preparation, and one trainer commented on specifically referring back to learning points when debriefing their trainee's consultations.

Participants were in agreement that a review would be useful to occur at some stage in GP training, with most suggesting its employment in the final ST3 year of training. By this stage, trainees would be familiar with practice in a primary care setting, and have greater perceived benefit from a detailed review concomitant with the reduction in frequency and intensity of routine individual consultation debriefs. The benefit of an external party delivering feedback was commented on, and the importance of expert facilitation for any feedback event was also championed. Providing the feedback report at the time of the feedback tutorial permitted the provision of appropriate context, so as not to unduly alarm trainees. However, some parties would have preferred prior availability of the feedback report to allow better preparation for the feedback tutorial. The detailed way in which a skilled pharmacist could conduct a review was praised, but the pragmatism of 'real-world' general practice would also have to be considered, in order to facilitate appropriate practice change.

Various suggestions for improvement to the REVISiT process were proffered by participants. These included providing a more focused review of prescribing, and greater use of benchmarking in the feedback report. The resource intensity of the current REVISiT process was apparent to participants, who suggested the use of a self-review process, which they thought could have perceived benefit, if appropriately managed. A self-review process could be augmented by pharmacist input, and facilitated through locality training groups. The concept of a structured self-review was also supported for use by GPs beyond the training period.

Chapter Five: Discussion

This chapter will commence with a summary of the results, followed by a discussion of some of the main strengths and limitations of the research. There will then be a critique of how key findings compare with the relevant literature, followed by a description of how the study has progressed since its completion. Implications for research, policy and practice will then be presented, followed by the conclusions.

Summary of the results – Quantitative

Ten GP trainees and their trainers were recruited to the study from the Nottingham Vocational Training Scheme. Five of the trainees were female (50%), and five were male (50%). Five trainees (5/10 = 50%) were of White British ethnicity, two trainees (2/10 = 20%) were of British Indian ethnicity, one trainee (10%) was of British Pakistani ethnicity, one trainee (10%) was of Asian (other) ethnicity and one (10%) reported being of mixed ethnicity. Eight trainees (8/10= 80%) graduated in the UK, five of these had attended the local University of Nottingham Medical School. Two of the trainees (2/10 = 10%) had graduated from non-UK medical schools: one from a university in Sudan, and another from a university in Pakistan. All the trainees (10/10 = 100%) had completed the earlier stages of their general practice training with the Nottingham Vocational Training Scheme. Nine (9/10 = 90%) were in their final (ST3) year of training and one (1/10 = 10%) was in the penultimate ST2 year.

The list size of the practices where the GP trainees were hosted ranged from 6 700 to 13 443 (mean list size 9 392, SD 2 499). The average deprivation scores associated with the 10 practices was 16.4 (SD of 9.5). Two of the practices had deprivation scores in the highest quintile of deprivation, and three of the practices were in the lowest quintile of deprivation.[101 102]

GP trainees each had approximately 100 prescription items reviewed to highlight prescribing errors, and episodes of suboptimal prescribing. A total of 1028 prescription items was reviewed, which had been issued over the course of 1291 consultations. Ninety-two prescribing errors were reported, which represented an error rate of 8.9%.

The most common error was that relating to the dose or strength of a medication prescribed (n=30, 32.6% of all prescribing errors). Examples of this error included prescribing an inappropriate dose of antibiotics for the indication or age of the patient, or prescribing a dose of medication that was not in keeping with the narrative within a consultation. The second most common error type observed related to providing incomplete or inadequate information on the prescription (n=24; 26.1% of all errors). Examples of this error type included the provision of nonspecific dosage instructions for potent steroid creams, and antibiotic eye drops where there could be confusion regarding their use.

The BNF chapter which contained medications with the greatest number of reported errors was Chapter 5: Infections. Medications in this chapter were responsible for 28 of the 92 errors reported (30.4%). The medication with the greatest number of reported errors from this chapter was amoxicillin, which had thirteen errors associated with it. These related to 13 different prescribing incidents involving 13 different patients. So amoxicillin prescriptions contained a prescribing error in 21.7% (13/60) of the episodes that it was prescribed during the study period. Seven of the ten GP trainees had at least one error relating to amoxicillin. Twelve of the 13 errors related to prescribing an inadequate dose of antibiotic for the age of the child being reviewed. One error related to an inadequate quantity of amoxicillin liquid being prescribed for an elderly patient, with the amount of medication only due to last three days rather than the required seven days of the course of medication.

The chapter with the next highest number of prescribing errors was Chapter 4: central nervous system. The medications within this chapter were implicated in 27 of the 92 errors

(29.3%). Six of these errors related to the use of immediate-release, or sustained release morphine products.

A total of 360 episodes of suboptimal prescribing were identified, representing a suboptimal prescribing rate of 35%. Most of the suboptimal prescribing came under the category of 'instructions' (n=132; 36.7% of all suboptimal episodes). The next most common subcategory of suboptimal prescribing related to trainees prescribing the incorrect formulation or quantity of a medication. Providing inadequate documentation was the next most frequent variety of suboptimal prescribing. Fifty-one episodes of this were recorded, which was 14.2% of all suboptimal prescribing.

Over the course of reviewing the 1291 consultations, it was noted that the GP trainees had performed 63 medication reviews: a total of 259 medications were reviewed as part of this process. There were six review errors and 50 episodes of suboptimal review relating to the 153 medications that were reviewed and not issued. This represented a review error rate of 3.9% and a suboptimal review rate of 32.7%.

The GP trainees made 134 recommendations for over-the-counter medication. Two of these recommendations were associated with an error, and three were classified as suboptimal. This represented a recommendation error rate of 1.5% and a suboptimal recommendation rate of 2.2%.

Summary of results – Qualitative

Participants reported a range of reasons for wanting to engage with the study, including a perceived deficit in prescribing education, and a desire to received personalised feedback on their practice. There was a perception that receiving feedback about prescribing errors could have been challenging and deflating for trainees, but the lived experience of the actual feedback tutorials was very positive, with educational benefit being perceived by both trainers and trainees. The feedback report was thought to have an intuitive structure, and was easy to follow. Participants were generally in agreement with the contents of the report, especially regarding the higher-level prescribing errors. There was a general perception that some of the lower-level prescribing issues reported were inconsequential to practice. Most of the participants were pleased that errors and suboptimal prescribing had been balanced with the reporting of trainees' good practice. Some parties, however, reported ignoring the aspects of good practice, preferring to focus on where areas for improvement could be found. Some parties also commented on the deficit of good practice reports in comparison to the adverse prescribing events identified.

Trainees offered a range of explanations for the occurrence of prescribing errors and suboptimal prescribing. Sometimes trainees were unaware of appropriate guidance, or had deliberately chosen to follow alternative advice or prior practice. The way in which the practice computer system had been set up, including the ease at which non-specific or inappropriate prescribing directions could be inadvertently employed was another explanation offered from participants. As one trainee reported, this was *literally a clicking problem.* (Trainee 1401). The misuse of other resources, including out-of-date paper copies of the BNF was also implicated in some prescribing events. Time pressure, and the difficulties of effective consultation management were also highlighted by trainees. Two further rationalisations were proffered by trainees regarding the occurrence of certain prescribing events. Pragmatic prescribing described where trainees might acquiesce to patient preference, or perceived patient preference, when official guidance may disagree with this approach. When adopting this prescribing behaviour, the need for comprehensive documentation was apparent so that adequate explanation of the prescribing decision

would be evident to all parties. Trainees were also impacted by systemic influences, including their trainer and other senior colleagues in the practice, and other external experts.

The importance of being made aware of potential prescribing events was reported by trainers and trainees, even when they related to issues which were considered to be inconsequential. On receiving feedback, all trainees made plans for some practice changes, ranging from acting upon knowledge deficits at the level of an individual drug or drug class, to making a commitment to more diligent use of local guidance. Similarly, trainers reported a desire to change their own prescribing practice, mainly relating to providing more detailed prescription instructions for patients. Some trainers also reported plans for a greater focus on medicine safety when supervising future trainees, and also reported a desire to make changes to practice processes at a systems-level where the review had uncovered less than ideal practice. In the follow-up interview, some participants were able to report actual changes they had made to prescribing practice, such as amending the length of antibiotic courses to reflect local guidance. One trainer was able to report how they had changed the way in which they were supervising a new trainee. Although cognisant of their trainees' perceived practice changes, it was difficult for most trainers to confirm an actual practice change due to the lack of a follow-up systematic review of prescribing. One trainee had conducted a prescribing audit, however, which was able to demonstrate practice change.

Most parties were very positive about their involvement in the project. Where they perceived that error classification had been overzealous, however, some trainers suggested this did not reflect real-world practice. Trainers and trainees generally reported benefit from involvement in the study, and would recommend it to fellow trainees, and to GPs in general. Aspects of the feedback process had been repurposed in practice education events, and CQC preparation, and one trainer commented on specifically referring back to learning points when debriefing their trainee's consultations.

Participants agreed that a review would be useful at some stage in GP training, with most suggesting its employment in the final (ST3) year of training. By this stage, trainees would be familiar with practice in a primary care setting, and have greater perceived benefit from a detailed review concomitant with the reduction in frequency and intensity of routine individual consultation debriefs by their trainer. The benefit of an external party delivering feedback was commented on, and the importance of expert facilitation for any feedback event was also championed. Providing the feedback report at the time of the feedback tutorial permitted the provision of appropriate context, so as not to unduly alarm trainees. However, some parties would have preferred prior availability of the feedback report to allow better preparation for the feedback tutorial. The detailed way in which a skilled pharmacist could conduct a review was praised, but the pragmatism of 'real-world' general practice would also have to be considered, in order to facilitate appropriate practice change.

Various suggestions for improvement to the REVISiT process were proffered by participants. These included providing a more focused review of prescribing, and greater use of benchmarking in the feedback report. The resource intensity of the current REVISiT process was apparent to participants, who suggested the use of a self-review process, which they thought could have perceived benefit, if appropriately managed. A self-review process could be augmented by pharmacist input, and facilitated through locality training groups. The concept of a structured self-review was also supported for use by GPs beyond the training period.

Strengths and limitations of the study

Participants were recruited from one vocational training scheme, and were therefore only practising in a limited geographic area within the country. There may be factors specific to this area or training scheme, which could have had an influence on the prescribing practice of this group of trainees. The study had been designed with the capability of being able to recruit GP trainees from across the East Midlands. When full recruitment was achieved through the Nottingham training scheme, it was decided to limit participation to this group, in order to limit the variables for this initial study. Widening the pool of participation may have increased the richness of data, especially for the qualitative review.

Although the practices where the GP trainees were hosted had a range of deprivation scores, the average deprivation score of these practices was 16.4 (SD=9.5): this is lower than the average for English practices at the time (21.8),[102] which implies that the practices hosting the recruited trainees were, on average, situated in less deprived areas. There is evidence to suggest that social deprivation can impact prescribing patterns for certain medications such as opioids and antibiotics.[119-121] Recruited practices also tended to be larger than average practices. The list size of the practices where the GP trainees were hosted ranged from 6 700 to 13 443 (mean list size 9 392, SD 2 499). In 2014, the average list size of a GP surgery in England was 7 171.[103]

There was a good mix of participants in terms of trainee gender: 50% of those recruited were female, and 50% were male. It is important for a study of this nature to have both male and female participants. There is some evidence that physicians of different genders may react to the occurrence of a medical error in different ways.[85] In one study involving more than 3000 North American physicians, post-error stress was more likely to be reported by female physicians.[122] Wu and colleagues surveyed 254 junior doctors regarding clinical mistakes for which they had been responsible. That study found that 'constructive changes in practice' such as 'increased information seeking' or 'increased vigilance' was significantly associated with female gender.[123] Descriptive statistics presented in this thesis suggested

that there was a slightly higher error and suboptimal prescribing rate for female rather than male participants. However, standard deviations were overlapping, and, due to the small sample size, the effect of confounding factors is likely to have a significant impact on any difference. Clearly, a larger sample size would have permitted deeper exploration of the potential impact of the gender of the prescriber, both from a quantitative and qualitative perspective. A larger cohort size was not possible for this initial study due to funding constraints.

Participants were a self-selected cohort, which opens the study to selection bias.[124] Trainees who elect to take part may not have been representative of the wider trainee population, and may have, for example been more confident in their prescribing, or more open to receiving feedback. Any future larger scale studies should involve more random selection, but it is also important to interrogate the demographic of those who took part in the current study.

Recruited trainees had a range of reported ethnicities. In 2015, 55% of the medical NHS workforce described themselves as being of white ethnicity, 28% reported an Asian ethnicity, 3% reported a black ethnicity, 3% reported a mixed ethnicity, 4% were reported as 'other ethnicity' and 7% were of unknown ethnicity.[125] In this study 50% of trainees were of white British ethnicity, 40% were of an Asian ethnicity and 10% were of mixed ethnicity. Where participant numbers are low, it is difficult to recruit a truly representative sample, but in studies of this nature, diverse participation is paramount. There is much in the literature regarding the attainment and awarding gap that exists for non-white doctors, and also for international medical graduates of all ethnicities.[126-128] Non-UK graduates are also more likely to be referred to the GMC Fitness to Practise process, and to receive adverse sanctions as a result of going through such a process.[129] In 2014, just over 25% of the 'hospital doctor' NHS workforce were non-UK nationals, with 12.2% of staff having arrived from an Asian country.[130] In this study, 20% of participants completed their training in a country other than the UK, both of these participants were from a country in Asia.

Although all participants reported some benefit from taking part in the study, numbers were not sufficient to be able to specifically explore the outcomes at the level of ethnicity or gender. The small number of participants also negated the value of any multivariate analysis for factors that may be associated with the occurrence of particular types of errors, as confounding factors are likely to have a significant effect on any conclusions that could be drawn from such analyses. It would , however, have been useful to be able to have conducted such analyses.

The PRACtICe study was able to conclude that female patients were less likely than men to experience a prescribing error (OR 0.66, p=0.013), as were patients in practices with list sizes of greater than 10,000 (OR 0.56, p=0.047).[9] Sedon and colleagues evaluated 4238 prescriptions of patients admitted to nine hospitals in Northwest England.[131] They found that the number of items that were prescribed on a single prescription was the 'strongest predictor'[131] of whether one of those items would contain an error. Each additional item on a prescription chart increased the likelihood of an error by about 14%[131]Such interrogation of the data would have been useful for a study involving GP trainees such as REVISiT: consultation management can be difficult for this cohort of prescribers,[132] and the effect of additional 'prescribing burden' would be useful to explore.

A larger cohort size would have permitted the potential influence of the practice computer system to be explored. Emis Web and *SystmOne* have different ways of presenting patient information, which could have an influence on prescribing behaviour.[133 134] MacKenna and colleagues interrogated national prescribing data for records of prescribing safety breaches involving Ciclosporin, Tacrolimus and Diltiazem.[133] Although safety breaches were found in practices using all computer systems, clinicians using Emis Web were about four times more likely to prescribe these medicines outside of national guidance, compared with those using *SystmOne.*[133] The authors hypothesised that this could have been due to the former system preferentially setting prescribing to 'generic' rather than 'branded': the latter being best practice for these particular medications.[133] Emis Web did present clinicians with a 'pop-up' warning about the need to prescribe certain medications by brand, but this warning

appeared ‘alongside multiple other warnings such as interactions with other medications.’[133] The way *SystmOne* had been configured discouraged the user from prescribing these particular medications in the generic form to begin with (by way of limiting search terms) and then generated a stand-alone ‘pop-up’ screen for the clinician ‘warning of the importance of brand prescribing’,[133] which was not co-presented with other prescribing warnings, as was the case in Emis Web.

MacKenna and colleagues separately reported on the phenomenon of ‘ghost prescribing’ generic medication.[134] These are occurrences where generic forms of medication should have been prescribed (for the purpose of cost benefit), but one system (this time, *SystmOne*) preferentially presented prescribers with a ‘branded version’ of a generic medication, rather than the true generic form, which the prescriber then (potentially unknowingly) selected.[134] On a national level, the group estimated that this needless prescribing of a branded generic medication would have cost the NHS an additional £9.5 million in the year of data collection (2018).[134]

Presentation of descriptive statistics from the REVISiT data set did suggest a difference between the prescribing error rates, and suboptimal prescribing rates of those trainees who had used *SystmOne*, compared with those trainees who had used Emis Web. Standard deviations were, however, overlapping, and confounding factors would likely have a major influence in any correlation hypothesis. As computer systems are designed independently, and have varying ways of facilitating user prescribing,[133 134] it would, however, be important to fully investigate the impact of computer system design on prescribing error rate and suboptimal prescribing rate, especially for GP trainees, who may be using the system for the first time, and not be used to the nuances of operation.

Nine of the ten GPs were in the final ST3 year of training, and one of the trainees (1201) was in the penultimate ST2 year. ST2 trainees would generally only have four months in a general practice setting, whereas ST3 trainees spend the full year in primary care.

Prescribing outcome data were similar for trainee 1201, when compared to the rest of the participants. This trainee had a reported error rate of 8%, which is lower than the 8.9% average; their reported suboptimal prescribing rate was 31%, which is again lower than the 35% average.

All the recruited trainees completed the study and engaged in the initial and follow-up interviews. Nine of the ten GP trainers also engaged in both the initial and follow-up studies; one trainer cited a lack of time as the reason for non-engagement with the interview process. It is difficult to determine 'acceptable' loss to follow-up in small scale studies of this nature. In larger epidemiological studies, loss to follow-up of between 5 and 20% is generally considered to be acceptable.[135 136]

There was only one study pharmacist reviewing the medication of trainees. Although this could promote consistency between the trainees' reviews, the presence of a single reviewer does have the potential to introduce bias to the process. Medication was, however, being reviewed by use of a tight protocol, with any deviations of the protocol being discussed at a review panel meeting. The study pharmacist was one of the four pharmacists who had been involved in data collection for the PRACtICe study, where more than 6000 unique prescription items had been reviewed, and protocols developed for identifying prescribing errors and suboptimal prescribing.[9] The pharmacist was therefore very experienced at performing this sort of focused medication review. The results of the study were also 'sense-checked' by the clinical member of the research team who fed back the results to the trainer and trainee, and also by the trainer and trainee themselves. Although there was sometimes critique that the review had been too *picky* (trainer 1301; trainer 1901), there was no disagreement that the reported prescribing events were a deviation from best practice.

Relying on one pharmacist could also be described as having a 'single point of failure',[137] which would have had a detrimental effect on the study if the pharmacist had become

unavailable during the study period. There could also be the possibility that a single reviewer, however experienced, might not recognise or record all the prescribing events that had happened. The structured way in which the pharmacist had to complete the data collection forms may have helped to prevent this from happening, and the presence of a research pharmacist (NS) reviewing those forms as part of data-entry may also be protective against that concern. A more robust data collection process may also have employed a second study pharmacist to review a portion of the data collection. Having an error rate that was in keeping with other published studies, and also a suboptimal prescribing rate greater than that of similar studies would suggest that lack of a second check did not have a significant detriment effect on data collection.[9 24] Further detail will be provided regarding comparison with the literature in the next section of the discussion.

As this study could be described as providing 'proof of concept'[138 139] to the idea of a pharmacist providing a detailed review of prescribing for a GP in training in the UK; there is also merit in introducing as few variables as possible in the early stages of concept proof.

The study presented in this thesis was not able to demonstrate actual change in prescribing practice, only the reports of such a change, which were sometimes able to be corroborated by trainer comment. The limited duration of the study also negated long-term follow up to ascertain how long any reported change remained embedded. The primary objective of the REVISiT study included assessing the 'feasibility and value of undertaking a pharmacist-led review.' Executing the review on a small-scale and gathering stakeholder feedback would be an important part of concept proof that could help facilitate the future development of a larger controlled study of longer duration, for which greater funding would be required. In order for a funder to consider backing a larger-scale trial, it would be important for concept proof to be fully explored on a smaller scale.

Comparison with the literature

In this section, comparison will be made between some of the key findings of the REVISiT study and the relevant literature.

How common are prescribing errors?

Reported rates of medication errors can have great variation: full comparison is often difficult due to adoption of different definitions and study design.[24 140-142] Many studies relate to prescribing error in a hospital or secondary care setting.[24 140-142] It is relevant to explore this setting, however, as GP trainees in their ST3 year would have spent a large proportion of their prior training in secondary care. Lewis and colleagues reviewed 63 studies which involved multiple grades of doctor in a hospital setting, which reported error rates of between 0.2% and 38.6%.[142] Ross and colleagues concentrated on junior doctors below the consultant grade. They reviewed 24 studies which reported error rates of between 0.2 and 51.4%, and also suggested that medication errors were affecting between 1 and 100% of patients admitted to hospital.[140] More recently, Lloyd and colleagues reported an error rate of 25% in a UK hospital (pooled across all grades of doctor).[24]

The prescribing by GPs in 55 English care homes was the focus for a study by Barber and colleagues, who found an error rate of 8.3%.[143] This obviously only involved a specific sector of the population, but with the prevalence of multimorbidity and the resultant polypharmacy, this is an important population subset.[69]

The PRACtICe study is the most comprehensive review of prescribing in the primary care setting in England, and reported a medication error rate of about 5%.[9] Ten of the fifteen practices recruited to that study were actively involved in GP training. Although the error rate of GPs in training was not specifically reported, one of the study's recommendations was that that 'strategies for reducing the prevalence of error should focus on GP training.'[9]

Doctors in training have been a focus of other patient safety research. The EQUIP study reviewed the prescribing safety of doctors across 19 hospitals in North West England, and reviewed a total of 124, 260 prescriptions.[17] The prescribing error rate varied across grade of doctor. Foundation year one doctors were found to have an error rate of 8.4%, foundation year two doctors had a higher rate of 10.3%, possibly reflecting the increase in practice and responsibility. Specialty training doctors had an error rate of 8.3%, which is comparable with the 8.9% error rate reported in the cohort of GP trainees who took part in the REVISiT study. As a comparison group, consultants recruited to the EQUIP study had a reported medication error rate of 5.9%.[17]

The PROTECT study took place across eight hospitals in Scotland, at a similar time to the EQUIP study.[144] Pharmacists reviewed 44,726 prescriptions, reporting a cumulative error rate of 5.3%. Consultants had a similar error rate to that found in the EQUIP study (5.1%). Foundation year one doctors had a reported error rate of 5.0%, foundation year two doctors 7.0%, and specialty trainees (and other senior house officers) 6.8%.[144] Although both the EQUIP and PROTECT studies employed Dean's definition of an error,[17 144] which was also used for the PRACtICe and REVISiT studies,[9] in the absence of comprehensive case law, it is difficult to compare how the different pharmacists involved would have interpreted the definition.

Internationally, doctors in training have also had scrutiny of their prescribing. Honey and colleagues reviewed the prescribing of 'residents' from various training programmes including paediatrics, internal medicine and family medicine, as they took part in paediatric clinics in a US hospital.[145] A total of 2,941 prescriptions were reviewed. Residents had a combined error rate of 5.5%, with family medicine residents having an error rate of 11%. There are obviously differences between training programmes and settings in the UK and USA, but it is interesting to observe a comparable rate of medication error.

Exploring the different subtypes of error

The most common errors from the REVISiT study (reported in this thesis) were those relating to the dose or strength of medications prescribed (n=30, 32.6% of all prescribing errors). The second most common error type related to providing incomplete or inadequate information on the prescription (n=24; 26.1% of all errors). The PRACtICe study had also found that these factors were common sources of error. Having incomplete information on the prescription was the commonest error in that study (n=74, 30% of all errors) with 'dose/ strength' errors as the second commonest error type. Incomplete information was also the most common source of error in Barber and colleagues review of care home prescribing, accounting for 39% of errors in that study.[143] 'Dose/ strength' error was actually the third most commonly reported error in Barber *et al.* (14.4% of errors), with 'unnecessary drug' being more of a feature in their prescription set (23% of errors).[143] This may be reflective of the polypharmacy that is often prevalent in their study cohort's age group.[69]

Antibiotic Stewardship

The dominance of the dose/ strength error in the REVISiT study is likely to be a consequence of the high proportion of errors relating to inappropriate antibiotic prescribing. Although poor antibiotic stewardship was a feature in the prescribing errors reported in the PRACtICe study,[9] analysis of the interview data from the REVISiT study revealed why antibiotic prescribing had been so error prone for this cohort. A recent change in guidance with respect to paediatric amoxicillin doses had gone unnoticed by some of the study participants: an issue which was compounded by the presence of out-of-date BNFs in consultation rooms.

The amount of guidance that doctors must be conversant with to practice safe, evidence-based based medicine increases year-on-year. Ratnani and Fatima talk of the 'pileup of

never-ending guidelines' and the need for more appropriate education for practitioners regarding their use: especially during medical school and junior doctor years.[146] The need for robust systems to facilitate access to appropriate guidance is also important: trainee 1901 was wise to migrate to the on-line version of the BNF in order to always be able to consult the most up to date prescribing guidance. Indeed, all UK NHS prescribers now have universal access to core components of the e-resource, 'Medicines Complete', which includes the electronic BNF.[147] Paper copies are still made available when requested, however.[148]

The 'duration of antibiotic' treatment was one of the practice areas that participants in the EQUIP study highlighted as a training need:[17] participants in the REVISiT study may have also concurred with this. Several episodes of suboptimal prescribing related to trainees prescribing a course of antibiotic that was either inappropriately short or long. Prescribing second-line antibiotics which were not in keeping with local protocol was another area of suboptimal prescribing, as was the use of a 'delayed' prescription where the documented presentation may not support such a prescription.

In 2019, the NHS launched a five-year 'national action plan' for 'tackling antimicrobial resistance', with a stated aim of containing and controlling antimicrobial resistance by 2040.[149] [150] A key feature of this plan is optimising 'the use of antimicrobials' and enacting a '25% reduction in antibiotic use in the community'.[149] Enhanced antibiotic stewardship among GP trainees, and GPs in general is vital for the realisation of this goal.

Having a greater awareness of the way in which antibiotics should be prescribed is one factor in improving antibiotic stewardship. Participants in the REVISiT study were able to report several practice changes as a result of the feedback they had received (for example prescribing a 10-day course of Penicillin V when they had previously prescribed a 5 or 7-day course.) Studies have linked a greater knowledge regarding appropriate antibiotic stewardship with outworking appropriate practice. Martinez-Dominguez and colleagues

devised an infectious disease OSCE examination, which was undertaken by 255 junior doctors in three hospitals in Mexico.[151] They observed a 'negative correlation between clinical competence and (subsequent) antibiotic prescription error' rate.[151] The use of enhanced departmental prescribing audits were shown to be beneficial in various departments in two hospitals in Southern Italy.[152] Those departments that had taken part in an 'education-based antimicrobial stewardship programme' saw a significant enhancement in antimicrobial stewardship. For example a review of practice after the programme demonstrated that no patients were receiving antibiotics that were not a part of hospital guidelines, whereas up to 44% of patients from hospital areas who had not experienced the programme were receiving antibiotics that were not in the guidelines.[152]

Appropriate use of antibiotics is not dependent on prescriber knowledge alone. Recent qualitative studies involving general practitioners sought to shed further light on this area. O'Doherty and colleagues interviewed 13 GPs from the Mid-West of Ireland.[153] Although inadequate antimicrobial guidance was one of the emergent themes, the perception of patient expectation was another theme which sought to explain the over-use of antibiotics. Fletcher-Lartey and colleagues interviewed 32 GPs across Australia. Patient expectations was again one of the emergent themes, which also included 'limited time', 'poor doctor-patient communication' and 'diagnostic uncertainty.'[154] These two studies were not included within a qualitative literature review exploring GP overprescribing published in 2021. Rose and colleagues analysed 17 qualitative studies, and again reported cumulative themes which included time pressure and patient expectation.[155]

Participants in the REVISiT study had considered how time pressure might lead to inappropriate prescribing, and also commented on the use of prescribing as a tool to end a consultation. Trainee 1201 commented that *you're not going to get them out of the door unless you bend to their will* [to prescribe antibiotics which may not be appropriate]. A similar fatalistic approach was echoed in one of the participants from O'Doherty *et al*.: i*f they really want it I often end up giving the antibiotic … if they are in that pattern of behaviour… you are not going to change it.*[153]

Effective educational interventions to enhance prescribing practice may therefore need to approach antibiotic stewardship from several angles. Not only must the prescriber have the knowledge of appropriate diagnosis and antibiotic choice, but they must also be equipped with the necessary consultation management skills. Magin and colleagues recruited 90 trainers and 90 trainees in Australia to a study involving a combination of educational interventions including communication skills training and case-based discussions.[44] They reported that all parties reduced their reported intentions to prescribe antibiotics after going through the educational interventions.[44] Deckx and colleagues described the qualitative analysis of the study, which involved semi-structured interviews with seven of the trainees and seven of the trainers.[44] The study evaluated well, with participating trainees reporting a positive influence on their prescribing behaviour, and a greater confidence in aspects of antimicrobial stewardship.[45] Part of the intervention involved the use of case-based discussions which took place between trainer and trainee. The study reported that there was no 'prescribing conflict' between the trainee and their supervisor, but that 'different (antimicrobial) prescribing strategies within the practice' could sometimes cause 'internal conflict for the GP trainee'.[45] Similarly, the REVISiT study did not report any antimicrobial 'prescribing conflict' between the trainee and their trainee. Generally, feedback from the REVISiT study was well received at a practice level. For example, trainer 1901 recounted a comment from a colleague *oh yeah…we must remember about childhood doses of amoxicillin.* However, trainee 1801 recounted a conversation regarding a practice colleague's *backdated prescribing habits*: although the colleague was happy for the trainee to now prescribe clarithromycin instead of erythromycin, the trainee was unsure if the colleague's practice would change. It might have been because of that encounter that trainee 1801 later went on to say that *rather than trusting a senior colleague* [they would be better to] *perhaps just refer to the guidelines and that will tell you the accurate answer*. Deckx and colleagues stress the importance of whole practice education to help ensure 'consistency of message and practice.'[45]

Interestingly, Deckx *et al.* found that in contrast to trainees, trainers did not tend to report any change in practice as a result of going through Their educational intervention, nor did

they report changes to the way in which they would teach subsequent trainees.[45] Trainers from the REVISiT study reported multiple areas of practice change, most commonly focused around how they may supervise future trainees. This could be due to the REVISiT process involving actual prescriptions that the trainee had produced, rather than generic prescribing vignettes.

Some of the trainees reported that the way the computer system had been set-up or pre-populated was a factor in inappropriate antibiotic prescription generation (*literally a clicking problem,* trainee 1401). Although computer records have many clear advantages over hand-written varieties, the way that systems are set-up has long been discussed in terms of facilitating unwanted prescribing events.[156] Some of the *clicking problems* may again be a consequence of paucity of time, or ineffective consultation management, but any way in which a computer system could be developed around these shortcomings would serve to enhance patient safety. The further integration of Artificial Intelligence (AI) into practice computer systems warrants investigation.[157]

Documentation within patient records

As well as being proffered as an explanation for inappropriate antibiotic prescribing, time pressure was one of the explanations given by REVISiT participants for inadequate documentation, and for writing non-specific medication instructions. The literature concurs that time-pressure, or a feeling of being 'overburdened' can result in the production of inadequate medical notes or medication instructions.[158-160] In *Good Medical Practice*, the GMC states that 'clinical records' should be 'clear, accurate and legible'.[161] It goes on to say that such records should include 'relevant clinical findings…the decisions made and actions agreed…the information (that has been) given to patients, and (details of) any drug prescribed or other investigation or treatment.'[161] The RCGP expects its trainees to make 'effective use of patient records' and engage in 'accurate, legible and contemporaneous clinical record keeping.'[162] REVISiT study participants reflected on how their documentation

could be misinterpreted by colleagues, and also how poor or non-specific prescription instructions could be misinterpreted by patients, with potentially disastrous effects.

Although time pressure is undoubtedly an inescapable truth in current primary care practice[163], naivety in consultation management skills could also be a contributor to perceived lack of time and the resultant inadequate documentation. Hall and Chae conducted a focus-group study with 50 GP trainees and educators, with the aim of presenting 'threshold concepts' which are apparent on the journey towards becoming a fully qualified general practitioner.[132] Threshold concepts are the 'core concepts that people must master'[164] in order to fully realise a role or place in a profession, and are commonly thought to have four key components.[165] They are *transformational*, causing a shift in how a learner identifies themselves with respect to a profession; *integrative*, bringing together 'seemingly unrelated knowledge and attitudes' to culminate in a 'aha!' or 'lightbulb' moment;[132 165] *irreversible*, not able to be 'unlearned' once embraced, and *troublesome*, reflecting 'the angst that learners feel as they approach a new way of experiencing themselves and their role, coupled with their fear of this new unknown.'[165] It is not surprising that all of the threshold concepts revealed by Hall and Chae's study were centred on the doctor-patient relationship, and included aspects of appropriate consultation management.[132] The authors concluded that GP training could be enhanced by being cognisant of these concepts, in order to better facilitate the professional realisation process.[132]

Appropriate documentation is also required when recommending that patients purchase over-the-counter products, Even though the medication is not actually prescribed, inappropriate use of over-the-counter products can still have severe consequences, especially when a patient is taking other medication concurrently.[68] With the increasing drive to recommend over-the-counter products rather than prescribe them,[66 166 167] it is all the more important that prescribers spend appropriate time on these tasks, to the same extent as if they were prescribing them.

