Methodological and ethical challenges in investigating nurses' experiences of medication errors

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Dissertation submitted to the University of Nottingham in partial fulfilment of the requirements for the Degree of MA in Research Methods (Health Pathway)

December 2017

method [1]

< *méthode,* in middle French

< *methodus,* in middle Latin

< *μέθοδος,* in ancient Greek:

méthodos = [*metá* + *hodós*]

méthodos is the 'pursuit of knowledge, investigation,

mode of prosecuting such inquiry, system'

< from the words: 1) *metá*, μετά: 'after, expressing development'

and 2) *hodós*, ὁδός: 'way, motion, journey'

[1] Waite, M. (2013) **Pocket Oxford English Dictionary, 11th edition.** Oxford: Oxford University Press.

Abstract

The present dissertation is about registered nurses' experiences of medication errors (MEs) which are approached as lived phenomena. A meta-synthesis (systematic review of qualitative evidence) of nurses' experiences of MEs is presented first, followed by a relevant research proposal to investigate them with interpretative phenomenological analysis (IPA), a reflexive chapter about the methodological and ethical challenges for their investigation and finally a Doctor of Philosophy (PhD) research proposal is presented.

The meta-synthesis included eight studies and was conducted by using thematic synthesis. The focus is gathered exclusively on nurses' experiences of MEs which were approached as lived phenomena. The themes and subthemes that emerged out from the synthesis were six and twenty, respectively. The themes were: 'moral and emotional impact', 'constructive learning', 'impact on professional registration and employment', 'nurses' coping strategies with the experience', 'patient and family' and 'identification of contributing factors of and preventive measures for MEs'.

The review contributes to the understanding of nurses' making sense of experiences of MEs and towards to this direction a holistic view about the value and dimensions of the experience itself is provided. As frontline nurses are responsible for the medication administration to patients, the moral and emotional impact of the errors is devastating for their professional identity, employment status, and personal life. Yet, the experience of MEs by nurses poses a constructive aspect and nurses detect strategies to cope with the error occurrence and its consequences. They also detect ways to translate their experience into a beneficial and constructive lesson for themselves, their practice and the organisation they work for.

The meta-synthesis revealed that none of the previous studies used IPA to explore nurses' experiences of MEs and only a few studies focused exclusively on their meaning. Thereby, a research proposal presents the rationale for using IPA, methods, methodological and ethical challenges that such a study entails. However, within the context of the master course, it was impossible to achieve ethical approval to carry out the proposed study and a reflexive chapter about the methodological and ethical challenges faced is developed instead. Examples of the challenges faced concerned nurses' recruitment and management of emotionality during the interview.

The above research proposal and reflections about the methodological challenges led to the formation of a future PhD proposal of a qualitative interviews design study combined with characteristics of IPA. Finally, the dissertation concludes with implications for further research.

Keywords: registered nurses/RNs, medication errors, experience, qualitative research, methodology, ethics, interviews, phenomenology, IPA/Interpretative phenomenological analysis.

Acknowledgments

First and foremost, I would like to thank my academic supervisors Professor Alison Edgley, Professor Eleanor Wilson and my clinical supervisor Dr Philip Miller for providing their generous guidance to me, challenging me and improving my thinking skills regarding the present scientific piece of work. I would also like to thank Professor Kristian Pollock for her recommendations and Professor Jane Seymour for introducing myself to Professor Wilson.

I feel grateful for the strong support by Professor Alison Edgley, Professor Claire Diver and the postgraduate course administrator Mrs Lisa Burr for the opportunity to undertake the Master of Arts course, their support and understanding throughout the course. Also, I feel privileged to have met and worked together with all my fellow students.

Finally, many thanks to my family for the strong support, the Sandra Charitable Trust for the economic support, Professor Thalia Bellali for being my referee when I applied for the master and Dr Savvato Karavasiliadou for being my referee when I applied for the master and support throughout the course.

Abbreviations

BNI	British Nursing Index
CASP	Critical Appraisal Skills Programme
CINAHL	Cumulative Index to Nursing and Allied Health Literature
ICU	Intensive Care Unit
ICN	International Council of Nurses
IPA	Interpretative Phenomenological Analysis
IV	Intravenous
MARM	Master of Arts in Research Methods
ME	Medication Error
MST	Medicine Safety Team
MeSH	Medical Subject Headings
NCCMERP	National Coordinating Council for Medication Error Reporting and Prevention
NHS	National Health Service
NMC	Nursing and Midwifery Council
NPSA	National Patient Safety Agency
PQ	Participant's/Participants' Quote
PICo	Population, phenomenon of Interest, Context
PhD	Doctorate of Philosophy degree
PRISMA-P	Preferred Reporting Items for Systematic Review and Meta-Analysis-Protocols
PTSD	Post-Traumatic Stress Disorder
REC	Research Ethics Committee
RN	Registered Nurse
UK	United Kingdom
UoN	University of Nottingham
USA	United States of America
WHO	World Health Organisation

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Chapter one: Introduction

This dissertation is about registered nurses' (RNs') experiences of medication errors (MEs). The first chapter presents the statement of the project, modification of the project and dissertation structure, followed by subchapters that synthesise the background of the topic. In the present piece of work the terms RNs and nurses referred to the same individuals.

1.1. Small scale study to test the design

This dissertation project concerns the exploration of nurses' experiences of MEs by using interpretative phenomenological analysis (IPA). The essence of the exploration of making sense of the human experience is translated in the present study as for how the lived phenomenal experience (ME experience) is expressed by the worldviews of individuals (nurses) who are engaged in it and in a very specific context (each ME case). The expected benefits of the investigation of nurses' experiences of MEs include how they make sense of their experiences (as phenomena) and their relevant structure:

- contributory factors to MEs (Mrayyan, Shishani and Al–Faouri, 2007, Jones and Treiber, 2010, Kim, Kwon, Kim et al., 2011),
- actions for reporting them or not (Mayo and Duncan, 2004, Kim, Kwon, Kim et al., 2011, Stratton, Blegen, Pepper et al., 2004),
- legal consequences (Schelbred and Nord 2007),
- educational outcomes (Arndt, 1994, Santos, de Camargo Silva, Munari, and Miasso, 2007),
- psychological impact on nurses (Schelbred and Nord, 2007)

or any other new aspects. After reviewing the theoretical context of an array of the above relevant studies, three elements of nurses' experiences were chosen for further development of the empirical part of the project: identification, reporting and management of MEs.

1.2. Study design and dissertation structure

The dissertation is synthesised by six chapters. The first chapter presents the topic of the dissertation and background of MEs in nursing. The second chapter is a systematic

review of studies that have investigated nurses' experiences of MEs. The third chapter addresses the methods and the methodology approach to explore nurses' experiences which is the proposed empirical part. The empirical part of the study was planned to be presented at the fourth chapter, but because I was unable to carry out the project, this chapter is replaced by reflections about its methodological and ethical challenges instead. The reasons for not conducting the project itself were its sensitivity and time limitations, in along with the process of preparing the forms for submission to the ethics committee. Finally, chapter five presents a Doctor of Philosophy (PhD) research proposal and the dissertation concludes with a summary of the present piece of work and further implications.

1.3. Background

The RNs across the UK are competent with the standards for medicines management, as defined by the Nursing and Midwifery Council (NMC) (official website NMC, 2010).

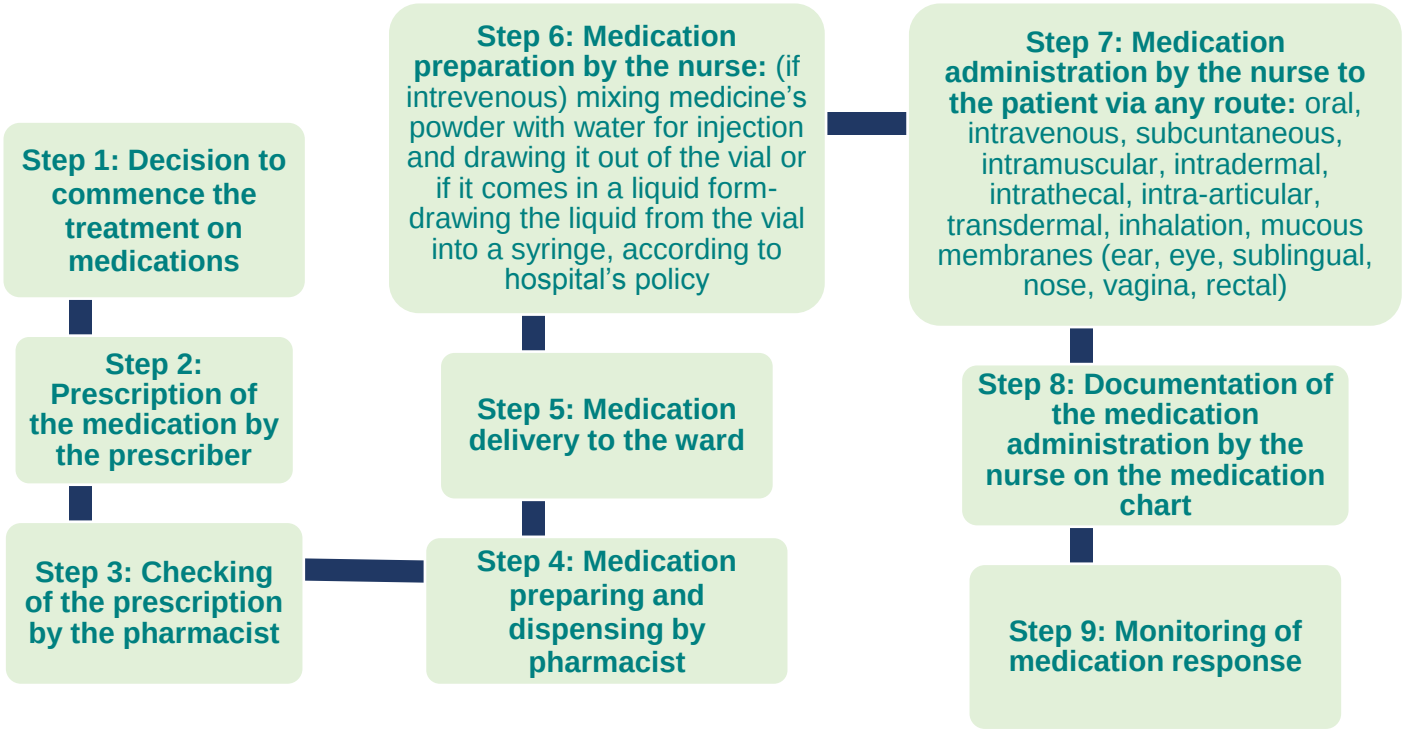
1.3.1. Medication administration process and nurses' role

The medication administration process consists of nine steps (Figure 1) (Leape, Kabcenell, Berwick and Roessner, 1998, Funnell, Koutoukidis and Lawrence, 2009). The first five stages of the medication administration process concern the doctors and pharmacists. The nurses are responsible and participate only in the last four stages of the process: medication preparation, administration, documentation and monitoring (Kazaoka, Ohtsuka, Ueno et al., 2007, Reid-Searl, Moxham, Walker and Happell, 2010), thereby these specific stages are considered and constitute the basis to develop the present project.

The RNs perform medication administration rounds to administer medications to patients (step 7, Figure 1). It is useful to mention what a medication administration round/drug round is:

> *'…drug rounds (medications administered to patients at prescribed times)… The prescribed times for administration of the drugs; starting and finishing times of the drug rounds; the way drugs were delivered (on a drug trolley, prepared at the time of administration)…'* (p. 187, Palese, Sartor, Costaperaria et al., 2009).

Figure 1. The stages of the medication administration process.



In a time-motion observation study about the amount of time of nurses' workflow is spend on care tasks (Keohane, Bane, Featherstone et al., 2008), *'obtaining and verifying medications'* was the medication-related task nurses dedicated high amount of their workflow. In fact, RNs spend around 25-40% of their workflow performing medication-related tasks (Armitage and Knapman, 2003, Keohane et al., 2008). Research evidence revealed that when nurses administer medications to patients pay attention to various factors, such as communication issues about medicines, checking dosages, making the whole process intellectually complex (Eisenhauer, Hurley and Dolan, 2007).

A study that looked into RNs' experiences of the medication administration process, assured that they experienced numerous issues and obstacles throughout the medication administration process, such as equivocal prescriptions, unavailability or incompatibility of the medicines, dysfunction of software, changing medicine brands and a substantial amount of generic substitutions (Pirinen, Kauhanen, Danielsson-Ojala et al., 2015).

Thereby, the whole medication administration process is a multistage and mentally vigilant practice that requires better understanding (Figure 1). It can be argued that the frontline nurses play an important role in the chain of patient safety, which is demanding, and determinant for its maintenance, especially on busy clinical environments (Wolf, 1989, Jones and Treiber, 2010, Reid-Searl et al., 2010).

1.3.2. Research significance of medication errors

The research on MEs is vital because of the involvement of various healthcare professionals in patient care, which is usually very complex (Unver, Tastan and Akbayrak, 2012). Specifically, the MEs research has an impact on the:

a. healthcare professionals: legal consequences, moral consequences, psychological effects, educational lessons and implications on their professional practice/fitness to practice (Erlen, 2001, Schelbred and Nord, 2007, Sulosaari et al, 2011)
b. national health service (NHS) Trusts: identification of contributory factors and establishment of preventive measures of MEs, process of reporting MEs, culture of safety, quality of care, legal consequences and financial implications (readmissions, prolonged length of hospitalisation, patient morbidity and mortality) (Mayo and Duncan, 2004, Stratton et al., 2004, Mrayyan et al., 2007, Kim et al, 2011, Smeulers, Onderwater, Zwieten et al., 2014, Hayes, Jackson, Davidson and Power, 2015)
c. patients: patient safety, severity of harm, morbidity and mortality risk, emotional distress/psychological effects for patient and relatives (Erlen, 2001, Vincent, 2006).

1.4. Summary

This chapter is an overview of the topic that is presented in the dissertation, its structure, significance of investigating nurses' experiences and MEs, medication administration process and nurses' role in medicine safety. After reading this chapter, the understanding of the issues presented in the next chapter is enhanced.