Opioid Prescribing

In common with antibiotic prescribing, opioid prescribing is one of the areas most frequently associated with error and patient harm.[168] Although poor documentation and inadequate dosing instructions were the stated reason behind opioid errors in the REVISiT study, these may mask a lack of understanding of their importance in opioid prescribing. For example, it is important to enquire about exact details of current opioid use when amending analgesic prescription, and it is also important to understand equivalent dose strengths when transferring a patient between different opioid types.[169] Both of these areas were either not documented, or not performed accurately when opioids were prescribed in the REVISiT review.

Junior doctors in the EQUIP study had highlighted opioid prescribing as an area of practice they had not received appropriate training in.[18] More recently, Prathivadi and colleagues undertook semi-structured interviews with 20 GP trainees in Victoria, Australia in order to discuss their opioid prescribing practices.[170] Participants reported a lack of confidence in 'initiating, prescribing and weaning opioids.'[170] Although they reported good relevant pharmacology knowledge, there was a general lack of awareness of appropriate national guidelines. Prathivadi *et al.* highlighted the importance of outworking complex consultation management techniques, and receiving appropriate supervision from their trainers, which was not always apparent.[170]

Even in areas with high opioid use, such as in-patient palliative care facilities, staff cite a lack of adequate knowledge as a reason behind medication errors.[171] It is therefore no surprise that errors occur all too commonly in clinical areas where opioid prescribing is not as frequent.[168 172] In the REVISiT study, there were six prescriptions for an Opioid medication, issued by four of the 10 trainees: there were six errors associated with this class of medication.

Some describe the Western world as being in the middle of an 'opioid epidemic'.[173] There has, thankfully, been a slight reduction in opioid use in the UK over the past four years, which may be related to better stewardship of opioid medication in non-cancer pain.[174] The majority of palliative care remains in the community, however,[175] and the risk of harm from opioids remains high: GP trainees may benefit from enhanced training in this area of prescribing, which should include advanced consultation skills support.

Medication reviews

Performing medication reviews is an important part of the prescribing process, aimed at ensuring patients are continuing to receive the most appropriate medication, and reducing potential harm that could result from inappropriate medication use.[176] They are increasingly important in an age of multimorbidity and polypharmacy, where medication interactions could have serious consequences, and nuanced prescribing decisions need to be made.[69] Performing an appropriate medication review is a highly skilled task, especially when the practitioner often has to rely on guidance focused on single conditions, rather than the reality of polypharmacy.[177] [178]

Over the course of reviewing the 1291 consultations in the REVISiT study, it was noted that the GP trainees had performed 63 medication reviews: a total of 259 medications were reviewed as part of this process. There were six review errors and 50 episodes of suboptimal review relating to the 153 medications that were reviewed and not issued. This represented a review error rate of 3.9% and a suboptimal review rate of 32.7%. The error rates were lower than the rate uncovered for actual medication prescription, and indeed lower than PRACtICe study's reported 5% error rate for GP prescribing in primary care.[9] This could be reflective of the role of medication review in reviewing prescriptions that have already been

prescribed by another healthcare professional, rather than initiating prescriptions themselves.

Errors that occur in this process are very important to uncover: authorisation of medication through the review process will often permit a patient to request that medication regularly for the next year without further input from prescribers in the practice: there is therefore more continued scope for medication harm in the presence of an inappropriate prescription.[77] For example, trainee 2001 authorised the continued use of regular ibuprofen in an 81 year old lady without co-prescribing gastroprotection, or documenting discussion of the potential risks of this medication. Inappropriate review is also a lost opportunity to enact best practice guidance. Trainee 2001 also reviewed a patient who had experienced a CVA, but was not receiving the recommended secondary protection of clopidogrel. It is possible that in the absence of REVISiT feedback, discussion of appropriate secondary protection may not have taken place for another year for that patient.[77]

The literature suggests that GP trainees see a different case mix to post-CCT GPs, with the former seeing fewer patients with 'chronic, complex, psychosocial and circulatory conditions.'[179] This proposition is also supported by a comparison of the summary data in the REVISiT study with national prescribing data from Primary Care in England. For the latter data set, drugs used in 'hypertension and heart failure' and 'lipid lowering drugs' were the first and second most prescribed medication groups.[104] These drug types were the tenth and eleventh most prescribed by participants in the REVISiT study, which had antibacterial drugs as the most prescribed drug group: antibacterials were the eighth most commonly prescribed drug group for national data.[104]

If these differenced in prescribing patterns are universal, it is likely that trainees may not be gaining the experience necessary to conduct appropriate medication reviews. There is also evidence that medication reviews may not be used to their full potential in primary care because of competing pressure from other priorities.[180] In their recent qualitative study

involving GPs and pharmacists, Duncan and colleagues reported that several participants from both professional groups described medication reviews as 'a 'tick box' exercise which they did 'in the quickest way possible.'[181]

This is despite structured medication reviews remaining one of the key requirements laid out in the PCN contract specification from NHS England.[182] Such reviews were also seen as one of the main 'responses to overprescribing' outlined in the National Overprescribing Review, which was published in 2021.[183] The review highlighted the possibility that as many as 10% of medications prescribed in primary care, may not actually be required by the patient.[183] It is questionable whether medication reviews would enact change in overprescribing or medicines safety enhancement, if they are only seen and outworked as a 'tick box' exercise.

This is clearly an area where GP trainees (and indeed the whole primary care workforce) would benefit from greater support and training to make the most of the medication review encounter. Kirwan and colleagues reported findings from a 'pilot cluster randomised trial' involving a 'multimorbidity collaborative medication review and decision-making intervention.'[184] This intervention facilitated practitioners to undertake appropriate reviews of complex patients. It employed various 'behaviour change techniques' including 'peer support' to develop appropriate patient management plans, 'action planning' to augment practice protocols, appropriate activity recording for the purpose of CPD, and crucially 'allocating protected time within the GPs' schedule to conduct the reviews'. Preliminary findings from this study are encouraging, and a larger-scale trial is awaited.[185]

McCahon and colleagues undertook a qualitative study with patients to explore their 'perceptions and experiences of medication review.'[186] Some of the participants were unclear regarding the purpose of a medication review, and themselves referred to it as a 'tick box' exercise.[186] In a study by Carson and colleagues, patients were pre-selected as likely to benefit from a new prescription of a particular diabetic medication, practitioners

were given specific training regarding this medication and patients were invited to consult with practitioners for a dedicated medication review.[40] It is interesting to reflect that even in these circumstances, one of the commonest reasons why the new medication was not prescribed was 'competing visit priorities.'[40] One of the outputs from McCahon *et al.*'s study was the production of a patient information leaflet, which contained details about 'the purpose of a medication review, what it involves and guidance on how to prepare for it.'[186] The importance of meaningful involvement of patients at all stages in healthcare cannot be overemphasised, and is indeed a statutory duty laid out in the Health and Care Act 2022.[187] In common with clinicians, patients may also benefit from enhanced education regarding the medication review process, and local health systems should be designed in a way that facilitates outworking of appropriate reviews, even in the presence of competing patient priorities.

The Additional Roles Reimbursement Scheme has brought about a mushrooming of the number of clinical pharmacists working in primary care.[188 189] The number of primary care pharmacists in NHS England has increased by 66% since 2021: there are currently more than 6300 full time equivalent pharmacists employed in this setting.[190] Undertaking structured medication review is already an area that clinical pharmacists are taking more of a role in, although this may not always be fully realised where there are 'competing priorities'[181] for their time, or where particular patients fall outside of their skillset. GP trainees welcome the addition of pharmacists to the primary care workforce,[191] although report concern regarding 'unclear boundaries between different staff roles.'[192] There is a need to enhance understanding between the professions, and foster good interprofessional working relationships.

The benefits of feedback

All the participants were positive about their involvement in the study, with each of the trainees able to cite at least one area of behaviour change they had enacted, or were

intending to enact because of taking part. The role of feedback in practice change is complex: a meta-analysis of feedback intervention studies, which synthesised more than 23, 000 participant observations found that around one third of feedback interventions actually resulted in a decrease in participant performance, although the net effect of all of the interventions reviewed was an increase in performance.[193] Weallans and colleagues recently conducted a systematic review of effective feedback use in postgraduate medical education.[57] They reviewed 51 studies, and as a conclusion presented 'common principles of effective and ineffective feedback in clinical supervision':[57] which correspond well with other summary data presented in the medical education literature.[58-61] Weallans and colleagues' common principle summary is shown in table 43.

Table 43: Common principles of effective and ineffective feedback in clinical supervision[57]

Effective feedback is:	***Ineffective feedback is:***
Given in the context of an educational alliance	*Delivered in a disrespectful or threatening manner*
Specific	*Making generalisations*
Based on first-hand observations	*Focused on hearsay or inference*
Focused on behaviour	*Focused on personality*
Descriptive in language	*Judgmental or evaluative language*
Stating what was done well and areas for improvement	*Only focused on positive or negative aspects*
Provided as actionable amounts of information	*Excessive or scarce in the amount of information*
Provided in a timely manner after performance	*Provided in an untimely manner*
Seeking the supervisee's self-assessment first	*Not eliciting the supervisee's self-assessment*
Providing suggestions for improvement	*Not providing suggestions for improvement*
Exploring the supervisee's view of feedback	*Assuming the supervisee's view of feedback*
Developing an action plan for improvement	*Not linked to an action plan for future action*

The feedback in the REVISiT study was indeed based on actual practice, specific and descriptive, focused on behaviour and avoided the use of 'judgmental or evaluative' language.[57] There had been the apprehension from some of the trainers that the process

might have been *threatening* (trainer 1401), but this was never experienced by participants as an actual effect of the study. By co-recruiting the trainee's trainer, this was in keeping with giving feedback 'in the context of an educational alliance'.[57]

Ramani and colleagues discuss the importance of viewing feedback 'through a sociocultural lens':[59] the feedback is more likely to be accepted if it appears to have 'credibility'.[59] There was much praise for the role of the pharmacist in the REVISiT study, but there was also a concern that some of the feedback was too *picky* (e.g. trainer 1301) and not in keeping with *real-world* practice (e.g. trainer 1901). If the whole process was perceived to be out of touch with the realities of everyday general practice, then there is a danger that feedback would be ignored. Hewson and colleagues caution the provision of 'too much' feedback,[194] which runs the risk of being overly time consuming to process and action. Most REVISiT participants valued the detail of the feedback, and there were even suggestions of the need for more prescription items to be reviewed. Some of the participants had been expecting feedback in the form of 'themes' rather than the level of granular detail that had been provided. It would be beneficial to explore different ways in which the same feedback could have been given.

The REVISiT study reported a high level of 'suboptimal prescribing'. These were prescribing events which did not reach the threshold for inclusion as an error, but nevertheless 'represented less than ideal practice.'[9] The rate of suboptimal prescribing reported in the REVISiT study was substantially higher than that observed in the PRACtICe study (34.9% v 7%).[9] Although the same definitions of suboptimal prescribing were used in both studies, the pharmacist in the REVISiT study was directed to consider a broad definition of suboptimal practice (which would still have to be ratified by case law or panel review) in order to maximise the educational opportunities afforded by the process. Although there was the impression from participants that it was useful to have any areas of suboptimal practice highlighted, this overly inclusive use of 'suboptimal' may have contributed to concerns that aspects had been too *picky*. In future studies it may be beneficial to revisit the terms of suboptimal inclusion to try to mitigate this effect. However, the large difference in

reported suboptimal practice that is apparent between the PRACtICe and REVISiT study may suggest that the cohort of trainees in the REVISiT study had further to learn regarding high quality prescription writing.

There was a time-lag of between 3 and 4 months from the date of the first consultation, and when the feedback session took place. This was a consequence of the verification and processing that had to take place, and was greater than anticipated due to lack of automated reporting function. Such a time lag may not be described as 'timely' and two of the trainers commented that their trainees found it difficult to recall some of the necessary consultation details. However, follow-up interviews confirmed specific practice areas were still able to be reviewed and amended, due to the ability for individual consultation records to be accessed and discussed.

Several participants discussed the benefit of receiving both good feedback, and areas for improvement. For example, trainer 1101 commented that highlighting good practice demonstrates to the trainee that they are actually capable of enacting good practice: which is all the more important when prescribing errors occurred that could have been prevented by the universal adoption of the good practice techniques that were highlighted. Typically, postgraduate trainers may be more comfortable with delivering positive feedback, possibly motivated by not wanting to discourage a trainee, or adversely affect the training relationship.[195] The efficacy of the traditional 'feedback sandwich' may be limited to learner satisfaction rather than actual practice change.[196] Non-specific positive feedback is unlikely to change practice, but careful use of positive feedback may enhance the efficacy of the feedback process.[58] Participants in the REVISiT study reported various comments on the role of positive feedback, with some preferring to ignore it and progress to areas of improvement. This is further evidence of the importance of promoting a positive learning environment, where the trainee's individual learning style is well understood in the context of feedback.[57]

Although providing some 'suggestions for improvement', the REVISiT project did not specifically create an 'action plan' for the trainee: this was left to the trainer and trainee to discuss and take forward. Seeking the trainee's views on performance first was not an overt part of the process: indeed one of the trainees commented that this would have augmented the process.

The role of the pharmacist

Pharmacists have been involved in several prescribing feedback interventions reported on recently in secondary care.[22 53-56] Reynolds and colleagues reviewed the prescribing of junior doctors in two large teaching hospitals in London.[53] Pharmacists provided feedback regarding prescribing errors that had taken place. The intervention evaluated well, with junior doctors reporting that it had been a useful experience, and that they had a greater awareness of safer prescribing principles. There was no significant effect demonstrated by the period of dedicated pharmacist feedback in terms of the number of prescribing errors recorded, although there was an increase in the number of prescriptions containing the name of the junior doctor who had prescribed them from about 10-50%.[53]

Lloyd and colleagues were able to demonstrate a significant reduction in error rate after a cohort of clinicians had received feedback from a prescribing audit conducted by pharmacists.[54] Thirty-six prescribers (both medical and non-medical) received feedback from a review, and then were subjected to another review three months later. A control group of 41 prescribers were also evaluated. The intervention group had an initial error rate of 25%, which reduced to 6.7% after the intervention. The control group's error rate actually increased from 19.7% to 25%.[54] The pharmacists, who had delivered both verbal and written feedback were very positive about their involvement in the process. They had been concerned about the potential adverse effect on working relationships as a result of giving feedback, but their fears had not been realised.[55]

Although integral to the REVISiT study, the pharmacist in the study did not routinely deliver the prescribing feedback to the trainees. Study participants spoke highly of the role of clinical pharmacists in general practice, although some were concerned that they may lack insight into the role of a general practitioner. Clinical pharmacists are now more embedded in UK primary care than they were when the study was conducted;[27] therefore, it is likely that this perception has changed, although pharmacists have not been part of the integrated primary care team for as long as they have been a regular feature in secondary care wards.[26] REVISiT participants had discussed the benefits of close interprofessional working; Lloyd's findings in secondary care concur with these thoughts.[55] Future versions of the REVISiT study would benefit from greater involvement of pharmacists in all areas of the process.

Prescribing education

Several of the REVISiT trainees reported paucity of prior prescribing education as a reason for wanting to take part in the study. These were sentiments shared by junior doctors in the EQUIP study,[17] and more recently by medical students interviewed by Kennedy and colleagues.[197] Participants in the latter study had been drawn from 25 of the UK's medical schools: only a minority of them thought that their medical course had 'prepared them sufficiently for practical prescribing' (372/1023 = 36.4%).[197]

Since August 2016, all new foundation year one doctors in the UK were required to pass the 'Prescribing Safety Assessment' in order to satisfy completion of competencies for that year.[198] The majority of final year medical student participants (n=303; 72.1%) in Kennedy and colleague's study stated that they thought undergoing the PSA had 'improved their practical prescribing skills.'[197] An independent review of the PSA conducted in 2019 concluded that while there were many limitations, 'the PSA is almost certainly a significant

contributor to patient safety.'[199] A further review of the PSA is due to be published later this year.[200]

Participants in the REVISiT study would not have undergone the PSA as part of their foundation training. However, even those trainees who would have completed the PSA still report challenges in outworking appropriate prescribing in primary care.[5] Some of the prescribing events and suboptimal prescribing reported in the REVISiT study related to trainees migrating practices adopted in secondary care to their new primary care roles, where they were no longer appropriate (and in some cases may not have been appropriate in the secondary care setting also.) Some of the trainers discussed the need to improve the induction of future trainees with respect to prescribing in primary care. Even with the continued development of the PSA, there will still be a need for adequate orientation to prescribing in primary care: both in terms of the types of medication that are appropriate to prescribe, but also in terms of the way in which individual computer systems are set up.

Consideration of error theory

James Reason emphasises the importance of adopting a 'system' approach when exploring error causation.[201] Such an approach is commonly adopted in 'high reliability' error critical environments, such as nuclear power stations and the aviation industry.[201] The 'system' approach is contrasted with the 'person approach'[201] where an error is seen as a 'moral' or 'ethical failure that constitutes an unprofessional act'.[202] Such an approach often promotes a 'blame culture'[202] which can enhance healthcare professional burnout and stifle the potential to learn from mistakes. The NHS Patient Safety Strategy asserts that blame perpetuation in healthcare 'relies on two myths….the perfection myth (and) the punishment myth.'[203] The former is summarised as 'if we try hard, we will not make any errors' and the latter as 'if we punish people when they make errors, they will not make them again'.[203] This contrasts with the system approach of high reliability organisations where there is an expectation that errors will occur, but they 'train their workforce to recognise and recover them'[201] and look for system-wide reform rather than focusing on 'making local repairs.'[201] The World Health Organisation in their 'Patient Safety' briefing comments on the need to move 'from the traditional blaming approach to a more system-based thinking.'[204] The NHS Patient Safety Strategy estimates that full adoption of a more comprehensive system-based approach could save an additional 1000 lives in England each year.[203]

Reason proposed the 'Swiss cheese model of system accidents'.[201] Hazards would usually be prevented from occurring by a series of barriers (the slices of cheese). Each barrier, however, has 'unintended weaknesses or holes – hence the similarity with Swiss cheese'.[205] It would only be when all of the 'holes' align by chance, that a 'loss' occurs as a result of the hazard not being prevented.[201] Reason comments that the holes manifest in response to both 'active failures' and 'latent conditions'.[201]

Dean and colleagues adapted Reason's model of accident causation to explore the root cause of medication errors that occurred in a hospital inpatient setting.[206] The team identified 88 potentially serious medication errors that occurred in a two-month period, and conducted interviews with 44 of the doctors who had prescribed the medication containing an error.[206] All the interviews took place within 96 hours of the medication being prescribed, and were used to help understand the reasons behind the errors occurring.[206]

In all the cases, Dean and colleagues were able to uncover an 'active failure', which led to the error.[206] These active failures were divided into one of four categories: a 'skill-based slip', a 'memory-based lapse', a 'mistake' or a 'violation'.[206] Slips and lapses accounted for most of the errors (57%): the authors gave an example of a prescriber having to make a decision between one of two drugs, but then getting distracted and entering the dose of the drug they hadn't decided to prescribe, rather than the dose associated with the drug they had actually prescribed.[206] 'Mistakes' occurred 'because of an absence of knowledge of relevant rules'[206] and violations occurred when protocols had specifically been overridden or 'rules of correct behaviour…consistently ignored.'[206]

Reason describes latent conditions as 'the inevitable 'resident pathogens' within the system…(arising) from decisions made by designers, builders, procedure writers, and top level managers.'[201] He comments on two distinct adverse effects from poor latent conditions: they have the potential to 'create long-lasting holes or weaknesses in the defences'[201] and they can also 'translate into error-provoking conditions within the local workplace.'[201]

From the perspective of a 'long-lasting hole',[201] Dean and colleagues discussed the paucity of authentic prescribing training that had been received by junior doctors.[206] A strong defence against this latent condition was the presence of ward pharmacists, who have a role in identifying and correcting errors.[206] The authors lament the inadequacy of the pharmacy resource available, and also comment that some of the participants mentioned an over-

reliance on pharmacist colleagues to the extent that 'they would sometimes not bother to look up (drug) doses (themselves.)'[206]

'Error-provoking conditions within the local workplace' were described by Dean and colleagues and related to the individual prescriber, the team they were a part of, or the environment in which they worked. Individual factors included 'hunger' and 'tiredness'. Team factors included inadequate verbal and written communication, and deficiencies of team structure. Error producing conditions related to the work environment included inadequate physical space in which to work, as well as unmanageable workloads and a sense of being 'hurried to prescribe'.

The importance of Dean and colleagues' study is that although a final 'active failure'[201] was identified for each prescribing error, there was a thorough investigation of latent failures which either contributed to the error occurring, or prevented the error from being rectified at an earlier stage.[206] A greater understanding of both active and latent factors is important for the reduction of prescribing errors in healthcare settings.[206] As commented in the WHO briefing, this approach in no way removes individual professional accountability, but paves the way for a safer approach to prescribing,[204] as long as adequate resource is given to ameliorating both latent and active failures.

Relating Reason's model to the findings from the REVISiT study

Although a formal root cause analysis was not undertaken for each episode of prescribing error and suboptimal prescribing uncovered in the REVISiT review, many prescribing events were discussed as part of the follow-up interviews. These will now be discussed in relation to active and latent failures that were apparent.

Many of the active failures related to mistakes or a lack of knowledge. Examples of this included prescribing antibiotics at the wrong dose, or for the wrong duration. A lack of awareness of particular guidelines, or indeed the change in prescribing patterns between secondary and primary care were also factors in this domain. A smaller number of slips and lapses were reported. For example, trainee 2001 had an error involving prescribing an NSAID to a patient with asthma. When asked about this, they commented '*I did know that anyway, I'd just forgotten it on one occasion!'* Trainee 1501 had prescribed an incorrect number of antibiotics, even though they had the intention to prescribe the correct length of course (28 days): *I wrote in 28-day course, twice daily and it automatically populated 28 (tablets) and I didn't check that.*

Analysis of participant comments suggested the apparency of error-producing conditions. These were related to the computer system, use of prescribing aids, a lack of time, and consultation management skills (including patient demand).

With respect to the computer system, trainees commented on the way in which some fields were pre-populated, so it was easier to keep those fields populated with information that may not have been relevant for the patient in question, rather than type in new information.

…if you choose clarithromycin, it says specifically for Helicobacter pylori treatment, and obviously usually I don't use it for that purpose, because obviously you prescribe for chest infections a lot more frequently than H-pylori eradication. So you purposefully have to delete the Helicobacter part and type in chest infection. (Trainee 1801).

One of trainees described the steps that would have to be taken in order to prescribe an item, and commented that *it's very easy electronically for you to just not click something, or click something and it completely changes what comes up on the prescription.* (Trainee 1501). Another trainee commented on 'pop-up fatigue' or 'alert fatigue',[207] whereby

important announcements are ignored by the prescriber due to the number of announcements and warnings that are co-presented. *I think it's difficult finding that balance with the ones that you have to take seriously and the ones that you can be like OK, that's not too important*. (Trainee 2010)

It is important that computer systems are designed in a way that facilitates good prescribing, considering user feedback and the findings from studies such as this one.[133 134] Also, the appropriate induction of GP trainees with respect to the nuances of a practice computer system cannot be overrated.

The REVISIT study took place at a time when physical copies of the BNF were in use, rather than the *Medicines Complete* on-line suite.[147] Out of date copies of the BNF would have to be replaced in order for the most up to date guidance to be followed. One of the trainees commented that *I was using an older version of BNF, so it was a couple of years old* (trainee 1901). This was a common reason for many of the antibiotic-related errors uncovered in the study. It is important for prescribers to be supported to have the best available resource in order to maximise prescribing accuracy.

Many of the trainees commented on a lack of time being responsible for suboptimal prescribing, or prescribing errors, as did their trainers.

I think the other theme that came out is that you need to be careful. That a lot of the errors come through rushing through things, just doing it quickly and routinely without thinking about it and the extra 5 seconds it takes to write, or less than that

Trainer 1101

Linked to a lack of time was the way in which consultations were managed by the trainees, and their ability to deal with the demands of their patients.

Sometimes the battle in GP is that you only have ten minutes and some patients come in with a very, very rigid idea of what they want out of a consultation and sometimes they might be pushing and pushing and pushing for antibiotics and you're stuck between a rock and a hard place because you're not going to get them out of the door unless you bend to their will.

Trainee 1201

GP training must be able to evolve in order to equip trainees to adequately and safely manage their patients, as well as being able to prioritise their own needs.[132] The way in which appointment times are generally limited to ten minutes may also need to be reviewed if not fit for purpose in the modern healthcare setting.[208] There could also be a role for better patient education regarding the best use of a GP appointment.[209 210] Appropriate workforce planning must also be in place in order to safeguard the working environment of all primary care prescribers,[211] and to permit appropriate time to be available for complex tasks such as prescribing.

In common with the findings from Dean and colleagues,[206] the main latent condition apparent was the paucity of authentic prescribing education that had been received by GP trainees. One of the trainees commented on the value of the ward-based pharmacists while they had been on hospital placement: such a 'check' on prescribing is not generally available in primary care. The main 'defence' for the lack of training may be the role of the trainer, although some of the trainees were of the opinion that prescribing safety was not a focus of the consultation debriefs that would take place with their trainers.

As a result of going through the REVISiT process with their trainee, some trainers did comment on how they would change their practice to be more of a 'latent defence' from this perspective.

*…since we've had this feedback….I've had another, I've had (*name of trainee*) join me as an ST1, so she's a new registrar into the thing, she hasn't done any general practice. So I have been much, much clearer about teaching with (*name of trainee*) about prescribing I think and watching over errors and potential places.*

Trainer 1101

Viewing the findings of the REVISiT study through the lens of Reason's model of accident causation permits the role of the individual GP trainee to be placed in the context of system inadequacies which must be addressed in order to maximise patient safety.[201] An educational intervention such as REVISiT may be able to positively influence a prescriber's active failures, as well as give them a greater realisation of the importance of latent conditions, and of the need for good prescribing in general. Although an awareness of latent conditions may help the individual prescriber to more safely navigate the primary care landscape, healthcare systems have a duty to respond to these latent conditions if a true and universal enhancement of patient safety is to be realised.[203 204]

A deficit in authentic training in the domain of prescribing is a recurring theme in the literature and was also apparent in REVISiT participant responses.[1 9 18 206] This is a clear latent failure that must be resolved. It is hopeful that a more integrative and holistic approach to therapeutic teaching at an undergraduate level,[197-199 212] coupled with a greater emphasis on prescribing as part of vocational training,[5 213] will have a positive impact here. From a UK perspective, policy makers will need to be mindful of the potential effect of reducing the length of undergraduate training. The NHS workforce plan has an aim to 'move from five- to four-year undergraduate degree programmes'[214] and to 'bring newly qualified doctors into the NHS workforce better prepared to deliver patient care.'[214] Careful curriculum planning will be required in order to ensure that appropriate prescribing skills can be developed in a shorter time frame than previously available. It is likely that a greater

use of simulation and AI technology will be necessary to help newly qualified prescribers gain the necessary 'situational awareness'[215] to prescribe safely and holistically.[157 216 217]

Progression of the REVISiT process

When the REVISiT study concluded, it was clear that participants reported subjective gain from being a part of the process, with some evidence of changes in practice also being apparent. All 10 prescribing reviews had highlighted aspects of practice that would benefit from improvement, and it is reasonable to propose that enacting those improvements would enhance patient safety. The literature from secondary care suggested that structured feedback from pharmacists was useful: even though the evidence was not always supportive of an actual practice change.[22 53-56] A similar evidence-base was not yet apparent in primary care.

There were limitations to the REVISiT study that have already been discussed, and also potential concerns raised by participants that would need to be addressed before wider applications of the REVISiT study could be realised. For example participants had discussed why some trainees may be apprehensive about taking part. A fear of being *criticised* (trainee 1401), getting *into trouble* (trainee 1101), or simply being *overwhelmed* (trainer 1301) with the prospect of being faced with their own mistakes were legitimate concerns. There might also have been other consequences of taking part, or barriers to a larger programme being successful, which the research team were not aware of.

It was therefore decided to commence a qualitative study into the feasibility of conducting widescale REVISiT reviews for GPs in training in primary care.[3] This was with an aim of working towards developing a 'programme theory': necessary for appropriate development of a complex intervention.[62] Twenty eight interviews were conducted with key stakeholders (GP trainees, GP trainers, pharmacists and members of the medicolegal profession) and two

focus groups were also conducted with members of the public.[3] There was general consensus that the REVISiT intervention had merit: for example, one of the pharmacist participants commented 'This is obvious: why haven't we been doing this forever?'[3] The need for robust evaluation was also commented on: would such an intervention be an appropriate use of pharmacist time, would widescale roll out be feasible, and would such an intervention be cost effective?[3]

The concern about widescale roll out was evident when discussing REVISiT with the Workplace Based Assessment team (WPBA) from the Royal College of General Practitioners (RCGP). This team has oversight of the 'on-the-job' assessments that GP trainees complete while based in a practice.[213] Although supportive of the REVISiT concept, the WPBA team were concerned that there would not be the universal availability of pharmacist time to allow every GP trainee in the county to receive a REVISiT intervention.[218]

The WPBA had been tasked by the General Medical Council (GMC) to produce a meaningful assessment of trainee prescribing.[218] One of the suggestions from participants in the REVISiT study was to engage in a self-review of prescribing. There were, however, concerns raised about the effect of unconscious incompetence, and also *how critically* (trainer 1501) trainees may look at their own practice. Similar concerns had also been raised by participants in the post-REVISiT qualitative study.[3] Indeed, a systematic review by Davis and colleagues concluded that 'physicians have a limited ability to accurately self-assess.'[219] However, Van der Steen and colleagues reported that a programme of structured critical self-review of prescribing had significantly reduced the number of 'potentially harmful prescriptions' issued by junior doctors in comparison with a control group who did not engage in such self-review.[220]

When discussing the potential use of prescribing self-assessment, trainer 1501 commented on the need for providing trainees with appropriate guidance to complete the task. The REVISiT team worked with the RCGP WPBA to develop the GP Prescribing Assessment: a

mandatory self-review process for all final year GP trainees.[5] The 'case-law' from the REVISiT study was adapted to produce detailed self-review guidance, and the process was refined so that GP trainees reviewed 60 sequential prescription items, 20 of which were randomly selected for detailed scrutiny by their trainer. GP trainee and trainer then met for a structured tutorial, during which a reflection and action plan were developed.[5]

The REVISiT team also devised the evaluation of the first year of roll out of the GP Prescribing assessment. Detailed questionnaires were completed by the vast majority of ST3 trainers and trainees (1567 trainers and 1771 trainees).[5] Most of the trainees reported at least one episode of suboptimal prescribing (n=1714; 98.4%), with an error being reported by 1244 trainees (71.5%). The mean reported prescribing error rate was 8.3%, and the mean reported rate of suboptimal prescribing was 40.6%.[5] These figures are comparable with the error rate and suboptimal prescribing rate reported in the REVISiT study (8.9% and 35% respectively). This would seem to suggest that trainees were indeed capable of appropriate critical self-review. The prescribing assessment also had face validity and was well received by participants. The majority of trainees (76.4%, n = 1330) and trainers (82.0%, n = 1293) agreed or strongly agreed that the exercise had been useful in assessing a trainee's prescribing. A change in prescribing practice was reported by most of the trainees who had taken part (n=1571; 90.2%).[5] The GMC approved the use of the prescribing assessment, which is now a routine part of GP training in the UK.

While the prescribing assessment was being piloted, the REVISiT team also devised a small-scale randomised controlled trial of the REVISiT intervention.[4] The idea was that this would form part of 'feasibility testing' for a complex intervention,[62] and aimed to recruit twenty GP trainees who would be randomised to either receive prescribing feedback through the REVISiT process, or progress through the usual GP training programme. A review of the prescribing practice of both cohorts three months after the intervention group had received their feedback would allow for comparison of error rates and rates of suboptimal prescribing. The control group would also undergo a retrospective prescribing review, corresponding with the time period when the intervention group had received their first

review, in order to facilitate a comparison of baseline prescribing practice. An on-line database was developed to facilitate data entry from prescribing reviews, which also permitted comment from trainer and trainees. A training programme for interested practice, CCG and PCN pharmacists was also devised, with the aim of recruiting pharmacists who would usually be a part of the practice where the recruited GP trainee was based.[4] Unfortunately the study did not recruit the required number of participants. The study period coincided with the Covid-19 pandemic, and many pharmacists were understandably not keen to take on additional workload, even though study funding would permit payment for the pharmacist's time. GP trainees were also reluctant to take part in the study as they were mandated to complete self-review regardless of whether they were recruited into the pharmacist-led study.[4]

Interestingly, review of the GP prescribing assessment qualitative feedback suggested the anecdotal involvement of pharmacists in the process at some practices. Indeed Brown and colleagues formalised the use of practice-based pharmacists in the feedback stage of the WPBA GP prescribing assessment.[221] Their study involved 53 pharmacists based in training practices across Western Scotland. Trainees and trainers reported benefit from the involvement of pharmacists, and all parties thought that the process had also benefited current and future interprofessional practice in general.[221] This sentiment had been shared by participants in the REVISiT study when discussing the putative involvement of pharmacists in feedback delivery.