Chapter two: Literature review

The second chapter presents a systematic review of qualitative research evidence (meta-synthesis) about nurses' experiences of MEs and examination of studies' methodological design, as well. The meta-synthesis was conducted as an evidence-based part to support the initial research project, independently of carrying out the empirical part or not.

2.1. Background

The background section of this systematic review refers to MEs in nursing and focuses mainly on the identification, reporting and management of MEs by RNs. The same elements have been proposed in the research protocol for the empirical part, as well.

2.1.1. Medication errors in nursing

The National Coordinating Council for Medication Error Reporting and Prevention (NCCMERP) of the United States of America (USA) defined the ME as:

> *'any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, procedures, and systems, including prescribing, order communication, product labelling, packaging, and nomenclature, compounding, dispensing, distribution, administration, education, monitoring and use'* (official website NCCMERP USA, 2001).

The above definition is adopted in the present work, as it is prevailing globally, even though there is a need of formulation of a standard, clear and consistent definition of what a ME is (Lisby, Nielsen, Brock et al., 2010). To my knowledge, there is no respective definition coming from British professional bodies or researchers. Along with MEs definition, it is useful to classify them according to the degree of harm: none, mild (minimal harm and short term), moderate (symptomatic patient, requires interventions, increased the length of hospitalisation, cause permanent or long term harm), severe (symptomatic patient, requires medical/surgical life-saving interventions, loss of life expectancy, major long term or permanent harm) and death (based on probabilities-

harm was caused and led to death shortly after the error) (official website, World Health Organisation-WHO, 2009). There are four categories of MEs: (1) no error, (2) error occurrence, but no patient harm noticed, (3) error occurrence and patient harm noticed (temporary, permanent, needed interventions to sustain life), and (4) error occurrence which resulted or contributed to death (official website NCCMERP USA, 2001). Further, the types of MEs are classified according to the description of the incident (Appendix A) and when investigating MEs should be considered (Taxis and Barber, 2003, Westbrook, Rob, Woods and Parry, 2011).

The MEs incidence has only been recorded by researchers locally. For example, 2/3 of 224 nurses participated in a cross-sectional study mentioned recent (last month prior the study) involvement in ME incidents (Kim et al., 2011). In the same study, the ME cases concerned mainly intravenous (IV) medication administration (67.2%), they were cases where the error concerned wrong medication dose (26.8%) and nearly half (43.3%) of the ME cases happened during day shifts (Kim et al., 2011). The same evidence is identified in other studies: cases where the top cause for the MEs concerned wrong medication doses (Tang et al., 2007, Sheu, Wei, Chen et al., 2009); or high rate during day shifts (Sheu et al., 2009). Further, the error-prone wards were the medical, surgical wards and intensive care units (ICUs) with high occurrence (70-75%) of MEs (Tang et al., 2007, Sheu et al., 2009).

In one of the studies mentioned above (Sheu et al., 2009), the severity of MEs was examined. The sample of the study was nurses and the MEs analysed concerned only stages of the medication administration process that nurses were involved in and found that 6.6% and 9.6% of the errors had mild (vital signs or blood sugar change, allergic reaction) and severe (severe reaction, coma, death) consequences to patients, respectively. Again, it is hard to ascertain MEs incidence because of their definitions, causes, relation to the stage of the medication administration process, methods of observation and ways to study them, vary among researchers (Wright, 2013).

In addition, the report of Kohn, Corrigan and Donaldson (1999) is a benchmark for errors in healthcare research. The report identified the significance of the consequences of medical errors by estimating between 44,000 98,000 deaths/year in the USA. The report by Koh et al. (1999) is vital because it highlighted the importance of MEs (happened in any of the stages of the medication administration process) and the implications for the healthcare professionals, health systems and patients. In contrast, the exact incidence of MEs in the UK is unknown (official website Department

of Health, UK, 2004), even though there are few published individual studies about the incidence of MEs in the UK which emphasise their upward trend (Dean, Schachter, Vincent and Barber, 2002, Dean, Vincent, Schachter and Barber, 2005, Schachter, 2009).

2.1.2. Contributory factors

Depending on their contributory factors, MEs are classified to individual and systematic/organisational. The individual causes include factors such as nurses' personal neglect, nurses' non-adherence of the '5 Rights' (Appendix B) or double checking and exhaustion, while the systematic causes involve the heavy workload, distractions, interruptions, insufficient training and high nurse-to-patient ratio (Brady, Malone and Fleming, 2009, Jones, 2009, Karavasiliadou and Athanasakis, 2012). Taiwanese nurses considered the combination of factors, as the major cause of MEs occurrence. The factor *'need to solve other problems while administering drugs'* was the top error-prone condition (p.451, Tang et al., 2007).

Both individual and organisational factors contribute the same to ME occurrence (Karavasiliadou and Athanasakis, 2012). The understanding of the complexity of the contributory factors, in along with the contribution of nurse managers and leaders, educators, researchers and the other healthcare professionals is essential to recognise them and apply strategies to prevent them (Brady et al., 2009).

2.1.3. Management of medication errors

It is evident in a series of studies that nurses' experiencing fear which is the top barrier when reporting a ME (Chiang and Pepper, 2006, Kagan and Barnoy, 2008, Jones and Treiber, 2010, Petrova, 2010, Kim et al., 2011) and that MEs are under-reported (Stratton et al., 2004, official website NPSA, 2007, Mansouri, Ahmadvand, Hadjibabaie et al., 2014, Higuchi, Higami, Takahama et al., 2015). Nurses' decision-making regarding the reporting of a ME is relevant to their experiences of previous cases of errors (own or colleagues) (Chiang, Lin, Hsu et al., 2010). In fact, results from another study stressed that ME cases always need reporting, even if their consequences are not serious (Jones and Treiber, 2010). Instead, nurses report their MEs only when the consequences are serious (Wright, 2013).

In a qualitative study (Jeffe, Dunagan, Garbutt et al., 2004), the top facilitator for reporting a ME was the explicit guidelines of the reporting process. Other facilitators of

reporting a ME were the anonymity of the referrer of the error and simplification of the process (Jeffe et al., 2004). The establishment of a standard and accurate reporting process for MEs is adequate (Mayo and Duncan, 2004, Kim et al., 2011). For instance, the introduction of anonymity when reporting an error is beneficial. Its benefits are its influence on the overall process of reporting and elimination of their under-reporting. In addition, it is a criterion to revise current medication protocols or to educate the nurses on medicine safety issues (Mayo and Duncan, 2004, Kim et al., 2011).

The established preventive measures for the MEs include measures like the minimisation of interruptions, adherence of the '5 Rights' (Appendix B), adherence of the double-checking of the medication (the medication is checked by two registered professionals-usually RNs), improvement of nurses' medication calculation skills, establishment of an electronic medication system and adoption of safety strategies from other disciplines (aviation) (Choo, Hutchinson and Bucknall, 2010, Elliott and Liu, 2010, Athanasakis, 2012, Athanasakis, 2015). Choo et al. (2010) underlined the adoption of multidisciplinary approaches, but considered the interdisciplinary communication equally necessary to promote safety.

All the established measures for the prevention of MEs have been criticised by researchers who questioned their modification and effectiveness. For instance, the efficacy of the '5 Rights' (Appendix B) may not be enough because they do not consider the human factor and its role in the process or in accordance with other authors there are more 'Rights' added to the already known: 'Right Documentation', 'Right Action', 'Right Form', 'Right Response' (Grissinger, 2002, Eisenhauer et al., 2007, Conrad, Fields, McNamara et al., 2010, Elliott and Liu, 2010, Macdonald, 2010).

In brief, it is worth mentioning that each preventive measure and all of them combined target to the minimisation of MEs incidence, as their full elimination is probably unlikely. Nowadays, there is a need for a thorough examination of every factor of the context and the settings in which the MEs happened (Wright, 2013).

2.2. Aim, rationale and methods

2.2.1. Aim

The aim of the meta-synthesis is to aggregate and synthesise the qualitative evidence of studies about nurses' experiences of MEs and appraise studies' methodological quality. A literature search and the PICo tool formulate the research question (Table 1) (Methley, Campbell, Chew-Graham et al., 2014, The Joanna Briggs Institute, 2014).

Thereby, the research question is the following: **How do clinical RNs make sense of experiencing a medication error in their practice?.**

Table 1. The PICo tool applied to the present systematic review.

PICo items	Elements of the systematic review
Population	RNs with experience over 6 months who work in clinical areas and provide direct patient care. Clinical nurses are those who attended a 3-year undergraduate degree in Nursing (Manias and Bullock, 2002).
phenomenon of Interest	RNs' making sense of experiences of MEs.
Context	All clinical areas of hospital settings of, either public or private sector.
Types of included studies: all types of qualitative studies and the qualitative part of mixed methods studies, provided that it is presented and analysed separately.	

2.2.2. Rationale

Only a few primary research studies investigated elements of nurses' experiences of MEs, underlying the possible lack of evidence of systematic assessment of the relevant studies. The number of studies investigated the methodological approaches of exploring topics around MEs in nursing is limited, as well. So, the present systematic review of research evidence about the phenomenon of experiencing MEs by nurses contributes to a better understanding of its sense for them and the methodological challenges their study entails. Furthermore, it is of interest to develop knowledge in these fields to:

a. find out what the answer is to the research question the meta-synthesis sets out
b. gather previous qualitative evidence to provide insights into all the dynamics, behaviour and elements of the lived experience of MEs by nurses
c. discuss the methodologies used to investigate nurses' experiences
d. enrich the literature about nurses' experiences.

2.2.3. Design

The present review integrates principles of a systematic literature review of qualitative research evidence (meta-synthesis) (Sandelowski and Barroso, 2003, 2007). The Cochrane Collaboration (2017) defines the systematic review as a *"…review of a*

clearly formulated question that uses systematic and explicit methods to identify, select, and critically appraise relevant research, and to collect and analyse data from the studies that are included in the review…". The value of systematic reviews is related to the gathering of research evidence to handle the growing knowledge, to contribute to trustful conclusions, inform and influence the clinical practice and the evidence-based practice (Evans and Pearson, 2001, Beck, 2009, Pryce-Miller, 2015). On the other hand, an advantage of the systematic review towards the traditional literature review is that it contributes to the assessment of the quality of the studies reviewed and synthesises their findings by using accountable, explicit and rigorous methods to interpret the evidence and inform the research question. Also, by setting inclusion and exclusion criteria in the systematic reviews, the possibility of researcher bias is minimised and transparency is achieved (Ham-Baloyi and Jordan, 2016).

Systematic reviews concern either quantitative or qualitative primary research evidence, and are named as meta-analyses and meta-syntheses, respectively (Evans and Pearson, 2001). The approaches of synthesis in qualitative research are: meta-synthesis, thematic synthesis, meta-ethnography, meta-summary, meta-narrative, critical interpretive synthesis and meta-study (Barnett-Page and Thomas, 2009, Tong, Palmer, Craig et al., 2014). 'Meta-synthesis' is defined as: '*an interpretive integration of qualitative findings in primary research reports that are in the form of interpretive syntheses of data: either conceptual/thematic descriptions or interpretive explanations'* (p.199, Sandelowski and Barroso, 2007). Meta-syntheses aim at the understanding or interpretation of the contextual frame of the phenomenon under investigation (Walsh and Downe, 2005, Thorne, 2009). The goal of the syntheses is the production of *'theoretical constructs, models or thematic schemas to explain the phenomena'* (p.4, Tong et al., 2014).

Lately, the rate of the published meta-synthesis papers has been increased and the editorial boards of the journals encourage the researchers to publish such papers (Harwood and Clark, 2013, Laging, Ford, Bauer and Nay, 2015, Schulman-Green, Jaser, Park and Whittemore, 2016). However, there are debates in literature so far, about the challenges that a qualitative researcher faces and the methodological issues of meta-syntheses. For instance, the methods of how to integrate the qualitative findings, the fact that their preparation is a time-consuming process or challenges the ways to address the validity of the data analysis (Jones, 2004, Dixon-Woods, Bonas, Booth et al., 2006, Xu, 2008).

In the present meta-synthesis, thematic synthesis is undertaken (Thomas and Harden, 2008). By setting inclusion and exclusion criteria, integrating tools (PIcO, PRISMA, CASP), setting explicit research question and transparent describing of the review steps are strategies that constitute the core of systematic review process. All the above steps are the structure of the present meta-synthesis that define the ground to synthesise elements of nurses' experiences and bring them together to understand how nurses' make sense of their experiences of MEs. The systematic review is the first step towards the understanding existing research on the topic and development of a research proposal. All steps of the systematic review were performed by the author of the dissertation.

2.2.4. Search strategy

A search was undertaken in PUBMED, BNI (British Nursing Index) and CINAHL (Cumulative Index to Nursing and Allied Health Literature). The inclusion and exclusion criteria are presented in Table 2. The searches included combinations of the keywords: '**r**egistered nurse', 'nurses' experience', 'nursing' 'medication error/s' and 'qualitative research'. An example of a search strategy is illustrated in Appendix C.

Before commencing the second search, the references of the studies found in the first search were checked for any potential study to be included in the review. Additional searches were conducted to the database of the library of University of Nottingham (UoN) and Google Scholar to enhance the detection of other possible studies and to detect grey literature, mainly Master or PhD dissertations published on the libraries of the universities. The inclusion and exclusion criteria were the same, as the ones in the first search. The results of the grey literature are presented at the discussion part.

2.2.5. Study selection

The PRISMA flowchart (Flowchart 1) illustrates the inclusion and exclusion of studies in the meta-synthesis. The total number of the eligible studies was eight.