Implications for research

The REVISiT study has shown that detailed prescribing review is seen as beneficial by a cohort of GP trainees and their trainers. Some form of enacted or planned practice change was reported by all participants.

Case-law developed from the REVISiT process has been adapted to provide detailed guidance for a prescribing assessment based on the principles of self-review, which is now embedded as a mandatory part of GP training in the UK.[5 213] Trainees who have taken part in the prescribing assessment report an average error rate and rate of suboptimal prescribing that is comparable to the rate revealed for the cohort of prescribers in the REVISiT study, and indeed comparable studies of junior doctor prescribing.[17 145] It could still be useful to evaluate the role of the pharmacist in reviewing a GP trainee's prescribing, and compare this with self-audit. The phenomenon of unconscious incompetence, and potential limitations of self-assessment could infer that additional prescribing issues may be revealed by the input of a pharmacist.[3 219] Even though the current self-review process also involves review of a subset of 20 prescription items by the GP trainer, this may not be adequate to confidently appraise all prescribing habits. Also, a GP trainer may not be reviewing the prescriptions to the same level that a pharmacist would.[221] Robust evaluation of pharmacist-led review of prescribing by GP training may therefore be beneficial This would have to be balanced with the current availability of pharmacist resource. Although the number of clinical pharmacists in primary care continues to increase, pressures on their time also continue to increase.[27]

The primary care workforce has increasing numbers of prescribers from different professions.[191] From 2026, all pharmacists graduating from accredited university courses will have the status of independent prescriber.[222] Prior to this, pharmacists would have had to undergo further postgraduate training in order to attain this status.[223] Lloyd and colleagues demonstrated that all levels of prescribers benefitted from a pharmacist-led review of prescribing in a secondary care setting.[24] It could be prudent to evaluate REVISiT-style

prescribing interventions for other prescribers in primary care. There may be particular interest in evaluating recent pharmacy graduates, who hitherto would not have graduated with prescribing rights. There may be benefit in limiting REVISiT-style reviews to small scale studies which explore if there are particular prescribing deficits or concerns for particular professional groups. Findings from such studies could then be used to inform educational practice.

The REVISiT study revealed potential deficiencies in prescribing related to antibiotics and opioids. These findings are echoed in other studies.[17 168 170] It would be useful to further evaluate such prescribing by GP trainees, to help improve education in these areas.

Implications for Policy

The REVISiT study has added to the literature demonstrating that there is a need for a greater emphasis on prescribing safety for doctors in training.[1 9 206] This should include appropriate induction training at the transition point between secondary and primary care. The consultation is the main tool through which the general practitioner outworks their therapeutic process.[224] GP trainees may benefit from enhanced consultation skills training: specifically with a focus on difficult or complex prescribing tasks.[132] Prescribing should never be viewed as an 'add-on' or maladaptive consultation tool to help get a 'difficult patient' out of the door.

Qualitative findings from interviews with GP trainers suggested that their role in latent defence[201 206] may be enhanced as a result of experiencing their trainee go through the REVISiT process. Empowering trainers with lessons learned from the study, and equipping them with the necessary time and resource may help them to greater realise their wider role in latent defence for GP trainee prescribing.

There is a need for authentic therapeutic education throughout all stages of medical training,[197 199 212 215] which must continue to be prioritised even if the length of undergraduate training for UK doctors is reduced.[214]

The medical education simulation literature would propose that there is value in utilising realistic case-based scenario teaching for all levels of medical training.[216] The case-law developed through the REVISiT process is a rich resource for such teaching, and has already been used for postgraduate GP training sessions across the East Midlands.

There is universal acceptance of the importance of medication reviews in practice: especially with the ever-increasing reality of multimorbidity and polypharmacy.[69 176 177] More time and resource needs to be given to all providers so that medication reviews can be used in an effective, patient-centred way. Appropriate prescribing behaviour of any type cannot be rushed. Commissioners and policy makers should be mindful of the patient-safety consequences of not providing enough resources to the practice of prescribing.

Pharmacists are becoming more embedded in the primary care team, but there is still uncertainty regarding their role, and the best way in which their expertise can be harnessed within the team.[27 55 191 192] Providing well-managed and structured feedback to team members regarding prescribing practice could enhance patient safety, and interprofessional working relationships.[221]

Practice computer systems should be developed in response to user feedback in order to maximise patient safety. Appropriate guidelines should be made available for all practitioners to access in a timely and efficient manner. For example, NHS users are not universally able to access all components of the 'Medicines Complete' suite despite this being an easy-to-access and regularly updated prescribing resource.[225]

Being mindful of the latent failures and error-producing conditions[201 206] that manifested during the study period will be important for realising the goals of the NHS Patient Safety Strategy, and the World Health Organisation's Patient Safety Campaign.[11 204]

Implications for practice

A detailed review of prescribing performed by a pharmacist for ten GP trainees revealed prescribing errors and suboptimal prescribing in each of the participant's prescription pool. This has implications for both clinical and educational practice.

Giving other trainees an awareness of the possibility of prescribing errors, and an understanding of the errors that peers had made could be beneficial for individual learning. GP trainers who took part in REVISiT discussed how they planned to change, or had already changed the way in which they taught future trainees, because of experiencing the feedback delivered to their current trainee: sharing this knowledge among the training community would also be beneficial.

Clinicians must understand the importance of providing appropriate documentation of prescribing decisions, and the rationale behind them. In an age of decreasing continuity, the need for good interprofessional communication and handover cannot be overemphasised.[226-228] There is also need for clear instructions on the actual prescription, especially when usage directions could be misinterpreted by patients. The issue of trainee 1601 producing prescriptions along the line of 'take take one or take two tablets take four times/day' highlights the need for the prescriber to be aware of all stages of the life of the prescription. The clinician would do well to 'walk a mile in [their] patient's shoes'[229] to fully understand receipt of the prescription from this important perspective.[230] Keeping the patient at the centre of all aspects of patient care, including prescribing, cannot be overemphasised.[231]

Equipping individual prescribers to have a greater awareness of the latent failures and error-producing conditions that are apparent in the workplace,[201 206] may help to mitigate these factors while appropriate systems are being developed to adequately manage them.[203]

Conclusion

Prescribing medication is a fundamental part of the care delivered to patients in primary care. Medication error continues to be responsible for significant unnecessary morbidity and mortality. Educational interventions have been shown to enhance prescribing safety in hospital and outpatient settings,[19-23] but there remains a paucity of robust studies, especially in the domain of primary care, and specifically involving GP trainees.[36-50]

In the REVISiT intervention described in this thesis, ten GP trainees each had around 100 sequential prescription items reviewed by a pharmacist and received detailed feedback regarding prescribing errors, suboptimal prescribing and areas of good practice. Prescribing errors and suboptimal prescribing were revealed in 8.9% and 35% of prescription items respectively. Immediate and follow-up interviews were conducted with GP trainees and their trainers, which were able to explore some of the reasons behind prescribing events and also where practice change may occur, or would not be likely to occur. Qualitative analysis explored the active failures, and revealed latent and error-producing conditions which likely led to the error or suboptimal prescribing events occurring.

This small-scale pilot study has shown that a detailed prescribing review by a pharmacist is valued by GP trainees and trainers, and seen by participants as being able to enhance patient safety, both at the level of the individual prescriber and the wider practice team. Lessons learned from the prescribing events of these ten trainees can be added to the patient safety canon to help inform the teaching of future trainees, and the enhancement of prescribing safety in primary care as a whole.

Although a natural follow-on from this study may be to explore the validity of the intervention through a larger scale, randomised controlled trial, this may not be a practical next step due to the pharmacist-resource that would have to be utilised. Findings from the REVISiT intervention have, however, already been used to inform the design of a national

prescribing assessment for GP trainees, which was well received by trainees and trainers, and now forms a mandatory part of GP training.

Further evaluation of the national prescribing assessment, and indeed exploring a robust prescribing evaluation for other clinicians in the primary care setting, would be a useful next step with the lessons learned from the REVISiT study.

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Appendices

Appendix One – Literature review search strategies and article summaries

Search strategy

searches took place in May 2023

MEDLINE

1. Medication Errors (MeSH) – explode
2. inappropriate prescribing (MeSH) – explode
3. Irrational prescribing
4. Prescribing error
5. Prescription error
6. Prescribing indicators
7. Drug prescriptions (MeSH) – explode
8. Drug Utilization (MeSH) – explode
9. Practice Patterns, Physicians' (MeSH) – explode
10. 1 or 4 or 5
11. 2 or 3 or 6 or 7 or 8 or 9 or 10
12. Internship and residency (MeSH) – explode
13. Medical staff, Hospital (MeSH) – explode
14. Physician, junior
15. Junior physician
16. Junior doctor
17. Education, Medical, Graduate (MeSH) – explode
18. Registrar
19. 12 or 13 or 14 or 15 or 16 or 17 or 18
20. General practitioners (MeSH) explode
21. Family practice (MeSH) explode
22. Physicians, Family (Mesh) – explode
23. Primary healthcare (Mesh) – explode
24. Physicians, primary care (MeSH) – explode
25. General practice (MeSH) – explode
26. Community health services (MeSH) – explode
27. Rural health services (MeSH) – explode
28. Rural health (MeSH) – explode
29. 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28
30. (GP and medication error) – 29 AND 11
31. (GP and medication error and junior doctor) – 30 AND 19
32. Limit 30 to >1990 and English and human
33. Limit 31 to >1990 and English and human – 477
34. Initial screening of title and abstract – 7 kept
35. Total of 5 kept for review after full text screen

Embase

– combination of Emtree and keywords used

1. Medication Error (Emtree) – explode
2. inappropriate prescribing
3. Irrational prescribing
4. Prescribing error (Emtree) - explode
5. Prescription error
6. Prescribing indicators
7. Prescription (Emtree) – explode
8. Drug Utilization (Emtree) – explode
9. Clinical practice (Emtree) – explode
10. 1 or 4 or 5
11. 2 or 3 or 6 or 7 or 8 or 9 or 10
12. Resident (Emtree) – explode
13. Medical staff (Emtree) – explode
14. Physician, junior
15. Junior physician
16. Junior doctor
17. Residency education (Emtree) – explode
18. General Practice Registrar (Emtree) - explode
19. 12 or 13 or 14 or 15 or 16 or 17 or 18
20. General practitioner (Emtree) - explode
21. Family practice
22. Physicians, Family
23. Primary healthcare (Emtree) – explode
24. Physicians, primary care
25. General practice (Emtree) – explode
26. Community care (Emtree) – explode
27. Rural health care (Emtree) – explode
28. Rural health (Emtree) – explode
29. 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28
30. (GP and medication error) – 29 AND 11
31. (GP and medication error and junior doctor) – 30 and 19
32. Limit 30 to >1990 and English and human
33. Limit 31 to >1990 and English and human – 1312
34. Initial screening of title and abstract - 20 kept
35. Total of 9 kept after full text screen and duplicate removal

ERIC

– all collections involving primary care with a descriptor of 'medical education' (573 collections)

Medication error – 71

Prescribing - 536

No additional articles on abstract screening

Cochrane library

Medication error and general practice (searching word variations) – 33 Cochrane reviews – nil to include; 383 trials – 6 possibles – no additional articles on abstract review

Medication errors and residency (searching word variations) – 1 review; 406 trials – 1 possible, none on abstract review

CINAHL

medication errors or drug errors or prescription errors AND internship or residency or graduate medical education or junior doctors AND general practice or GP or primary care or primary healthcare or primary health care or family medicine

12 articles – no new articles that had not previously been found

PsycINFO

medication errors and primary care – 84 (nil relevant) – when adding internship or residency or residency – no articles

Table 44: Summary of publications from review

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
1	2022	Zhang J *et al.*[36] Conference abstract	Less is more: deprescribing PPIs in a resident primary care clinic during the Covid-19 pandemic	One US health centre – 46 residents	Residents took a '10 min virtual presentation on evidence-based PPI deprescribing'	Knowledge of appropriate PPI use increased post educational event – also residents reported 'increased comfort with deprescribing PPIs' Also – actual rates of PPI usage decreased over the 3 months after the educational intervention	No control group – no comparison with rates from previous years (e.g. would similar numbers of patients have been reviewed anyway at this point?)
2	2016	Shahid B[37] Conference abstract	Educational intervention to reduce inappropriate use of PPI in a resident primary care clinic	All residents at one US health centre	Baseline survey of 10 pts with PPI – 7/10 'no longer had an indication for [prolonged PPI] use' Education 'provided to [all] residents regarding guidelines of PPI use and associated risk of inappropriate prescribing' - reminder posters were placed in the building. These occurred June to November – and then post intervention data collected Dec 2015- May 2016	Reduction in the 'total number of PPI prescriptions by 4.6% after the intervention' compared with before - and a '38% reduction in spending on PPIs'	No control group One clinic – small number of patients – changes did not reach statistical significance

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
3	2021	Lee *et al.*[38] Conference abstract	Resident education is an effective method to decrease PPI over-prescription in a resident primary care clinic	All family medicine residents in a single clinic	2.5-minute educational video and distribution of a standardised note template to aid consultations involving PPIs.	Control group was the audit on PPI usage that the group had previously done. 2/51 pts in control group 'received a trial off [PPIs, whereas] 8/25 pts in the intervention grp had received a trial off' PPI	Control group (although similar age profile) was from a different time period than intervention group Numbers very small – one clinic
4	2002	Ables *et al.*[39] Peer reviewed journal article (Family Medicine)	Improving family practice residents' compliance with asthma practice guidelines	All residents in the 'center for family medicine', USA	Baseline evaluation of asthma care for all patients seen by residents between oct and March '98. Then July-Oct '99 programme of formal and informal teaching related to asthma management.	Post intervention review of patients treated by residents between October 1999 and March 2000 Improved documentation and classification of error severity (8.5% of 198 patients v 51% of 271 pts) but decrease in proportion of patients receiving appropriate therapy 100% v 76%	No control group One centre Apparent decrease in proportion of appropriate therapy given

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
5	2022	Carson E *et al.*[40] Conference abstract	Prescribing SGLT-2 inhibitors and GLP-1 agonists in primary care: improving rates of guideline concordant practice	USA family practice	Residents underwent 30 min educational intervention on prescribing this type of DM medication.	18/51 patients were started on the medication after the visit 40/46 residents 'more likely' to prescribe the medication after receiving the educational intervention (NB – 'competing visit priorities' were perceived as a barrier to prescribing)	Patients were pre-screened to determine who might be eligible for the medication. No control group to see who would have been started on the medication anyway. One family medicine practice
6	2013	Spern-Hillen *et al.*[41] Conference abstract	Simulated provider training improves diabetes management	341 primary care residents	Evaluation of the use of web-based '18-case comprehensive learning curriculum' related to diabetes management looking at 'longitudinal patient encounters'. Randomised controlled trial	Diabetes management knowledge and confidence with DM management – significantly higher in intervention than control group	No link to actual practice – although patients of family medicine practitioners who had engaged in a similar RCT did demonstrate improved DM care and had fewer inappropriate metformin prescriptions – but the differences did not reach significance.

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
7a	2016	Magin *et al.*[44] Peer reviewed journal article (Education for Primary Care)	Reducing general practice trainees' antibiotic prescribing for respiratory tract infections: an evaluation of a combined face-to-face workshop and online educational intervention	90 GP trainees and 90 GP trainers in Australia (from 2 of Australia's 19 'Regional Training Providers'.)	90 min face-to-face teaching for GP trainees and their trainers and 2 on-line educational modules – aim to reduce inappropriate antibiotic use for non-pneumonia respiratory tract infections. Prescribing vignettes pre taking part and then 12 weeks post intervention	'Statistically significant reduction in antibiotic prescribing for sore throat vignette, the otitis media vignette, and two of the three acute bronchitis vignettes' and 'significant reductions in the supervisors' antibiotic prescribing intentions for the same four vignettes'.	Self-selected, no control group. 'Intention to prescribe' rather than actual practice. NB training did include comm skills for consultations and also specific training skills for trainers.
7b	2017	Deckx *et al.*[45] Peer reviewed journal article (Family Practice)	Focus on early-career GPs: qualitative evaluation of a multi-faceted educational intervention to improve antibiotic prescribing	GP trainers and trainees in Australia	Qualitative evaluation of Magin *et al.* 7 GP trainees and 7 GP trainers who had taken part in Magin *et al.*	Intervention had been well received with trainees saying they had adopted practices from the intervention with good effect	Small, self-selected sample of self-selected study group. No actual practice change recorded

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
8	2019	Soran C *et al.*[42] Conference abstract	A clinical learning experience for residents in the management of chronic pain and opioids	14 primary care residents rotating through experience in a multi-disciplinary academic primary care clinic	Confidence levels with opioid prescribing after attending a specialist clinic	Increased self-reported confidence in all areas of opioid prescribing	Self-reported confidence levels immediately after attending one specialist clinic No follow up after this time No reports of actual practice change No control group
9	2023	Ofei-Dodoo *et al.*[43] Peer reviewed journal article (Family Medicine)	Improving first-year family medicine residents' confidence in safe opioid prescribing through a multi-activity educational programme	USA first year Family Practice residents	72 first year residents 3 months 'chronic pain management' intervention – lectures, OSCE, post-OSCE debriefing – 4 cohorts of 18 residents over a 4-year period.	Participant responses immediately after and 6 moths post intervention – significant improvement in comfort, knowledge and concern in prescribing opioid for chronic non cancer pain	No control group, no measure of practice or reported practice change, no baseline assessment of prior knowledge or comfort with prescribing before undergoing the intervention.

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
10	2022	Aquino L *et al.*[46] Peer reviewed journal article (Family Medicine)	Evaluation of a residency peer-to-peer intervention in opioid prescribing	Residency programme in USA	32 residents attended between 1 to 3 structured discussion sessions regarding opioid prescribing over the 3-year period of their residency programme. Session attended by physician, pharmacist, pharmacy students and 1-2 residents.	Over the course of the residency programme, varying proportions of recommendations for management change had been followed through, but there was a slight reduction in MME dosage. 7 out of the 32 residents took part in qualitative interviews- 'attuned them to safer prescribing practices' also benefitted specifically from recommendations made by pharmacists in the session.	No control group (so would slight changes in practice have happened anyway) Only 7 out of the 32 took part in interviews

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
11	2021	Westerhof *et al.*[47] Conference abstract	Outcomes of an ambulatory care pharmacist-led antimicrobial stewardship program within a family medicine resident clinic	One family medicine residency clinic (Michigan, USA) – 30 family medicine residents	Baseline prescribing practices over a 6-month period before the intervention. Pharmacist and ID specialist physician provided an educational session to residents giving results of baseline survey and review of prescribing guidelines and 'the importance of not prescribing antibiotics for viral infections' – and provided with pocket guide for prescribing For a 6-month period – every other week all prescribers received individualised feedback about their prescribing of all antibiotics – highlighting areas for improvement as well as good practice (e.g. 'utilising watch-and-wait prior to prescribing an antibiotic')	'Significant improvement in guideline concordant antibiotic prescribing'	No control group No follow up after the intervention period to see if antibiotic prescribing rates persisted

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
12	1999	Zwar N *et al.*[48] Peer reviewed journal article (Family Practice)	Influencing antibiotic prescribing in general practice: a trial of prescriber feedback and management guidelines	GP trainees in NSW, Australia	157 GP trainees randomly allocated to educational intervention on antibiotic use (n-=78) or 'intervention on an unrelated topic' (n=79) Intervention 1. Individualised prescriber feedback re URTI and tonsilitis (by email) 2. Individualised prescriber feedback re URTI and tonsilitis (by email) 3 months later 3. Intervention group members who were prescribing higher than expected rates of antibiotics – practice visit or telephone call 'educational visit' by senior GP trainees	Practice activity surveys x3: 6 months apart (focusing on antibiotic use for tonsilitis and URTI) Significant reduction in antibiotic prescribing rate for URTI (19.7 per 100 diagnoses v 31.7 per 100 diagnoses- p=0.002) Significantly more appropriate prescribing (to guideline) for tonsilitis (73.0 per 100 consultation v 58.5 per 100 consultations p.0.05)	Self-selected cohort

Ref. No.	Year	Authors/ publication type	Title	Setting	Description	Outcome	Quality notes
13	1994	Shaughnessy AF & D'Amico[49] Peer reviewed journal (Family Medicine)	Long-term experience with a programme to improve prescription writing	12 family practice residents	Continuous evaluation and feedback by a clinical pharmacist over a 2-year period	Decrease in error rate 14.4% to 6% (p=0.0002)	No control group
14	2015	Winder MB *et al.*[50] Peer reviewed journal article (Journal of the American Pharmacy Association)	Impact of pharmacist-led educational and error notification interventions on prescribing errors in a family medicine clinic	One Primary care clinic in US	All residents on a programme invited to attend 1. One-hour educational programme on prescription writing – looked at prescribing errors that had been discovered in the review of prescribing that had taken place at baseline – and signposting to good prescribing resources 2. Prescriptions Witten by all residents reviewed by a pharmacist every day to identify errors – fed back on a daily basis to the resident 3. Weekly newsletter sent to all residents with a summary of the common errors that had been picked up that week 4. Post intervention error assessment carried out about a year after the first one	24 residents – mean pre intervention error rate 20.9% - greater than the post intervention 14.9% - significantly less – one year between the 2 measurements	No formalised control group. Small group of participants: self-selected

Appendix Two – Approvals and participant information leaflets

2a. Conformation of funding from NHS Nottingham City PCT

Nottingham City Primary Care Trust

Contract for the development of research grant applications

Project: Utilising NIHR Research Capability Funding to support research grant bid development

Contract Reference: PCT/UoN/06/RCF/12-13

Date of issue: 17th January 2013

Contents

Contract Agreement

Schedule 1 Service Specification

Schedule 2 Contract Delivery Schedule

Schedule 3 Payment Schedule

Contract Agreement for NIHR Research Capability Funding

University of Nottingham – School of Community Health Sciences, Division of Primary Care

This Service Level Agreement is between:

(A) **Nottingham City Primary Care Trust** ('the Authority') whose principal office is Standard Court, Standard Court, Park Row, Nottingham, NG1 6GN

and

(B) **University of Nottingham** whose registered office is at University Park, Nottingham NG7 2RD ('the Contractor').

WHEREAS

The Authority and the Contractor have agreed to be bound by the NHS Conditions of Contract for the Supply of Services September 2010 and the attached Schedules.

Contract Period: **This Contract Agreement is for a period of 12 months from 1st April 2013**

SIGNED for and on behalf of Nottingham City PCT

SCHEDULE 1 – Service Specification

University of Nottingham

The Division of Primary Care, School of Community Health Sciences, University of Nottingham agrees to:

Conduct the following pilot study:

GP Registrars and safety of prescribing in primary care

This includes:

- Medication review, conducted by a PCT/CCG pharmacist, of first 100 prescriptions initiated by 10 GP registrars since starting in practice
- Individual feedback of results to each GP registrar on the medication review via a 1-hour tutorial with the pharmacist
- Individual interviews with GP registrars and their GP trainers
- Descriptive analysis of the anonymised data on the prescribing of the GP registrars
- Developing an NIHR Research for Patient Benefit grant application or NIHR Health Technology Assessment grant application as applicable, following pilot study findings

The work will take place under the supervision of Professor Tony Avery, Professor of Primary Health Care

The pilot study is being undertaken in preparation for a research grant application to one of the NIHR research funding streams.

Conditions of the funding

- To provide an update on progress after 6 months
- To provide a final report at the end of the pilot study
- To submit an NIHR research grant application based on the findings of the pilot study
- To ensure appropriate PCT/CCG involvement/collaboration in the development of the research grant application and to keep the PCT/CCG updated about the outcome of research grant applications.
- To provide financial management of the budget at University of Nottingham and comply with financial reporting requirements as required.

Schedule 2 Contract Delivery Schedule:

To deliver Schedule 1 by 31st March 2014

Schedule 3 Payment Schedule:

The Division of Primary Care at the School of Community Health Sciences will receive the following allocation of NIHR Research Capability Funding: £34, 630 broken down as follows:

£7,000: 200 hours of pharmacist time at £35 per hour

£13,000: 0.4 wte qualitative researcher for 1 year

£6,500: 0.2 wte quantitative researcher for 1 year

£500: Payments to cover the time of GP registrars (£50 x 10)

£500: Payments to cover the time of GP trainers (£50 x 10)

£1,000: Transcription costs (20 transcripts at £50 per transcript)

£830: Travel for pharmacists and researchers (60 journeys at 30 miles per return journey and 46p per mile)

£2,400: Backfill costs for Mindy Bassi, 2 half days a month for 12 months

£2,400: GP locum costs to provide backfill for Dr Nick Silcock, 1 session per month for 12 months

Invoicing details:

Invoice for the full amount of £34,630 by 31st March 2013.

Please include the following postal address on the invoice and ensure the invoice includes an invoice number with Andrew Turner, Public Health, as the named contact:

NHS Nottingham City

5EM Payables 6985

Phoenix House

Topcliffe Lane

Wakefield

West Yorkshire

WF3 1FE

2b NHS REC Provisional approval

NHS
Health Research Authority

NRES Committee East Midlands - Nottingham 1
The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

Telephone: 0115 8839525

16 December 2013

Professor Tony Avery
Professor of Primary Care
University of Nottingham
Division of Primary Care
D1417 University of Nottingham Medical School
Queen's Medical Centre,
Nottingham NG7 2UH

Dear Professor Avery

Study title:	**Retrospective Review of Prescriptions Issued by GPs in Training**
REC reference:	**13/EM/0430**
Protocol number:	**13094**
IRAS project ID:	**127171**

The Research Ethics Committee reviewed the above application at the meeting held on 10 December 2013. Thank you for attending to discuss the application.

We plan to publish your research summary wording for the above study on the NRES website, together with your contact details, unless you expressly withhold permission to do so. Publication will be no earlier than three months from the date of this favourable opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to withhold permission to publish, please contact the REC Manager, Miss Helen Wakefield, at nrescommittee.eastmidlands-nottingham1@nhs.net

Ethical opinion

- The Committee stated this was an interesting study.
- The Committee stated that the titles of the participant information sheet and consent form should match the long title given in the IRAS form.
- The Committee queried whether the Clinical Commissioning Group (CCG) complaints procedure was independent enough. The researchers stated it was the standard complaints route, and although the pharmacist was employed by the CCG, any complaints would go through the formal process and would be independently checked.
- The Committee agreed that this presented no major concerns.

NHS REC letter page 1 of 5

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

NHS Sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

1) The Committee ask that an addition be made to the participant information sheet in the 'What if there is a problem?' section. This should read 'If this achieves no satisfactory outcome you should then contact your local Clinical Commissioning Group (CCG) [address to be inserted] or alternatively you can contact the University of Nottingham complaints office [insert contact details].'

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. The REC will acknowledge receipt and provide a final list of the approved documentation for the study, which can be made available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participi[illegible]ld be sought from the R&D office on the information it required to give permission for this activity".

http://www.rdforum.nhs.uk/

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non clinical trials this is not currently mandatory.

If a sponsor wishes to contest the need for registration they should contact Catherine Blewett (catherineblewett@nhs.net), the HRA does not, however, expect exceptions to be made. Guidance on where to register is provided within IRAS.

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Evidence of Insurance or Indemnity	Insurance Broker"s Letter	31 July 2013
Investigator CV	Professor Anthony Avery	30 June 2013
Letter from Sponsor	Sponsorship Statement - University of Nottm	01 November 2013
Letter of invitation to participant	1.0	31 October 2013
Other: Investigator's CV	Dr Richard Knox	04 November 2013
Other: Evidence of Funding - NIHR		21 December 2012
Other: GP Trainers' Interview Schedule	1.0	31 October 2013
Other: GP Trainers' Interview Schedule (follow-up interview)	1.0	31 October 2013
Other: GP Registrars' Interview Schedule	1.0	31 October 2013
Other: Nottm City Primary Care Trust - Contract for the Development of Research Grant	PCT/UoN/06/RCF/12-13	17 January 2013
Other: GP Registrars' Interview Scheudle (follow-up interview)	1.0	31 October 2013
Other: The "100 Prescriptions" Pilot Project - Details for Pharmacist and Data Collection Forms	1.0	31 October 2013
Participant Consent Form: GPs' Trainers Consent Form	1.0	31 October 2013
Participant Consent Form: GP Registrar's Consent Form	1.0	31 October 2013
Participant Information Sheet: GP Trainers and Registrars	1.0	31 October 2013
Protocol	1.0	24 October 2013
REC application	127171/521898/1/478	10 December 2013

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research

Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

Further information is available at National Research Ethics Service website > After Review

13/EM/0430	Please quote this number on all correspondence

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

With the Committee's best wishes for the success of this project.

Yours sincerely

pp

Mr Robert Johnson
Chair

http://www.hra.nhs.uk/hra-training/

Email: nrescommittee.eastmidlands-nottingham1@nhs.net

Enclosures: *List of names and professions of members who were present at the meeting and those who submitted written comments*
"After ethical review – guidance for researchers"

Copy to: *Mr Paul Cartledge*
Shirley Mitchell, Nottinghamshire Healthcare NHS Trust
NIGB Ethics & Confidentiality Committee Secretariat

NHS REC letter page 4 of 5

NRES Committee East Midlands - Nottingham 1

Attendance at Committee meeting on 10 December 2013

Committee Members:

Name	*Profession*	*Present*
Dr Glenys Caswell	Research Fellow	Yes
Professor Cris Constantinescu	Professor of Clinical Neurology	Yes
Dr Ursula Holdsworth	Retired Staff Grade Community Paediatrician	No
Mr Robert Johnson - Chair	Lay Member	Yes
Reverend Keith Lackenby	Lay member	Yes
Mrs Sarah Lennon	Surgical Registrar GMC registration maintained	No
Mr Jon Merrills	Barrister / Pharmacist	Yes
Mr Robert Oldroyd	Lay member	No
Dr Ian Ross	Consultant Physician	Yes
Mr Ian Thompson	Lay member	Yes
Mrs Shirley E White	Lay member	No

Also in attendance:

Name	*Position (or reason for attending)*
Mr David Carpenter	Ethics Officer
Helen Wakefield	REC Manager

2c. NHS REC Final approval

NHS
Health Research Authority
NRES Committee East Midlands - Nottingham 1
The Old Chapel
Royal Standard Place
Nottingham
NG1 6FS

Telephone: 0115 883 9390

07 January 2014

Professor Tony Avery
Division of Primary Care
D1417 University of Nottingham Medical School
Queen's Medical Centre, Nottingham
NG7 2UH

Dear Professor Avery,

Study title:	**Retrospective Review of Prescriptions Issued by GPs in Training**
REC reference:	**13/EM/0430**
Protocol number:	**13094**
IRAS project ID:	**127171**

Thank you for your letter of 6 January 2014. I can confirm the REC has received the documents listed below and that these comply with the approval conditions detailed in our letter dated 16 December 2013

Documents received

The documents received were as follows:

Document	*Version*	*Date*
Covering Letter		06 January 2014
Interview Schedules/Topic Guides	GP Trainers, V1.1	01 December 2013
Interview Schedules/Topic Guides	GP Trainers (follow-up interview), V1.1	01 December 2013
Interview Schedules/Topic Guides	GP Registrars (follow-up interview), V1.1	01 December 2013
Interview Schedules/Topic Guides	GP Registrars, V1.1	01 December 2013
Other: GP Registrars invitation letter	1.1	01 December 2013
Participant Consent Form: GP Trainers	1.2	01 December 2013
Participant Consent Form: GP Registrars	1.1	01 December 2013
Participant Information Sheet: GP Trainers and Registrars	1.1	01 December 2013

NHS REC letter page 1 of 2

Approved documents

The final list of approved documentation for the study is therefore as follows:

Document	Version	Date
Covering Letter		06 January 2014
Evidence of Insurance or Indemnity	Insurance Broker's Letter	31 July 2013
Interview Schedules/Topic Guides	GP Trainers, V1.1	01 December 2013
Interview Schedules/Topic Guides	GP Trainers (follow-up interview), V1.1	01 December 2013
Interview Schedules/Topic Guides	GP Registrars (follow-up interview), V1.1	01 December 2013
Interview Schedules/Topic Guides	GP Registrars, V1.1	01 December 2013
Investigator CV	Professor Anthony Avery	30 June 2013
Letter from Sponsor	Sponsorship Statement - University of Nottm	01 November 2013
Other: Investigator's CV	Dr Richard Knox	04 November 2013
Other: Evidence of Funding - NIHR		21 December 2012
Other: Nottm City Primary Care Trust - Contract for the Development of Research Grant	PCT/UoN/06/RCF/12-13	17 January 2013
Other: The "100 Prescriptions" Pilot Project - Details for Pharmacist and Data Collection Forms	1.0	31 October 2013
Other: GP Registrars invitation letter	1.1	01 December 2013
Participant Consent Form: GP Trainers	1.2	01 December 2013
Participant Consent Form: GP Registrars	1.1	01 December 2013
Participant Information Sheet: GP Trainers and Registrars	1.1	01 December 2013
Protocol	1.0	24 October 2013
REC application	127171/521898/1/478	10 December 2013

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

13/EM/0430	Please quote this number on all correspondence

Yours sincerely,



Rebecca Morledge
REC Assistant

E-mail: NRESCommittee.EastMidlands-Nottingham1@nhs.net

Copy to: *Mr Paul Cartledge,*
Shirley Mitchell, Nottinghamshire Healthcare NHS Trust
Kate Marsden

NHS REC letter page 2 of 2

2d. CAG provisional approval letter

NHS
Health Research Authority
Confidentiality Advisory Group

Professor Tony Avery
Division of Primary Care
Room D1417
University of Nottingham Medical School
Queen's Medical Centre
Nottingham
NG7 2UH
tony.avery@nottingham.ac.uk
richard.knox@nottingham.ac.uk

Skipton House
80 London Road
London
SE1 6LH

Tel: 020 797 22557
Email: HRA.CAG@nhs.net

6 December 2013

Dear Professor Avery

Study title: **The 100 Prescriptions study**
CAG reference: **CAG 9-03(PR2)/2013**
Protocol number: **1**
IRAS Project ID: **127171/517606/4/627**

Thank you for your research application, submitted for approval under Regulation 5 of the Health Service (Control of Patient Information) Regulations 2002 to process patient identifiable information without consent. Approved applications enable the data controller to provide specified information to the applicant for the purposes of the relevant activity, without being in breach of the common law duty of confidentiality, although other relevant legislative provisions will still be applicable.