2.2.6. Quality appraisal

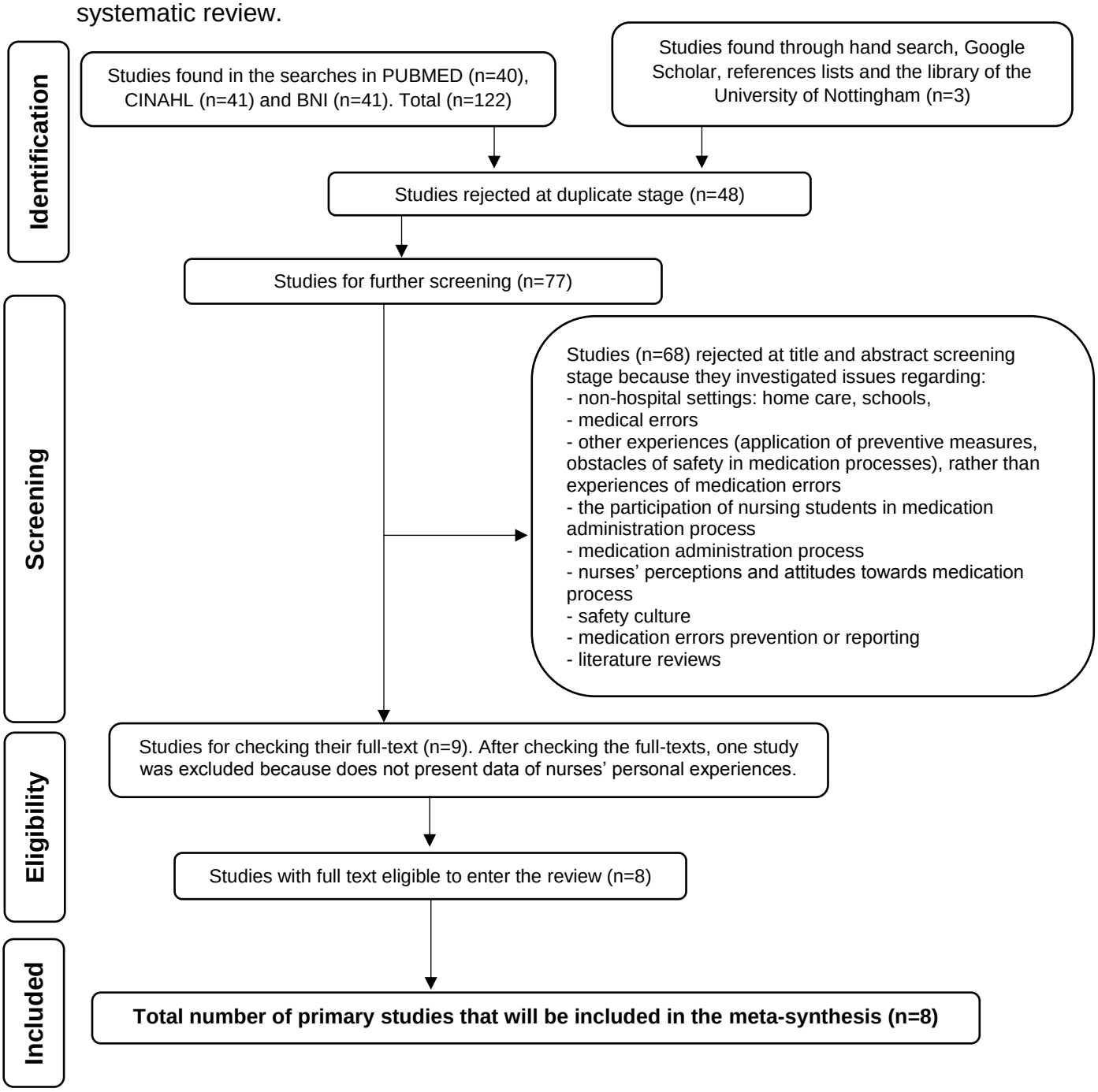
The Critical Appraisal Skills Programme (CASP) tool was used for the assessment of the qualitative studies that reached this stage (CASP, 2013) and their findings were integrated in Appendix D. The points to be emphasised are the appropriateness of the sample to the research question, collection of data, analysis of data, transferability of

the findings, ethical considerations management (and reflexivity) and clear overall description of the design (Kuper, Lingard and Levinson, 2008).

Table 2. The inclusion and exclusion criteria for the studies reviewed for the meta-synthesis.

Inclusion criteria	Exclusion criteria
- Band 5 and above RNs with >6 months of experience who work in any NHS hospital wards/acute settings of public or private sector	- Band 5 and above RNs with <6 months of experience settings other than hospital wards/acute settings, such as nursing homes, community or private hospitals and
- RNs who are competent with medication administration	- RNs who are not competent with medication administration
- RNs who experienced their own MEs	- RNs who did not experience any MEs
Studies that:	
- included predominantly nursing sample. Other studies that recruited mainly RNs, but recruited also nursing students will be considered.	- included nurses, but included other healthcare professionals (physicians, healthcare assistants), as well, without focusing on nurses' experiences merely
- investigated RNs' experiences (any dimension: a sequence of actions-pre- and post-event, a record of what happened, nurses' feelings, emotional response, support, reporting of the error, contributory factors, constructive outcomes, defensive outcomes) regarding MEs	- investigated only other areas rather than experiences of MEs (e.g. RNs' attitudes or perspectives of the factors contributing to MEs' occurrence, prevention measures for MEs, facilitators or barriers for reporting MEs). Also, studies that explored RNs' experiences of MEs from the clinical and professional perspective, rather than the experience of MEs as a phenomenon or situation
- which investigated exclusively RNs experiences of MEs or in combination with other factors, like perspectives or attitudes	- which investigated only RNs' attitudes or perspectives of any issue about MEs
- investigated RNs' experiences of all types and severity degree of MEs	- investigated errors in healthcare in general: medical errors ad nursing errors without a special reference to the MEs from a nursing perspective
- which are primary research and used qualitative methods (interviews, focus groups, coding, content analysis) and design (grounded theory, phenomenology, conversation analysis, ethnography, discourse analysis) or the qualitative part of mixed methods studies, if it is presented separately	- which are articles or papers (like purely quantitative studies) other than primary qualitative research or mixed methods studies that analysed both qualitative and quantitative data in their findings
- published from January 1980 until June 2017 and in English. It is expected that most of the studies would have been published 1999 and onwards. This is because of the publication of the study by Kohn et al. in 1999 which constituted an alert for patient safety and concern about the increased rate of MEs. Thereby, the studies about MEs in healthcare and particularly in nursing are mainly published after 1999.	- published before January 1980 and after June 2017 in a language other than English

Flowchart 1. The PRISMA flowchart of the studies included and excluded in the systematic review.



2.2.7. Data abstraction and synthesis

The synthesis of the qualitative evidence for the present meta-synthesis was based on thematic synthesis by Thomas and Harden (2008). It aims at the identification of recurrent themes and consists of three stages: coding text, developing descriptive themes and generating analytical themes (Thomas and Harden 2008, Tong et al., 2014). First, all participants' quotations were read line-by-line. Then, participants' quotations of all studies were gathered in a single table. All quotations were separated

and classified according to their meanings which led to the development of the first sub-codes. All sub-codes were read again. At the final stage, further processing on the sub-themes took place, which led to the final table of themes. All themes were scanned again and were classified, according to their meanings, similarities, so that to generate new constructs of interpretation.

The combination of qualitative primary evidence of studies that each of them used different qualitative methodologies is a certain aspect. First, extracting and synthesising qualitative data is legitimate, as truths are multiple in the qualitative paradigm (Walsh and Downe, 2005). However, there should be an array of characteristics in place among the included studies, like the implementation of:

- analytic technique: inter-relation-as they explored aspects of nurses' experiences of MEs, tabulation of all details and reciprocal translation (Appendix D), preservation of the original text and its meanings, the rich hermeneutic intent of meanings (Walsh and Downe, 2005)
- synthesis of translation: exemplify refined meanings and new concepts (Walsh and Downe, 2005).

The thematic synthesis by Thomas and Harden (2008) is a suitable approach to analyse primary data about nurses' experiences because it focuses on primary research studies and participants' quotations, it is transparent and allows the development of analytical themes and the creation of new knowledge and concepts which respond to the research question (subchapter 2.2.1.) of the systematic review. In addition, an important feature of the process is that the participants' quotations from the primary studies were used inductively to capture the meaning of every quotation and form the codes.

2.3. Findings

Eight studies were included in the meta-synthesis (Arndt, 1994, Rassin et al., 2005, Santos et al., 2007, Schelbred and Nord, 2007, Luk, Ng, Ko et al., 2008, Jones and Treiber, 2010, Smeulers et al., 2014, Linnard-Palmer and Ngo, 2016). Their basic features are presented in Appendix D. A brief table of the themes and subthemes that emerged out from the synthesis of the findings of the included studies were six and twenty, respectively (Table 3). An analytical table of the themes and relevant quotations is presented (Table 4).

Table 3. The themes and subthemes that emerged out from the meta-synthesis.

Theme 1: Moral and emotional impact
- personal ethical codes - human fallibility - experience of feelings - experience of symptoms - catharsis
Theme 2: Constructive learning
- constructive changes in self-learning and in clinical nursing practice - constructive changes within the organisation culture
Theme 3: Impact on professional registration and employment
- professional registration - employment
Theme 4: Nurses' coping strategies with the experience
- self-management and colleagues - professional support - compliance with the medication administration policies - non-reporting of the medication error
Theme 5: Patient and family
- contact with the patient - patient's status and safety - disclosure of the error and its consequences or not - sympathy towards the nurse
Theme 6: Identification of contributing factors of and preventive measures for medication errors
- individual-related factors - health system-related factors - preventive measures

Table 4. The findings (themes, subthemes, quotations) of the meta-synthesis.

Theme 1: Moral and emotional impact

Personal ethical codes

Nurses perceived themselves to have an ethical character as individuals and healthcare professionals, as well. A moral aspect of the dilemmas that nurses faced at the period post to MEs is the compromise of their career or not, because of reporting the ME or not. The participants described this deontological dichotomy with the words such as *'no choice'*, *'right'* and *'rules'* (Arndt, 1994). Further, by making the MEs nurses felt that they betrayed their colleagues, the patient and relatives:

'…trust in me. I felt that I gambled with others' trust and love' (Participant's Quote (PQ), p.320, Schelbred and Nord, 2007),

'horrible, like I betrayed the patient's trust even though no harm was done.' (PQ, p.246, Jones and Treiber, 2010).

Human fallibility

Human fallibility is mentioned in the context of *'reconciliation with human precariousness'* (p.524, Arndt, 1994):

'I was not the only one to do such a thing', 'we are all human, we all make mistakes' (PQ, p.524, Arndt, 1994).

Arndt (1994) underlined that nurses' acceptance of their fallibility is a way of harmonisation with the feelings of guilt. Nurses started accepting their fallibility, as they are humans, and realising that are prone to make mistakes and understanding that nobody is perfect, even though they considered themselves perfectionists:

'…*That you can also make a mistake, not just your colleagues. Even though you're a perfectionist.*' (PQ, p.879, Rassin et al., 2005).

In another study, human fallibility was the result of a combination of being stressed and distracted. In other words, it was not just human fallibility, but also a result of their environment. In the specific example, the source of nurses' stress was an

increased workload. Nurses were prone to make a ME when they performed many nursing tasks simultaneously and especially when they were distracted:

> *'…I've gone through the vials in the tray and took the appropriate one. I didn't check again, and administrated the medicine. I kept talking to the patient and hadn't paid attention. Later, another nurse asked me why the patient was suddenly been given antibiotics'* (PQ, p.877, Rassin et al., 2005),
>
> *'The one moment where it sometimes goes wrong is when it is busy, because you need a double check and you can't find anyone. Then, sometimes you make the consideration; 'OK what is the risk if I don't do the double check?' And sometimes I choose to do it alone'* (PQ, p.280, Smeulers et al. 2014).

Although authors considered that participants' reports were congruent with previous research evidence; it is shown that the occurrence of increased workload, nurses' stress and exhaustion or distractions and interruptions during the medication process are contributory factors to MEs. It is useful to remember that the risk for MEs becomes even higher when all the above three factors are occurred the same time, instead of occurring separately.

Thus, nurses resisted on accepting their new self-image, which included the experience of a ME that threatens their professional identity:

> *'how can my words have any importance after this? Being a professional nurse has always been a part of my identity. The error was a severe threat to my identity'* (PQ, p.320, Schelbred and Nord, 2007).

Experience of feelings

Of course, the review confirms that across all studies the experience of MEs has strong devastating consequences for nurses' emotions. A plethora of negative emotions is identified: fear, loss of self-confidence, self-blaming, blaming, anger, self-doubt, lack of concentration, humiliation, shame, stress, precariousness, loneliness, concern, powerless, insecurity, trauma, tension, disability, panic, mistrust, despair, thoughts of worst scenarios of what the ME could result to and keep distance from things (Arndt, 1994, Rassin et al., 2005, Santos et al., 2007, Schelbred and Nord, 2007, Jones and Treiber, 2010, Linnard and Ngo, 2016).

A major feeling of nurses that experienced ME was fear:

a. the description of the potential to cause severe harm to the patient was strain (Schelbred and Nord, 2007). The initial fear was related to the severity of harm to the patient and the potential that it could have caused moderate or severe harm:

'The hardest was hearing that I made a mistake. I was terrified and immediately thought what will be with the patient.' (PQ, p.878, Rassin et al., 2005),

'I feared that my patient would die. He had got out of a severe moment and I would be the responsible for that and I didn't want to.' (PQ, p.485, Santos et al., 2007),

'My first and major concern was for the patient's safety and well-being. Then I experienced an overwhelming sense of despair…' (PQ, p.245, Jones and Treiber, 2010),

'Medication is something people are afraid of making mistakes with, afraid to give the wrong medication; afraid to be held accountable for. The biggest fear is to give something that kills someone. You don't want that on your conscience of course' (PQ, p.278, Smeulers et al., 2014),

b. another type of fear was the *'fear of clarify misunderstandings'* between nurses and patients:

'My patients are afraid to ask questions… they don't understand all aspects of medications and treatments and they won't ask questions… they are reluctant to ask questions…' (PQ, p.48, Linnard-Palmer and Ngo, 2016),

c. fear of being involved in disciplinary procedure and repercussion:

'…And I believe that anybody can make an error, and it depends on whether people use the procedures to make it a disciplinary event, or a supportive event and leam something at the end of it…' (PQ, p.524, Arndt, 1994),

'I was sure they'll send me home and fire me.' (PQ, p.879, Rassin et al., 2005),

and while expecting the announcement of the verdict of the inquiry of the incident:

'I didn't know what to expect and thought of the worst.' (PQ, p.879, Rassin et al., 2005),

'…every day is like eternity.' (PQ, p.882, Rassin et al., 2005).

It is obvious that the relationship between fear and MEs is a multifaceted issue. Fear around issues of MEs implies the negative climate that dominated in clinical nursing practice, the absence of support to nurses by nursing administrators and subsequently nurses' reluctance to report their errors, especially if the errors do not cause actual harm to patient's status (Arndt, 1994, Walker and Lowe, 1998). Multiple studies about nurses' views on reporting of MEs documented that disciplinary actions, punishment, power hierarchy and reactions of nursing administrators post-error were barriers for nurses towards the error reporting (Chiang and Pepper, 2006, Mrayyan et al. 2007, Ulanimo et al., 2007, Kim et al., 2011). In a couple of studies included in the meta-synthesis, fear was followed by despair or self-doubt and mistrust (Schelbred and Nord, 2007, Jones and Treiber, 2010).

A result of nurses' resistance of accepting human fallibility as part of their human nature was shame. Notably, in one study in which it is mentioned the following statement: *'He who works, errs'* (p.880, Rassin et al., 2005). Nurses were ashamed in

respect of their colleagues, the patient and their relatives (Rassin et al., 2005, Santos et al., 2007, Schelbred and Nord, 2007, Jones and Treiber, 2010). Shame also occurred as consequence of losing their clinical confidence. For the nurses who maintained their self-confidence after the error, it was more likely to be open and they had the possibility to discuss their experience further (Schelbred and Nord, 2007).

Feeling guilty is mentioned in various studies. In one study, all participants were feeling guilty (Rassin et al., 2005). Examples of feeling guilt are:

> *'I could have died'* (PQ, p.524, Arndt, 1994),
>
> *'I felt guilty and uncomfortable about being the main origin of this discomfort for the patient.'* (PQ, p.485, Santos et al., 2007).

Nurses believed that fear was the one that dominates and influences them on whether to report a ME (Walker and Lowe, 1998). Perhaps their self-blaming, explains that nurses were afraid to lose their registrations in case of MEs reporting (Wolf, 1989). Besides, a systematic review of 24 studies about the psychological effects on healthcare professionals following the experience of a medical error were the emotional distress (feelings of anxiety, self-doubt, shame, guilt) (Sirriyeh, Lawton, Gardner and Armitage, 2010).

Experience of symptoms

Aside from the negative feelings, other conditions were identified. These were symptoms and signs of diseases: depression, sleep difficulties (nightmares, dreaming of the event, insomnia), post-traumatic stress disorder (PTSD) and thoughts of committing suicide (Rassin et al., 2005, Schelbred and Nord, 2007). Almost all the above symptoms are signs of PTSD. The PTSD occurs after the exposure to a traumatic or stressful event and usually is triggered by fear, angry, feeling horror, stress,

sleep difficulties (National Institute of Mental Health, 2016). In the study of Schelbred and Nord (2007) a several number of nurses experienced PTSD.

The experience of making a ME lasted for months or years:

> *'they* (the nurses) *thought and dreamt of the event for several months.'* (p.882, Rassin et al., 2005),

> *'…was traumatic for our participants* (the nurses) *and that, even years after, they still struggled to handle the stress caused by the error*' (p.322, Schelbred and Nord, 2007),

and there were nurses who were reliving the incident again after its occurrence:

> *'I could walk down the street when it came to my mind, 'you did it!' It has lasted for years. And I feel at this moment; it will always be in my mind.'* (PQ, p.320, Schelbred and Nord, 2007).

The experience of a ME was a *'traumatic event'* (p.883, Rassin et al., 2005) for the nurses throughout their career. It left its signs and a trauma that will never heal:

> *'…It's hard even today, it left me deeply traumatised. I can't forgive myself…'* (PQ, p.882, Rassin et al., 2005).

It is certain that recovering from this experience needs time. The catastrophic consequences of the errors influenced both personal and professional level of individual's life and left a sense of incompetency with the nurse: *'Often having feeling of incompetency'* (p.47, Linnard-Palmer and Ngo, 2016). Extreme examples (two cases) of the deep mental health instability were the suicidal thoughts. The cases were primary results of criticism to the nurse and the other one was the result of ineffective management of the incident by the nurses' superiors. One of the nurses experienced difficulties to rebuilt her

personal life (Schelbred and Nord, 2007). Likewise, in the same study, there were doctors that blamed a nurse who made the error by saying that she should receive punishment for that, accentuating in this way the nurse's negative feelings (Schelbred and Nord, 2007).

Catharsis

The phenomenon of catharsis was rare. It refers to the relief that nurses feel after sharing the experience with other people who supported them. Schelbred and Nord (2007) reported briefly that the interview was an opportunity for the interviewees to deal with their errors. Also, only one participant in a study mentioned that the experience was cathartic for him (Arndt, 1994). Feelings of tranquillity after discussing the experience and relief after realising that the ME did not cause harm to the patient were experienced:

> *'The decision I took soothed me because I did the right thing. I called my boss and communicated the event to her…'* (PQ, p.485, Santos et al., 2007).

Similarly, it is worth mentioning a similar example from another study that explored self-reconciliation following mistakes in practice (in general) by hospital nurses. One of the participants have not discussed her pain for 20 years after the error and cried while being interviewed. However, the participant herself expressed the therapeutic meaning that the interview with the researcher had (Crigger and Meek, 2007). Further, Rassin et al. (2005) concluded in their work that a future research direction to face the negative feelings is the sharing of emotions among people with similar experiences within a group.

Theme 2: Constructive learning

Constructive changes in self-learning and in clinical nursing practice

A very first constructive lesson for the nurses who experienced a ME is a reminder of the rituality of the tasks of the medication administration process. The lessons that nurses obtained from their experiences had to do with their self-consciousness and risk awareness when working in the clinical areas. The self-awareness or the *'self-regulations'* (p.884) includes:

a. acknowledgment of their role and *'strong feelings of responsibility'* (p.278) within the medication administration context:

'You just have to look carefully, you always have to look carefully on the medication order, what it says, what is prescribed, what dosage for which patient.' (PQ, p.278, Smeulers et al., 2014),

b. avoidance of multitasking during the shift:

'There is a lot of turmoil in the medication room. I mean if you are working with five nurses during the day and there are eight students present as well, and they all have to prepare medications, then it's a henhouse, that doesn't work.' (PQ, p.280, Smeulers et al., 2014),

c. and maintenance of their attention only in the task they perform every time:

'…turned the distribution of medication from a regular and routine action, to a process demanding concentration, thought, and complete attention, according to the professional medication procedure requirement.' (p.884, Rassin et al., 2005).

Participants mentioned improving of their judgement towards their colleagues and that judging others is not so easy anymore. They were more tolerant and understood that nurses were prone to making MEs:

'I have a deeper insight in the sense of not judging other people so easily. My tolerance is much higher.' (PQ, p.321, Schelbred and Nord, 2007).

A constructive change for the clinical nursing practice was the enhancement of nurses' skills of medication safety and practices. These concerned medicine administration vigilance and consciousness of MEs reporting (Schelbred and Nord, 2007). Vigilance was described as:

a. mode of looking for knowledge:

'Read, if you're in doubt read again, still in doubt?...ask' (PQ, p.486, Santos et al., 2007),

b. improving levels of knowledge:

'I started studying more about pharmacology.' (PQ, p.486, Santos et al., 2007),

c. generation of a state of alert when administrating medications:

'…For that time it made its mark, and now I have eight eyes when I distribute medication.' (PQ, p.884, Rassin et al., 2005),

'Now I ask the name, I'm more alert to the patient's name. I don't call the patient, I ask his/her name.' (PQ, p.486, Santos et al., 2007),

'I have never forgotten. In fact, whenever I'm injecting I remember this error, you know. You can see h/ow it marks us, can.t you?' (PQ, p.486, Santos et al., 2007),

'It marked me and since then I'm very careful with this matter of medication dosage, right route and right time.' (PQ, p.486, Santos et al., 2007),

d. acknowledgment of situations wherein the risk for making a ME was high:

'A mistake with oral medication is…well that feels less serious than injections. All medications that you give through an infusion or injection generally work very fast, so you have limited options to correct.' (PQ, p.279, Smeulers et al., 2014).

Constructive changes within the organisation culture

The learning can be *'part of a process of change in the organisational structure of nursing education and practice'* (p.525, Arndt, 1994) and nurses' experiences of MEs, for instance, resulted to amendments of policies, changes in the understanding of hierarchy and staff management (Arndt, 1994). Nurses who participated in another study highlighted issues around patient safety practices, such as their efficacy, scientific validity, and innovation that will ensure MEs were detected on time:

'People have to feel that it has an advantage and that it contributes to the safety of the patient. I think that is what motivates nurses.' (PQ, p.281, Smeulers et al., 2014).

Theme 3: Impact on professional registration and employment

Professional registration

Nurses' professional self-image was another essential aspect of the experience of MEs that was affected (Jones and Treiber, 2010). Only two studies referred to nurses' professional registration issues. Schelbred and Nord (2007) added the theme 'National Board of Health' to their data. Three out of 10 cases that were analysed have been reported to the professional body for nursing with two of them receiving dereliction of duty, i.e. not performing their duties, either accidental or deliberate. In the same study, a nurse felt *'like a criminal'* (p.323) during the whole process and that made her reluctant for reporting MEs of no or mild harm in the future.

Employment

Rassin et al. (2005) mentioned the subtheme *'I might get fired'* (p.880), as this was nurses' reaction during the first month after the error, however, its details referred to thoughts and feelings and not to actual employment issues. Also, an interesting finding was mentioned in another study. Although the consequences of the ME did not cause permanent harm, the nurse was transferred to another clinical setting with no permission to administer medications. The reason for the nurse's transfer was considered by the nurse to be the result of her manager's behaviour (Schelbred and Nord, 2007).

Theme 4: Nurses' coping strategies with the experience

Self-management and colleagues

There were strategies that nurses recruited to overcome the consequences of the ME experience. These were cognitive efforts, *'self-convictions and rationalisations'* (p.879) such as the following:

'Afterwards, I thought what I did since nothing happened.' (PQ, p.879, Rassin et al., 2005).

Nurses expressed their willingness to seek further support in two studies. This indicates their awareness of their psychological condition and needs to open their hearts and share their unpleasant experience:

'I wanted someone to help me.' (PQ, p.485, Santos et al., 2007),

or how nurses defined the near miss:

'Talk about. Process it.' (p. 47, Linnard-Palmer and Ngo, 2016) and

'Investigating how the near miss happen, calling whoever else involve, communicate near miss with MD, writing up an unusual occurrence form. Discuss at staff meeting.' (PQ, p.47, Linnard-Palmer and Ngo, 2016).

The attention and support of colleagues who were close to nurses who made the error were valuable, supportive and encouraged:

'everyone said: 'we think about you and this is not only your fault. You are one of our best nurses!' (PQ, p.320, Schelbred and Nord, 2007).

Nurses who have experienced other previous ME incidents during their career offered emotional support and reassured the nurse who made the error (Schelbred and Nord, 2007). But, there was a case of a nurse who was dissatisfied because of the absence of support by her head of nursing:

> *'I wish she (the head nurse) could have seen me. It seemed like she had forgotten it 2 days after I told her about it. She took it for granted that I could handle it on my own.'* (PQ, p.321, Schelbred and Nord, 2007).

On the other hand, only one case of a nurse is mentioned that did not discuss the issues she experienced after the error with the nursing management and kept a distance by remaining silent about the error. Furthermore, nurses avoided discussing their experience with their family members or friends (Schelbred and Nord, 2007). Perhaps this happened because the family members were not healthcare professionals and underestimated the severity of the situation:

> *'I told my husband and sister-in-law. They tried to cheer me up. Initially they reacted half seriously half laughingly, and asked whether I killed anybody.'* (PQ, p.881, Rassin et al., 2005).

The healthcare professionals' reactions might not be always professional and decent. There were doctors who blamed the nurses for their MEs, colleagues who neglected nurses' need for seeking further support (Schelbred and Nord, 2007) and colleagues who reacted in a way that is not representative of professionals who belong to the same nursing and multidisciplinary team:

> *'Now I think everyone in the ward knows, not just from me. At first I told only to the head nurse and another nurse, since I knew they would react maturely and won't ridicule it. Principally, people's reactions were divided into two: those who said that he who works errs and that it could happen to anyone, and others who didn't, but I knew they were talking behind my back.'* (PQ, p.881, Rassin et al., 2005).

Professional support

Nurses received professional support (specialist for people in crisis) only when the ME resulted in permanent patient harm (Schelbred and Nord, 2007).

Compliance with the medication administration policies

The medication administration tasks and ways of management medication incidents are ruled by the respective policies and guidelines. Nurses are accountable to the above rules. The adherence of clinical practice guidelines, policies and protocols that were in place, entailed that all MEs were expected to be reported independently of their severity and guide the nurses towards effective decision-making (Arndt, 1994, Manias, Aitken and Dunning, 2005, Wolf and Hughes, 2008).

There were nurses who experienced a ME and reported them directly or were looking for advice from superiors:

'I at once went to the doctor because I wanted to prevent complications from the patient. By the end of the shift I was very stressed out, and all the time I checked if he's ok.' (PQ, p.879, Rassin et al., 2005),

'When I realised that I made a mistake, I went to the treating doctor and head nurse and told them what happened. I asked how we proceed from here.' (PQ, p.879, Rassin et al., 2005).

Nurses felt the need to communicate the ME formally:

'The decision I took soothed me because I did the right thing. I called my boss and communicated the event to her…' (PQ, p.485, Santos et al., 2007),

and acknowledged the sense of responsibility and proceeded to its reporting:

'I have to inform my manager' (PQ, p.523, Arndt, 1994).

Arndt (1994) emphasised association between words like ‘right’ or ‘rule’ and ‘reporting’, revealing in this way nurses’ personal morality and the moral obligation towards the medication administration policies.