The role of the Confidentiality Advisory Group (CAG) is to review applications submitted under these Regulations and to provide advice to the Health Research Authority on whether an application should be approved, and if so, any relevant conditions. This application was considered via the proportionate review process under criteria 3 - *Where applicants are accessing data on-site to extract anonymised or effectively pseudonymised data.*

Health Research Authority approval decision

The Health Research Authority, having considered the advice from the Confidentiality Advisory Group as set out below, has determined the following:

1. The application is provisionally approved, subject to compliance with the standard and specific conditions of approval.

Context

Purpose of application

This research application from the University of Nottingham set out the purpose of a research study to assess error rates in prescribing by GP registrars, following on from similar work on behalf of the General Medical Council. A recommendation for class 1, 5 and 6 support was requested to cover access by a CCG-employed pharmacist to notes of 1,000 GP patients in the East Midlands, in order to assess the appropriateness of the most recent 100 prescriptions issued by each of 10 GP registrars recruited to the study.

CAG approval letter page 1 of 5

Confidential patient information requested

Access was requested patient records on GP practice sites in order to extract anonymised data.

Confidentiality Advisory Group advice

Public interest

Members agreed that there was a valid public interest in assessing the quality and safety of prescribing and identifying and rectifying any particular shortfalls by GP registrars.

Practicable alternatives

Members considered whether a practicable alternative to the disclosure of patient identifiable data without consent existed, taking into account the cost and technology available in line with Section 251 (4) of the NHS Act 2006.

- Feasibility of consent

Members noted the assertions that seeking consent would not be practicable due to the potential effect that incomplete ascertainment could have on the validity of the study findings.

- Use of anonymised/pseudonymised data

It was noted that access to identifiable data would be time limited and anonymised data only would be extracted for analysis purposes.

Fair processing

It is a requirement of the Regulations that an application cannot be inconsistent with the principles of the Data Protection Act 1998 (DPA). The first principle of the DPA requires that reasonable efforts are made to inform data subjects of the use of their data. In line with this, Members emphasised that appropriate attempts should be made to raise awareness of this study, for example provision of an information poster and leaflet which could be displayed and distributed in participating GP practices. Any patient information should include details of how a patient could register an objection with the GP practice and ensure that their records were not accessed.

CAG advice conclusion

In line with the considerations above, the CAG agreed that the minimum criteria under the Regulations appeared to have been met, and therefore advised recommending *provisional* support to the Health Research Authority, subject to compliance with the specific and standard conditions of support as set out below.

Specific conditions of support

1. Favourable opinion from Research Ethics Committee
2. Confirmation of suitable security arrangements via IG Toolkit submission. Please note that as access is taking place on NHS sites it has been confirmed by the security review team that you should provide IG toolkit references for those sites along with confirmation from the Caldicott Guardian that your research is being undertaken in line with their IG toolkit return prior to accessing data at each site. This information will then be reviewed by the security review team who will confirm if this is satisfactory for the purposes of your application.

3. Provision of patient information materials and confirmation that these will be distributed at a local level.

Further actions

Please provide further information in line with the conditions of approval. Once provided, the response will be reviewed and if satisfactory, the HRA will confirm final approval. Support only comes into effect once this final approval letter has been received.

Please do not hesitate to contact me if you have any queries following this letter. I would be grateful if you could quote the above reference number in all future correspondence.

Reviewed documents

The documents reviewed by Members were:

Document	*Version*	*Date*
IRAS application form		
Protocol	1	24/10/2013
GP Trainer Consent Form	1	02/10/2013
GP Registrar Consent Form	1.0	October 2013
GP Trainers & Registrars Information Sheet	1	October 2013
GP Registrar invitation letter	1	October 2013
Pharmacist data collection forms and guidance notes		

Membership of the Committee

The members of the Confidentiality Advisory Group who considered this item are listed below.

There were no declarations of interest in relation to this item.

With the Group's best wishes for the success of this project.

Yours sincerely

Claire Edgeworth
Deputy Confidentiality Advice Manager

Email: HRA.CAG@nhs.net

Enclosures: *List of members who considered application*

Standard conditions of approval

Confidentiality Advisory Group
Sub-committee

Group members

Name	Capacity
Dr Mark Taylor (Chair)	Lay
Professor Jennifer Kurinczuk	
Mr Terence Wiseman	Lay

NHS
Health Research Authority
Confidentiality Advisory Group

Standard conditions of approval

The approval provided by the Health Research Authority is subject to the following standard conditions.

The applicant will ensure that:

1. The specified patient identifiable information is only used for the purpose(s) set out in the application.
2. Confidentiality is preserved and there are no disclosures of information in aggregate or patient level form that may inferentially identify a person, nor will any attempt be made to identify individuals, households or organisations in the data.
3. Requirements of the Statistics and Registration Services Act 2007 are adhered to regarding publication when relevant.
4. All staff with access to patient identifiable information have contractual obligations of confidentiality, enforceable through disciplinary procedures.
5. All staff with access to patient identifiable information have received appropriate ongoing training to ensure they are aware of their responsibilities.
6. Activities are consistent with the Data Protection Act 1998.
7. Audit of data processing by a designated agent is facilitated and supported.
8. The wishes of patients who have withheld or withdrawn their consent are respected.
9. The Confidentiality Advice Team is notified of any significant changes (purpose, data flows, data items, security arrangements) prior to the change occurring.
10. An annual report is provided no later than 12 months from the date of your final confirmation letter.
11. Any breaches of confidentiality / security around this particular flow of data should be reported to CAG within 10 working days, along with remedial actions taken / to be taken.

NHS
Health Research Authority
Confidentiality Advisory Group

Professor Tony Avery
Division of Primary Care
Room D1417
University of Nottingham Medical School
Queen's Medical Centre
Nottingham
NG7 2UH
tony.avery@nottingham.ac.uk
richard.knox@nottingham.ac.uk

Skipton House
80 London Road
London
SE1 6LH

Tel: 020 797 22557
Email: HRA.CAG@nhs.net

29 August 2014

Dear Professor Avery

Study title: **The 100 Prescriptions study**
CAG reference: **CAG 9-03(PR2)/2013**
Protocol number: **1**
IRAS Project ID: **127171/517606/4/627**

Thank you for your research application, submitted for approval under Regulation 5 of the Health Service (Control of Patient Information) Regulations 2002 to process patient identifiable information without consent. Approved applications enable the data controller to provide specified information to the applicant for the purposes of the relevant activity, without being in breach of the common law duty of confidentiality, although other relevant legislative provisions will still be applicable.

The role of the Confidentiality Advisory Group (CAG) is to review applications submitted under these Regulations and to provide advice to the Health Research Authority on whether an application should be approved, and if so, any relevant conditions. This application was considered via the proportionate review process under criteria 3 - *Where applicants are accessing data on-site to extract anonymised or effectively pseudonymised data.*

Health Research Authority approval decision

The Health Research Authority, having considered the advice from the Confidentiality Advisory Group as set out below, has determined the following:

1. The application is approved, subject to compliance with the standard and specific conditions of approval.

Context

Purpose of application

This research application from the University of Nottingham set out the purpose of a research study to assess error rates in prescribing by GP registrars, following on from similar work on behalf of the General Medical Council. A recommendation for class 1, 5 and 6 support was requested to cover access by a CCG-employed pharmacist to notes of 1,000 GP patients in the East Midlands, in order to assess the appropriateness of the most recent 100 prescriptions issued by each of 10 GP registrars recruited to the study.

Confidential patient information requested

Access was requested patient records on GP practice sites in order to extract anonymised data.

Confidentiality Advisory Group advice

Public interest

Members agreed that there was a valid public interest in assessing the quality and safety of prescribing and identifying and rectifying any particular shortfalls by GP registrars.

Practicable alternatives

Members considered whether a practicable alternative to the disclosure of patient identifiable data without consent existed, taking into account the cost and technology available in line with Section 251 (4) of the NHS Act 2006.

- Feasibility of consent

Members noted the assertions that seeking consent would not be practicable due to the potential effect that incomplete ascertainment could have on the validity of the study findings.

- Use of anonymised/pseudonymised data

It was noted that access to identifiable data would be time limited and anonymised data only would be extracted for analysis purposes.

Fair processing

It is a requirement of the Regulations that an application cannot be inconsistent with the principles of the Data Protection Act 1998 (DPA). The first principle of the DPA requires that reasonable efforts are made to inform data subjects of the use of their data. In line with this, Members emphasised that appropriate attempts should be made to raise awareness of this study, for example provision of an information poster and leaflet which could be displayed and distributed in participating GP practices. Any patient information should include details of how a patient could register an objection with the GP practice and ensure that their records were not accessed.

CAG advice conclusion

In line with the considerations above, the CAG agreed that the minimum criteria under the Regulations appeared to have been met, and therefore advised recommending *provisional* support to the Health Research Authority, subject to compliance with the specific and standard conditions of support as set out below.

Specific conditions of support

1. Favourable opinion from Research Ethics Committee. **Confirmed.**
2. Confirmation of suitable security arrangements via IG Toolkit submission. **Confirmed 18/08/2014.**
3. Provision of patient information materials and confirmation that these will be distributed at a local level. **Confirmed**

As the above conditions have been accepted and/or met, this letter provides confirmation of final approval. I will arrange for the register of approved applications on the HRA website to be updated with this information.

Annual review

Please note that your approval is subject to submission of an annual review report to show how you have met the conditions or report plans, and action towards meeting them. It is also your responsibility to submit this report on the anniversary of your final approval and to report any changes such as to the purpose or design of the proposed activity, or to security and confidentiality arrangements. An annual review should be provided no later than 31 July 2015 and preferably 4 weeks before this date.

Please do not hesitate to contact me if you have any queries following this letter. I would be grateful if you could quote the above reference number in all future correspondence.

Reviewed documents

The documents reviewed by Members were:

Document	*Version*	*Date*
IRAS application form		
Protocol	1	24/10/2013
GP Trainer Consent Form	1	02/10/2013
GP Registrar Consent Form	1.0	October 2013
GP Trainers & Registrars Information Sheet	1	October 2013
GP Registrar invitation letter	1	October 2013
Pharmacist data collection forms and guidance notes		

Membership of the Committee

The members of the Confidentiality Advisory Group who considered this item are listed below.

There were *no* declarations of interest in relation to this item.

Feedback

You are invited to give your view of the service provided by the Confidentiality Advice Team and the application procedure in general by completion of this survey http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/. We would be grateful if you could take some time to provide your feedback.

Yours sincerely

Claire Edgeworth
Deputy Confidentiality Advice Manager

Email: HRA.CAG@nhs.net

Enclosures: *List of members who considered application*

Standard conditions of approval

Confidentiality Advisory Group
Sub-committee

Group members

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NHS
Health Research Authority
Confidentiality Advisory Group

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5. All staff with access to patient identifiable information have received appropriate ongoing training to ensure they are aware of their responsibilities.
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10. An annual report is provided no later than 12 months from the date of your final confirmation letter.
11. Any breaches of confidentiality / security around this particular flow of data should be reported to CAG within 10 working days, along with remedial actions taken / to be taken.

2f. Statement of support from Sponsor

Our reference:
RGS 13094
NRES REC reference:
13/EM/0430

0115 9515679
sponsor@nottingham.ac.uk

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

Research and Graduate Services
University of Nottingham
King's Meadow Campus
Lenton Lane Nottingham
NG7 2NR

Confidentiality Advisory Group (CAG)

Professor Tony Avery, Chief Investigator
Professor of Primary Health Care,
Faculty of Medicine & Health Sciences
Room D1415
Division of Primary Care
University of Nottingham Medical School
Nottingham
NG7 2UH

09 April 2014

Dear Sir or Madam,

Sponsorship Statement
Re: Retrospective Review of Prescriptions issued by GPs in Training (REVISiT 100)

I can confirm that this research proposal has been discussed with the Chief Investigator and agreement to sponsor the research is in place.

The University of Nottingham is in the process of completing the IG Toolkit.

The research proposal will be conducted in accordance with Caldicott principles and the Data Protection Act.

I can confirm that prior to the research commencing in any NHS organisation, the local Caldicott Guardian will be made aware of this research proposal and approval for the study to be conducted will be sought as part of the NHS R&D approval process.

Should you have any queries please do not hesitate to contact me

Yours faithfully

Angela Shone
Head of Research Governance
University of Nottingham

world-changing research

2g. NHS REC Declaration of the end of the study

NHS
Health Research Authority

DECLARATION OF THE END OF A STUDY
(For all studies except clinical trials of investigational medicinal products)

To be completed in typescript by the Chief Investigator and submitted to the Research Ethics Committee that gave a favourable opinion of the research ("the main REC") within 90 days of the conclusion of the study or within 15 days of early termination. For questions with Yes/No options please indicate answer in bold type.

1. Details of Chief Investigator

Name:	Professor Anthony Avery
Address:	The Dean's Office School of Medicine University of Nottingham Queens Medical Centre Nottingham NG7 2UH
Telephone:	0115 823 0209
Email:	Anthony.avery@nottingham.ac.uk
Fax:	

2. Details of study

Full title of study:	A Retrospective Review of Prescriptions Issued by GPs in Training
Research sponsor:	Nottingham
Name of main REC:	East Midlands – Nottingham1
Main REC reference number:	13/EM/0430

3. Study duration

Date study commenced:	24 October 2014
Date study ended:	19 August 2015
Did this study terminate prematurely?	/ **No** *If yes please complete sections 4, 5 & 6, if no please go direct to section 7.*

NHS REC Declaration of end of study page 1 of 4

4. Circumstances of early termination

What is the justification for this early termination?	n/a

5. Temporary halt

Is this a temporary halt to the study?	***/ No***
If yes, what is the justification for temporarily halting the study? When do you expect the study to re-start?	*e.g. Safety, difficulties recruiting participants, trial has not commenced, other reasons.*

6. Potential implications for research participants

Are there any potential implications for research participants as a result of terminating/halting the study prematurely? Please describe the steps taken to address them.	n/a

7. Final report on the research

Is a summary of the final report on the research enclosed with this form?	***Yes*** *If no, please forward within 12 months of the end of the study.*

8. Declaration

Signature of Chief Investigator:	A J Avery
Print name:	Anthony Avery
Date of submission:	29/09/2015

FINAL REPORT FOR NRES
EAST MIDLANDS – NOTTINGHAM1
A RETROSPECTIVE REVIEW OF PRESCRIPTIONS ISSUED BY GPS IN TRAINING (REF:13/EM/0430)

INTRODUCTION

Since completing the largest and most comprehensive study to date on the prevalence, nature and causes of prescribing errors in general practices we identified several promising potential interventions to reduce errors. One of these was to conduct a pharmacist led review of the prescribing of GP registrars and to give individual feedback so that registrars can learn from, and address, any problems identified.

AIMS AND OBJECTIVES

The purpose of this project is to identify whether a pharmacist–led review of a series of prescriptions issued by GP Registrars at or near their final year of training will be an effective method to improve safer prescribing with GPs.

The Primary objective of the project is to assess the feasibility and value of undertaking a clinical pharmacist-led review of the first 100 prescriptions initiated by GP registrars during their final year of training.

The secondary objectives of the proposed pilot study are to:

- Describe the prevalence of prescribing errors and suboptimal prescribing in the cohort of GP registrars during their final year of training
- Identify gaps in knowledge, skills and attitudes with respect to safe prescribing in newly appointed GP registrars
- Explore the views of GP registrars on the usefulness of having a pharmacist led review, followed by a tutorial, based on issues identified from their first 100 prescriptions
- Explore the views of the GP trainers of registrars on the usefulness of the exercise
- Provide sufficient information to allow for a successful bid to evaluate a larger scale intervention study
- Provide information on the learning needs of GP registrars that can be fed into the development of e-learning materials (and other sources of educational assistance)

METHODS

To recruit 10 GP registrars, their GP trainers, and to undertake a review of 100 prescriptions for each registrar by a clinical pharmacist

SUMMARY OF THE PROJECT

Initially we

- Set up a project management group with monthly meetings
- Developed data collection tools to assist with transcription of prescribing data by the NHS pharmacist conducting the review of practice
- Identified potential study sites gained preliminary expressions of interest from GP Registrars

We experienced delays in the pre-implementation phase of the project due to the complicated nature of receiving appropriate ethical approval. This was due to the national information governance review and the change in the structure of NHS England and the role of the NHS pharmacist who will be conducting the review. We examined several options to take this work forward and finally decided on submitting our project to the Confidentiality Advisory Group (CAG)

to review our application with the hope of supporting our study to allow our pharmacist access to patient information.

We achieved approval for the research project from the local NHS Research Ethics Committee in January 2014, and approval in principle from the Confidentiality Advisory Group (CAG) at this time also. The CAG stipulated that all practices taking part in the study should have level 3 IG toolkit status (when the normal level for a general practice would be level 2). However, the University as research sponsor subsequently gained level 3 status, the CAG was satisfied that practices taking part in the study need only have the standard level 2 status.

Clarification of the CAG stipulations, and the university obtaining level 3 status unfortunately caused further delays to the commencement of data collection. However, should similar projects need to be completed in the future, the experience gained will be invaluable.

We were, therefore, only able to commence data collection in the first practice in October 2014.

We completed data collection on 19th August 2015. We recruited the agreed 10 GP Registrars and their GP Trainers. Our Clinical Pharmacist undertook reviews at all 10 practices. This data has been collated, and then entered into a database where it has been cleaned and checked for data entry errors. Individual reports have been produced and given to each of the GP Registrars and their Trainers when one of our project clinicians visited each practice to discuss the findings of the audit. The whole dataset is currently being analysed using our data analysis protocol.

Shortly after each clinician feedback session, one of our researchers visited the GP Register and the Trainer to interview them individually on their perceptions of the project, the value of the audit report and the usefulness of the feedback session. Each interview was then repeated up to 3 months later to check how effective the audit has been for long term value for both the Registrar and the Trainer. All interviews have now been completed except for one Trainer who refused to be part of the interview process. These interviews were audio-recorded with consent, and have been professionally transcribed, checked for errors and uploaded onto Nvivo10. We are currently analysing this data.

We expect to produce a report when both the qualitative and quantitative data has been completed.

2h. CAG Declaration of end of study

NHS
Health Research Authority

Research/Non-Research Notification of Closure Form
OR Notification s251 Support is No Longer Required

Please complete this template to submit a notification of project closure to an approved application or notification that s251 Support is no longer required for this application. The completed template will be reviewed by the Confidentiality Advice Team (CAT) who will then confirm the appropriate action. Supporting documentation can be used in conjunction with this form.

Please note that once the notification has been validated and acknowledged by the CAT, s251 support will not be in effect and therefore, further processing of confidential patient information without support would be deemed as unlawful.

PIAG/ECC/CAG Reference Number: CAG 9-03(PR2)/2013
Application Title: Retrospective Review of Prescriptions Issued by GPs in Training
Closure Date: 27 July 2015

Applicant Name: Richard Knox

Address:

Email: Richard.Knox@nottingham.ac.uk

Notification of the following:

- Notification of Project Closure
- Notification s251 Support is no Longer Required

Please would you confirm if currently or plan to retain Confidential Patient Information (please note you will still require s251 support if you plan to continue to retain patient identifiable data):

We do not have nor plan to have or retain any patient identifiable information

Please would you confirm if you have destroyed the confidential patient information utilised for your project?

Our clinical pharmacist audited the patients notes and left any identifiable information within the GP Practice. No patient identifiable information was taken from any practice nor did any other member of the project see any patient identifiable information.

CAG Declaration of study end page 1 of 2

NHS
Health Research Authority

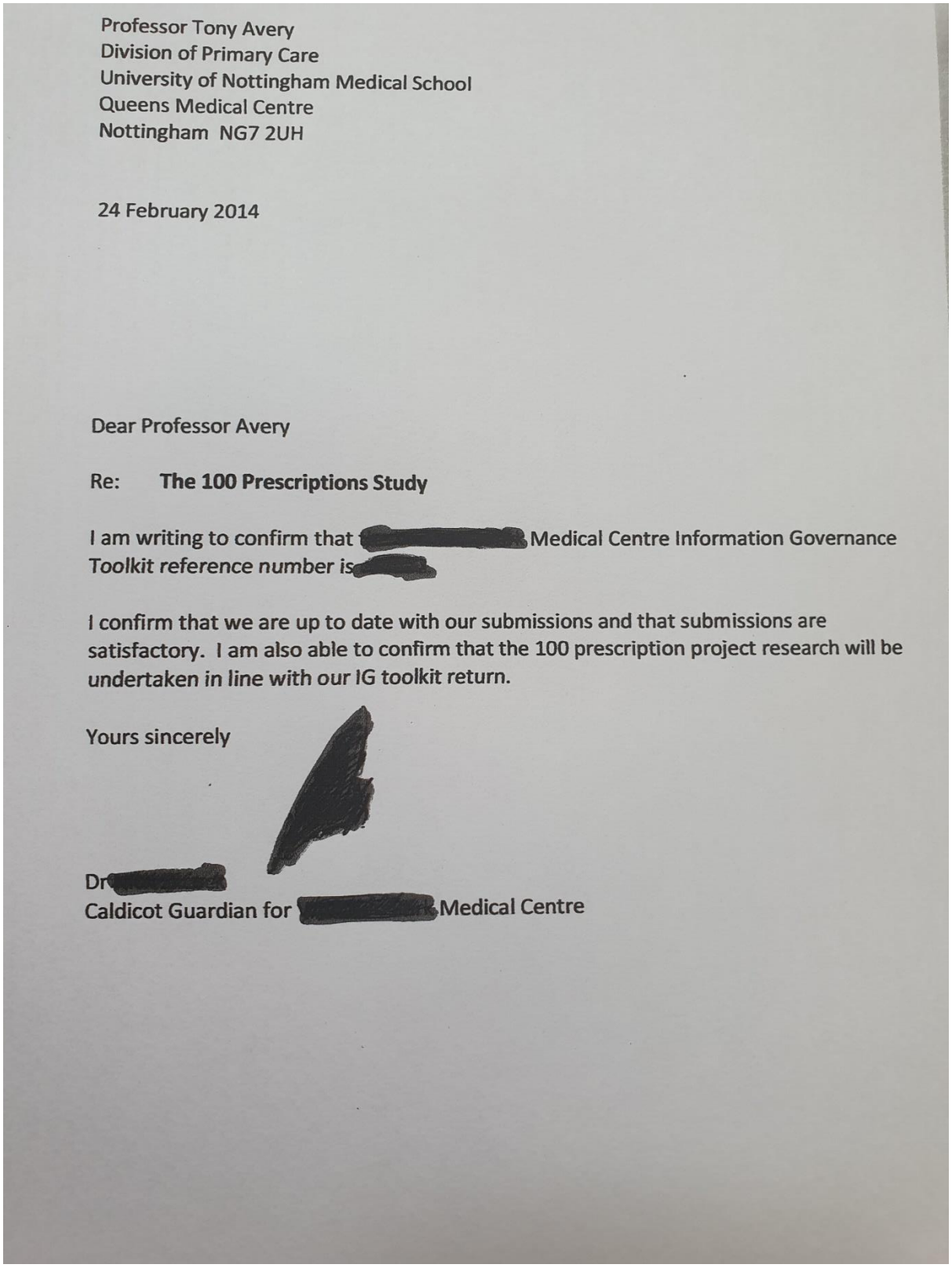
Information Guardian/Chief Investigator Name: Professor Anthony Avery

Signed: A J Avery

Date:

This form should be submitted, in conjunction with any relevant supporting documentation, to HRA.CAG@nhs.net. If you require any assistance in completing this form you are advised to contact the Confidentiality Advice Team on HRA.CAG@nhs.net or on 020 797 22557.

2i. Example letter from Caldicott Guardian of GP practice (redacted)



Professor Tony Avery
Division of Primary Care
University of Nottingham Medical School
Queens Medical Centre
Nottingham NG7 2UH

24 February 2014

Dear Professor Avery

Re: **The 100 Prescriptions Study**

I am writing to confirm that [redacted] Medical Centre Information Governance *Toolkit reference number is* [redacted]

I confirm that we are up to date with our submissions and that submissions are satisfactory. I am also able to confirm that the 100 prescription project research will be undertaken in line with our IG toolkit return.

Yours sincerely

[redacted]

Dr [redacted]
Caldicot Guardian for [redacted] Medical Centre

2j. Patient information poster displayed at participating practices



Working together to improve prescribing

Did you know that more than one billion prescriptions were issued by GPs in England last year?

It is important to ensure that prescribing is as safe as possible, and pharmacists work in partnership with GPs to help with this.

An NHS pharmacist is currently working in this practice to review the prescribing of one of the GP registrars. The pharmacist will then give feedback on any ways in which their prescribing could be improved.

If you would like any more information about this, or if you have any concerns about an NHS pharmacist looking at your records for this purpose, please ask for more information at the reception desk where an information leaflet is available.

2k. Patient information leaflet

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

Working together to improve prescribing

Project title:

The 100 prescriptions study –
Retrospective review of prescriptions issued by GP Registrars

What is a GP registrar?
A GP registrar is a fully qualified doctor who has decided to become a GP. He or she will have had several years of experience of working in a hospital, but they now need to receive additional training about working as a GP. They receive this training while working in a 'training practice' (your GP surgery). They are supervised by a GP who has good clinical experience and expertise in training (a 'GP trainer').

Why are you reviewing the prescribing of one of the GP registrars in this practice?
The GP registrar has volunteered to have the review of their prescribing. They will receive detailed feedback which will help their training, and will also help to enhance patient safety.

Don't NHS pharmacists look at patient records anyway?
Yes – practice pharmacists routinely review patient records to help to quality assure the prescribing system, and the pharmacist who will be reviewing patient records is employed by one of the local groups of practices to do this. However, this is the first time that a group of GP registrars have had a series (100) of their prescriptions reviewed by a pharmacist such an organised way.

This is a research project – does that mean that my patient records are going to go to the University of Nottingham?
No – the pharmacist will review the prescriptions issued by the GP registrar and prepare a report on where they have done well and what improvements can be made. This report will also be shown to their trainer (the GP in the practice who is in charge of their training) to ensure that appropriate action is taken. Any information that could identify you as a patient will remain in the GP surgery. A

summary of the findings from the pharmacist's reports will be made available to the research team at the University of Nottingham, but this will not contain any information that could be used to identify individual patients.

What if I don't want the pharmacist to look at my records?
If you would prefer your patient records not to be a part of this project, simply complete the tear-off strip at the bottom of this page and return it to reception. The reception staff will give this slip of paper to the practice manager (or another suitable person in the practice) who will make sure that your records are not viewed by the pharmacist. This will obviously not affect your care at the surgery: NHS pharmacists will still look at your records as part of their routine job in your healthcare team, but they will not look at your records for the purposes of this project.

Where can I find out more about the study?
This project has been organised by the Prescribing and Patient Safety research team at the University of Nottingham. This team is led by Professor Tony Avery, Professor of Primary Care. He can be contacted by emailing tony.avery@nottingham.ac.uk or telephoning 0115 823 0209 or writing to Professor Tony Avery, Room D1417, Division of Primary Care, Nottingham University Medical School, Queens Medical Centre, Nottingham, NG7 2UH. The study has been approved by the East Midlands NHS research ethics committee and the Confidentiality Advisory Group of the NHS Health Research Authority.

Please tear off this strip of paper and hand it in to reception:
FAO Practice Manager; ***Retrospective review of prescriptions issued by GP Registrars***

Name_____

Date of Birth_____

I would not like my GP records to be a part of this study.

Signed_____

Date_____

2l. Participant information leaflet: GP trainees and GP trainers

Information Sheet

Retrospective Review of Prescriptions Issued by GPs in Training

V1.1 December 2013

Name of Researcher: **Professor Tony Avery.**

We would like to invite you to take part in our research study. Before you decide we would like you to understand why the research is being done and what it would involve for you. One of our team will go through the information sheet with you and answer any questions you have. Talk to others about the study if you wish. Ask us if there is anything that is not clear.

What is the purpose of the study?

Errors happen everywhere in health care. Accidentally being subjected to an error in general practice can result in serious harm and possibly death. It is also a cause of emotional distress both for the patients and doctors involved. Avoiding errors, or identifying and correcting them, is a high priority for the NHS.

Our GMC funded study involved a detailed retrospective review of 6,048 prescription items from a random sample of 1,777 patients from 15 general practices in England (including five from Nottingham/Nottinghamshire). The study showed that over a 12-month period around one in eight patients were subject to a prescribing or monitoring error, and that the risk of error was higher in children, older people, men and those receiving multiple medications. Errors were more common in drugs requiring blood test monitoring and for certain categories of drugs such as nonsteroidal anti-inflammatory drugs and immunosuppressants. The most common types of error involved lack of essential information on the prescription (e.g. 'as directed' instructions for oral corticosteroids), dose/strength errors, timing errors and failure to request a blood test monitoring.

As part of the study we interviewed over 30 prescribers to explore the underlying causes of errors and we conducted six focus groups to identify strategies that practices use to prevent errors. One of the problems identified by the study was a lack of attention given to prescribing in GP training. This resulted in knowledge being picked up in a rather ad hoc way, and newly qualified GPs feeling particularly ill-equipped when dealing with complex patients with long term conditions.

A pilot study was undertaken analysing prescriptions issued by two GP registrars in order to identify prescribing errors. For each registrar over 20 issues were identified from 100

prescriptions. These issues were discussed at a subsequent tutorial, and informal feedback from the registrars suggests that the exercise has helped them to identify and address a number of learning needs with respect to knowledge, skills and attitudes for safer and effective prescribing.

We are now looking to extend this study by recruiting 10 GP Registrars to undertake a clinical pharmacist-led review of 100 of their prescriptions. We also wish to recruit the GP Trainers who have responsibility for the Registrars who are taking part in the study.

Why have I been invited?

You are invited to take part in this research as you are either a GP Registrar at or near the final year of your GP training and practicing in a GP Practice in the East Midlands or you are a GP Trainer and one of your GP Registrars is willing to participate in this study and we need both of you to agree to participate in this study.

Do I have to take part?

It is up to you to decide whether or not to take part. If you do decide to take part you will be given this information sheet to keep and be asked to sign a consent form. If you decide to take part you are still free to withdraw at any time and without giving a reason. This would not affect your legal rights.

If either of you decide not to take part then the other will not be able to participate in the study.

What will happen to me if I take part?

By agreeing to take part in this study this will have meant that one of your GP Registrars has also agreed to take part in the study. A pharmacist will analyse, retrospectively, one hundred prescriptions that the GP Registrar has issued. These prescriptions will be identified by looking at the records of patients seen by the GP Registrar within their current practice.