Non-reporting of the medication error

The non-reporting of ME entails the non-adherence of the medication administration policies. Arndt (1994) characterised nurses’ non-compliance with the policies as ‘counteridentification’ (p.523). The decision-making on whether to report an error or not is intertwined with the:

a. previous (*‘harsh’*) negative experiences of MEs (p.523, Arndt, 1994)
b. receiving unfair penalties by the superiors:

   ‘…go through the procedures of disciplinary action in a hardline manner’ (p.523, Arndt, 1994),

   ‘if it was in a similar situation, I would feel very reluctant, to inform the nursing officer. Unless I knew the nursing officer and I knew that they were going to support me’ (PQ, p.523, Arndt, 1994),

c. severity degree of the ME:

   ‘…keep quiet about minor mistakes’ (PQ, p.523, Arndt, 1994),

   ‘…to cover up a mistake under certain circumstances.’ (p.523, Arndt, 1994),

d. manager’s reaction and management of the case by nursing superiors:

   ‘…the ruthless characters’ of a manager (PQ, p.523, Arndt, 1994).

The responses of justifications of not adhering the policies were *‘to be treated like that’* (p.523) and unwillingness to provoke ‘*hurt or harm’* to themselves or to colleagues (p.523, Arndt 1994). This happened only when the ME did not cause harm to the patients.

Theme 5: Patient and family

Contact with the patient

Many of the participants reported that continuous contact with the patient was difficult (Schelbred and Nord, 2007). Thereby, they avoided it:

'..it was hard every time I had to meet the patient. It was painful'. (PQ, p.320, Schelbred and Nord, 2007).

Patient's status and safety

Nurses expressed concerns about the potential of causing harm to the patient who was given the wrong medication, even though there was no obvious harm:

'…There was huge and catastrophic pressure in the ward. Lots of geriatric patients. In a momentary absent mindlessness, the error occurred. Luckily for me, I picked it up in a couple of minutes, so the patient's condition hadn't worsened.' (PQ, p.876, Rassin et al., 2005),

'My first and major concern was for the patient's safety and well-being…Fortunately, the patient was not harmed.' (PQ, p.245, Jones and Treiber, 2010).

In one study, nurses' agony about patient's status was considerable:

'The drug notwithstanding, the patient deteriorated that afternoon. It was the hardest for me. The doctors tried to calm me down, and say this wasn't the cause. They tried to let it slide. But I never forgave myself.' (PQ, p.876, Rassin et al., 2005).

Disclosure of the error and its consequences or not

It was not easy to cover up an error, especially if patient's suspiciousness was raised because of the consequences that needed urgent interventions by nurses or doctors, monitoring of patient's status and changes in the treatment plan:

'The patient asked me why I measured her blood-pressure all the time. Conscientiously, I wanted to tell her the truth. I asked her forgiveness. I've explained to her that these things can happen during pressure at work. The funny thing was, eventually she calmed me down.' (PQ, p.881, Rassin et al., 2005).

The disclosure of the error to the patient and its consequences took place in many of the ME cases explored by Schelbred and Nord (2007). Nurses chose to inform the patient, as they were feeling that this was a moral duty and responsibility. However, there were participants who did not disclose the consequences of the error or whose responsibility the error was (Schelbred and Nord, 2007).

A study examined only the disclosure of the error to the patient and the relation to ethical issues (Luk et al., 2008). Five out of seven cases of MEs were not communicated to the patients because there was no serious harm and to avoid frightening them:

'I didn't tell the patient that he was given the wrong medication. I as afraid it would affect his illness when I told him. The medicine I gave him was vitamins and one was a coagulant. It didn't really matter…' (PQ, p.31, Luk et al., 2008).

There was one case that a nurse lied to the patient (because there was no obvious harm) and in four cases the nurses acknowledged their errors.

Sympathy towards the nurse

Following the disclosure of the error to the patients, they charged none of the nurses and expressed sympathy towards them (Schelbred and Nord, 2007) or kept a positive attitude:

'…The funny thing was, eventually she calmed me down.' (PQ, p.881, Rassin et al., 2005).

Nurses involved in ME incidents have been understood and were treated fairly and with *'empathy'* (p.33) by superior nurses (Luk et al., 2008):

> *'What I learnt from her [the senior nursing staff member's] attitude was that she only wanted to understand the event, but not to find the troublemaker. That was all I felt. After the interview with her, I felt more relieved. She didn't scold me [about] why I didn't check it carefully, but tried to understand whether I knew there was a mistake in the incident...'* (PQ, p.32, Luk et al., 2008),
>
> *'…I would then pay more attention to everything I encountered. I was touched by hearing her words. Actually, our seniors were very helpful and appreciated our work. They would not dismiss staff because of minor events. They wanted us to learn from our mistakes, to think of improvement and ways of making our work better.'* (PQ, p.32, Luk et al., 2008).

But, there were two cases of nurses that claimed that were not treated fairly (Luk et al., 2008).

Theme 6: Identification of contributing factors of and preventive measures for medication errors

This theme includes cases of nurses who experienced ME incidents helped the identification of contributing factors (related to individuals and the health system) and the necessity of what preventive measures should be in place.

Individual-related factors

The qualitative results of a mixed methods study revealed a list of potential contributory factors to MEs: *'physical exhaustion', 'interruptions and distractions', 'being new and having lack of experience and/or training' and 'pace/staffing/patient load'* (p.245, Jones and Treiber, 2010). An example of nurses' responses about the *'physical exhaustion'* is:

"[I] increased the rate of lidocaine infusion to 230 cc/hr instead of 23 cc/hr. I was hypoglycemic, no break in 5 hours, no food, and had blurred vision.' (PQ, p.245, Jones and Treiber, 2010).

It should be mentioned that this list is a mixture of system and individuals-related contributory factors. According to the theory developed (subchapter 2.1.2.) about the discrimination of the contributory factors, the *'physical exhaustion'* belongs to the individuals-related contributory factors, whereas the rest factors of the above example belong to the system-related factors.

Health system-related factors

Nurses recognised a positive relation between the understaffing levels of a ward and their workload. That means having an increased number of nursing tasks to do and not adequate nursing staff levels, patient safety was at risk and subsequently at risk for MEs (Arndt, 1994). A nurse's response to the increased workload was:

'I think institutions try to get by with too few nurses and medical support staff, and then expect way too much from them.' (PQ, p.245, Jones and Treiber, 2010),

The factor *'system failed them'* was identified as a factor that contributed to ME occurrence. The nurses justified their thoughts by saying that there was not adequate nursing input regarding the organisational strategies that are in place for the prevention of MEs:

'…Errors are a result of several breakdown along the way from ordering/pharmacy/transcribing and administering.' (p.246, Jones and Treiber, 2010),

Worries about communication issues among the disciplinary teams that deliver patient care included *'miscommunication between healthcare team members', 'miscommunication between shifts'* and *'pharmacy verifying and approving wrong med/wrong dose'* (p.47)*:*

'No clarity between doctors, pharmacy and nurse.' (PQ, p.47, Linnard-Palmer and Ngo, 2016).

Preventive measures

One study focused exclusively on nurses' experiences of medication safety practices. Three main themes: *'nurses' role and responsibilities in medication safety', 'nurses' ability to work safely'* and *'nurses' acceptance of safety practices'* emerged from the data analysis (Smeulers et al., 2014). Nurses described in their narrations that they were following the prevention of MEs by:

a. assessing clinical situations based on their experience and clinical reasoning:

'You have to think, even if you work here for 30 years and you have a prescription, you have to think and know that if is right, if it is the appropriate dosage, you need to have that knowledge and if you don't know you have to look it up and consult the physician' (PQ, p.279, Smeulers et al., 2014),

'But also the clinical reasoning, if a patient is hypotensive and you as a nurse are just giving the medications groundless, than you cannot give full responsibility for that to the physician just because a patient's vitals are incidentally different.' (PQ, p.279, Smeulers et al., 2014),

b. applying step-by-step and careful adherence of the medication administration protocols and maintenance of the awareness of the risk factors (route of administration, larger consequences of the administration, high-risk medications, omission) within the medication administration process. An example is the following:

'I think there is a difference, if I forget to give a paracetamol, I think that is less bad than if I do not give enough chemotherapy; these of course are two extremes. A paracetamol can also be important for some patients here, but some medications are more important than others, if a patient is on antibiotics for prophylaxes and I forget it,

it is not so bad, but if the patient already has a fever and you forget to give it, yes then it is bad.' (PQ, p.280, Smeulers et al., 2014),

c. being aware of the circumstances with the potential to lead to MEs (multitasking, increased workload, work pressure, busy clinical environments, prescription and documentation issues, delivery of medications from the pharmacy) (Smeulers et al., 2014),

d. specifying which safety practices like the '*Do-not-disturb tabards'* (p. 281, Smeulers et al., 2014) were evidence-based, feasible, appropriate and comfortable when they are implemented in real environments:

'People find it important to give their input, to try things out and then evaluate and see how it goes.' (PQ, p.281, Smeulers et al., 2014).

2.4. Methodological quality of included studies

The quality of the studies checked with the CASP tool and all evidence was integrated into Appendix D. The design of the included studies was qualitative with triangulation of methods (Arndt, 1994), qualitative (Rassin et al., 2005, Santos et al., 2007, Schelbred and Nord, 2007, Luk et al., 2008, Smeulers et al., 2014) and mixed-methods (Jones and Treiber, 2010, Linnard-Palmer and Ngo, 2016).

2.4.1. Data collection

The data collection process in most of the studies was prominent and explained how the samples were recruited (Appendix D). The data collection methods were triangulation of qualitative methods (Arndt, 1994), semi-structured interviews (Rassin et al., 2005, Santos et al., 2007, Smeulers et al., 2014), in-depth interviews (Rassin et al., 2005, Schelbred and Nord, 2007, Luk et al., 2008) and open-ended qualitative responses of the questionnaire (Jones and Treiber, 2010, Linnard-Palmer and Ngo, 2016). Data saturation was reached in two studies when authors collected data (Santos et al., 2007, Smeulers et al., 2014). There were participants who responded negatively when requested to participate in the study (Rassin et al., 2005).

Transferability of studies' findings can be achieved via homogeneity of the sample and contribute to the comparison of findings among studies (Suri, 2011, Thomas and Magilvy, 2011). Homogeneity was achieved in three studies (Rassin et al., 2005, Luk et al., 2008, Smeulers et al., 2014, Linnard-Palmer and Ngo, 2016) in which all participants were RNs from hospital settings. There were studies wherein many of the participants were coming from hospital settings (Schelbred and Nord, 2007, Jones and Treiber, 2010).

Arndt (1994) in her study recruited nurses from Germany and Scotland; nevertheless, all of them were RNs. The difference in the country where RNs work may have affected the results because both countries have differences in their health systems. Also, Schelbred and Nord (2007) conducted the interviews in Norwegian and translated them into English themselves. Perhaps one would expect the provision of evidence about how they secured transparency of the translation and how the data remained neutral throughout the procedure (Temple and Young, 2004).

Furthermore, although all participants experienced MEs, the majority of them did not clarify their type (e.g. wrong dose) and severity (e.g. caused harm or not). Apart from four studies: Rassin et al. (2005) mentioned only the types, Schelbred and Nord (2007)

and Luk et al. (2008) mentioned both types and severity and Linnard-Palmer and Ngo (2016) examined only the severity. Further, only in one study the authors documented which definition of ME they adopted (Smeulers et al., 2014) and in another one the authors identified lack of definition of what a near miss is, whilst they mentioned definitions given by previous authors (Linnard-Palmer and Ngo, 2016).

2.4.2. Data analysis

Seven out of the eight included studies (Appendix D) used qualitative methods for data analysis: discourse analysis (Arndt, 1994), content analysis-coding of Berg (1998) (Rassin et al., 2005), thematic analysis of Barding (Santos et al., 2007), phenomenological analysis of Giorgi (1985, 1997) (Schelbred and Nord, 2007), coding suggested by Miles and Huberman (1994) (Luk et al., 2008), Benner's interpretative model (Jones and Treiber, 2010) and content analysis by Hsieh and Shannon (2005) (Linnard-Palmer and Ngo, 2016). Also, one study used mixed methodology (Jones and Treiber, 2010) and is included in the present meta-synthesis as the qualitative part of the study is presented separately from the quantitative one.

Concerning the dependability, the authors discussed their philosophical assumptions and rationale within the context of data analysis: discourse analysis (Arndt, 1994), phenomenological interpretation (Schelbred and Nord, 2007), but the rest of the studies lack documentation of philosophical underpinnings. All studies provided a well-developed introduction to present their study.

The authors described explicitly the steps of the process of analysis, even though it is not described whom of the authors performed it (Rassin et al., 2005, Santos et al., 2007, Jones and Treiber, 2010, Linnard-Palmer and Ngo, 2016) or only authors who performed specific steps (Luk et al., 2008). A single author (Arndt, 1994) conducted one of the studies. In the rest studies (Schelbred and Nord, 2007, Smeulers et al., 2014), it is documented which steps were performed and by whom. In one study, two authors used software to analyse the qualitative data conducted the coding process independently (Smeulers et al., 2014). The separate coding by two authors essential to increase the study's credibility (Barbour, 2001).

A way to enhance validity and transferability is through the rich and thick presentation of participants' quotations (Creswell and Miller, 2000, Merriam and Tisdell, 2016). All authors presented participants' quotations in a clear and comprehensive way with rich

and thick verbatim quotations. The quotations are identified throughout the section of the findings of every included study.

More importantly, reflexivity is one of the essential aspects of the methodological rigor. Nevertheless, the included studies recorded it inadequately, apart from Arndt (1994) who referred to methodological issues faced. The rest of the authors did not reflect on any methodological challenges they faced, how eventually data shaped and the whole study. Reflexivity, for instance, can be achieved through keeping critical reflective journals, by recognising their role as qualitative researchers, discuss issues with research supervisors or record the methodological decisions took place during the study (Creswell and Miller, 2000, Murphy and Dingwall, 2003, Ortlipp, 2008, Green and Thorogood, 2009).

2.4.3. Ethical considerations

The report of detailed ethics when investigating MEs is crucial (Erlen, 2011). Ethical considerations were underreported (Arndt, 1994, Rassin et al., 2005), mentioned only the approvals obtaining (Santos et al., 2007), mentioned a brief report on ethics (Schelbred and Nord, 2007, Luk et al., 2008, Jones and Treiber, 2010, Linnard-Palmer and Ngo, 2016) and there was one study for which ethical approval was not necessary accordingly to country's laws (Smeulers et al., 2014).

2.5. Discussion

The second chapter is a meta-synthesis of research evidence of nurses' experiences of MEs. To my knowledge, this is the first meta-synthesis that focused exclusively on the exploration of nurses' experiences of MEs. The qualitative evidence synthesis was conducted by using thematic synthesis.

2.5.1. Main findings

Each of the included studies examined specific fields of nurses' experiences of MEs:

- their meaning (Arndt, 1994, Schelbred and Nord, 2007)
- nurses' mental, social state (Rassin et al., 2005), recovery (Linnard-Palmer and Ngo, 2016) and support after the error (Schelbred and Nord, 2007)
- nurses' feelings (Santos et al., 2007)
- management of the errors (Luk et al., 2008)

- identification of contributory factors (Linnard-Palmer and Ngo, 2016) and an explanation of errors (Jones and Treiber, 2010)
- identification of prevention issues (Smeulers et al., 2014).

The major findings of the synthesis of qualitative evidence revealed six major themes and twenty subthemes. Through this review and the development of the themes, a picture of nurses' experiences of MEs is presented. The synthesis indicates nurses' experiences of MEs have multifaceted issues with a negative and positive impact on them. They accept their human side and that everyone is prone to make MEs. They understand the responsibility they have for their errors and, of course, in the aftermath they experience a plethora of negative emotions with cases of nurses who presented signs and symptoms due to their errors. However, there were nurses who managed to develop various strategies to cope with them and even more to transform their experiences into fruitful and learning opportunities. Further, nurses acknowledged factors that involved their interactions with patients and families after the error and reflected (discuss contributing factors, preventive measures) on their errors as part of their experiences.

2.5.2. Grey literature

A search on the UoN eTheses database detected two PhD theses related to the present piece of work (Mansour, 2009, Alsulami, 2013) and theses like the present one. Their basic features are presented in Appendix E. However, none of them was the same as the lived nurses' experience is approached at this chapter.

2.5.3. Limitations

There are limitations to this meta-synthesis. It was performed by a single author. There were studies that were excluded directly from the review because they explored issues out of the present review's aim; such as exploration of nurses' experiences of the medication administration process without analysing specifically MEs (Verity, Wiseman, Ream et al., 2008, Pirinen et al., 2015), examined nurses' experience from the perspective of years working in clinical areas and not as a phenomenon or lived condition (Westbrook et al., 2011) or explored nurses' experiences of nursing errors in general (Soltanian, Molazem, Mohammadi et al., 2016).

The findings of the meta-synthesis are limited to the findings of the studies included in it. The concepts of the experience of MEs examined in each study were various and

examined experiences of MEs-related topics (the experience itself, feelings, contributory factors, making sense of the experience, support post-error, power distance). However, the philosophical stances adopted by the authors and the approaches to explore the experiences were all qualitative. Only primary research studies were considered which were published in the selected databases within a specific period.

2.6. Conclusion of the meta-synthesis

The conclusions of the meta-synthesis are presented in Table 5.

2.7. Summary

This chapter presented a meta-synthesis about how nurses making sense of their experiences of MEs. The synthesis provides a full understanding of the literature on the specific topic and to my knowledge, it's the first review exclusively about nurses' experiences of MEs. Specific tools and techniques were used to assess the describe the systematic review process, included studies and present the data. The overall rigor of the included studies was not fully satisfactory. The findings presented plenty of themes and subthemes with positive and negative aspects of the experience of MEs by nurses.

Table 5. Conclusions of the meta-synthesis.

What is already known about the topic?
▪ The nurses acknowledge their role within the medication administration process, its high responsibility and how the healthcare system contributes to MEs occurrence. ▪ The nurses experience facilitators and barriers regarding the reporting of MEs and there are measures in place that nurses have incorporated into their practice to prevent ME occurrence. ▪ The factors that synthesise nurses' experiences of MEs have been studied as individual cases in the literature, e.g. only emotional impact of the experience. However, have not been put together to present the whole set of factors that make up the experience itself.
What the meta-synthesis adds?
▪ The focus is gathered exclusively on nurses' experiences of MEs which were approached as lived phenomena. ▪ The review contributes to the understanding of nurses' making sense of experiences of MEs and towards to this direction a holistic view about the value and dimensions of the experience itself is provided. ▪ As frontline nurses are responsible for the medication administration to patients, the moral and emotional impact of the errors is devastating for their professional identity, employment status, and personal life. ▪ Yet, the experience of MEs by nurses poses a constructive aspect and nurses detect strategies to cope with the error occurrence and its consequences. They also detect ways to translate their experience into a beneficial and constructive lesson for themselves, their practice and the organisation they work for.
Implications for the clinical practice?
▪ The meta-synthesis has an impact on nursing administrators who should recognise the value of frontline nurses' experiences and provide suitable support to them. ▪ It is important to assess carefully every ME case in order to improve the overall learning climate and policies about medicine safety towards the transformation of nurses' experience to a learning opportunity.

Chapter three: Methodology and research methods

The third chapter presents the philosophical underpinnings, methodology and methods (participants' recruitment, data collection-interviews, data analysis, data management and ethical considerations) of investigating nurses' experiences of MEs.

3.1. Introduction

Based on the meta-synthesis findings of nurses' experiences of MEs, an empirical protocol is developed. It pursues to: approach the experience of MEs by nurses as a lived phenomenon in its whole spectrum, understand how nurses make sense of their experiences, unveil potential new fields of the structure of experience (that have not been mentioned in the meta-synthesis-chapter 2), record and appraise any methodological and ethical challenges that will present throughout the study conduction. The protocol will include the conduction of face-to-face-interviews to gather data from 5-7 RNs of acute medicine wards about their experiences of MEs and analyse data with IPA. All the steps will be performed by the author of the dissertation and the contribution of the academic supervisor when necessary.

3.2. Philosophical underpinnings-Methodology

The paradigms are used by researchers to shape the approaches they adopt to justify their rationale and conduct research projects (Weaver and Olson, 2006, Levers, 2013, Everest, 2014). The researchers' *'worldviews'* (p.7) play an important role to attempt to solve the epistemological problems (Kikuchi, 2003, Polit and Beck, 2008). Depending on the paradigm adoption, fundamental concepts of epistemology, ontology, methodology and methods have been developed (Table 6) (Gray, 2009, Carter and Little, 2007, Levers, 2013). A methodological dichotomisation emerged out of the paradigms. A typical example is positivism and interpretivism that led to the quantitative and qualitative inquiry, respectively, and subsequently dichotomy in methodology and philosophical assumptions of the studies (Mesel, 2013).

The methodological and epistemological distinction between positivism (measure the world) and interpretivism (interpretive the world) is known. The roots of the distinction between positivism and interpretivism, therefore explanation and interpretation respectively, originated from the distinction between physical and social sciences (Abel, 1948). This distinction generates a debate between them, like the fact that not

all qualitative methodologies can be under a single interpretivist paradigm (Rolfe, 2006). In addition, there is an ontological distinction between them, interpretivism is based on relativism, while positivism on realism (Weaver and Olson, 2006).

Table 6. Examples of epistemology, ontology, methodology and methods.

Epistemology	Objectivism, subjectivism, constructivism
Ontology	Positivism, interpretivism, feminism, critical theory
Methodology	Experimental research, surveys, ethnography, grounded theory, phenomenology, discourse analysis
Methods	Sampling, questionnaires, interviews, focus groups, observation, content analysis, document analysis

Another characteristic feature of interpretivism is subjectivity and inter-subjectivity. Interpretivism focuses on how individuals make sense of experiential phenomena and how they express their interpretations. On the other hand, positivism focuses on the view of truth as it is (objective truth) and natural laws, rather than its dependence on human engagement in it (Silverman, 2001, Weaver and Olson, 2006, Everest, 2014). The inductive mode that findings are formulated to generate theories and models, instead of varying or falsifying hypotheses (deductive approach) and locating causality between variables is equally important (Lincoln and Guba, 1985, Guba and Lincoln, 1994, Gray, 2009).

Interpretivists have a set of beliefs that determine the way they see and study the world (Levers, 2013). They accept multiple viewpoints of human beings that provide a comprehensive understanding of the phenomenon under investigation (Thanh and Thanh, 2015). The primary data sources for interpretivists are the human beings and their accounts, meanings, perceptions, experiences, motives, their interaction with phenomena and the context they manifest (Mason, 2002, Elster, 2007). For the interpretivists, all the above concepts count as knowledge (Mason, 2002, Murphy and Dingwall, 2003), whereas for positivism knowledge is quantifiable and includes features like numbers, variables, instruments and questionnaires (Gray, 2009).

Interpretivism is selected as philosophical standpoint because it is the key to study phenomena in their environment and the individuals' accounts that are engaged in it. It focuses on human beings and their accounts, namely in the present piece of work

concerns RNs and their accounts of experience MEs. By examining nurses' accounts of their experiences pursues to understand the meaning of the experience they attribute to it and their accounts count as knowledge.

Interpretivism is selected because it intends to reveal how reality is constructed in each participant's world (the intervention of administering medications) and how this is expressed and interpreted through their words and accounts (what led to the error occurrence? how nurses manage their errors? how do they make sense of their experience? did they perceive it as a constructive experience?). To answer these questions, interpretivism uses naturalistic methods, for instance the present project includes nurses' interviews. On the other hand, it would be impossible to investigate nurses' experiences by employing positivism, as the current project does not intend to test hypotheses and reject or verify facts.

Qualitative method is employed to reveal knowledge about nurses' experiences. The value of qualitative research and meta-synthesis in the healthcare arena and evidence-based practiced have been acknowledged (Barbour, 2000, Sandelowski, 2004, Thorne, 2009). Qualitative research is:

> *'..an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting.'* (p. 15, Creswell, 1998).

Barbour (2000) supports the influence among data, researchers, and their impact on the data analysis, pointing out in that way the reflexivity in qualitative research. The scope of qualitative inquiry is *'suited to providence in-depth contextualised accounts'* (p.157, Barbour, 2000).

The epistemological underpinnings of qualitative inquiry differ from the quantitative one because it enriches researchers' understanding through descriptions, provision of insights and holism into phenomena, experiences, behaviours, the interaction of social setting and individuals, interpretations and making sense of phenomena as perceived and experienced by individuals (Berg, 2001, Creswell, 2003, Carter and Little, 2007). Thereby, qualitative inquiry employs verbal and textual data to explore assumptions, while quantitative use numerical data to test hypotheses (Porter, 2007).

In the context of qualitative methodology, phenomenological interviews will be applied to explore nurses' experiences to retrieve data. The phenomenological interview *'yields a unique source of knowledge'* (p.458, Høffding and Martiny, 2016). It is nurses' narrations that will construct the study's findings, express each participant's singularity, social reality and their interaction with it. This construction will be achieved through their speech, dialogue and will portray the innermost sense that will make up the features of the phenomenon under investigation. It is the interviewer that engages with the participants in real time, guides the interviewee according to the areas of interest; nevertheless, the interviewer is always alerted to identify any unexpected and interesting data in interviewees' accounts. Consequently, both interviewer and interviewee constantly shape the interview process from the beginning until the end of it, when the interviewer obtains the accounts from which the 'new' knowledge will emerge out and tis further analysis with IPA will transform it to professional knowledge (Lopez and Willis, 2004, Smith and Osborn, 2010, Bevan, 2014, Pietkiewicz and Smith, 2014, Matua, 2015, Guerrero-Castañeda, Menezes and Ojeda-Vargas, 2017). To integrate the above principles to the present dissertation topic, interviewing the nurses about their experiences will provide information of the pre- and post-error time, the singularity every nurse describing the meaning of the experience and how they articulate it verbally, how they see themselves within the context of the error-their actions and social interactions. After all these steps, every piece of knowledge will build up the interpretation of nurses' experiences of MEs and its meanings.

3.3. Rationale for using IPA to investigate nurses' experiences

3.3.1. Theoretical background

IPA was introduced by Smith et al. (2009). According to the theoretical orientation the *'active role of the researcher who influences the extent to which they get access to the participant's experience and how, through interpretative activity, they make sense of the subject's personal world'* (p.8, Pietkiewicz and Smith, 2014). The orientation of IPA relies on three principles: a) phenomenology (analysis of the components of a phenomenon), b) hermeneutics (make meaning of the phenomenon and translate/interpret it) and c) idiography (analysis of each case in its unique context) (Pietkiewicz and Smith, 2014). Moreover, researchers' endeavours to make sense of participants' experiences (twofold sense-making process) is another feature of the IPA and is called double hermeneutics (Smith et al., 2009, Pringle, Drummond, McLafferty

et al., 2011a). Before the conduction of interviews with IPA, even though the researcher has predetermined specific fields of the topic they want to cover, new and unique fields or data may emerge (Shaw, 2001). Again, interviews with IPA have the potential to use a combination of questioning hermeneutics with empathic hermeneutics that offers to the researcher the privilege to ask critical questions to the interviewee (Smith and Osborn, 2010).

As all methodologies have weaknesses, when analysing data with IPA, a key emergent theme of the interpretative studies is to preserve its integrity and rigor. De Witt and Ploeg (2006) outline a framework of criteria to enhance interpretative studies' rigor: openness (transparency of the steps of the research), balanced integration (intertwining of philosophical assumption), resonance (reading study's findings upon the reader), concreteness (usefulness of findings) and actualisation (future realisation of the resonance). Similarly, guidelines on rigor and assessment of the validity of qualitative studies focus on same issues (Dixon-Woods, Shaw, Agarwal et al., 2004). Of course, there are other transparent techniques such as participants' words-thick, rich quotes, member checking, peer debriefing and researcher's reflexivity to eliminate bias (Bloor, 1997, Creswell and Miller, 2000, Murphy and Dingwall, 2003, Thomas and Magilvy, 2011).