Following the analysis, the GP Registrar will be asked to attend a one-hour tutorial with the pharmacist or another clinically qualified member of the research team to discuss any issues identified from the prescribing reviews, and to identify and document learning points. The pharmacist/clinician will record key points arising from the tutorials and will feed these back in an anonymised form to the research team. As the GP Trainer supervising the registrar you will also be given access to the issues identified from the medication review and be invited to take part in the tutorial.

A short time afterwards, you will be invited to attend an audio-recorded interview with one of our researchers where your views on the usefulness of the medication review and tutorial will be explored. The interviewer will also explore the extent to which you and the registrar may have addressed any learning needs identified from the exercise, and your views on the usefulness of any on-going training and support with respect to prescribing. There will be one final follow-up interview (which can be face-to-face or via the telephone) at about 3 months after the initial tutorial: this will allow you to comment on any longer-term

perceived practice change that has occurred following the pharmacist-led review of prescriptions, or any other effect of the intervention (both positive and negative).

Expenses and payments

Each participant will be offered a £50 voucher to participate in the study.

What are the possible disadvantages and risks of taking part?

There are not expected to be any adverse events for research participants. The feedback tutorial is expected to last one hour, the two follow-up interviews are also expected to not last longer than one hour each. Our previous work has suggested that the prescription review process will be useful for both the GP registrar, and the trainer who has a responsibility to quality assure the work of their trainee.

What are the possible benefits of taking part?

We anticipate this study may help identify a number of learning needs with respect to knowledge, skills and attitudes for safer and effective prescribing so that together with the registrar you can identify and plan future training.

GP Trainers have an obligation to quality assure the treatment given to patients by Registrars under their supervision. Trainers will be given full access to the review report compiled by the pharmacist. If a serious medication error is uncovered, both the pharmacist and trainer would have an obligation to ensure that the error is appropriately followed up by the practice's incident reporting system. Any errors uncovered by the pharmacist would be reported in a timely manner to ensure patient safety is the first priority.

What happens when the research study stops?

We plan to submit the findings of this study to the SPCR funding body (report) and to medical journals (papers) for publication. You will not be identified in any report/publication.

What if there is a problem?

If you have a concern about any aspect of this study, you can initially approach the lead investigator, Professor Tony Avery, Division of Primary Care, Nottingham University Medical School, Queens Medical Centre, Nottingham, NG7 2UH. Telephone: 0115 823 0207. Email: tony.avery@nottingham.ac.uk. If this achieves no satisfactory outcome, you should then contact Jonathan Hollands, Research Manager, School of Medicine, University of Nottingham, Queen's Medical Centre, Nottingham NG7 2UH email: jon.hollands@nottingham.ac.uk telephone 0115 823 1500.

Will my taking part in the study be kept confidential?

All information supplied will be kept strictly confidential. Any information reported from the interview will not enable you to be recognised. You will not automatically be expected to take part in any future research. All information, which is collected about you during the course of the research, will be kept on a password protected database and is strictly

confidential. Any information about you which leaves the research unit will have your name and address removed so that you cannot be recognised from it.

Although what you say in the interview is confidential, should you disclose anything to us which we feel puts you or anyone else at any risk, we may feel it necessary to report this to the appropriate persons.

Each GP registrar who participates will be given a unique participation identification number by the reviewer so that the results be will be anonymised as well as the transcript. The GP trainers will also be given a similar participation identification number so that transcripts made from interviews will be anonymised. The basic principles of confidentiality and the Data Protection Act of 1998 will be followed by all members of the research team e.g. no unnecessary personal data will be collected, all data will be kept in a secure physical environment and on password protected computers or filing cabinets, data will be destroyed at an agreed period in keeping with recommended research guidelines. Nothing will be written or discussed outside of the research team that could identify the participants

Only the researcher(s) involved in interviewing and/or conducting focus groups will have access to participants' personal data during the study. All the necessary precautions will be taken to ensure that this information remains secure, with the researcher will reduce the identifiability of the data at the earliest reasonable point (transcription stage). We will follow ethical and legal practice and all information about you will be handled in confidence.

All information which is collected about you during the course of the research will be kept **strictly confidential**, stored in a secure and locked office, and on a password protected database. Any information about you which leaves the University will have your name and address removed (anonymised) and a unique code will be used so that you cannot be recognised from it.

Your personal data (address, telephone number) will be kept for 6 months after the end of the study so that we are able to contact you about the findings of the study and possible follow-up studies (unless you advise us that you do not wish to be contacted). All other data (research data) will be kept securely for 7 years. After this time your data will be disposed of securely. During this time all precautions will be taken by all those involved to maintain your confidentiality, only members of the research team will have access to your personal data.

What will happen if I don't want to carry on with the study?

Your participation is voluntary and you are free to withdraw at any time, without giving any reason, and without your legal rights being affected. If you withdraw then the information collected so far cannot be erased and this information may still be used in the project analysis.

What will happen to the results of the research study?

We plan to submit the findings of this study to the NIHR Research Capability Funding, from Nottingham Clinical Commissioning Group (report) and to medical journals (papers) for

publication in the next few months. You will not be identified in any report/publication. You can be given a copy of the summary report if you would like.

Who is organising and funding the research?

This research is being organised by the University of Nottingham and is part of research funded by the NIHR Research Capability Funding, from Nottingham Clinical Commissioning Group.

Who has reviewed the study?

This study has been reviewed and approved by the University of Nottingham Medical School Ethics Committee.

Further information and contact details

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2m. Participant consent form: GP trainee



University of Nottingham,
Division of Primary Care

GP Registrars Consent Form

Retrospective Review of Prescriptions issued by GPs in Training

v1.1; December 2013

Name of Chief Investigator : **Professor Tony Avery**

REC ref: 13/EM/0430

Name of Participant:

Please initial box

1.	I confirm that I have read and understood the information sheet v1.1 dated December 2013 for the above study and have had the opportunity to ask questions.	☐
2.	I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without my legal rights being affected. I understand that should I withdraw then the information collected so far cannot be erased and that this information may still be used in the project analysis.	☐
3.	I understand that the data collected in the study may be looked at by authorised individuals from the University of Nottingham, the research group and regulatory authorities where it is relevant to my taking part in this study. I give permission for these individuals to have access to these records and to collect, store, analyse and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential.	☐
4.	I understand that the interview will be recorded and that anonymous direct quotes from the interview may be used in the study reports.	☐
5.	I agree to take part in the above study.	☐

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature

2 copies: 1 for participant, 1 for the project notes

Retrospective Review of Prescriptions Issued by GPs in Training
Appendix 5 GP Registrars Consent Form, v1.1 December 2013

2n. Participant consent form: GP trainer

The University of Nottingham

University of Nottingham,
Division of Primary Care

GPs Trainers Consent Form

Retrospective Review of Prescriptions issued by GPs in Training

v1.2 December 2013

Name of Chief Investigator: Professor Tony Avery

REC ref: 13/EM/0430

Name of Participant:

Please initial box

1. I confirm that I have read and understand the information sheet version 1.1 dated December 2013 for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, and without legal rights being affected. I understand that should I withdraw then the information collected so far cannot be erased and that this information may still be used in the project analysis. ☐
3. I understand that data collected in the study may be looked at by authorised individuals from the University of Nottingham, the research group and regulatory authorities where it is relevant to my taking part in this study. I give permission for these individuals to collect, store, analyse and publish information obtained from my participation in this study. I understand that my personal details will be kept confidential. ☐
4. I understand that interviews/focus groups will be recorded and that anonymised direct quotes from interviews/focus groups may be used in the study reports. ☐
5. I understand that no identifiable patient information will be removed from the surgery. ☐
6. I understand that only NHS pharmacists accredited by the local CCG will be undertaking the audit.. ☐
7. I agree to take part in the above study. ☐

Name of GP Trainer	Date	Signature
Name of Researcher	Date	Signature

2 copies: 1 for participant and 1 for the project notes

Retrospective Review of Prescriptions Issued by GPs in Training
GP Trainers Consent Form Version 1.2 December 2013

Appendix Three – condensed case law documentation

Table 45: Summary of REVISiT case law

	1= error, 2= sub-optimal prescribing		
Error code	**Type of error**	**Error description**	**Examples**
1	**Unnecessary drug**		
1.1.1	Error: unnecessary drug.	Prescription of a medication that is not clinically required and the evidence in the documentation is clear.	1) *H. Pylori* eradication treatment to a patient who is *H. Pylori* negative. 2) 2) Terbinafine prescribed for a 2-week history of nail discolouration to right big toe. Treatment started without nail clippings being done as patient keen to treat blindly despite clear local guidance.
1.2.1	Suboptimal : unnecessary drug	Prescription of a past medication for a current indication without current clinical need.	1) 3 *Fostair* inhalers prescribed to a long-term stable asthmatic patient who is currently not taking any preventer and uses salbutamol very rarely. No asthma review undertaken recently. Inhalers prescribed in case of need whilst travelling in India for six months. 2)
2	**Incorrect drug**		

2.1.1	Error : Incorrect drug	Incorrect drug chosen for clearly documented current clinical requirements. Includes all forms of medication.	1) Hydrocortisone butyrate cream selected for use on child's face instead of standard hydrocortisone cream. 2) Gabapentin prescribed for costochondritis without trying any other possible analgesia including NSAIDs. 3) Steroid cream used without justification in a young child. 4) Very potent topical steroid prescribed without clinical reason. 5) *Betnovate* scalp application used in a 2-year-old with cradle cap (not severe or resistant) without time limit.
2.1.2	Error : Incorrect drug	Incorrect drug prescribed when stepping up or down therapy.	1) *Flutiform* 250 inhaler reduced to *Clenil* 200 2pbd in an unstable asthmatic. 2) *Clenil* started (after salbutamol) as a first line treatment for someone with possible COPD who was awaiting spirometry.
2.2.1	Suboptimal : incorrect drug	Prescription of a second line antimicrobial therapy according to local antimicrobial guidelines without documentation to explain choice.	1) Second line *H. Pylori* eradication treatment regimen prescribed. 2) Clarithromycin prescribed to penicillin allergic patient with chesty cough in COPD when doxycycline would be preferred in guidelines and patient had successfully had this in the past.
2.2.2	Suboptimal : incorrect drug	Prescribing a topical medication for an unlicensed indication where the possibility of harm from the product is unknown and alternatives are possible	1)Ketoconazole shampoo in for a one-year-old with seborrheic dermatitis 2) Ibuprofen gel for head injury resulting in headache and neck pain without stipulating for neck only and no other analgesic provided or recommended.
2.2.3	Suboptimal : incorrect drug	Prescription of a product that is likely to result in reduced adherence where more suitable alternatives options are available for the condition.	1) Lacri-lube ointment for a 15-year-old presenting for the first time with a weeklong history of dry itchy eyes. Standard drops that do not cause blurred vision had not been tried.

2.2.4	Suboptimal : incorrect drug	Prescription of an NSAID to someone with existing GI symptoms that MAY have been made worse when alternative NSAID given previously. Alternative analgesic options are available to the patient.	1) Mefenamic acid for menorrhagia to patient already prescribed omeprazole 40mg twice daily and domperidone. Notes state symptoms may have been worsened with previous naproxen use. Patient was on other regular analgesia at unknown amounts, but other analgesic options or tranexamic acid was still available.
2.2.5	Suboptimal : incorrect drug	Prescription of an opioid analgesic where a non-opioid would be more appropriate	1) Tramadol prescribed as only analgesic for biliary colic. Patient would have been suitable for NSAID. 2) Tramadol prescribed as alternative to codeine (which was causing patient to feel sick) for back pain no other analgesia prescribed including paracetamol.
2.2.6	Suboptimal : incorrect drug	Prescription of a medication that would not be recommended locally as an alternative to the recommended product because guidance for the recommended product could not be complied with.	1) Amorolfine prescribed topically for suspected fungal nail as patient wanted treatment and results of clippings to prescribe terbinafine may not be known until after patient had gone travelling.
2.2.7	Suboptimal incorrect drug	Prescription of a restricted topical antimicrobial agent against local antimicrobial guidelines (but national guidelines suggest prescribed product)	1) Fusidic acid cream prescribed for impetigo when local guidelines advise topical *polyfax* for small area or oral flucloxacillin.
3	**Duplication**		

3.1.1	Error: duplication.	Prescribing of the same vaccine twice in too short a time period (independent of whether the second dose was administered).	1) prescription of a second influenza vaccine within the same flu season.
3.1.2	Error: duplication.	Prescription of paracetamol when another paracetamol-containing product is on the patient's repeat prescription (or vice-versa): both products prescribed at the same time with no warning that they should not be taken together.	1) Prescription of paracetamol when another paracetamol containing product is on the patient's repeat prescription (or vice-versa): both products prescribed at the same time with no warning that they should not be taken together. 2) Generic and brand version of the same medication issued at the same time e.g. salbutamol prescribed as an acute on the same prescription as *Ventolin* from repeat.
3.1.3	Error: duplication.	Generic and brand version of the same medication issued at the same time.	1) Salbutamol prescribed as an acute on the same prescription as *Ventolin* from repeat.
3.1.4	Error: duplication.	Prescribing two oral medications from the opioid group without providing advice on stopping one without a clear management plan for using both concurrently.	1) Initiation of a strong opioid e.g. morphine when patient is already on tramadol and notes do not advise stopping.
3.2.1	Suboptimal prescribing: duplication	Prescribing two oral or topical medications from the same therapeutic group which are not intended to be used together (that do not fall into the error categories for duplication) with no information as to when to use each one.	1) Combined oral contraceptive pill left on repeat prescription after an alternative hormonal contraceptive had been given. 2) Prescribing a PPI e.g. lansoprazole 30mg on acute for gastroprotection from NSAID when a different more potent PPI e.g. omeprazole 40mg on repeat and nil in notes to state that the repeat one should stop. 3) Co-codamol prescribed as acute with codeine on repeat. 4) Diclofenac gel added as an acute as an alternative to ibuprofen gel as not working - ibuprofen gel left on repeat.

			5) Ramipril as acute to patient confused with medication whilst ramipril also on repeat. 6) *Eumovate* prescribed to a patient with *Betnovate* on repeat for same indication. 7) Ibuprofen 200mg prescribed to a patient with 400mg on repeat but not being collected. 8) Topical NSAID and oral NSAID prescribed together without documenting that they should not be taken together.
3.2.2	Suboptimal prescribing: duplication	Intending to recommend/prescribe two oral medications from the same therapeutic group be used together when it is not considered clinically appropriate to do so.	1) Combination of chlorphenamine 4mg three times a day and cetirizine 10mg daily recommended for wasp sting.
3.2.3	Suboptimal prescribing: duplication	Multiple issues of the same medication prescribed the same way on the same prescription.	1) e.g. *Migraleve* issued three times
4	**Allergy**		

4.1.1	Error: allergy error.	Prescription of a drug in circumstances where the pharmacist notes that an allergy to that drug has been recorded, and the prescriber gives no acknowledgement/ justification for prescribing in light of the previous allergy documentation.	
5	**Contraindication**		
5.1.1	Error: contraindication error.	Prescription of a drug that is contraindicated according to the BNF (unless a clear and defensible justification has been given by the prescriber or in correspondence from secondary care).	1) An example would be the prescription of combined hormonal contraceptives in patients with two or more risk factors for thromboembolism. 2) The use of diclofenac in a patient with contra-indications according the MHRA guidance without clear documentation that patient wants to continue despite increased risks.
6	**Interaction**		
6.1.1	Error: interaction error.	Prescription of two oral NSAIDS at the same time.	
6.1.2	Error: interaction error.	Prescription of a medication which is known to interact with warfarin without a plan to check the INR or an acknowledgement of an interaction.	1) clarithromycin and warfarin
7	**Dose/strength**		

7.1.1	Error: dose/strength error.	Failure to act on a suggested dose change or recommendation from secondary care/specialist correspondence, where that dose change was aimed at either increasing therapeutic benefits or reducing risk of harm.	
7.1.2	Error: dose/strength error.	Overdose of an oral medication in a child, e.g. clearly above that recommended by BNF for height/age, unless the medication has extremely low risk of harm.	
7.1.3	Error: dose/strength error.	Overdosage of an oral medication in an adult where there is clear increased risk of harm (unless a clear and defensible justification has been given by the prescriber or in correspondence from secondary care).	1) Colchicine 1 four times a day for 4-5 days with no maximum dose of 12 tablets per course stated
7.1.4	Error: dose/strength error.	Overdosage of a single dose of an oral medication (e.g. sulphonylurea) where BNF recommends dividing the dose above a certain dosage level (unless a clear and defensible justification has been given by the prescriber or in correspondence from secondary care).	
7.1.5	Error: dose/strength error.	Prescription of a drug with potential for harm at a dose above that recommended by the BNF (for a specific indication).	1)Rosuvastatin 40 mg in a patient without “severe hypercholesterolemia or with high cardiovascular risk and under specialist supervision”. 2)*Migraleve* pink prescribed with the dose " take two at onset, take two few hours later inb", max dose of *Migraleve*

			pink is 2 per 24-hour period as contains buclizine so above licensed dose.
7.1.6	Error: dose/strength error.	Underdosing of oral antimicrobial agents.	
7.1.7	Error: dose/strength error.	Failure to match the dose intended in the consultation notes to the dose prescribed.	1) Consultation notes state increase dose omeprazole to 40mg. Prescription issued only states omeprazole 20mg once daily.
7.1.8	Error: dose/strength error.	Failure to titrate or convert opioid medication appropriately	1) 30-week pregnant woman with pelvic pain was taking codeine 15mg 1-2 up to four times a day. It was converted to morphine 5-10mg when required. 30mg codeine is approx. equivalent to 3mg morphine so there was a significant increase in dose. Nothing in notes to say patient was in more pain and nothing to say why the analgesics where switched.
7.1.9	Error: dose/strength error.	Suspected under or overdosing of a medication for a child when medication dosing relies on a weight and there is no recent weight on record and dose appears inappropriate.	1) The continuation of clarithromycin in a 9-year-old child. Latest weight in notes was 18 months previously at 20.35kg. Dose prescribed was 250mg (which is for 30-40kg), 187.5mg is for 20-29kg.
7.1.10	Error: dose/strength error.	Prescribing the correct medication at the dose for the wrong indication and the dose is likely to cause a deleterious effect on the patient effectiveness of treatment	1) Aciclovir prescribed at dose for cold sores when treating for shingles.

7.2.1	Suboptimal prescribing: dose/strength error.	Prescribing of a medication above the standard recommended dose but at a dosage that is unlikely to cause harm.	1) Aspirin 150 mg daily as secondary prevention for coronary heart disease. (The panel felt that the 150mg dose was a standard dose in the US) 2) Lansoprazole 30mg prescribed for gastro-protection from NSAID licensed dose is 15mg, no other risk factors. 3) Nefopam prescribed at 30mg - take one or two tablets three times a day for cervicalgia in a 74-year-old, notes state 60mg three times a day. BNF states nefopam should be used with caution in the elderly and gives a starting dose of 30mg. (Cervicalgia patient aged 74 years). 4) Asthma ICS started for the first time in an adult at a higher than guideline dosage e.g. Clenil 200 2p twice daily. 5) *Otomize* prescribed as more than one spray per dose.
7.2.2	Suboptimal prescribing: dose/strength error.	Prescribing of a medication below the standard recommended dose but at a dosage that is risk of harm is low, the risk of treatment failure is low, or the dose is unlikely to cause a deleterious effect on the patient in terms of lack of control of symptoms.	1) Calcium tablets prescribed at lower than the recommended dose. (The panel thought the BNF advice regarding dosage is not clear) 2) Converted from ramipril 10mg to losartan due to cough (hypertension not heart failure). Dose prescribed was 25mg which is not equivalent to the original ramipril dose.
7.2.3	Suboptimal : dose/strength error	Prescription of a medication at a dosage for a different indication that is unlikely to have a deleterious effect on the patient in terms of effectiveness in treatment.	1) Prednisolone dose prescribed for exacerbation of COPD at the asthma dosage or vice versa.
7.2.4	Suboptimal : dose/strength error	Change of dose noted for medication in the clinical notes but the dosage has not been changed on the medication instructions on the repeat.	1) Dose of citalopram recommended when a patient is withdrawing not updated on the repeat. 2) Patient seen at medication review advised to trial increasing the dose of omeprazole without updating the repeat to reflect the increased dose.

7.2.5	Suboptimal : dose/strength error	Prescribing a dose of antimicrobial agent that is lower than the local guidance but is still within the dose range within the BNF (if the dosage is below that recommended in the BNF then is an error).	1) Erythromycin 250mg in an adult. 2) Co-amoxiclav 375mg for pyelonephritis.
7.2.6	Suboptimal : dose/strength error	Prescribing a strength of medication where more than one dosage unit is needed to supply the required dosage. (Unless there is an obvious cost-saving motive or clinical reason).	1) *Estradot* patches 2x25mcg when there is a 50mcg strength available. 2) Lansoprazole 2x15mg od prescribed as a long term repeat rather than 1x30mg.
8	**Formulation**		
8.1.1	Error: formulation error.	Drug not prescribed in the correct formulation when this might lead to increased risk of patient harm.	1) Tacrolimus and other medications where the BNF states the importance of prescribing the correct formulation.
8.1.2	Error: formulation error.	Prescribing two products to be used together that are unsuitable due to the formulation chosen.	1) Spacer prescribed for use with a salbutamol breath actuated CFC free inhaler rather than a metered dose inhaler.
8.2.1	Suboptimal prescribing : formulation error.	Prescribing the incorrect formulation of a product for the indication so that the use becomes "off-label" although the risk of harm is low, and the product is likely to be effective.	1) 2% clotrimazole cream prescribed in addition to oral flucloxacillin to treat impetigo. 2% is only licensed for symptom relief of vaginal candidiasis and therefore the PIL would state this - the 1% cream should be the product choice.
8.2.2	Suboptimal prescribing : formulation error.	Failure to prescribe the recommended formulation of a medication by secondary care/specialist although the likelihood of harm or a deleterious effect on the patient is low.	1) Topiramate sprinkles recommended in neurology letter as patient has tried tablets and not got on with them so had stopped taking them. Tablets prescribed again in consultation with nil in notes to say why neurology advice had not been followed (note: panel thought that if the patient had been epileptic the coding may have been different).

8.2.3	Suboptimal prescribing : formulation error.	Prescribing a formulation of a product not included on the local formulary without good clinical reason when other options are readily available.	1) *Spatone iron plus* prescribed to a 30-week pregnant woman.
8.2.4	Suboptimal prescribing : formulation error.	Prescribing of a formulation of a product known to have increased risk of side - effects or harm when there are other formulations available, and these have not been tried or discussed.	1) Tiotropium *Respimat* prescribed as a repeat to a patient who has never tried the *Handihaler* or alternative LAMA devices. Nothing in the notes to say a discussion regarding risks from MHRA alert have been discussed. (Note: the panel assessed this prescribing incident before the MHRA alert regarding the *Handihaler* was released). 2) Separate ICS and LABA inhalers prescribed (and appear to be being taken regularly from collection data) with no documented discussion of consideration of combination in notes.
8.2.5	Suboptimal prescribing : formulation error.	Failure to prescribe the correct formulation of an antimicrobial product in line with local antimicrobial guidelines although there is unlikely to be a deleterious effect on the effectiveness of the treatment and a low risk of harm to the patient.	1) Clotrimazole 500mg pessary prescribed to a pregnant woman instead of the 100mg pessaries for 6 nights.
9	**Frequency**		
9.1.1	Error: frequency error.	Antimicrobials prescribed at a frequency below that recommended in the BNF.	1) *Naseptin* cream prescribed twice daily for 7 days instead of four times a day for 10 days for recurrent epistaxis.
9.1.2	Error: frequency error.	Prescription of a topical steroid containing products in a child at a frequency higher than that advised by BNFC or SPC. (The panel took advice	1) Hydrocortisone cream.

		from a paediatrician after discussing at length).	
9.2.1	Suboptimal prescribing: frequency error.	1) Prescription of a topical product which has a low potential for harm, at a frequency different to that recommended by the BNF.	1) Antifungal. 2) Mild corticosteroid (in an adult and not on the face).
10	**Timing**		
10.1.1	Error: timing error.	Prescribing a product that is required to be taken at a certain time of day for increased effectiveness without stating the time of day on the instructions.	1) Simvastatin prescribed to be taken daily rather than specifying to be taken at night.
10.2.1	Suboptimal prescribing: timing problem.	Failure to add a specific administration time to a medication that would be preferred to avoid possible side-effects or inconvenience to the patient.	1) Bendroflumethiazide prescribed to be taken daily rather than in the morning. 2) Oral corticosteroids prescribed as daily rather than in the morning. 3) Topical creams where times are specified by the manufacturer e.g. adapalene cream.
10.2.2	Suboptimal prescribing: timing problem.	Unnecessary additions of timings for administration that are not required and complicate the medication regimen.	1) The addition of "with food" on erythromycin (the panel thought that whilst it was possible to take erythromycin with food if there were GI upsets, it could complicate the regimen unnecessarily if not needed).
11	**Information incomplete**		
11.1.1	Error: information incomplete.	Oral corticosteroids prescribed “as directed” without further instructions.	
11.1.2	Error: information incomplete.	Inhaled corticosteroid prescribed without clear dosage instructions, e.g. PRN, BD.	

11.1.3	Error: information incomplete.	Medication, with significant risk of harm if not taken according to precise dosage instructions, prescribed “as directed” (e.g. amiodarone, betablockers, methotrexate, n.b. warfarin not included).	
11.1.4	Error: information incomplete.	Prescription of a topical product with significant potential for harm if dosage instructions are incorrect or not clear, e.g. moderately-potent corticosteroid in a child, or potent corticosteroid in an adult, or products containing antibacterial agents (includes lack of information on duration of use).	
11.1.5	Error: information incomplete.	Prescription of oral antibiotics without clear dosage instructions, e.g. PRN.	
11.1.6	Error: information incomplete.	Prescription of hormone replacement therapy without detailed dosage instructions, e.g. “as directed”, for preparations where the PIL does not contain clear and unambiguous instructions.	
11.1.7	Error: information incomplete.	Eye drops for glaucoma or that contain steroids prescribed without clear directions as to the eye for administration or frequency of use.	
11.1.8	Error: information incomplete.	Drops that can be used in more than one route e.g. Eye/ear or eye/ear/nose without specifying where to use them.	1) *Sofradex* eye/ear drops

11.1.9	Error: information incomplete.	Strong opioids with inadequate dosage instructions.	1) Oral morphine prescribed with no frequency on the prescription only take 2.5 to 5ml as required.
11.1.10	Error: information incomplete.	Ambiguous or unclear dosing instructions for a medication that can cause significant harm.	1) Nortriptyline prescribed as: 2 TABLETS NIGHT/DAY - does this mean 2 per day or 2 twice a day? 2) Propantheline prescribed as "four times daily max" x 224 as a long-term repeat, dose can vary for propantheline up to 120mg daily so current dosage not clear but given quantity issued likely to be 2QDS rather than 1QDS.
11.1.11	Error: information incomplete.	Eye drops for infections without treatment eye stated when multiple carers will be involved. (The panel felt that without the treatment eye stated then there is a reliance on verbal instructions being passed between different carers and therefore a high risk of them being administered incorrectly.)	e.g. nursing/care/learning disability home, young child attending nursery, young child/baby seen by GP with grandparent.
11.1.12	Error : information incomplete	"As directed" on paracetamol liquid for a child. (The panel felt that whilst the information given with a pre-packaged bottle of paracetamol may give the information this may not be clear, and dosages are given in bands. There is also the possibility of the dispensed product being decanted from a bulk pack to a smaller amber bottle that would not have the same information. at dispensing. The potential for harm from overdose was considered to be high).	

11.1.13	Error : information incomplete	Ear drops without treatment ear stated when multiple carers will be involved.(The panel felt that without the treatment ear stated then there is a reliance on verbal instructions being passed between different carers and therefore a high risk of them being administered incorrectly.)	
11.2.1	Suboptimal prescribing : information incomplete	Ambiguous or unclear dosing instructions for a medication with a low potential for harm.	1) *Difflam* spray prescribed for a child without directions as to the number of sprays to use. The PIL is not very clear as it states, "spray 1 puff for every 4kg body weight up to a maximum of 4 puffs to the sore area", in this case the child was 22kg so 4 puffs. 2) Prescription of a topical product which has very low potential for harm, e.g. emollient, antifungal, without clear dosage instructions. 3) Benzodiazepines at low dose, e.g. 2 mg, **and** small numbers of tablets, e.g. 10, prescribed “as directed” for conditions such as flight phobia and muscle spasm. 4) Medication prescribed without stating the number of tablets to be taken each time, e.g. metformin 500 mg tablets “twice daily” provided that the default dose of one tablet/capsule each time would be an appropriate dose (n.b. very high-risk drugs not included in this scenario). 5) Topical preparation prescribed with dosage instructions implying an oral route for administration, e.g. take one twice daily. 6) salbutamol prescribed PRN without the number of puffs being stated. 7) GTN sublingual tablets/spray prescribed “as directed.”

			8) Phosphodiesterase type-5 inhibitors with “as directed” dosage instructions. 9)Prescription of HRT without detailed dosage instructions, e.g. “as directed”, for preparations where the PIL contains clear and unambiguous instructions. 10) Prescription of the combined hormonal contraceptive pill/patch without detailed dosage instructions, e.g. “as directed”. 11) Oral corticosteroids prescribed “as directed by X” (where X is usually a secondary care clinician). 12) Ketoconazole shampoo with no dosage instructions on it (including a child). PIL gives multiple dosage options. 13) *EMLA* prescribed as directed - information on PIL is not clear although - up to 20g of cream on a total skin area not larger than 200 square centimetres in size. Application time approx. 1 hour, maximum 5 hours. 14) Bumetanide added to repeat after recent discharge as "take two tablets twice a day in the morning" discharge states two morning and lunch time.
11.2.2	suboptimal prescribing: information incomplete.	Prescription of a preparation for an adult (with or without the need for an interpreter) that is available OTC and is prescribed with “as directed” dosage instructions (n.b. NSAIDs to be considered on a case-by-case basis).	1) No directions on lacri-lube eye ointment in a 15-year-old. 2) No dose prescribed for *Spatone iron* in a 30-week pregnant woman.
11.2.5	Suboptimal prescribing: information incomplete.	Ear drops prescribed without indicating which ear they should be used in. (Unless multiple carers involved in which case see error information incomplete)	

		Incudes very young children where the main carer is likely to be the same.	
11.2.6	Suboptimal prescribing: information incomplete.	Eye drops (for non-serious symptomatic conditions such as conjunctivitis or dry eye) prescribed without indicating which eye the drop should be used in. (Unless multiple carers involved in which case see error information incomplete) incudes very young children where the main carer is likely to be the same.	
11.2.7	Suboptimal prescribing: information incomplete.	Use of Latin short codes on prescriptions e.g. PRN, BD so patient cannot understand the dosage as it appears on the prescription (Panel thought the patient should be able to read the prescription and there was a possibility of prescriptions sent by EPS would need intervention by the dispensing pharmacist to convert to English)	
11.2.8	Suboptimal prescribing: information incomplete.	Mild topical steroid cream for a child with no directions on it (n.b. moderate is classified as an error in children)	1) Hydrocortisone 1% cream
11.2.9	Suboptimal prescribing: information incomplete.	Mild or moderate topical steroid cream prescribed in an adult with no directions on it (n.b. potent is classified as an error in adults)	1) *Betnovate RD* cream

11.2.10	Suboptimal prescribing: information incomplete.	Two or more topical steroid creams of different potencies prescribed for the same indication with no indication of where to use the different creams.	1) *Eumovate* and hydrocortisone
11.2.11	Suboptimal prescribing: information incomplete.	Writing the dosage in the pharmacy box on EMIS Web rather than in the instructions. Dose would not appear on the repeat side of the prescription and will not be transferred as a dose on EPS.	
11.2.12	Suboptimal prescribing: information incomplete.	Issuing further supplies of medication that was initially prescribed as an increasing dose without updating the dose to reflect the current use.	1) Gabapentin
11.2.13	Suboptimal prescribing: information incomplete.	Medication prescribed regularly when it is intended for intermittent use and stated as such in the notes.	1) Zopiclone 1ON when intended for 1ON PRN.
11.2.14	Suboptimal prescribing: information incomplete.	*Nicorette* lozenge for a pregnant lady with the directions as directed and no maximum stated per day.	
12	**generic/brand**		
12.1.1	Error: generic/brand name error.	Prescribing a medication generically where brand prescribing is advised by the BNF for safety reasons.	1) Antiepileptic medications used in epilepsy.
12.2.1	Suboptimal : brand/generic	Prescribing a generic version of a medication when local guidelines request brand prescribing to prevent confusion and expensive unlicensed products (the panel felt this was an educational point)	1) Cholecalciferol

12.2.2	Suboptimal prescribing brand/generic	Prescribing by brand when a generic is more cost-effective and there is no clinical reason to need a brand and no patient preference noted.	1) *Prozac* 2) Prescribing a more costly pill when the patient has already had the more cost-effective version and tolerated it well.
13	**Omission**		
13.1.1	Error: Omission	Omission error related to failure to prescribe concomitant medication.	1) Prescription of an NSAID to an older person (>65 years) without an ulcer-healing (younger patients to be judged on a case-by-case basis). 2) *Canesten HC* for 31wk pregnant woman for thrush no intravaginal azole give as per guidance.
13.2.1	Suboptimal: omission	Omission error related to failure to prescribe concomitant medication but were the panel felt that extra advice or assessment could have been given but not documented.	1) Failure to prescribe calcium and vitamins D to a patient who is receiving a bisphosphonate for osteoporosis or fracture prevention. (Patients may have sufficient dietary intake or be taking other supplementation). 2) Codeine prescribed as only pain killer after knee reconstruction - nil in notes to say paracetamol recommended OTC and no other analgesia on repeat. 3) Prescribing *Betnovate* for hand eczema without current prescription for emollient.
13.2.2	Suboptimal : omission error	Preventer prescribed on repeat to a patient with asthma (not for a SMART/FMART regimen) that does not have a SABA available on repeat.	
14	**Inadequate documentation**		
14.1.1	Error: inadequate documentation in medical records.	Prescription of a drug with very high potential for harm without documented evidence of an indication for the drug.	1) Immunosuppressants 2) Strong opioids 3) Diazepam

14.1.2	Error: inadequate documentation in medical records.	The conversion of *Oramorph* to MST at a dose that is significantly below that expected to provide adequate pain relief without documentation of current usage or supporting reason for the low dosage. (There was discussion as to whether this should be a dosing error, but it was thought that there the main issue was not enough documentation to support the dosage chosen to decide whether a dosage error had occurred).	
14.2.1	Suboptimal prescribing: inadequate documentation in the medical records.	Prescription of any medication (except those with very high potential to cause harm) without documentation of the indication in the medical records. (Including where the Read code in the consultation does not match the medication issued).	1) *Nasacort* in a consultation for a 3-day history of cough with no mention of blocked nose.
14.2.2	Suboptimal prescribing: inadequate documentation in the medical records.	Failure to document the current dose and treatment plan for a patient known to be reducing medication who has been reviewed face to face and for whom further medication supplies have been issued.	1) Patient prescribed *Nicotinell* 1mg lozenge and previous entry in notes states “happy to reduce to 1mg lozenge and continue for at least 6 weeks". Next reviewed three months later and further supply given with no change in dose or comment in notes.