3.3.2. Formulating the research question

First, the identification of the phenomenon takes place following by the articulation of the research question and phenomenon's meanings. The phenomenon under investigation is nurses' experiences of making ME. Kleiman (2004) by mentioning to Alford (1998) work highlights that the research question has an empirical and a theoretical component. In the present piece of work, the empirical component of the question is: **What are the meanings that nurses assign to the lived experience of making a medication error in their practice?;** and the theoretical one was: **What is the structure, constituted by the essential meanings emerging from the data, which explains the nature of nurses live experiences of making a medication error in their practice?.**

3.3.3. Aim

The aim of the research protocol is to make sense of RNs' experiences of MEs. The objectives were to understand nurses' experiences of the following factors:

a. the meaning of the experiences the nurses attribute
b. how MEs are recognised
c. the processes in place to report them
d. nurses' involvement in the management of MEs.

3.3.4. Justification

IPA will be adopted to answer the research question. The first reason for choosing IPA to approach nurses' experiences is the identification of similarities between nursing and IPA. Namely, the foundations of both nursing and IPA perceive the human being as a whole. IPA *'considers the whole person and values their experience'* (p.31), therefore the holistic perspective adopted by IPA is very familiar for nurses as they have been educated on this during their professional training and apply it in the everyday clinical practice (observing, interviewing and interacting with patients) (Beck, 1994, Balls, 2009). Aside from this, IPA has been used traditionally in health research and especially in psychology; and is suggested to investigate poorly understood phenomena in nursing predominantly for the understanding of patients' experiences of being ill (Delmar, 2006, Pringle et al., 2011a, Matua, 2015). The three principles (see subchapter 3.4.1.) of IPA's orientation (Pietkiewicz and Smith, 2014) fit the present protocol's framework as presented in Table 7.

The second reason is to access what it is like to be a nurse and make a ME (lived experience) and construct the domains of nurses' experiences and draw commonalities through nurses' '*coherent and legitimate accounts'* that describe their experiences (p.23, Pringle et al., 2011a). As one of the benefits of IPA is to uncover new fields of the experience that might not exist in the literature and may not be to researcher's intention to explore them. This is achieved through interviewer's asking of critical questions (see section 3.4.1.) to interviewee during the interview, in along with following a semi-structured plan. In addition, in the context of the living experience hermeneutics try to capture nurses' experience as a learning one and articulate the rupture the experience creates between themselves and their world (McManus Holroyd, 2007).

The third reason is that nurses' sample is expected to be small and would work within the context of investigating nurses' experiences of MEs. In addition, the fourth reason is to offer the opportunity to nurses to share their experiences, express themselves through their accounts and pieces of self-reflection about their experiences (Smith,

Flowers and Osborn, 1997). This opportunity refers to nurses' reflective skills that include the comprehension of what happened, what the ME meant for them, what the consequences were if nurses obtained any constructive lessons and how they felt about it. Besides, the therapeutic dimension is recorded in studies (Arndt, 1994, Santos et al., 2007) and was one of the findings of the systematic review (chapter 2). Nurses' openness to discuss their experiences with the researchers has the potential to be therapeutic and relievable for them.

Table 7. IPA's orientation adjusted to present protocol's framework.

Phenomenology	Analysis of nurses' lived experience of making a ME (the phenomenon) in their practice.
Hermeneutics	As has been described *'phenomenology uncovers meanings, hermeneutics interprets the meanings'* (p.10, Pringle, Hendry and McLafferty, 2011b), namely, make sense, translate and interpret the meanings of the lived experience of making a ME (through their accounts). Hermeneutics belongs to IPA and is more detailed, seeks descriptions of the being-in-the-world experience, descriptions of interactions, relation to other individuals, relations of time to place of the experience, participants' choices, rather than just seeking descriptive categories of reality (descriptive phenomenology) (Lopez and Willis, 2004).
Idiography	According to Smith, Flowers and Larkin (2009) the experience is amenable to because *'(the experience) is uniquely embodied, situated and perspectival'* (p.29). Thereby, idiography examines the real-world phenomena (experience of ME) in the context they occur (clinical environment) and how the experience is expressed by nurses. Factors like the clinical environment the error occurred in, its degree of severity (none, mild, moderate, severe, death) and nurses' years of clinical experience (novice, experienced) should be reported because they interact with the experience itself. For instance, if a ME results to moderate degree of harm to the patient, e.g. prolonged hospitalisation, it's completely different when indications of harm are absent.

3.4. Research methods

3.4.1. Sampling

A purposive sample is proposed: RNs who experienced their own MEs in their practice. The sample size will target between 5-7 RNs predominately from acute medicine wards, emergency department, ICU of a university hospital. These areas are selected because the systematic review (subchapter 2.1.1.) showed that the above areas are more likely to be error-prone (Tang et al., 2007, Sheu et al., 2009). The minimum time of nurses' clinical experience will be six months and they should hold a contract (full-time or part-time) with the hospital.

In the beginning, nurses from acute medicine wards will be approached via their hospital e-mail addresses and an invitation letter will be sent, in along with the information sheet that explains the processes and study's aim (Appendix F). It will be explained that participation in the study is voluntary, its aim and all data will be strictly confidential. Time (2-4 weeks) will be given to the nurses to think about their participation in the study, to clarify any queries they might have and respond to the invitation positive by sending reply slips. Apart from the invitations via the e-mail addresses, posters about carrying out a study about nurses' experiences of MEs will be shared on hospital's announcement boards.

The method of nurses' recruitment will be the snowball sampling which is recommended when the identification of participants is difficult and allows inclusion of several experiences (Babbie, 2004, Macnee and McCabe, 2008). Snowball sampling is considered as an effective method for recruiting nurses, an alternative way to collect data from nurses about MEs in a *'non-reprimanding atmosphere'* (p.559, Sheu et al., 2009). Nurses from acute medicine wards will be approached first, and then the response rate will be assessed. If there are any positive responses, the nurses will be asked to share verbally that a study about MEs will be undertaken without expressing if they participated or not. Any queries will be clarified at this stage of the research. At this point, the total size of the nurses' sample will be checked and if it will be less than five, then nurses from surgical wards will be asked to participate in the study in the same way acute medicine nurses approached. On the other hand, if the sample size will be above seven, then all nurses will be accepted to carry on to the next stage.

The option of choosing between face-to-face and telephone interviews will be offered to nurses when their feedback for recruitment is positive. Interviewing by telephone is

proposed as a data collection method that will enable the participants to feel more comfortable and lead to the disclosure of more detailed data about their experiences (Elmir et al., 2011). Afterwards and providing that they would like to undergo a face-to-face interview, the location, day and time of the interview will be negotiated and defined. It will be the nurses' decision where they prefer to be interviewed, so that their sense of vulnerability and any negative impact of the interview to them are kept to the minimum (Elmir, Schmied, Jackson et al., 2011, Gagnon, Jacob and McCabe, 2015). In case this option would not be feasible for any of the nurses, negotiations will take place to check if they prefer a neutral location, such as a room in any of the UoN libraries. Also, during the interviews refreshments will be offered to the nurses to keep them comfortable.

Regarding the size of the sample, in IPA small size samples are employed because the researcher can analyse one by one every participants' account and offer in-depth analysis of phenomena (Pietkiewicz and Smith, 2014). Homogeneity of the sample will be achieved by including in the study mostly nurses from busy clinical environments who are experienced (at least six months clinical experience) and experienced ME/s in their practice. Homogeneity is dependable to interpretative concerns and pragmatic considerations (Pietkiewicz and Smith, 2014), i.e. the variation of the experiences of the ME cases and the rarity of the lived experience or potential difficulties on participants' acceptance to be recruited.

3.4.2. Data collection

Before commencing the interview, all interviewees will be notified of their rights. The study's aim and processes will be explained thoroughly to the interviewees. Their oral and written informed consent will be obtained (Mason, 2002). Further explanation of the research process and clarification of any detail will be provided to them at any time if they requested so. Interviewees will be informed that they have the right to withdraw at any time during the interview or if they would like to have small breaks. They will be reassured that strict anonymity and confidentiality will be adhered and that only the interviewer will know their identity as part of the study. Finally, it will be checked that they feel sure and secure for participating in the study.

Semi-structured interviews up to an hour are selected as data collection method and are proposed to be performed by the author of the dissertation. The interview guide with specific prompts is presented in Appendix G. The prompts are drawn from certain

points of reviewing the literature about MEs (chapter 2): identification of contributory factors, reporting of and prevention of MEs. It would be opened with descriptive details and more analytical questions will follow. Examples of the analytical questions begin with: *'What does … the … mean to you?', 'How would you …?'* and *'What are your thoughts about …?'*.

The reasoning behind the choice of the semi-structured interviews lies in the fact that they offer the opportunity to the interviewer to penetrate interviewees' accounts (Murphy, Dingwall, Greatbatch et al., 1998, Kvale and Brinkman, 2009). Semi-structured interviews are suitable for the establishment of rapport; they offer flexibility and contribute to the exploration of novel areas and production of richer data (Smith and Osborn, 2010).

3.4.3. Data analysis

The data will be analysed as soon as possible after every interview and the IPA by Smith and Osborn (2010) will be applied. The aim of IPA of data is to *'…step into the participants' shoes as far as possible.'* (p.11), multiple readings of the transcripts, recall of the atmosphere of the interview and listen to the audio recording (if it is possible) to make sense of their experiences (Pietkiewicz and Smith, 2014). The IPA suggested by Smith and Osborn (2010) will be applied for the analysis of the transcripts. All interviews will be transcribed verbatim and meticulously (including mistakes, mis-hearings, pauses) (Biggerstaff and Thompson, 2008).

IPA is a structured method involving three stages:

a. looking for themes in the first case, re-read all transcripts, record any thoughts on the margin of each transcript. The parts of the transcripts need to be connected to the respective prompt of the interview guide.
b. connecting the themes (initial list of themes, clustering of themes)
c. continuing analysis of other cases (Smith and Osborn, 2010).

The themes will be tabulated in a summary table (Biggerstaff and Thompson, 2008).

For the phenomenological analysis of data, it is recommended to leave time (for this project 1-3 days) between the completion of each interview before moving to the data analysis to avoiding overloading (Guerrero-Castañeda et al., 2017). A combination of sources is necessary to confirm data: a combination of participants' quotations with researcher's recording of thoughts and experiences (reflective journal). Reading interviews in an interpretive manner, presupposes the 'reading' of the interviews to

realise what interviewees meant, to infer and connect the data with knowledge outside of the interview field. Again, decisions about how to manage data, for instance, the adoptions of reflexivity techniques, like the adoption of stances about how knowledge is derived from data are influential for the construction of the findings (Mason, 2002). Emphasis will be given to the provision of rich data (many and long quotes) and broad (from all participants), themes will be presented in a table and an external expert in IPA will be asked to review the transcripts and the themes. After coding, data will be checked again until saturation in order to be finalised (Bradley, Curry et al., 2007).

3.4.4. Data management

All interviews will be digitally recorded and transcribed verbatim. The recorded audio and data will be stored on a password-protected computer of the UoN and only the author of the present work will have access to them. The analysis will be objective, careful and the limitations of the study will be reported clearly. Data will remain confidential. Participants' anonymity will be adhered when reporting the findings: nurses' quotes will be anonymised and pseudonyms will be used: 'Registered Nurse (RN) 1…, RN 2…, RN 3…'.

The stewardship of the data is linked to participants' privacy and confidentiality. The data will be stored safely and the findings should be reported responsibly. The publication of sensitive data and data that expose the participants can result in legal action. For the protection of both researcher and researched the findings can be subjected to 'censorship' by the researcher before submission for publication (Adler and Adler, 1993, Murphy and Nightingale, 2002).

3.4.5. Ethical approvals and considerations

Ethical approvals by the REC of the UoN and the hospital the nurses would come from. The nature of the ethics is not the same as those in quantitative research. The qualitative researchers should always ensure that the research project is moral at its all stages because of the constant interaction among human beings and the data collection process (Orb, Eisenhauer and Wynaden, 2001, Mason, 2002). The ultimate goal of ethics is to protect the participants and aiming at minimising the harm that their participation in the study may pertain (Orb et al., 2001).

The exploration of MEs in healthcare is a sensitive field. MEs are the result of unintended actions (Leape, 2000). It is sensitive because of the potential to put

patients' safety at great risk, to compromise the quality of care delivery and implies the dilemma of whether to disclose the error to the patient (Erlen, 2001, Schelbred and Nord, 2007). Finally, all the information that will be obtained through participants is sensitive because of the ME, as an event, is a very traumatic experience for nurses and it is an event that nurses will remember it for a long time, even this is 20 years (Crigger, 2004), if not throughout their career.

The reveal of any data by the nurses during the interview may threaten their professional career. The nurse undertakes learning tasks following the ME occurrence, depending on the severity of harm and nursing superiors. For instance, the learning tasks concern the completion of the oral or IV medication administration booklet that includes theory and calculation tasks, and answering scenarios relating to medication management practices; or when the case is very serious the nurse is referred to the NMC or are subjected to the law. Since the error occurrence took place before the conduction of interviews, it is likely that interviewees will already have undertaken any reflective tasks, reassessed for medication administration competency or received any charges-which means revealing data will not affect their career, as every case will have been addressed timely and appropriate by nursing superiors.

The principal standpoint of this study to approach nurses will be to listen to them (Mitchell, 2015), their descriptions and narrations as an opportunity to improve their skills and an educational experience, rather than perceiving them as *'error-makers'* (p.28, Mansour, 2011). Likewise, another issue is the power relations handling that becomes more apparent at the data collection stage between the interviewer and interview. The flow of the interview depends on the balance of the power relations between interviewer and interviewee. It is inherent that the interviewer controls the interview process (Mason, 2002, Brinkmann and Kvale, 2005). There are various tactics to establish rapport (Karnieli-Miller, Strier and Pessach, 2009). A tactic that would fit into the present protocol is to be warm (Kvale, 1996), through asking kind questions to the interviewees about their feelings, if they feel comfortable to carry on with the process and in a tone of voice that demonstrates warmth. In case any of the participants will feel vulnerable during the interview due to emotional intensity and sensitivity nature of the topic, support from the Medicine Safety Team (MST) of the hospital or participants' ward manager will be requested.