14.2.3	Suboptimal prescribing: inadequate documentation in the medical records.	Medication supplied without the recommended/ expected follow up documented.	1) Pill check for combined oral contraceptive code and medication issued without documentation or smoking status or weight etc. 2) Sumatriptan started by another doctor as a trial 10 days previously. Seen for sleeping tablets but a further 6 sumatriptan also given with no documentation as to whether they are effective or how they needed a further supply so soon. 3) Propranolol issued to an asthmatic who uses salbutamol and had tolerated the combination previously without comment regarding the possible interaction. 4) Second supply of salbutamol issued (during a consultation for back pain) to a patient awaiting spirometry without documenting whether first one had helped shortness of breath.
14.2.4	Suboptimal prescribing: inadequate documentation in the medical records.	No documentation of current requirements of a medication issued to a known addict when medication issued at a review when the patient is being closely managed.	1) Zopiclone issued to someone with known addiction. Previous consultation states "see when needs more". Patient was seen but no information was available in the notes.
14.2.5	Suboptimal prescribing: inadequate documentation in the medical records.	Prescription of a medication for a stated indication where either the drug chosen, or the dose would be considered unusual for that indication (although not outside accepted range) without documenting why the dose was chosen.	1) Omeprazole 40mg as a new repeat for reflux when patient was not taking any PPI prior to prescribing and was not at high risk of bleeding. 2) Lactulose in diverticular disease. 3) Codeine in possible mastalgia when patient has a tendency to constipation and other analgesics could have been suitable. 4) Ibuprofen recommended for uvulitis to an asthmatic patient (salbutamol on repeat) who nasal polyps which raises

			the risk of intolerance to NSAIDs. Nothing in the notes to say that the risk had been discussed or assessed.
14.2.6	Suboptimal prescribing: inadequate documentation in the medical records.	Prescribing large quantities of medication for travel without documenting period of travel or reason for giving more than 3 months' supply (DoH advice).	1) 6 months' supply given of 12 medications for a patient travelling to India. No further information given in the notes.
14.2.7	Suboptimal prescribing - inadequate documentation in the medical records	Prescribing medication as a handwritten script e.g. at a home visit and documenting the issue in the clinical notes but not adding the medication to the medication screens on the computer.	1) Nitrofurantoin issued at a home visit but not added to the medication screen.
14.2.8	Suboptimal prescribing - inadequate documentation in the medical records	Failure to add or remove sensitivities/allergies from the clinical computer system as they are identified.	1) Prescription of a drug in circumstances where a previous adverse drug reaction (ADR)/allergy or sensitivity has been recorded; the patient has received the drug since the Read coding with no apparent problems. The medication is issued again as part of the review without acknowledging the potential issue or updating the records. 2) Identification of a sensitivity or allergy, prescribing an alternative and documenting the reason in the notes but not adding the drug to the sensitivity/allergy page.
14.2.9	Suboptimal prescribing - inadequate documentation in the medical records	Read coding the wrong indication on consultation notes.	1) Read coding the consultation as cold sores when it is for shingles.

14.2.10	Suboptimal prescribing - inadequate documentation in the medical records	Prescribing medication as an acute at one strength when the same medication at a different strength is on repeat and it is unclear from the notes as to the plan.	
14.2.11	Suboptimal prescribing - inadequate documentation in the medical records	Starting a new controlled drug and documenting that the dose has taken into account some but not all of the current opioids prescribed so that is unclear whether the medication was taken into account or whether to continue with it.	1) Oxycontin started - notes say stop tramadol and detail how starting dose was decided on but does not mention the co-codamol 8/500 on repeat which was collected in the last month.
14.2.12	Suboptimal prescribing - inadequate documentation in the medical records	The lack of documentation to support the stopping of medication that would be required prior to a prescribed test.	1) Urea breath test prescribed to a patient on ranitidine with nil in notes to stop taking the ranitidine before doing the test.
14.2.13	Suboptimal prescribing - inadequate documentation in the medical records	Lack of documentation to support the addition of medication normally prescribed as an acute to repeat.	1) Chloramphenicol eye drops added to repeat rather than issued as acute. Patient has not had frequent eye infections and there is nothing in the notes in explanation.
14.2.14	Suboptimal prescribing - inadequate documentation in the medical records	Failure to prescribe concomitant medication but were the panel felt that extra advice or assessment could have been given but not documented.	1) Failure to prescribe calcium and vitamins D to a patient who is receiving a bisphosphonate for osteoporosis or fracture prevention. (Patients may have sufficient dietary intake or be taking other supplementation). 2) Codeine prescribed as only pain killer after knee reconstruction - nil in notes to say paracetamol recommended OTC and no other analgesia on repeat. 3) Prescribing *Betnovate* for hand eczema without current prescription for emollient

			4) Prescribing a strong opioid e.g. morphine without a clear plan for laxatives. Patient had laxatives on repeat that had not been collected in a while.
15	**Quantity**		
15.1.1	Error: quantity error.	Prescription of a large quantity (e.g. greater than three months) of a drug that is either high-risk or has significant potential for misuse.	
15.1.2	Error: quantity issue.	Oral antibiotics prescribed with a quantity that is clearly below that normally recommended for successfully treating infection.	
15.1.3	Error: quantity issue.	Prescription of an item at a different quantity than the prescriber's intentions, where taking the prescribed quantity could cause harm or treatment failure.	1) Prednisolone for exacerbation of COPD at six tablets in the morning and supplying 28 rather than 42 tablets.
15.2.1	Suboptimal prescribing: quantity issue.	Prescribing a large quantity of a medication that is larger than would be needed to treat one person without documented reason.	1) Anthelminthics (for threadworms, head lice, scabies) prescribed on a single prescription with a quantity large enough to treat a whole family but without documentation that this was the intention.
15.2.2	Suboptimal: quantity issue.	Prescription of a very large quantity where there is a low risk of harm and there is a low potential for misuse.	1) *H. Pylori* regimen, 28 lansoprazole prescribed when only 14 needed and there is no intention to continue PPI therapy. 2) 28 high strength vitamin D capsules prescribed when only 11 capsules needed to complete the course. 3) Stable asthmatic, rarely collecting SABA issued 2 SABA inhalers per issue unnecessarily.

			4) Stable angina and patient very rarely collecting GTN sprays issued 2 per issue. 5) 4 months of citalopram issued to a patient withdrawing and unlikely to overdose. 6) 100g of steroid cream for a small area e.g. hands or elbows. 5) Large quantity of paracetamol prescribed for a child without clinical reason e.g. 500ml paracetamol for a URTI.
15.2.3	Suboptimal: quantity issue.	Prescribing antibiotic suspension quantities at a quantity that would result in the dispensing of an extra bottle unnecessarily and the patient potentially taking a longer than required course.	1) 210ml of amoxicillin 250mg/5ml suspension prescribed for a dose of 10ml three times a day. 300ml of antibiotic would be supplied at the pharmacy potentially lasting 10 days rather than seven. 200ml would have been sufficient for the infection.
15.2.4	Suboptimal : quantity issue	Prescribing a quantity of medication larger than that documented as intended in the consultation notes or at a quantity that would not be appropriate for the dosing schedule were the risk of harm is low.	1) 9 months' supply of combined oral contraceptive prescribed when only 6 months were intended in the notes. 2) Diclofenac 50mg three times a day prescribed with a quantity of 56 rather than 84.
15.2.5	Suboptimal : quantity issue	Issuing a prescription for medications on repeat where the quantities are not aligned to the other repeat medications with no clear reason **OR** prescribing more than one medication on acute that should be taken together at quantities that will run out at significantly different times.	1) 56-day and 28-day supplies on different repeat medications. 2) Omeprazole for 56 days with naproxen for 28 days supplied on the same prescription as acute.
15.2.1	Legal : quantity (reclassified as Suboptimal)	Prescribing a large quantity of medication intended for use on more than one person on one prescription	1) Malathion for scabies for 8 people on one child's script. Unknown who the people are or whether they are part of the practice.
16	**Inadequate review**		

16.1.1	Error : inadequate review	Failing to undertake the required review on a medication known to be high risk.	1) HRT prescribed for a 60-year-old woman. Nil in notes to say continued use and risks had been discussed. Last reviewed 1 year ago so review now due.
16.1.2	Error : inadequate review	Failure to identify and consider at a medication review the omission of a medication that would be expected to be prescribed given the patient's medical history.	1) No Statin prescribed despite cardiac risk. Entry in notes 5 years ago states "unclear why not on statin. I will discuss next week" no further entry made in notes. Past medication states simvastatin issued up to 2006 but nil since and nil in allergies and sensitivities. (Current medications include warfarin, digoxin, furosemide, bisoprolol, ramipril).
16.1.3	Error : inadequate review	Failure to consider, at medication review, changes to guidelines that mean the patient is on less effective treatment than currently recommended.	1) Aspirin prescribed alone for CVA (no dipyridamole or reason not to be on clopidogrel). Nothing in the notes regarding aspirin or a discussion regarding switching to clopidogrel as a more effective medication.
16.2.1	Suboptimal prescribing : Inadequate review	Failing to undertake the required review on a medication where the harm is likely to be low.	1) Young patient prescribed *Marvelon* (for more than 1 month) during a consultation focussed on a different issue where the previous pill check was 15 months previously and no review was undertaken or template completed.
16.2.2	Suboptimal prescribing : Inadequate review	Failure to identify poor adherence to medications at medication review where the patient was not showing clinical signs of deterioration.	1) Patient collecting ICS inhaler regularly but not LABA (not collected in 7months) and no mention of adherence and therefore stepping down or combination inhaler.
16.2.3	Suboptimal prescribing : Inadequate review	Failure to remove unwanted or unnecessary items from the repeat list at medication review or documented reason for it to remain on repeat.	1) *NovoRapid* vials and cartridges left on repeat at medication review. Collection history would suggest only vials now being used. 2) Gabapentin not collected in a year - sub therapeutic dosage, gabapentin or pain not mentioned in notes. 3) *Fortisip* left on repeat when patient now taking alternative supplements. 4) 5 versions of glucose test strips on repeat when only one needed.

			5) High dose combination inhaler being given as a repeat acute e.g. *Symbicort* 400 with a lower strength on repeat e.g. *Symbicort* 200. 6) Lansoprazole 30mg 1 daily issued irregularly from repeat with nothing to say now agreed can take PRN or dose updated.
16.2.4	Suboptimal prescribing : Inadequate review	Failure to align medication quantities at medication review e.g.. All to 28- or 56-day supplies (although no medication issued.)	
16.2.5	Suboptimal prescribing : Inadequate review	Failure to identify and discuss, at a medication review, medication that has been over-collected where the medication is unlikely to be addictive.	Child collecting too many inhalers of ICS and salbutamol and mum asking for more because claims has run out without discussing further.
17	**Duration**		
17.1.1	Error: duration error.	Prescribing of a long-term antimicrobial agent for an active infection without a clinical review (review is very overdue).	1) Oral terbinafine prescribed (e.g. for fungal nail infection) for greater than six months without review.
17.2.1	Suboptimal: duration problem.	Prescribing of a long-term antimicrobial agent for an active infection without a clinical is overdue.	2) Oral terbinafine prescribed (e.g. for fungal nail infection) for 3-6 months without review.
17.2.2	Suboptimal: duration problem.	Prescribing of antibiotics for a slightly longer duration than the local antimicrobial guidelines.	1) Clarithromycin for 7 days instead of 5 for ear infection. 2) 5-day course of *Penicillin V* for tonsillitis instead of 10 days. 3) Clarithromycin for 7 days not five days for chesty cough in COPD.
17.2.3	Suboptimal: duration problem.	Prescribing a topical antimicrobial agent for longer than its licensed use without clear indication.	1) *Daktacort* for 2 weeks.
18	**monitoring**		

18.1.1	Monitoring error : monitoring not requested.	Not responding to a request from secondary care to undertake laboratory test monitoring where this request is justified in terms of risks from the medication the patient is taking.	
18.1.2	Monitoring error : monitoring not requested.	Increasing the dose of an ACE inhibitor/ARB antagonist without checking U&E within three weeks.	
18.2.1	Sub-optimal prescribing: monitoring not requested.	Thiazide diuretic where monitoring or U+E recently overdue but not requested at medication review.	1) Bendroflumethiazide reviewed at medication review. Last U+E a year ago and last hypertension review also a year ago and no mention of monitoring required.
18.2.2	Suboptimal prescribing : monitoring not requested.	Failure to do a digoxin level for a patient who has not had one done for a number of years and whose renal function has reduced but there are no clinical symptoms of overdose.	1) 73-year-old patient with an eGFR of 30 six months previously, no digoxin level has been done since 2008 when digoxin level was 1.8 and eGFR was 39.
19	**Not a problem.**		
19.1.1	Not a problem.	Dosage instructions given using decimals rather than words, e.g. 0.5 tablets. The panel felt that while the use of decimals may be dangerous in some circumstances, it is unlikely that they would be transmitted on to the dispensing label having gone through a community pharmacy or dispensary.	
19.1.2	Not a problem.	Eye drops prescribed without indicating how many drops to use. Eye drops designed so that one drop gives a sufficient volume; patient inadvertently	

		using more than one drop are unlikely to come to harm as excess liquid spills out of the eye.	
19.1.3	Not a problem.	Loop diuretics prescribed “twice daily” without stating “one to be taken in the morning and one at lunchtime”. The panel felt that while the usual twice daily dosage for loop diuretics was in the morning and at lunchtime some patients might wish to take the doses at different times.	
19.1.4	Not a problem.	Prescription of a broad-spectrum oral antibiotic to a woman receiving the combined oral contraceptive pill (for contraception) without instruction (on the prescription, or documented in the patient's records) that extra contraceptive precautions should be taken. In light of WHO and RCOG advice that risks of pregnancy are not increased by use of non-enzyme inducing antibiotics, the panel judged this not to be a problem.	
19.1.5	Not a problem.	Prescription of a cephalosporin to a patient with previously recorded history of penicillin allergy (but no evidence of anaphylaxis). Although cross sensitivity is a potential problem, the panel felt that it was not a significant risk unless the	

		patient had previously had an anaphylactic reaction to penicillin.	
19.1.6	Not a problem.	Prescription of a drug, e.g. an oral NSAID, at a frequency greater than that recommended in the BNF, but with the total daily dose no higher than the recommended maximum.	
19.1.7	Not a problem.	Prescription of mild opioids to patients with mild-moderate COPD.	
19.1.8	Not a problem.	Prescription of two or more antihypertensive drugs to a patient with blood pressure in the normal range (this also includes prescriptions of ACE inhibitors and non-potassium-sparing diuretics (or spironolactone in heart failure).	
19.1.9	Not a problem.	Stating oral doses in milligrams, e.g. "amoxicillin 125mg/5mL, 125mg three times a day" is acceptable practice, as is stating the volume per dose, e.g. 5mL three times a day. The panel felt that either way of stating the dose is acceptable practice.	
19.1.10	Not a problem.	*Naseptin* cream prescribed as use for 7 days rather than 10 as in guidelines for recurrent epistaxis the panel felt that this	

		was not a problem as there was not enough evidence-based guidance.	
19.1.13	Not a problem.	Medication added as a new patient that have remained uncollected for a few months and not removed or discussed at medication review. Medication must be unlikely to cause harm by being omitted.	1) Ispaghula husk not collected since first prescribed as a new patient 4 months ago. 2) Paracetamol not collected for 4 months.
19.1.14	Not a problem.	Recommending an OTC NSAID to someone with some risk for gastric bleed without prescribing gastro protection but the risk is not thought to be clear or long term.	1) OTC recommendation to take ibuprofen for chest wall pain. Currently taking citalopram without gastro-protection. No gastro-protection considered or prescribed. 48-year-old with no other issues or pre-disposing factors to peptic ulcer.
19.1.15	Not a problem.	Standard release nitrofurantoin is prescribed rather than modified release. However dose is appropriate. Local and national antimicrobial guidelines recommend using the M/R formulation. However BNF does recommend the dose prescribed. (Not a problem but should mention in feedback to prescriber.)	
19.1.16	Not a problem.	Two *AeroChambers* given together for the first time when a review planned in a couple of days.	
19.1.17	Not a problem.	Zopiclone prescribed as 1ON when notes state for intermittent use. Only seven supplied. Not thought to be a problem due to the small quantity prescribed.	

19.1.18	Not a problem.	Tramadol prescribed alone for musculoskeletal chest pain. Paracetamol had been tried by patient but did not work - patient had tried a friend's tramadol and requested some.	
19.1.19	Not a problem.	Dutasteride and tamsulosin prescribed separately and not offered combination medication at medication review. This was not thought to be a problem on cost saving grounds only.	
19.1.20	Not a problem.	Recommending a topical NSAID to someone who does not "get on" with oral NSAID (even though oral on repeat and left on repeat.)	
19.1.21	Not a problem.	Using a low strength topical steroid e.g. hydrocortisone 0.5% cream on the trunk of an adult.	
19.1.22	Not a problem.	Atorvastatin prescribed instead of simvastatin due to interaction with amlodipine. Review with patient planned for 4-6 weeks but nil in notes re need for blood tests. Seven issues of atorvastatin authorised on repeat.	
19.1.23	Not a problem.	Confusing Read coding is not included in the study	1) Patient coded as asthmatic but then also that asthma resolved in 2006, on salbutamol and coded with a medication review - suggest Read coding needs updating.
20	**Case by case judgement**		

20.1.1	Assess on a case-by-case basis.	Prescription of paracetamol when another paracetamol containing product is on the patient's repeat prescription (or vice-versa): products not prescribed at the same time, e.g. >3 months between prescriptions, but no warning that the preparation should not be taken together. The panel felt that it was difficult to produce case law for this scenario.	

Appendix Four – Data collection forms used by review pharmacist

Form 0: Practice and GP Trainee Registration Form

One form used for each GP trainee

1	**Initials of pharmacist doing review:**	GG		
2	**Practice ID code** (2 digit numeric code assigned by research team):			
3	**Type of Clinical System currently in use in the practice:**	EMIS web ☐		SystmOne ☐
		EMIS LV ☐		Vision ☐
		Other (please specify)		
4	**Availability of Practice Formulary on the clinical system:**	Yes ☐		No ☐
5	**Date of consenting GP AiT into study:**	dd/	mm/	yyyy
6	**GP AiT ID code** (4 digit numeric code assigned by research team):			
7	**GP AiT sex:**	Male ☐		Female ☐
8	**Stage in training of GP AiT:**	ST 1 ☐		ST 2 ☐
		ST 3 ☐		ST 4 ☐
9	**Date GP AiT entered this practice:**	dd/	mm/	yyyy
10	**Date of FIRST consultation reviewed by the pharmacist**	dd/	mm/	yyyy
11	**Date of FIRST prescription prescribed by GP AiT and available for review by the pharmacist as part of the 100 prescriptions**	dd/	mm/	yyyy
12	**Date of FINAL consultation reviewed by the pharmacist**	dd/	mm/	yyyy
13	**Length of time (month) GP AiT has been in this practice before FIRST prescription was reviewed by the pharmacist**			
14	**Number of consultations reviewed to identify 100 prescriptions**			
15	**Please indicate if there have been any changes in the type of CLINICAL SYSTEM during period of data collection for this GP AiT:**	No ☐		Yes ☐
15i	*If yes, when did the practice STOP using the OLD CLINICAL SYSTEM?*	dd/	mm/	yyyy
15ii	*If yes, what system was in use before the change to the current CLINICAL SYSTEM happened?*	EMIS web ☐		SystmOne ☐
		EMIS LV ☐		Vision ☐
		Other (please specify)		
16	**Please indicate if there have been any changes in the availability of a PRACTICE FORMULARY on the system during period of data collection for this GP AiT:**	No ☐		Yes ☐
16i	*If yes, when did the last change to the PRACTICE FORMULARY happen during the period of data collection for this GP AiT?*	dd/	mm/	yyyy
16ii	*If yes, how many times has the PRACTICE FORMULARY changed on the system during the period of data collection for this GP AiT?*			
17	**A general summary of the prescribing:**			

Form 1: Prescribing record sheet

One form used per consultation (extra form one completed if patient had more than 8 prescriptions issued in the consultation.

1	**Date of data collection:**	dd/	mm/	yyyy
2	**GP AiT ID code** (4 digit numeric code = 2xPractice ID + 2 additional numbers assigned by research team):			
3	**Patient ID code:** (6 digit numeric code = 2xPractice ID, 2xGP AiT ID + 2 additional numbers assigned by research team. Also for internal use by practice):			
4	**Date of consultation:**	dd/	mm/	yyyy
5	**Patient sex:**	Male ☐		Female ☐
6	**Patient age:** _____ Years / Months (Indicate as appropriate and enter in months if patient <2 years old)			
7	**Medication review done:**	Yes ☐		No ☐

DRUG DETAILS (exactly as it appears on the patient record):				Is this drug on the drug monitoring list (Y/N)	**Status of drug:** - Not Prescribed (NP) - New acute (NA) - Re-issued acute (RA) - New repeat (NR) - Amended repeat (AR) - Re-issued repeat (RR) - Over-the-counter (OTC)	Is this drug part of the 100 prescription count (Y/N)	No. of possible prescribing error(s)1	No. of possible monitoring error(s)1	No. of examples of good prescribing1
Name & form	Strength	Dose instructions	Quantity						

Form 2: Details of prescribing issues

For each of the potential prescribing issues identified on Form 1, further details of this issue were entered into Form 2. One 'Form 2' was completed for each potential issue identified.

Date of data collection: dd/ mm/ yyyy

GP AiT ID code (4 digits - assigned by research team):

Patient ID code: (6 digits – assigned by research team and also for internal use by practice):

DRUG DETAILS (exactly as it appears in the patient record):				Error/issue code (1) Not a problem (2) Sub-optimal prescribing (3) Legal error (4) Prescribing error (5) Monitoring error INITIAL JUDGEMENT	Error/issue code (1) Not a problem (2) Sub-optimal prescribing (3) Legal error (4) Prescribing error (5) Monitoring error **FINAL JUDGEMENT**	Error/issue classification (see table below) INITIAL JUDGEMENT	Error/issue classification (see table below) **FINAL JUDGEMENT**
Name & form	Strength	Dose instructions	Quantity				

Error/Issue Classification Table			
Prescribing error			**Monitoring errors[2]**
1) Unnecessary drug	7) Dose/strength error	13) Omission error relating to failure to prescribe concomitant treatment	18) Monitoring not requested
2) Incorrect drug	8) Formulation error	14) Inadequate documentation in medical records	19) Requested but not done
3) Duplication	9) Frequency error	15) Quantity error	20) Results not available
4) Allergy error	10) Timing error	16) Inadequate review	21) Results not acted upon
5) Contraindication error	11) Information incomplete	17) Duration error	
6) Interaction error	12) Generic/brand name error		

1. Has initial judgement been based on case law? Yes ☐ No ☐
2. If not based on case law has initial judgement been reviewed? Yes ☐ No ☐
3. Has final judgement been completed? Yes ☐ No ☐
4. Has error/issue code been changed Yes ☐ No ☐
5. Has error/issue classification been changed Yes ☐ No ☐

Comments following panel review:

.....

.....

6. Feedback to GP AiT: Yes ☐ No ☐

7. Priority option for potential issue identified: High ☐ Medium ☐ Low ☐

Description of the potential issue:

.....
.....

Explanation of why this potential error is a problem:

.....

.....

.....

.....

Recommendation on how to avoid similar problems in the future:

.....

.....

.....

.....

8. Areas covered by this potential issue (please select all that apply):

Right drug ☐
Right form / quantity ☐
Right dose ☐
Right instructions ☐
Right follow-up ☐
Right documentation ☐
Drug omissions ☐
Right review ☐
Right monitoring ☐

Form 3: Examples of good prescribing

For the examples of good prescribing or monitoring issues identified on FORM 1, please provide further details below (use additional sheets as required).

One page per possible example

Date of data collection: dd/ mm/ yyyy

GP AiT ID code (4 digits - assigned by research team):

Patient ID code: (6 digits – assigned by research team and also for internal use by practice):

DRUG DETAILS (exactly as it appears in the patient record):			
Name & form	Strength	Dose instructions	Quantity

1. Feedback to GP AiT: Yes ☐ No ☐

Description of the example of good prescribing:

……

……

Explanation of why this is an example of good prescribing:

……

……

2. Areas covered by this potential issue (please select all that apply):

Right drug ☐

Right form / quantity ☐

Right dose ☐

Right instructions ☐

Right follow-up ☐

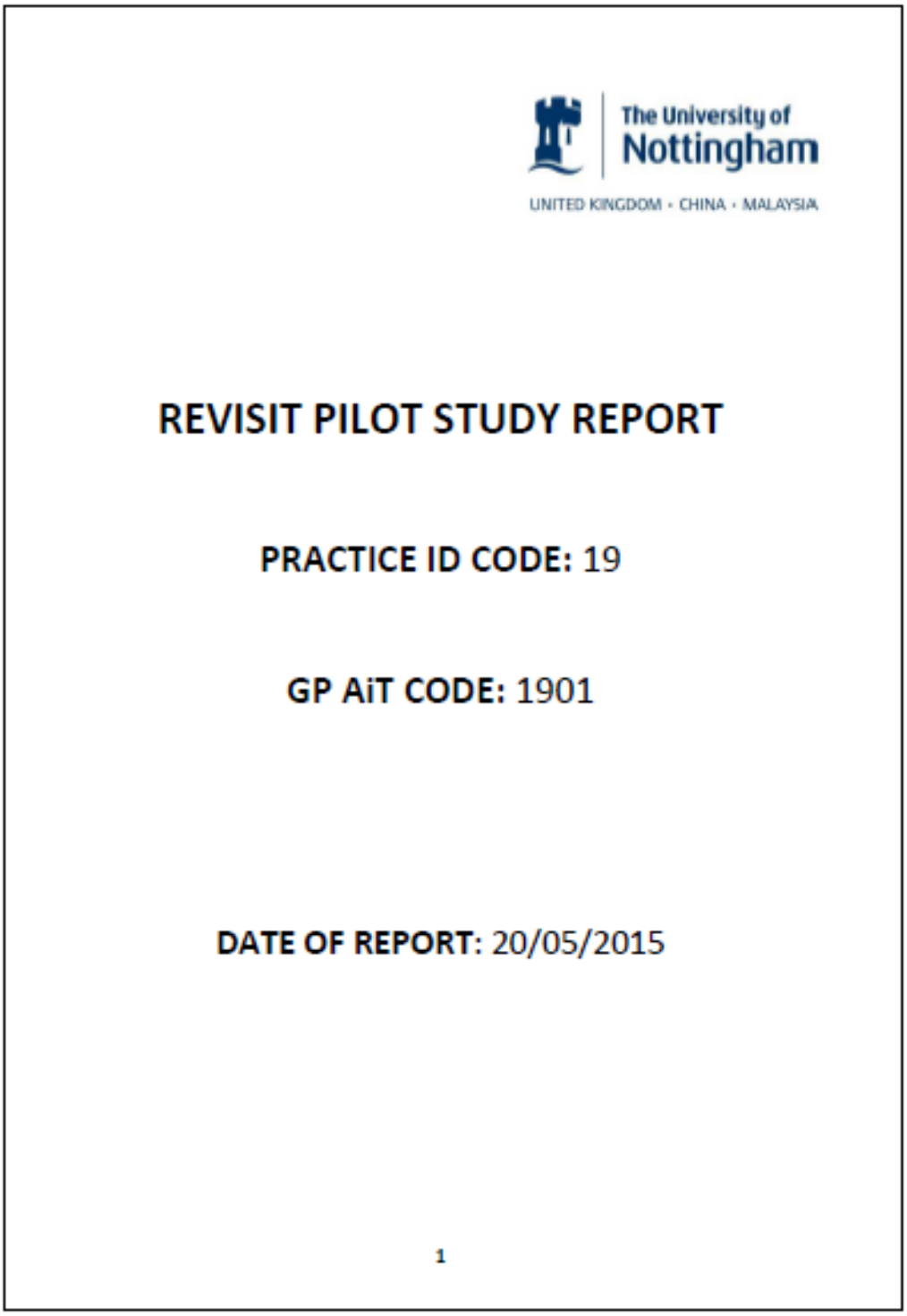
Right documentation ☐

Drug omissions ☐

Right review ☐

Right monitoring ☐

Appendix Five – Example feedback report prepared for a GP trainee



The University of Nottingham

UNITED KINGDOM • CHINA • MALAYSIA

REVISIT PILOT STUDY REPORT

PRACTICE ID CODE: 19

GP AiT CODE: 1901

DATE OF REPORT: 20/05/2015

1

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1. Introduction

1.1. The REVISIT study

Thank you for agreeing to take part in the REVISIT study. The overall aim of this pilot study is to assess the feasibility and value of undertaking a clinical pharmacist-led review of approximately 100 prescriptions issued by GP Associates in Training (AiTs) in consultations during their time in general practice.

1.2. The pharmacy-led review process

Prior to producing this report a pharmacist will have looked at your most recent consultation notes on the practice clinical system and identified consultations where prescribing has taken place. In most instances the review will have started with the most recent consultations and worked backwards until approximately 100 prescription items have been produced. We refer to these as the ***prescribed prescription items*** throughout the report. The prescriptions studied could be for acute or repeat medications but must have been issued during the consultation. Areas of good prescribing practice will also be documented.

In addition to this, we have looked at consultations where a medication review has been coded. All repeat items that have been reviewed during a medication review but not issued, have been noted separately from the prescribed prescription items. We have referred to these items as ***medication review items***.

Finally, we have reviewed recommendations for over the counter medications (OTCs). These ***OTC medicines*** have been summarised separately from the prescribed prescription items and medication review items.

1.3. The report structure

This report contains a further five sections. Section 2 provides an overview of the consultations and medicines reviewed by the pharmacist whilst Section 6 gives an overall impression of the GPAiT's prescribing. Sections 3 to 5 provides a breakdown of the items you have prescribed and the frequency of prescribing for the **prescribed prescription items**, **medication review items**, and **OTC recommendations** respectively. Prescribing events will be highlighted that, based on the information in the clinical record, may warrant further consideration. Each prescribing event will be classified as a:

- **Prescribing error** - a prescribing error occurs when, as a result of a prescribing decision or prescription-writing process, there is an unintentional, significant: reduction in the probability of treatment being timely and effective, or increase in the risk of harm when compared to generally accepted practice.
- **Monitoring error** - a monitoring error occurs when a prescribed medicine is not monitored frequently enough according to current recommendations (if a patient refused to give consent for a test, then this would not constitute an error).
- **Sub-optimal prescribing** – these are prescribing problems that do not fit the above error definitions, but represent less than ideal practice.
- **Legal problem** – these are prescribing problems that do not fit the above error definitions, but fall outside the legal framework for prescribing (an example would be prescribing for a whole family on a prescription for a single patient).

The prescribing events identified will be categorised further under eight headings (right drug, right form/quantity, right dose, right instructions, right follow-up, right documentation, drug omissions and right review).

Sometimes, a prescription may have more than one prescribing event linked to it e.g. it may have sub-optimal dosage instructions and incorrect form. If this occurs the prescription will be listed under each category.

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1.4. The report function and feedback

Although all prescribing events identified in the review process have been listed in the report it is unlikely that the discussion session will cover all of these. The prescribing events that will be discussed with you will appear as the first few entries in each table. Please note however that we have not attempted to categorise items in order of severity or frequency identified. It is hoped that the information in the report, coupled with the feedback session, will help you reflect on your current prescribing practices and where necessary identify any learning needs or changes in practice.

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2. Overview

2.1. Consultations reviewed

A total of 161 consultations you conducted between 16/02/2015 and 03/03/2015 were studied to identify the prescribed prescription items, medication review items and OTC medicines presented in this report.

2.2. Prescribed prescription items

The final number of prescription items reviewed during this process was 100. These prescriptions were identified from 75 consultations where one or more prescription items were issued. There were a total of 33 prescribing events (sub-optimal n=24; prescribing error n=9) identified for the 100 prescription items reviewed.

2.3. Medication review items

Seven consultations were coded to indicate that a medication review had been conducted. In total, twelve medications were reviewed. Of these five medications were reviewed and issued; these have been included under the prescribed prescription items in section 2.2 above. The remaining seven medications that were reviewed but not issued were associated with two prescribing events (sub-optimal prescribing n=2).

2.4. Over the counter medicines

OTCs were recommended in 34 consultations which identified 42 OTC recommendations for review. One prescribing event (error n=1) was identified with these OTC recommendations.

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3. Prescribed prescription items

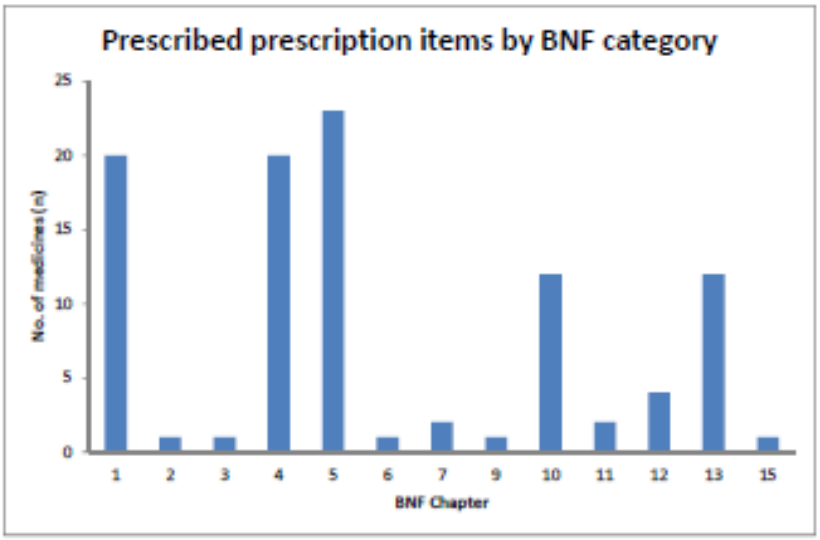
This section provides information on the 100 prescribed items that were reviewed by the pharmacist.

The prescribed prescription items will be summarised by:

(i) BNF category
(ii) Frequency a medicine is prescribed
(iii) Prescription type
(iv) Examples of good prescribing
(v) Category of prescribing event

3.1. Prescribed prescription items by BNF category

Figure 3.1: Breakdown of the prescribed prescription items by BNF category



3.2. Prescribed items showing BNF category and frequency prescribed

Table 3.2. List of the prescribed prescription items showing BNF category and frequency prescribed

BNF Category	Total medicines (n)
Chapter 1	
Buscopan	1
Fybogel®	1
Lactulose	2
Lansoprazole	14
Laxido®	1
Omeprazole	1
Chapter 2	
Doxazosin	1
Chapter 3	
AeroChamber® Plus	1
Chapter 4	
Buccastem®	3
Co-codamol 30/500	1
Codeine Phosphate	5
Diazepam	2
Gabapentin	1
Nicorette Quickmist®	1
Paracetamol	4
Prochlorperazine	2
Sumatriptan	1
Chapter 5	
Amoxicillin	10
Clarithromycin	3
Co-amoxiclav	2
Flucloxacillin	5
Macrobid®	1
Phenoxymethylpenicillin	1
Trimethoprim	1
Chapter 6	
Estradot®	1
Chapter 7	
Canesten®	1
Viagra®	1
Chapter 9	
Dioralyte®	1

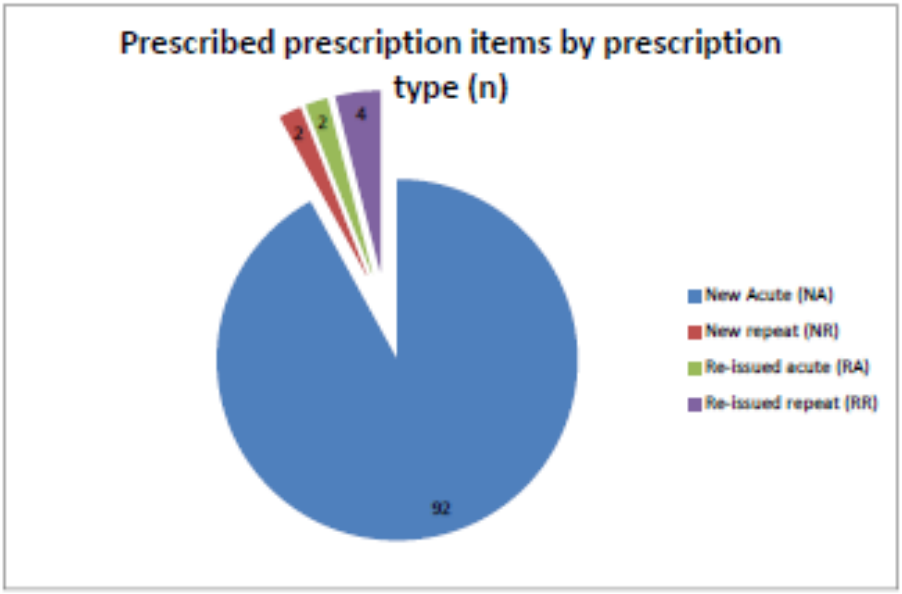
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Table 3.2. List of the prescribed prescription items showing BNF category and frequency prescribed (continued)

BNF Category	Total medicines (n)
Chapter 10	
Colchicine	1
Fenbid® Forte	1
Ibuprofen	7
Naproxen	1
Voltarol Emulgel®	2
Chapter 11	
Chloramphenicol	1
Tears Naturale®	1
Chapter 12	
Beclometasone	2
Nystan®	1
Otomize®	1
Chapter 13	
Bactroban®	1
Betnovate®	1
Cetraben®	4
Daktacort®	1
Fucidin®	1
Hydrocortisone	2
Nizoral®	2
Chapter 15	
EMLA®	1

3.3. Prescribed prescriptions items by prescription type

Figure 3.3. Breakdown of the prescribed prescriptions items by prescription type



NA: newly prescribed acute; NR: newly prescribed repeat; RA: acute re-issued from medication record; RR: repeat re-issued of prescription from medication record

3.4. Prescribed prescription items - Examples of good prescribing practice

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1901013	02/03/2015	Macrobid® 100mg Capsules - take one twice daily for seven days to treat a water infection - 14	Right drug	Nitrofurantoin 100mg M/R capsules prescribed for a UTI in a pregnant lady.	Correct drug choice, dose and duration of antibiotic in a pregnant lady for UTI according to local guidelines.
1901016	02/03/2015	Amoxicillin 500mg Capsules - One to be taken Three times a daily for Five days to treat infection - 15	Right documentation	Delayed prescription given for amoxicillin with clear instructions documented that it is not to be taken for 48-72 hours.	Good documentation of delayed prescription advice.
1901007	03/03/2015	Codeine Phosphate 15mg Tablets - take 1-2 tablets up to 4 times a day as required - 100	Right documentation	Codeine prescribed to a 14 year old. Notes state side-effects have been explained.	Good documentation that side-effects have been discussed with both patient and mum.
1901024	02/03/2015	Phenoxymethylpenicillin 250mg/5ml Oral solution - 1x5ml spoon 4 times/day - 200ml	Right form	Phenoxymethylpenicillin prescribed for a 10 year old for tonsillitis as a 10 day course length.	Correct use of a 10 day course in tonsillitis.

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3.5. Prescribed prescription items - prescribing events

3.5.1. Prescribed prescription items - Right drug

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901157	17/02/2015	Betnovate® 0.1% Scalp application - apply daily - 100ml	Betnovate scalp application prescribed to a two year old whose mum is requesting something for cradle cap. Nil else noted as being tried by mum. Nil in past medication.	Betnovate scalp application is a potent steroid. The BNFC recommends it for severe inflammatory disorders such as eczemas. Unresponsive to less potent steroids, psoriasis. The SPC states that "in general children require shorter courses and less potent agents than adults, courses should be limited to five days and occlusion should not be used." Betnovate scalp application is licensed for seborrhoeic capitis.	Betnovate is a potent steroid to use as a first choice in a 2 year old. If used it should be limited to a five day course.
1901161	16/02/2015	Co-amoxiclav 375mg Tablets - take one three times/day - 21	Co-amoxiclav prescribed for UTI in a man. Patient has an allergy/sensitivity coded to co-amoxiclav in 2007 due to nausea. Notes at a later date 2.3.15 show the allergy as being ended by the same GP and the consultation states patient is not allergic to co-amoxiclav and I have updated the records.	At the time of prescribing co-amoxiclav was coded as a sensitivity/allergy and there was nothing in the notes to say this had been taken into account when prescribing.	Check allergy/sensitivity status when prescribing and update if incorrect.
1901041	27/02/2015	Voltarol Emulgel® 2.32% Gel - apply twice daily - 30g	Diclofenac gel prescribed for ganglion in hand. Patient is asthmatic and has a moderate allergy to ibuprofen coded in the notes as causing breathlessness.	Voltarol 12 hour emulgel (the brand that is prescribed) is contra-indicated in patients who have had a reaction to NSAIDS.	Avoid topical NSAIDS if oral NSAIDS cause breathlessness.
1901106	23/02/2015	Co-amoxiclav 250/125mg Tablets - take one 3 times/day - 21	Co-amoxiclav 375mg prescribed for an 80 year old man with a UTI & BPH (doxazosin started). No allergies. No temperature or flank pain. No previous MC&S. eGFR=77 No repeat medication.	Co-amoxiclav is a second line antibiotic for UTI. It is not clear why the first line antibiotics were not chosen.	Follow local antimicrobial guidelines when possible.

Classification of prescribing event:

Prescribing error | Sub-optimal prescribing

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3.5.1 Prescribed prescription items - Right drug (continued)

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901098	23/02/2015	Fucidin® 2% Cream - Apply three times a day for 7 days - 15g	Fusidic acid cream prescribed for impetigo on face "red spots below lower lip - getting worse".	Fusidic acid cream is a red drug with restricted use in severe staph infections and is not indicated locally in the treatment of impetigo.	Oral antibiotics (flucloxacillin) are recommended for impetigo in very minor localized infections. Polyfax ointment can be considered.
1901158	17/02/2015	Nizoral® 2% Shampoo - Use TWICE a week as directed - 60ml	Ketoconazole shampoo prescribed for a 9 year old with seborrhoeic dermatitis.	Ketoconazole shampoo is not licenced in children under 12 years old.	Avoid prescribing ketoconazole shampoo to children under 12.
1901107	23/02/2015	Clarithromycin 500mg Tablets - take one every 12 hrs - 14	Clarithromycin prescribed as a delayed prescription at patient's request for antibiotics. Doctor thinks it is a viral respiratory infection. Cough lasting 10 days getting worse. No SOBOE, fever on one occasion. Green phlegm HR 100, O2 99% T37 RR16. Patient is a male and penicillin allergic.	For acute cough/bronchitis doxycycline would be the first line antibiotic choice in a penicillin allergic patient.	Refer to antimicrobial guidelines.
1901047	27/02/2015	Lactulose Solution - Take 15ml twice daily for constipation - 500ml	Lactulose prescribed (with Fybogel) for a patient with diverticular disease who may possibly be developing diverticulitis.	Lactulose is an osmotic laxative. CKS states "limited evidence available does not support the use of osmotic laxatives" for the management of symptoms associated with diverticular disease.	Avoid lactulose in diverticular disease.

Classification of prescribing event:

Sub-optimal prescribing

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3.5.2. Prescribed prescription items - Right form/quantity

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901023	02/03/2015	Amoxicillin 125mg/5ml S/F - Oral suspension - Take ONE 2-5ml spoon THREE times a day to treat infection - 100	Amoxicillin prescribed for otitis media as 2.5ml TDS x 100ml.	The quantity supplied will last 13 days but the usual course length for otitis media is 15 days. Amoxicillin suspensions have either a 7 day or 14 day expiry date and it is not possible to tell which was supplied. Therefore the patient may continue to take the antibiotics until the bottle is empty which may mean the product is out of date.	Add a course length to antibiotics especially if a larger quantity is being supplied.
1901121	20/02/2015	Amoxicillin S/F 125mg/5ml Oral suspension - Take ONE 2.5ml spoonful THREE times a day to treat infection - 100ml	Amoxicillin prescribed as 2.5ml TDS and a 100ml bottle supplied. This quantity would last 13 days. The patient had otitis media.	There is no course length stated on the prescription. A standard treatment course for otitis media is 5 days. Some versions of amoxicillin suspension will expire after seven days. The patient may therefore take the antibiotics until the bottle was finished which would be longer than intended and the product may be out of date.	State the course length on directions for antibiotics especially if supplying a greater quantity.
1901093	23/02/2015	Estradot® 25mcg/24hrs Patches - USE two TWICE WEEKLY (MIRENA IS PROGESTOGEN ARM AND NEEDS RV MAY 2018) - 6x24	Estradot prescribed as 2 patches to be used twice weekly.	Estradot is available in different strengths so 1x50mcg patch could be prescribed instead of 2x25mcg. Cost saving of £20 a month and easier for the patient.	Ensure that the correct strength is selected to allow single patch dosing whenever possible.

Classification of prescribing event:

Sub-optimal prescribing

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3.5.3. Prescribed prescription items - Right dose

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901023	02/03/2015	Amoxicillin 125mg/5ml S/F - Oral suspension - Take ONE 2-5ml spoon THREE times a day to treat infection - 100	Amoxicillin prescribed for a 30 week old for otitis media as 62.5mg TDS.	CBNF and local guidelines advise 125mg TDS of amoxicillin from 1 month to 1 year.	Follow recommended dose guidance for antibiotics.
1901145	18/02/2015	Amoxicillin 125mg/5ml sugar free - Oral suspension - Take ONE 5ml spoon THREE times a day to treat infection - 100ml	Amoxicillin 125mg TDS prescribed for otitis media in a 3 year old.	The standard dose of amoxicillin for children aged 1-5 years is 250mg TDS.	Follow recommended dosage in local antimicrobial guideline or CBNF.
1901127	20/02/2015	Amoxicillin 125mg/5ml sugar free Oral suspension - Take ONE 5ml spoon THREE times a day to treat infection - 100ml	Amoxicillin 125mg TDS prescribed for a 5 year old with otitis media.	The child is 5 years 8 months old. The standard dose of amoxicillin from 5 years up to adult is 500mg TDS.	Follow local guidance and CBNF for antimicrobial dosing.
1901121	20/02/2015	Amoxicillin S/F 125mg/5ml Oral suspension - Take ONE 2.5ml spoonful THREE times a day to treat infection - 100ml	Amoxicillin prescribed for a 30 week old child with otitis media at 62.5mg TDS.	The standard dose of amoxicillin for 1 month to 1 year is 125mg TDS.	Follow dosing in antimicrobial guidelines and CBNF.

Classification of prescribing event:

Prescribing error

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3.5.3 Prescribed prescription items - Right dose (continued)

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901071	25/02/2015	Colchicine 500mcg Tablets - One tablet To be taken Four times Daily for 4-5 days - 20	Dose on colchicine prescribed as one tablet to be taken four times daily for 4-5 days. Notes state advised no more than 12 tablets in one course.	Prescribed dose would allow for 16-20 tablets to be taken if patient forgets verbal advice. (Practice formulary dose states 'take one tablet two to four times a day until gout symptoms are relieved. Max 12 tablets per course. Do not repeat course within three days.)	Ensure dose prescribed does not allow for more than the maximum number of tablets in a course. Where there is a formulary dose consider using it.
1901161	16/02/2015	Co-amoxiclav 375mg Tablets - take one three times/day - 21	Patient had a UTI (with pain, feeling hot & vomiting). Co-amoxiclav prescribed (Allergies & sensitivities coded to cefaclor and co-amoxiclav). No MC&S results since Jan 2014. Diagnosis states infection of urinary tract possible ureteric colic. E-pain free, T 37.6 HR 85 RR 15 Urostomy in situ.	For complicated UTI trimethoprim and cefalexin are 1st line (allergy noted to cefaclor) for acute pyelonephritis. Co-amoxiclav 625mg is first line.	If treating as complicated UTI the guidelines would state a 7 day course of trimethoprim as a first line option. If treating as acute pyelonephritis then the higher dose co-amoxiclav would be advised.
1901048	26/02/2015	Daktacort® 1%/2% Cream - apply twice daily for Two weeks when needed - 30g	Daktacort cream was prescribed on infected rash to be used for two weeks.	The SPC for Daktacort recommend it for the initial treatment due to the corticosteroid and recommend stopping after 7 days and converting to miconazole if appropriate.	Use Daktacort for 7 day treatment periods.
1901029	02/03/2015	Flucloxacillin 125mg/5ml Oral solution - 1x5ml spoon 4 times/day - 140ml	Flucloxacillin prescribed for impetigo to a child of 2 years and 2 months old at a dose of 125mg QDS for 7 days	The local guidelines would advise that the dose for a child of 2 to 20 years is 250mg qds for 7 days	Follow the local guidelines for advice on dosage in children
1901043	27/02/2015	Nicorette Quickmist® 1mg/metered dose Mouth spray - use as directed - 1	Nicorette quickmist prescribed with the direction 'use as directed'.	There is no dosage on the prescription to support verbal instructions given to the patient e.g. maximum dose per day, dose per time.	Add a dosage to nicorette products.

Classification of prescribing event:

Prescribing error | Sub-optimal prescribing

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3.5.3 Prescribed prescription items - Right dose (continued)

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901002	03/03/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole 30mg OD prescribed as gastric protection from NSAID. (Both prescribed for TMJ disorder as acutes) No GI Hx, no GI irritant meds on repeat.	The licenced dose of lansoprazole for GI protection from NSAID is 15mg. As the patient is not at high risk of bleed this would be a suitable dose.	Follow licenced doses if appropriate.
1901014	02/03/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach and protect stomach - 56	Lansoprazole 30mg OD prescribed for gastroprotection from NSAID. Previously had 15mg OD with naproxen in November with no known problems. No GI history or concurrent medication.	Lansoprazole 15mg OD is the licenced dose for gastroprotection from NSAID although higher dosage could be used if the risks were high. This patient had no other risk factors.	Consider using lansoprazole 15mg OD for GI protection from NSAID unless there is high risk.
1901156	17/02/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole 30mg prescribed as gastro-protection for NSAID. No other medication. No GI history.	Lansoprazole 15mg is the standard gastro protection dose. The patient does not have any significant risk factors.	Consider using lansoprazole 15mg for gastro-protection unless the patient is at high risk of a GI bleed.
1901072	25/02/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole 30mg prescribed to be taken with OTC ibuprofen for back pain. No repeat medication or GI history.	Lansoprazole 15mg would be the usual gastroprotection dose for patients without other risk factors.	Consider using lansoprazole 15mg in patients who are not at high risk.

Classification of prescribing event:

Sub-optimal prescribing

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3.5.3 Prescribed prescription items - Right dose (continued)

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901040	27/02/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole 30mg prescribed to a patient taking regular NSAID OTC for a knee sprain. No GI history and no other medication.	The standard dose of lansoprazole for GI protection from NSAIDS is 15mg unless the patient is at high risk.	Consider using lansoprazole 15mg for gastroprotection unless there is higher risk.
1901021	02/03/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole 30mg OD prescribed for gastro-protection from ibuprofen. No GI history or concomitant GI irritant medication.	Lansoprazole 15mg OD is the standard GI protection dose unless the patient risks are high.	Consider lansoprazole 15mg OD for gastro protection unless the GI risks are high.
1901025	02/03/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole 30mg OD prescribed as gastroprotection from NSAIDS. No GI history and nil other medication.	Lansoprazole 15mg OD would be the standard licenced dose of lansoprazole for gastroprotection from NSAID unless GI risks are high.	Consider lansoprazole 15mg if gastroprotection from NSAID needed and patient is not at high risk.
1901096	23/02/2015	Omeprazole 40mg Capsules - take one daily to reduce stomach acid/protect stomach - 28	Omeprazole 40mg OD prescribed for 42 year old with viral gastritis (plus buscopan). No other medication, had omep 20mg once in 2011 for possible reflux.	Omeprazole 20mg would be a normal starting dose. The BNF recommends higher doses only when this dose has not been effective.	Consider omeprazole 20mg as the standard starting dose.

Classification of prescribing event:
Sub-optimal prescribing

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3.5.4. Prescribed prescription items - Right instructions

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901066	26/02/2015	Paracetamol paediatric Oral suspension 120mg/5mL - use as directed - 100ml	Paracetamol prescribed for 22 month old with bronchitis with the directions "use as directed".	There is no dose given for the paracetamol in a young child. Normal BNF dosing would be 120mg every 4-6 hours.	Add a dosage to prescriptions for paracetamol in children.
1901115	20/02/2015	Chloramphenicol 1% Eye ointment - Apply to the inner edge of the lower lid of the affected eye(s) FOUR times a day to treat infection - 4g	Chloramphenicol eye ointment prescribed without a treatment eye stated in the directions.	The patient may forget verbal instructions given in clinic.	Add treatment eye to drops and ointments.
1901006	03/03/2015	EMLA® 5% Cream - apply as directed - 5g	Emla cream prescribed for 4 year old with directions "apply as directed".	The PIL for EMLA states 'for children aged 1-6 years: up to 10g of cream on a total skin area not larger than 100cm squared in size. Application time: Approx 1hr, maximum 5 hours." The PIL instructions are not very clear to the patient.	Add clear directions to products when the information is not clear.
1901099	23/02/2015	Otomize® Ear spray - use three times a day - 1	Otomize prescribed with no ear stated on the directions but right ear stated in notes.	Stating an ear on the directions clarifies to the patient if for single ear or both as verbal instructions may be forgotten.	Add treatment ear to ear sprays/drops.

Classification of prescribing event:

Prescribing error	Sub-optimal prescribing

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3.5.5. Prescribed prescription items – Right review

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901147	18/02/2015	Lansoprazole 30mg Capsules - One to be taken daily to reduce stomach acid/protect stomach - 28	Lansoprazole issued from repeat and medication review coded. Nil in consultation regarding lansoprazole. Lansoprazole is linked to indigestion and was issued on 18/2/15, 15/4/14. There are no other medications on repeat.	Lansoprazole is not being collected regularly. It is not clear how often the PPI is needed for indigestion or if the 15mg strength is an option for PRN use.	Consider collection history when undertaking a medication review and consider reducing the dose of PPI if possible.

Classification of prescribing event:

Sub-optimal prescribing

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4. Medication review items

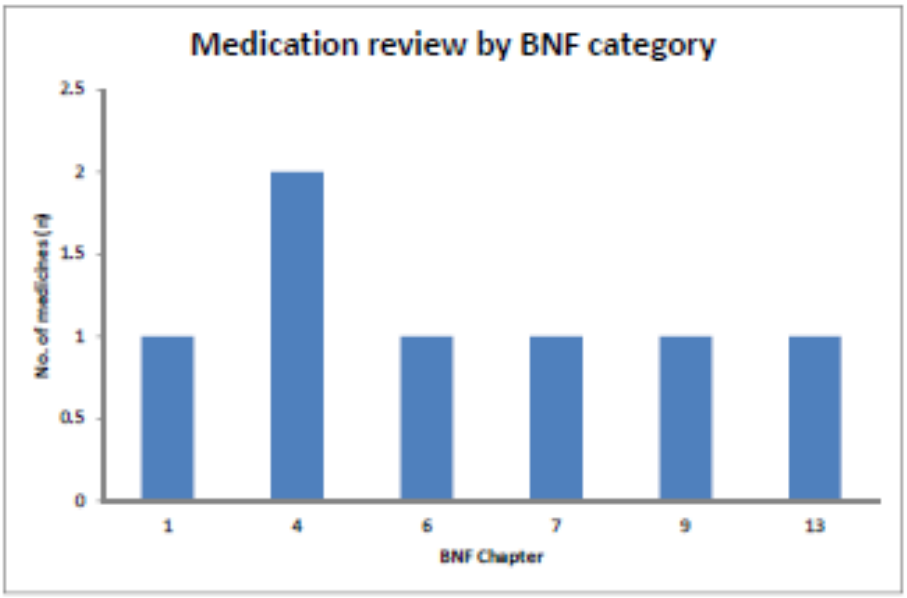
This section provides information on the seven items that you reviewed but did not issue to the patient during the consultation.

The medication review items will be summarised by:

(i) BNF category
(ii) Frequency a medicine was reviewed
(iii) Category of prescribing event

4.1. Medication review items by BNF category

Figure 4.1. Breakdown of the medication review items reviewed by BNF category



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4.2. Medication review items by BNF category and frequency prescribed

Table 4.2 List of the medication review items by BNF category and frequency prescribed

BNF Category	Total medicines (n)
Chapter 1	
Nexium	1
Chapter 4	
Fluoxetine	1
Zomig®	1
Chapter 6	
Actonel Once a Week®	1
Chapter 7	
Zelleta®	1
Chapter 9	
Adcal®	1
Chapter 13	
Epaderm®	1

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4.3. Medication review items - prescribing events

4.3.1. Medication review items - Right instructions

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901092	24/02/2015	Epaderm® Ointment - use as directed - 500	Epaderm prescribed as 'use as directed'.	The patient is collecting the product very infrequently and may forget how and when to use the emollient without a dose on.	Add directions to topical products.

Classification of prescribing event:
Sub-optimal prescribing

4.3.2. Medication review items - Right review

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901116	20/02/2015	Fluoxetine 20mg Capsules - One tablet daily - 30	Medication review coded and patient on fluoxetine (plus zelleta and zolmitriptan). Collection history would mean fluoxetine is not being taken daily. Last two issues 9th Jan and 30th October (Date reviewed by Doctor 20.2.15). Fluoxetine was not mentioned in the medication consultation notes.	The patient is unlikely to be adhering to treatment with SSRI and this should be discussed, the reasons addressed and documented.	Ensure concordance and side effects are assessed at medication review.

Classification of prescribing event:
Sub-optimal prescribing

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5. Over the counter medicines

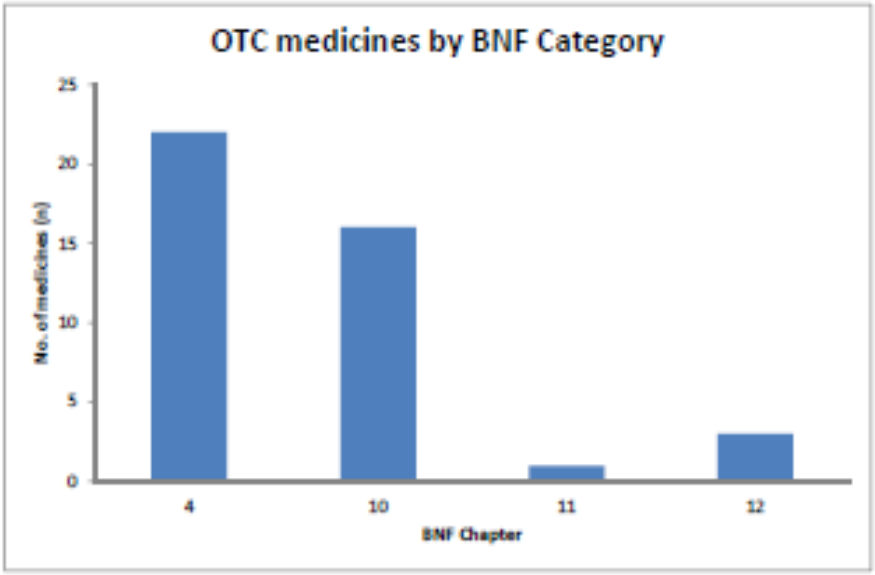
This section provides information on the 42 OTC recommendations you made during the consultations that were reviewed by the pharmacist.

The OTC medicines will be summarised by:

(i) BNF category
(ii) Frequency a medicine was recommended

5.1. OTC medicines by BNF category

Figure 5.1. Breakdown of OTC medicines by BNF category



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5.2. OTC medicines by BNF category and frequency recommended

Table 5.2. List of OTC medicines showing BNF category and frequency recommended

BNF Category	Total medicines (n)
Chapter 4	
Paracetamol	22
Chapter 10	
Ibuprofen / NSAIDs	16
Chapter 11	
Viscotears®	1
Chapter 12	
Olive Oil	3

5.3. OTC medicines – Example of good recommendation

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1901072	25/02/2015	Ibuprofen - no form / dose stated	Right documentation	Patient has asthma read coded but does not have inhalers on repeat. Patient was advised to take ibuprofen OTC and documented in notes that the patient had taken it before with no side-effects.	Good documentation that asthma had been acknowledged and when recommending ibuprofen and that it had previously been taken.

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5.4. OTC medicines – Prescribing event

Patient ID	Date of consultation	Medicine details	Description	Why is it a problem	Recommendation to avoid similar problems in the future
1901098	23/02/2015	Ibuprofen Gel - No dose stated	Ibuprofen gel recommended OTC to be used on impetigo area on face.	The use of ibuprofen gel is contraindicated on broken skin.	Do not recommend ibuprofen gel for broken skin.

Classification of prescribing event:
Prescribing error

6. General comments from the pharmacist undertaking the review

The consultation notes were very clear to understand and the reason for prescribing was documented. There were only a few medication reviews coded during the consultations reviewed. The prescriber has a preference for higher dose PPI for gastroprotection even if the patient has very low risk factors. The dosage of amoxicilin has been updated in children and prescribing was not found to be in line with the new guidance. New medications were generally selected from the practice formulary which was extensive and provides complete dosage instructions.

We would like to thank you once again for taking part in this study.

We will be asking for, and welcome, your feedback as to whether you have found this a valuable and worthwhile process as part of your training to become a GP.

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Appendix Six – interview guides for follow-up interviews

6a. Initial Interview for GP trainees

Ten GPs registrars have agreed to have a clinical pharmacist-led review of 100 prescriptions that they have issued. Following the detailed analysis of the prescriptions, the GPs registrars are asked to attend a tutorial with the pharmacist or another clinically qualified member of the research team to discuss any issues identified from the prescription reviews, and to identify and document learning points. A short time after the tutorial a researcher from the project will undertake a one-to-one, audio-recorded interview with the GP in Training. At this interview, the views of the registrars on the usefulness of the medication review and tutorial will be explored. The interviewer will also explore the extent to which the registrar has addressed the learning needs identified.

A common introduction will be used as follows:

A few days ago you received a tutorial from one of our pharmacists (or clinical members of the research team) in which you were given the results from the retrospective review of 100 of your prescriptions. In this interview I would like to discuss with you your impressions of the usefulness of that review and the value of the tutorial. I am interested in your opinions of the overall process. Your answers will be treated in a confidential manner, so I would like your honest opinion, whether these are positive or negative. If there are any questions you do not feel you can answer, we can skip over that question.

QUESTIONS

The REVISIT project feedback

Why did you decide to take part in this study?

The results

How did you find the report?

- Do you disagree with any of the issues raised?

Were you surprised by any of the results?

Were there any themes that came out for you e.g.

- Not using anti-microbial guidelines
- Any recurrent errors
- Not documenting any actions
- housekeeping

Were the results important for you?

What was the most important thing you got out of this report?

Did you find the feedback on the good prescribing helpful?

Giving the feedback

What did you think about the feedback session?

Were there any benefits with someone coming to explain the report?

Would you have preferred to get the report before the feedback or as we have done it?

The process

Did you find the process supportive?

What was the most useful part of this process for you?

What would you have changed about the process?

What will you now change as a result of this report?

Would you recommend this process to other registrars?

Training

Can you tell me what sort of training you have received on prescribing e.g.

- VTS
- GP Practice
- F1/F2 placements
- Medical School

Do you think this process should be part of the VTS training?

Do you have any further comments about this project?

Concluding remarks will end the interview:

That was the last question on this interview. Thank you so agreeing to the interview. As I mentioned earlier, all data are stored anonymously, and you will not be identifiable from any uses of these data. If you would like any further information about the study, please don't hesitate to contact me. My details have been provided on the information sheet.

Thank you for taking part in this interview.

We would like to contact you again in a couple of months for a final interview.

6b. Initial interview for GP trainers

Ten GPs registrars agreed to have a clinical pharmacist-led review of 100 prescriptions that they have issued. Following the detailed analysis of the prescriptions, the GPs registrars were asked to attend a tutorial with the pharmacist or another clinically qualified member of the research team to discuss any issues identified from the prescription reviews, and to identify and document learning points. A short time after the tutorial a researcher from the project will undertake a one-to-one audio-recorded interview with the GP trainer. At this interview, the views of the trainer on the usefulness of the prescription review and tutorial involving their GP registrar will be explored. The interviewer will also explore the extent to which the trainer believes the registrar has addressed any learning needs identified.

A common introduction will be used as follows:

A short time ago one of your registrars received a tutorial from our study pharmacist (or member of the research team) in which they were given the results from the retrospective review of 100 of his/her prescriptions. As the GP Trainer for this person, in this interview I would like to discuss with you your impressions of the usefulness of the review and the value of the tutorial. I am interested in your opinions of the overall process. Your answers will be treated in a confidential manner, so I would like your honest opinion, whether these are positive or negative. If there are any questions you do not feel you can answer, we can skip over that question.

QUESTIONS

The REVISIT project

Why did you decide to be part of this project?

What did you think about the project?

The results

What did you think about the report? Did you disagree with any of the issues raised?

Were you surprised by any of the results?

Were there any themes that came out for you e.g.

- Not using anti-microbial guidelines
- Any recurrent errors
- Not documenting any actions
- housekeeping

What have you found out about the registrar that you didn't know before?

What's the most important thing that you have got from this review?

What will you do differently now in terms of training?

What do you expect the changes to be for the registrar?

Did you find the feedback on good prescribing useful?

Giving the feedback

What did you think about the feedback session?

Did you see any benefits with someone coming to explain the report?

Would you have preferred to get the report before the feedback or as we have done it?

Was it useful to have an outsider do the feedback session – could trainer have just done it with the report?

What do you think about the pharmacist doing the feedback instead of a GP?

The process

Did you find the process supportive for the Registrar?

What was the most useful part of this process for you?

What would you have changed about the process?

What will you now change as a result of this report?

Would you recommend this process to other registrars?

Training

What do you think about the feasibility of doing this kind of review as part of the VTS?

- With a doctor or a pharmacist

What problems do you foresee?

Do you think this should be part of the training role?

How could the process be improved?

Do you have any further comments about this project?

Concluding remarks will end the interview:

That was the last question on this interview. Thank you for agreeing to the interview. As I mentioned earlier, all data are stored anonymously, and you will not be identifiable from any uses of these data. If you would like any further information about the study, please don't hesitate to contact me. My details have been provided on the information sheet.

Thank you for taking part in this interview.

We would like to contact you again in a couple of months for a final interview.

6c. Follow-up interview for GP trainees

Ten GPs registrars have agreed to have a clinical pharmacist-led review of 100 prescriptions that they have issued. Following the detailed analysis of the prescriptions, the GPs registrars are asked to attend a tutorial with the pharmacist or another clinically qualified member of the research team to discuss any issues identified from the prescription reviews, and to identify and document learning points. A short time after the tutorial a researcher from the project will undertake a one-to-one, audio-recorded interview with the GP in Training. At this interview, the views of the registrars on the usefulness of the medication review and tutorial will be explored. The interviewer will also explore the extent to which the registrar has addressed the learning needs identified. Three months following this, a researcher from the team will arrange a final one-to-one follow-up interview (with both the trainer and the registrar), which will again be audio-recorded. The interview will either be face-to-face or over the telephone. If neither of these contact modalities is feasible, the interview questions will be emailed to the participants for comment.

A common introduction will be used as follows:

A short time ago you received a tutorial from one of our pharmacists (or clinical members of the research team) in which you were given the results from the retrospective review of 100 of your prescriptions. Now that you have had a few months of practice since this review, in this interview I would like to discuss with you your impressions of the usefulness of the review process. Your answers will be treated in a confidential manner, so I would like your honest opinion, whether this is positive or negative. If there are any questions you do not feel you can answer, we can skip over that question.

QUESTIONS

1. *Can you think of any specific areas of your prescribing practice that have changed as a result of the prescribing review?*
2. *At the last interview you said that …. which were the issues that you felt were important – have you now altered that behaviour?*
3. *The review stated that …. Have you altered your way of prescribing since then?*
4. *Are there any other prescribing decisions that you now make differently in other areas?*
5. *What learning needs did the tutorial with one of our research team identify for you?*

***Prompt**: Were you aware of these beforehand?*

6. *Have you acted on addressing these learning needs yet, if not do you plan to do so?*
7. *Are there any kinds of prescribing habits you need to be aware of early on in your first placement for common errors to be found?*
8. *How has your knowledge of prescribing been influenced by the prescribing review?*

9. *How have your attitudes to prescribing been influenced by the prescribing review?*
10. *Do you think such medication reviews would be useful as a standard for GPs in Training?*
11. *How do you think the medication review process could be improved or changed?*
12. *Have you received any other educational input (e.g., tutorials, e-learning) regarding prescribing since the tutorial with the pharmacist/member of the research team?*
13. *Do you have any other comments?*

Concluding remarks will end the interview:

That was the last question on this interview. Thank you so agreeing to the interview. As I mentioned earlier, all data are stored anonymously and you will not be identifiable from any uses of these data. If you would like any further information about the study, please don't hesitate to contact me. My details have been provided on the information sheet.

Thank you for taking part in this interview.

Please let me know if you would like to receive a copy of our study report when this is completed.

6d. Follow-up interview for GP trainers

Ten GPs registrars agreed to have a clinical pharmacist-led review of 100 prescriptions that they had issued. Following the detailed analysis of the prescriptions, the GPs registrar were asked to attend a tutorial with the pharmacist or another clinically qualified member of the research team to discuss any issues identified from the prescription reviews, and to identify and document learning points. A short time after the tutorial a researcher from the project will undertake a one-to-one audio-recorded interview with the GP trainer. At this interview, the views of the trainer on the usefulness of the medication review and tutorial involving their GP registrar will be explored. The interviewer will also explore the extent to which the trainer believes the registrar has addressed any learning needs identified. Three months following this, a researcher from the team will arrange a final one-to-one follow-up interview (with both the trainer and the registrar), which will again be audio-recorded. The interview will either be face-to-face or over the telephone. If neither of these contact modalities is feasible, the interview questions will be emailed to the participants for comment.

A common introduction will be used as follows:

A short time ago one of your registrars received a tutorial from our study pharmacist (or member of the research team) in which they were given the results from the retrospective review of 100 of his/her prescriptions. Now that there has been a few months for the GP registrar to practice following the review, as the GP Trainer for this person, in this interview I would like to discuss with you your impressions of the usefulness of the review. Your answers will be treated in a confidential manner, so I would like your honest opinion, whether this is positive or negative. If there are any questions you do not feel you can answer, we can skip over that question.

QUESTIONS

1. *On reflection what do you now think about the 100 prescriptions review?*

***Prompt**: Did you think it provided you and the registrar with useful information?*

2. *At the last interview you said that …. which were the issues that you felt were important – has the registrar now altered that behaviour?*
3. *Have you seen any other improvement in their prescribing?*
4. *Has it altered any of your practices?*
5. *The review stated that …. Has the registrar changed their way of prescribing since then?*
6. *Did the tutorial with one of our research team identify any learning needs for the registrar?*

***Prompt**: Were you aware of these beforehand?*

7. *Have these learning needs been addressed?*

8. *How do you think that your registrar's knowledge and attitudes of prescribing has been influenced by the prescribing review?*
9. *Has your own knowledge, skills or attitudes towards prescribing been influenced by being a part of this review process?*
10. *Have you changed any of your teaching practices as a result of this review?*
11. *Do you think such medication reviews would be useful as a support for GPs in Training?*

Prompt: *In what ways could this be done?*

Prompt*: What about having peer review of medication prescribing audits*

12. *What did you think of the practice pharmacist's role in this review process?*
13. *How do you think the medication review process could be improved or changed?*
14. *How long has this practice been a training practice?*
15. *How long have you been a trainer?*
16. *Do you use EPS and if so, was it being used when the audit took place?*
17. *Do you have any other comments?*

Concluding remarks will end the interview:

That was the last question on this interview. Thank you for agreeing to the interview. As I mentioned earlier, all data are stored anonymously and you will not be identifiable from any uses of these data. If you would like any further information about the study, please don't hesitate to contact me. My details have been provided on the information sheet.

Thank you for taking part in this interview.

Please let me know if you would like to receive a copy of our study report when this is completed.

Appendix Seven – Examples of good prescribing fed back to trainees

Table 46: Good prescribing examples for trainee 1101

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1101032	27/10/2014	Amoxicillin capsules - 500mg - take one 3 times / day - 21	Right drug	Delayed prescription given for LRTI.	Correct use of a delayed prescription for antibiotics.
1101095	20/10/2014	*Zerobase* cream - 11% - use as directed - 500g	Right drug	*Zerobase* is on the local emollient formulary and is a good cost-effective choice.	Good use of local formulary guidance.
1101046	24/10/2014	Amoxicillin suspension - 250mg/5ml - 1x5ml spoon 3 times/day - 100ml	Right dose	Correct amoxicillin dosage in a one-year-old child (and use of delayed prescription).	Amoxicillin dose in this age range has recently changed.
1101180	09/10/2014	Betamethasone Valerate cream - 0.1% - use a small amount on the left arm twice a day 30mins after the emollient - 30g	Right instructions	Excellent clear instructions	The patient will be able to follow the instructions easily.
1101019	27/10/2014	Ketoconazole shampoo - 2% - Apply every night for 5 days lather on body then leave for 5 mins then rinse off. After 5 days use once every 2 weeks - 100ml	Right instructions	The directions on the prescription were very thorough for the patient.	The patient will be able to comply with the dosage regimen even if they have forgotten the verbal instructions.
1101001	28/10/2014	Clotrimazole pessary - 500 - insert one at night - 1	Right documentation	Good documentation in notes of the guidance being followed i.e. CKS.	This makes it very clear to anyone reading the notes the treatment plan being followed.
1101071	23/10/2014	Gabapentin capsules - 300mg - Day 1: 300mg once daily. Day 2: 300mg twice daily. Day 3: 300mg three times daily. Then continue on 300mg 3 times daily - 100	Right documentation	Good documentation that SE have been discussed and possible interactions. Also that patient will inform anticoagulation team.	Patient will be fully aware of potential issues with the new medication.

Table 47: Good prescribing examples for trainee 1201

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1201040	30/10/2014	*Imodium* - no dose / quantity specified	Right documentation	Good documentation of OTC recommendation.	It is clear what medication has been recommended.
1201045	30/10/2014	Trimethoprim 200mg Tablets - One to Be Taken Twice a Day - 6	Right form	Good use of three day prescribing of trimethoprim for uncomplicated UTI.	Prescribing in line with local antimicrobial guidelines and reduces unnecessary antibiotic use.
1201072	28/10/2014	Amoxicillin 250mg/5ml Oral suspension - One 5ml Spoonful to Be Taken Three Times A Day - 75ml	Right dose	Dose of Amoxicillin was originally prescribed incorrectly but this was realised, and the correct dose was prescribed.	Amoxicillin dosing in children has recently been reviewed and increased. Prescribing was in line with the new guidance.
1201072	28/10/2014	Amoxicillin 250mg/5ml Oral Suspension - One 5ml Spoonful to Be Taken Three Times A Day - 75ml	Right documentation	Delayed prescription was used correctly and documented in the clinical notes.	Using delayed prescriptions can reduce antibiotic prescribing.
1201086	27/10/2014	Bendroflumethiazide 2.5mg Tablets - ONE ONCE DAILY - 56	Right review	Medication review coded. Good documentation of compliance (although term used is now adherence) and lack of SE's.	Clear documentation that patient has been involved with the medication review and has no concerns.

Table 48: Good prescribing examples for trainee 1301

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1301085	14/11/2014	Citalopram Tablets 20mg - One to Be Taken Each Day - 14	Right documentation	Good documentation that an explanation has been given to patient that SSRI will not work for 4-6/52 and need to take for 6/12	Patient is clear from the start that the SSRI needs to be adhered to for a while before effect is seen therefore adherence is likely to be increased.
1301064	17/11/2014	Diazepam Tablets 2mg - Take one or two 30 minutes before procedure - 2	Right documentation	Good documentation in notes that patient had been counselled regarding possibility of drowsiness and to avoid driving after taking.	Effect on driving is an important counselling point for a one-off dosage of diazepam.
1301107	13/11/2014	Naproxen Tablets 500mg - One to Be Taken Twice a Day - 56	Right documentation	Patient was asthmatic. Prescriber checked if the patient had taken Naproxen before and been ok with it. This is clearly documented in the notes.	NSAIDs can precipitate an asthma attack. This possibility had been evaluated and documented by the prescriber.
1301064	17/11/2014	Diazepam Tablets 2mg - Take one or two 30 minutes before procedure - 2	Right form / quantity	Appropriate quantity prescribed of diazepam to cover anxiety for a procedure.	Over-prescribing of benzodiazepines can lead to dependence. Default quantity was not used.
1301035	18/11/2014	Phenoxymethylpenicillin Tablets 250mg - Two to Be Taken Four Times A Day - 80	Right form / quantity	10-day course of penicillin prescribed for acute tonsillitis.	Prescribing course length in line with local antimicrobial guidelines.
1301160	10/11/2014	*Differin* Cream 0.1% - Apply Thinly at Night - 45g	Right instructions	Excellent documentation of the counselling given to the patient regarding initiating adapalene cream.	Documentation is very clear that the patient has been given the information.

Table 49: Good prescribing examples for trainee 1401

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1401010	09/12/2014	Naproxen tablets 250mg - One to Be Taken Twice a Day - 28	Right documentation	NSAID prescribed to an asthmatic and "advised in regard to asthma" documented in notes.	It is clear that the effect of NSAIDS on asthma has been considered.
1401017	08/12/2014	Lansoprazole Capsules 15mg - One To Be Taken Each Morning - 28	Right drug	Lansoprazole was prescribed as gastro-protection with naproxen to a 69-year-old with risk factors.	Appropriate co-prescription of gastro-protection.
1401047	08/12/2014	Erythromycin Ethyl Succinate Oral suspension 125mg/5ml - One 5ml Spoonful to Be Taken Four Times A Day - 100ml	Right drug	Erythromycin 125mg QDS for 5 days prescribed for otitis media in a 23-month-old child with a penicillin allergy.	Drug, dose and course length prescribed all in line with local antimicrobial guidance.
1401072	05/12/2014	*Efient* Tablets 10mg - One to Be Taken Each Day - 28	Right follow-up	New patient review. MI with stent in Dec 2013. Prescribed Prasugrel. GP noted that may be able to stop prasugrel but will await notes to confirm.	GP showed awareness of guidance regarding prasugrel and stopping unnecessary medication.
1401099	03/12/2014	Aspirin Dispersible tablets 75mg - ONE TO BE TAKEN DAILY - 28	Right review	Medication review with patient who had recently finished TB treatment. Prescriber noticed non-adherence to aspirin. Patient did not realise needed it. Letter supports prescribing for at least 2 years.	Non-adherence noted and addressed. Referral to specialist letter to confirm prescribing.

Table 50: Good prescribing examples for trainee 1501

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1501049	09/12/2014	Citalopram 10mg Tablets - One taken each day for two weeks then one taken on alternate days for one week then stop. - 18	Right instructions	Citalopram prescribed as a reducing dose as cross tapering with mirtazapine. The dosage was very clear and well documented with the correct number of tablets given.	The prescriber's intentions were clear, and the patient would understand the dosage.
1501080	08/12/2014	Codeine Phosphate 15mg Tablets - One or two up to four times daily if needed (maximum is 4 tablets in one go). Minimal interval of 4 hours. No more than 16 tablets in one 24-hour period. Can cause nausea and constipation. - 100	Right instructions	Very clear and full directions for a pregnant woman on codeine with lower back pain.	Patient will be able to understand and refer to the dosage.
1501015	11/12/2014	Sodium Bicarbonate 5% Ear drops - Apply twice daily to left ear for 2 weeks - 10ml	Right instructions	Treatment ear stated on ear drops.	Clear dosage instructions provided.
1501045	09/12/2014	Zopiclone 3.75mg Tablets - 1 or 2 tablets taken at night if required. Short term use only - addictive. - 14	Right instructions	Directions included advice that they were for short term use and addictive.	Good clear information on directions to re-enforce to the patient potential for addiction.

Table 51: Good prescribing examples for trainee 1601

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1601031	19/01/2015	Paracetamol Oral Suspension 120mg/5ml - 30-60mg to be taken three times a day - 100ml	Right Dose	Correct dosage added to a paracetamol prescription for a 9-week-old.	Adding an age-appropriate dose to paracetamol prescriptions helps patients to give the correct dose especially in children.
1601028	19/01/2015	Prednisolone Tablets 5mg - 40mg Every Day - 40	Right Dose	Patient seen with asthma and prednisolone prescribed as 40mg dose for 5 days.	40-50mg daily for five days is the dose recommended in the NICE asthma guidance.
1601058	16/01/2015	Furosemide Tablets 40mg - take one each morning - 28	Right Instructions	Furosemide prescribed to be taken in the morning.	The prescription clearly states the preferred administration time as being in the morning rather than just daily. This is important for a diuretic.
1601039	19/01/2015	*Nystan* Oral Suspension 100,000m/ml - 1ml take four times/day - 30ml	Right Instructions	Patient presenting with oral candidiasis prescribed nystatin. GP noticed patient used *Seretide* inhaler and advised rinsing mouth out after use.	A side effect of ICS is oral thrush if the mouth is not rinsed after use.
1601058	16/01/2015	Furosemide Tablets 40mg - take one each morning - 28	Right Documentation	Patient started furosemide and consultation notes stated a clear plan to check bloods in a week and noted previous low sodium.	Intended monitoring plan was clearly documented in the notes.
1601037	19/01/2015	*Zapain* Tablets 30/500 - take take one or take two tablets take four times/day when required - 100	Right Documentation	*Zapain* prescribed, good documentation of why selected and that discussion has been had regarding side effects.	Good documentation.

Table 52: Good prescribing examples for trainee 1701

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1701001	28/01/2015	Amoxicillin Capsules - 500mg - One to Be Taken Three Times A Day - 21	Right Drug	Good documentation of the reason antibiotics were needed (acute sinusitis) and antibiotics prescribed in line with local guidelines.	Antibiotic choice, dose and duration are in line with local antimicrobial guidelines.
1701018	27/01/2015	Macrobid® Capsules 100mg - One to Be Taken Twice a Day - 14	Right Drug	UTI in pregnancy prescribed with correct drug, form, dose and quantity in line with the local guidelines.	Correct treatment of UTI in pregnancy.
1701109	21/01/2015	Amoxicillin Oral Suspension- 250mg/5ml - One 5ml Spoonful to Be Taken Three Times A Day for 5 Days - 100ml	Right Dose	Correct dosing of amoxicillin for a child (4 years) with otitis media.	Amoxicillin dosing has changed, and the dose prescribed is in line with current guidelines.
1701083	22/01/2015	Cefalexin Capsules 500mg - One to Be Taken Twice a Day - 14	Right Documentation	Patient presented with UTI and exacerbation of COPD. The patient had multiple allergies (penicillin, oxytetracycline, clarithromycin) and previous MC&S results showed resistance to trimethoprim and co-amoxiclav but sensitivity to cefalexin. (Penicillin allergy with unknown severity). There was very clear documentation of the thought process that led to cefalexin being prescribed.	The documentation was very clear as to the reason for the choice of antibiotic (which would not be in the local guidelines), and it would help another GP who reviewed the notes afterwards.
1701017	27/01/2015	Ramipril Capsules 10mg - take one daily - 56	Right Follow-up	The U&Es for ramipril were overdue, the GP recognised this and arranged bloods.	Annual monitoring is important for ramipril especially in patients over 65 years.

Table 53: Good prescribing examples for trainee 1801

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1801006	24/02/2015	Fluoxetine 20mg Capsules - take one daily (for menopausal symptoms) - 30	Right documentation	Fluoxetine reviewed for menopausal symptoms. Good documentation of improvement and patient's wish to continue then medication converted from acute to repeat.	Very clear documentation of the effectiveness of current treatment.
1801012	24/02/2015	Lansoprazole 15mg Capsules - take one once daily (to protect the stomach) - 28	Right drug	PPI prescribed to 78-year-old who has been taking NSAID regularly OTC for ankle pain.	Prescriber noticed that OTC medication was causing GI risk and prescribed the correct dosage of PPI.
1801018	24/02/2015	Cerazette® 75mcg Tablets - take one daily - 84	Right drug	Patient presented with headache and photophobia symptoms and diagnosed with migraine. Sumatriptan was prescribed. Prescriber noted that the patient was on a COC and changed to a POP.	Prescriber noticed that concomitant medication needed changing following migraine diagnosis.
1801042	23/02/2015	Amoxicillin 500mg Capsules - take ONE capsule THREE times a day (for infection) - 15	Right quantity	Amoxicillin for a chest infection at 500mg TDS for 5 days.	Correct course length prescribed according to antimicrobial advice.
1801006	24/02/2015	Fluoxetine 20mg Capsules - take one daily (for menopausal symptoms) - 30	Right instructions	The prescriber has added the indications of 'for menopausal symptoms' to the prescription. This is not a pre-set indication in the formulary.	Adding the indication makes it very clear to the patient and other prescribers that the product is not being used for its more common indication of depression.
1801064	20/02/2015	Naproxen 500mg Tablets - take up to one twice daily (for pain/arthritis) with food and stomach protection - 56	Right instructions	Very good, clear directions including advice to take with food, gastric protection and an indication.	The verbal instructions given in clinic will be supported by the clear directions.
1801091	17/02/2015	Simvastatin 40mg Tablets - take one at night to lower cholesterol - 28	Right instructions	Excellent documentation of monitoring requirements planned and discussed with the patient on initiation of simvastatin.	The prescriber's intentions with regards to monitoring are very clear.
1801064	20/02/2015	*Elocon* 0.1% Ointment - apply twice daily for a week on red areas of skin - 100g	Right review	Very clear documentation of a medication review including stopping unnecessary medication.	Good documentation of the medication review and advice given.

Table 54: Good prescribing examples for trainee 1901

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
1901013	02/03/2015	Macrobid® 100mg Capsules - take one twice daily for seven days to treat a water infection - 14	Right drug	Nitrofurantoin 100mg M/R capsules prescribed for a UTI in a pregnant lady.	Correct drug choice, dose and duration of antibiotic in a pregnant lady for UTI according to local guidelines.
1901016	02/03/2015	Amoxicillin 500mg Capsules - One to be taken Three times a daily for Five days to treat infection - 15	Right documentation	Delayed prescription given for amoxicillin with clear instructions documented that it is not to be taken for 48-72 hours.	Good documentation of delayed prescription advice.
1901007	03/03/2015	Codeine Phosphate 15mg Tablets - take 1-2 tablets up to 4 times a day as required - 100	Right documentation	Codeine prescribed to a 14-year-old. Notes state side-effects have been explained.	Good documentation that side-effects have been discussed with both patient and mum.
1901024	02/03/2015	Phenoxymethylpenicillin 250mg/5ml Oral solution - 1x5ml spoon 4 times/day - 200ml	Right form	Phenoxymethylpenicillin prescribed for a 10-year-old for tonsillitis as a 10-day course length.	Correct use of a 10-day course in tonsillitis.

Table 55: Good prescribing examples for trainee 2001

Patient ID	Date of consultation	Medicine details	Area covered	Description	Reason example selected
2001002	10/03/2015	Amoxicillin 125mg/5ml S/F Oral suspension - Take ONE 5ml spoonful THREE times a day - 100ml	Right dose	Correct dose of amoxicillin in a 37-week-old.	The recommended dose of amoxicillin has increased recently. Prescribing is in line with current guidance.
2001002	10/03/2015	Amoxicillin 125mg/5ml S/F Oral suspension - Take ONE 5ml spoonful THREE times a day - 100ml	Right documentation	Note of "NKDA" (no known drug allergy) added to notes when prescribing a penicillin.	It makes it clear that allergies have been checked.
2001035	23/02/2015	OxyContin® 15mg M/R Tablets - take one every 12 hrs - 56	Right documentation	Patient's pain medication was reviewed. Notes documented clearly how initiating dose of oxycontin was decided e.g. stopping tramadol currently taking 15mg TDS *Oxynorm* = 45mg daily equals 22.5mg BD.	Current opioid use was documented and taken into account when initiating oxycontin M/R.
2001041	20/02/2015	Lipitor® 20mg Tablets - Take ONE daily - 28	Right drug	Patient was on simvastatin 40mg and amlodipine. The patient was switched to atorvastatin.	Prescriber recognised interaction between simvastatin and amlodipine.
2001023	09/03/2015	Verapamil 80mg Tablets - Take TWO three times a day - 168	Right follow-up	Verapamil prescribed at 160mg TDS for cluster headache. Patient requested further supply during consultation for tonsillitis. Prescriber checked regarding next follow up with GP and ECG. This was documented before supplying.	Verapamil is unlicensed for cluster headache and should be under specialist review. High doses are used for this indication. The prescriber questioned whether the patient was being followed up before supplying further medication.
2001023	09/03/2015	Phenoxymethylpenicillin 250mg Tablets - Take TWO four times a day for TEN days - 80	Right form	Penicillin prescribed for tonsillitis as a 10-day course.	Correct course length advised and in line with local antimicrobial guidance.

Appendix Eight – Reflections from study team undertaking feedback tutorial.

Practice Code:	**1101**	**REVISIT GP**	**x**
Date / time of feedback:	29 01 15	**Place of feedback:**	xx surgery
GP Registrar ID:	1101	**GP Trainer:**	1101

Preparation for the feedback session **(Put here any ideas, comments that you may need to think of prior to the feedback session)**
Unsure re best way to structure the feedback session – want to make best use of time and highlight important aspects – good that the table has been laid out putting important feedback items towards the top. Firstly – thank registrar and trainer for taking part – explain the project and then start going through the paperwork – good to be able to highlight positive aspects (e.g. documentation that Gill had mentioned to me) Be conscious of time – may need to push through so all 'big picture' items are covered Thank at the end and confirm when Kate coming next week
Reflection on the feedback session **(Feel free to jot down any comments you may have following the feedback. You may wish to consider e.g. whether you felt you had enough time to provide feedback, how was feedback taken)**
90 minutes was a good amount of time – probably used 75 minutes in this (any longer not good)- but that allowed for the fact that 90 mins had been allocated and so both trainer and trainee would be starting seeing patients at 90 minutes – so good for them to have breathing space beforehand. Specific cases were talked through – seemingly with good effect and reflection on learning . Good to ask about receiving the document beforehand – although I really think this would decrease the value of the feedback session –good to be able to provide context and reassure re the fine detail level of prescribing issues being picked up Thoughts re questions to trainer and trainee by (*interviewer*) next week – was it useful to have an outsider do the feedback session – could trainer have just done it with the report? could trainer and trainee just be emailed the report? What about the pharmacist doing the feedback

Practice Code:	1201	REVISIT GP	x
Date / time of feedback:	3rd February 2015	**Place of feedback:**	Xx surgery
GP Registrar ID:	1201	**GP Trainer:**	1201

Preparation for the feedback session

(Put here any ideas, comments that you may need to think of prior to the feedback session)

Took about an hour to prepare.

I highlighted the things I wanted to discuss.

Slightly worried about doing all this in an hour.

Keen to avoid registrar feeling defensive.

Reflection on the feedback session

(Feel free to jot down any comments you may have following the feedback. You may wish to consider e.g. whether you felt you had enough time to provide feedback, how was feedback taken)

Went well overall.

I sensed the registrar was a little nervous to begin with and I tried hard to reassure her.

Managed to get through most of the material within 40 minutes (which was a surprise to me).

Registrar seemed to find the exercise useful and there were several learning points.

Practice Code:	**15**	**REVISIT GP**	**x**
Date / time of feedback:	Tues 4th March 2015	**Place of feedback:**	Xx surgery
GP Registrar ID:	1501	**GP Trainer:**	1501

Preparation for the feedback session

(Put here any ideas, comments that you may need to think of prior to the feedback session)

Feedback from pharmacist was that this GPR seemed to be very confident and possibly didn't seek help from his trainer as much as other GPRs

Viewing report there seemed a few areas of note

- There was a lot of non- generic prescribing
- There were quite a few prescriptions for non first line medications
- instructions on prescriptions were very comprehensive

Reflection on the feedback session

(Feel free to jot down any comments you may have following the feedback. You may wish to consider e.g. whether you felt you had enough time to provide feedback, how was feedback taken)

Generally the session went well

Feedback seemed to be well received and acknowledged as accurate

Trainer used the session to reinforce the importance of checking guidelines and asking advice of colleagues.

We also explored the GPRs justification for using non first line medication. Initially this was: 'In my experience first line medication doesn't work'. Further exploration clarified that he had seen consultants in hospital practice repeatedly using non first line medication. We explored the reasons for this, especially the different populations in primary and secondary care.

The number of drops in 1ml of medication was a leaning point for all of us.

The feedback took just under an hour, and this seemed plenty of time to complete the task without rushing.

Practice Code:	**1601**	**REVISIT GP**	**x**
Date / time of feedback:	29th April 2015	**Place of feedback:**	XX Surgery
GP Registrar ID:	1601	**GP Trainer:**	1601

Preparation for the feedback session

(Put here any ideas, comments that you may need to think of prior to the feedback session)

Issue with 'take take' highlighted.

I have been told that Sarah didn't graduate in the UK – could English be a factor here?

Reflection on the feedback session

(Feel free to jot down any comments you may have following the feedback. You may wish to consider e.g. whether you felt you had enough time to provide feedback, how was feedback taken)

Trainer and trainee were lovely – very receptive to the process – trainee especially very keen to learn and asking questions.

Issue with 'take take' – trainee says that the practice computer system automatically translates Latin short codes – she has been writing 'take TDS' – the computer has been translating 'tds' as 'take three times daily' so with her adding 'take' this makes more difficult to read for pt – trainee had been unaware this was happening. Trainer also wondered if others in the practice could also be having similar issues as the 'translation' is relatively new I think.

Issue with dose of paracetamol – trainee said that she had previously been very careful with e.g. weighing the child and then writing the correct dose of paracetamol down – they had had a talk from the chemist that most of the patients would go to – saying that they would write on the age – specific directions for drugs like paracetamol – so trainee reverted to just writing 'take as directed' – we reflected on what might happen when trainee hopefully starts independent GP practice soon – may not have as close a relationship with pharmacists

Also – on the 500ml of paracetamol – trainer and trainee thought that this might be a 'high-up' option on the drop-down list and so easier to select than one lower down the list.

Practice Code:	**1701**	**REVISIT GP**	**x**
Date / time of feedback:	28th April 2015	**Place of feedback:**	XX Surgery
GP Registrar ID:	1701	**GP Trainer:**	1701

Preparation for the feedback session

(Put here any ideas, comments that you may need to think of prior to the feedback session)

Generally there seemed to be quite a high number of events - just need to make sure that registrar doesn't feel got at and disengage as a result.

Seem to be quite a few events related to failing to remove items from repeat medication when prescribing alternatives.

One clearly significant error when Solaraze prescribed for topical pain relief

He seems to have got talked into some odd prescribing for patient travelling to India - I just wonder if registrar's own background has an influence on this.

Reflection on the feedback session

(Feel free to jot down any comments you may have following the feedback. You may wish to consider e.g. whether you felt you had enough time to provide feedback, how was feedback taken)

Generally felt the feedback session went ok

Trainer was quite protective of her Registrar but quite happy to admit that she had learnt quite a bit from the session.

The significant error had already been recognised by the practice and discussed fully so I didn't major on that.

Registrar felt that his prescribing had improved quite a bit in the 3 months since the data had been collected, and that he had already found ways of avoiding several of the prescribing events. For example he uses codeine rather than co-codamol when the patient is already using paracetamol. Also felt was more careful when selecting medication from dropdown lists. It seemed that the process of having his prescribing reviewed had made him reflect on possible weaknesses even before he had had the feedback.

We had a long chat about prescribing to patients who are just about to move out of the UK.

I was allowed an hour to give feedback and managed to keep within this timescale without rushing.

End of document