An ethical issue that may arise during the interviews concerns nurses' experiences of the reporting process of MEs. Every hospital has established its own policies and

guidelines for reporting every type of incident (including MEs). It is expected that the under-exploration MEs cases would have already been reported by the interviewees' themselves or their colleagues or the charge nurse and dealt with. However, it will be likely any of the interviewees to mention that they have not reported any of the past ME cases according to the hospitals' policy. In this case, although they would be past cases, their management was immediate, will be mentioned and discussed with nurse's ward manager and the MST. Furthermore, if an interviewee will mention that ME incidents happen often on their wards and they consider that there are specific contributory situations or factors, then it will be up to them to report or discuss them with their managers.

Finally, the content of the obtained data will be reflected on after each interview to minimise the risks to the researcher (Elmir et al., 2011). In the case of any emotional effect occurrence, advice form the MST and the mental health specialist nurses of the hospital will be requested.

3.5. Summary

This chapter presented a research protocol to investigate RNs' experiences of MEs with IPA. The explanation of the philosophical underpinnings is inextricably intertwined with the research protocol, defines its foundations and how the study will be performed step-by-step and how each issue will be handled.

Chapter four: Methodological and ethical challenges in investigating nurses' experiences of medication errors

Within the given time in the context of the MARM (Master of Arts in Research Methods) course, it was impossible to achieve ethical approval on time to carry out the suggested protocol because of its sensitivity and the practical issues the preparation of the forms to obtain approval by the RECs (Research Ethics Committees) involved. Thereby, the fourth chapter focuses on reflections about the methodological and ethical challenges faced with the design and research question to investigate nurses' experiences of MEs.

4.1. Introduction

For the exploration of sensitive issues in healthcare it is necessary to construct the methodology and ethic sections of a project adequately. The safety of medication administration and errors from a nursing perspective is a sensitive topic and the relevant research generates methodological and ethical challenges (Armitage, 2005, Mansour, 2011). A sensitive topic is:

> *'One that potentially poses for those involved a substantial threat, the emergence of which renders problematic for the researcher and/or the researched, the collection, holding and/or dissemination of research data.'* (p.5, Lee and Renzetti, 1993).

This definition stresses that the management of sensitive data is constant throughout the stages of a study. The terms sensitive and vulnerable are interrelated. The term 'vulnerable' means *'weak, helpless and someone requiring protection'* (p.206); and the term 'sensitive' means *'confidential, fragile and delicate'* (p.206, Crowther and Lloyd-Williams, 2012). It is likely that nurses' who are interviewed for the experiences of MEs would feel vulnerable as they narrate them, because they acknowledge the nature of their errors. They also understand its sensitivity as is related to very personal and professional data for them and thereby confidentiality is a necessary element for the investigation of the topic.

4.2. Methodological challenges

4.2.1. Recruitment of participants

The suggested method for recruiting nurses to conduct interviews was purposive. The basic criterion of a participant to be recruited is the personal experience of a ME. This is a major limitation of the suggested project. On one hand, it is a core characteristic of the project because the use of IPA presupposes that all participants have experienced the same phenomenon (making their own ME). On the other hand, the combination of two factors: the detection of nurses who experienced personal MEs in combination with the fact that some of them will not be willing to share their experiences, eliminates significantly the possibilities to recruit a satisfactory number of nurses (5 to 10). A potential solution to this issue would be the consideration of contacting more wards of the same hospital (specialities wards like cardiology, urology, respiratory) or apply for ethic approvals in more than one hospitals, in order to increase the possibilities of recruitment more participants. This option would not be manageable to carry it out in the context of the MARM course though, because it requires time, good preparation and organisation. The sample of 3-5 nurses would be manageable within the context of the MARM course.

A certain aspect that was faced during the ethic forms preparation is the recruitment of participants for the project, in particular how to approach nurses to participate in the study. It was proposed that the nurses will be approached via sending an invitation letter to their hospital e-mail address in the context of adopting the snowball sampling method. Potential issues that can arise at the stage of the recruitment include the reluctance of nurses to participate due to fear to be open or feel vulnerable, i.e. power imbalance or emotional vulnerability, as It is reasonable that for the majority of nurses the experience of a ME would be traumatic for their personal and professional life. These findings were confirmed by the systematic review (subchapter 2.3., theme 1 and 3).

To address this, the snowball sampling method was adopted. This method enables the nurses-participants to be self-selected and become the interviewees willingly. Under the snowball framework, they might be psychologically prepared (by being less stressed) in advance of the interview and any unpredictable emotional response they will experience during the interview. Although nurses who made a ME in the past and have accepted the fact that nobody is perfect, could be harmonised with themselves (subchapter 2.3., Theme 1, Catharsis), feel comfortable and wish to share their

learning, experience and its meanings. By this way, disclose of MEs' experiences is achieved and nurses would not feel stigmatised.

Another technique to deal with the low response rate during the recruitment process would be the involvement of research nurses of the hospital in the sampling process. Their role would be to facilitate interviewees' participation by disseminating that a study about nurses' experiences of MEs is going to be carried out. By having the research nurses as mediators for the recruitment process is a key factor because the research nurses are professionals who the potential interviewees co-operate with or are familiar with. Following this mode of recruitment, acceleration of the sampling process might be achieved. This process impacts on the relationship between researcher and participant, specifically on the decrease of feelings of exploitation in participants and to avoid any misinterpretation (Richards and Schwartz, 2002, Houghton, Casey, Shaw et al., 2010).

4.2.2. Data collection

As it is pointed in the literature, the experience of how to undertake a phenomenological interview is gained while doing it. The phenomenological interview is an intellectual process and the interviewer should be immersed in the phenomenon. Realising a phenomenological interview about nurses' experiences might uphold challenges to the interviewer, especially the management of the balance between the follow factors: being physically-emotionally-spiritually well, being attentive to nurses' accounts, following the interview protocol and recording nurses' body language (eye contact, movements, gestures, attitudes) (Guerrero-Castañeda et al., 2017).

To handle the above factors prior to the conduction of formal interviews, pilot interviews with the nurses were proposed (Mitchell, 2015). The value of conducting pilot interviews with at least two nurses is to test if the questions are understandable by the participants, if the interview guide is effective and if it works in practice. Feedback from the participants will be considered to readjust any weak or ambiguous questions of the interview guide. More, the pilot interviews will be an opportunity to improve my interpersonal skills (Murphy and Nightingale, 2002) and to understand better nurses' experiences to interpret their meanings.

The suggested method to gather data from nurses about their experiences was the semi-structured interviews. Armitage (2005) mentioned that research in errors implies (partially) judgement of participants' competence. The author underlines that a

methodological weakness of the use of interviews for this purpose might be a reason to present themselves in a favourable way. However, this view does not underestimate the value of the interviews, as they (interviewer-interviewee) offer confidentiality and anonymity that is required for this stage of the research.

4.2.3. Data analysis

A strategy to improve the interpretation of the data analysis and the legitimacy of the suggested protocol is by keeping reflective journals (diaries) after every interview. The reflective journals represent a 'layer' of interpretation of nurses' account and contribute to the transparency of the steps of the research. They would address experiences, thoughts or feelings of the researcher throughout the stages of the study (Ortlipp, 2008). The reflective journals also help the researcher to unpack the social context of the participants (Creswell and Miller, 2000, Green and Thorogood, 2009) and analyse the social aspects of the nurses' experiences. The record of a reflective journal after the conduction of every interview with each nurse would concern, for example, elements relevant to the interview: critical thinking on issues, use of words that are a way of making connections and *'express fledgling ideas'* (p.252, Jasper, 1999) or to record nurses' body language and tone of voice while they are being interviewed (Legard, Keegan and Ward, 2003). All the journals in conjunction with the data collection will enable the researcher to refine questions and sometimes are influential for the choice of avenues of inquiry or insist on deepening in particular fields of the project (Pope, Ziebland and Mays, 2000).

4.3. Ethical challenges

All studies that involve human participants require a report of the ethical considerations (Gelling, 2016). The professional standards by the NMC highlight that nurses are expected to *'collect, treat and store all data and research findings appropriately'* (p.9, The Code, NMC, 2015) which comes under the dimension of practising effectively. If integrate this dimension to the present project, the interviewer has an ethical responsibility to obtain participants' informed consent, ensure confidentiality, privacy, report beneficience and maleficience, as the code of ethics for nurses defines (International Council of Nurses-ICN, 2012).

When researchers apply for pursuing ethic approvals for the conduction of a project, they should explain its scientific value based on ethical practices and techniques of

good clinical practice. The RECs look for confirmation of a valid scientific question with a demonstration of its contribution to new knowledge and impact on clinical practice (Gelling, 2016). Depending on its nature, each project has its own ethical considerations. There are ethical considerations that are expected to happen by the researchers during the research process, even though it is not possible to predict all of them. There is often a need to *'make hasty judgements'* (p.79, Mason, 2002).

4.3.1. Phrasing of sentences and words

Attention was given on how to handle language and wording issues while preparing the forms to submit them for the exploration of nurses' experiences of MEs. In essence, attention was given to the presentation of the protocol in a way that is less offensive and objective.

The first step was to succeed to articulate the title of study's protocol: *'Registered nurses' experiences of identification, reporting and management of medication errors: a phenomenological study'*. The use of the phrase *'nurses' experiences'* makes it clear that the MEs refer to nurses and that the study focuses only on a nursing sample. Another way was to use the following phrase: *'nurses' inaccuracies in the medication administration process'*, but soon was rejected because it was ambiguous and does not include only MEs, but also, for example, errors in the antiseptic technique, when draw from or mix medications that are in vials.

A study was identified in the literature in which a similar issue is documented. Meurier et al. (1997) in their study modified the title of the questionnaire, after carrying out a pilot test. The initial title of the tool was *'nursing errors'* and modified to *'inappropriate nursing decisions and actions'* (p.113) to avoid ambiguity because confusion was noticed between medical errors and MEs (Meurier et al., 1997).

The way questions of the interview are expressed is reported in another study about nursing errors (Koehn, Ebright and Draucker, 2016). Apart from the use of prompts, the authors phrased the questions in a way that the indication that all nurses experience errors throughout their career is obvious. After reading the work of Koehn et al. (2016), the integration of data or statistics at the first part of the interview guide will be considered for the further development of the interview guide to investigating nurses' experiences of MEs; so that, the perspective of the fact that the participants realise that the experience of MEs is a common type of errors in healthcare.

Similarly, the ‘made a ME’ phrase was preferred than the ‘committed a ME’ phrase. Also, in the literature there are studies that refer to the nurses who made a ME as *‘erring worker’* or *‘erring nurse’* (Rassin et al., 2005, Belderson, 2013). The determination of the role of words enhances the establishment of rapport and is an attempt for building a safe relationship between researcher and participant (Mansour, 2011). For the present protocol (chapter 3), the wise use of words and phrases is part of the overall attitude of decriminalisation towards the way that nurses’ experiences are approached and a way of understanding their significance in nurses’ professional and personal life.

4.3.2. Recruitment of participants

An adjustment to the suggested protocol (chapter 3) that concerns the recruitment of nurses is the clear explanation of confidentiality. Namely, the explanation that only the interviewer would be aware of their identities, the confirmation of data anonymisation (Wilson, 2009) and storage of the interview records at a password-protected computer of the UoN. This technique enhances the participants’ accounts security and provides fundamental principles of security that they expect from their participation in the study. Inaccuracies in medication administration process are a sensitive topic to investigate and according to Erlen (2001) may result in patients’ harm, errors’ disclosure or not, trust erosion and quality care impact.

Safety of individuals is included in one of the sensitive topic categories that need attention in emergency nursing research (Murphy and Nightingale, 2002). Discussing sensitive topics can be an emotional trigger and put participants at emotion risk. Thereby, the acknowledgement of the boundaries of every project about what it intends to cover and in what degree are necessary parameters when exploring sensitive topics (McGarry, 2010). Another way of respecting the participants is to respect their periods of silence and give them time to prepare themselves to carry on the procedure (Elmir et al., 2011).

4.3.3. Location

In general, researchers’ thinking about the location of the interviews is engagement with reflexivity. Researchers should recognise the active role of the location of the interviews, regardless of whether the topic under investigation is sensitive or not. They should record and report how the place influences the interview and whole research

process. It helps to understand how the interaction between interviewer and interviewee are situated in specific contexts (Gagnon et al., 2015).

The location where the interviews would be undertaken is a factor that needs to be addressed to investigate nurses' experiences of ME. It contributes to the relationship that would be developed between researcher and participant and the nature of power balance between them (Houghton et al., 2010). Considering the sensitivity aspects of the topic, nurses' comfort during the interview is one of the prerequisites, which will eventually lead to feelings of relaxation, alertness to recall and share their experiences while the interview is progressed (Wilson, 2009, Elmir et al., 2011).

Otherwise, interviewing the nurses about their errors in a completely unfamiliar environment might not be the ideal scenario as it would prevent data generation and create the feeling of potential exploitation of them. Besides, the option of choosing where to be interviewed should be offered to them, since the interview is about a sensitive topic (their errors) and it is their right to maintain their privacy, ethically right, privilege to choose the location, so that they do not feel under pressure and minimisation of the emotional impact they might experience is enhanced.

4.3.4. Type of interviews

The suggested protocol for nurses' experiences suggested the option of telephone or face-to-face interviews. The reason behind this is that the telephone interviews can be an alternative method of data collection and offer to the participants protection of their privacy, confidentiality and to minimise the psychological risk for both participants and researchers (Elmir et al., 2011, Mealer and Jones, 2014). Another benefit of interviewing by telephone is the promotion of honest. This is opposite to the fact that participants may present a favourable picture of themselves (please see 4.2.2.).

By accepting to be interviewed by telephone, the nurses may prefer to protect themselves because of their exposure to the traumatic experience (the ME). Although the fact of having visual contact with the interviewers enriches the data, there is a disadvantage of how to handle the periods of silence. Mealer and Jones (2014) suggested using phrases like *'Please continue'* and *'Take all the time that you need'* (p.35).

4.3.5. Management of emotionality

A research study about conducting research on sensitive and emotive in nature issues revealed the dual meaning of the studies on sensitive topics. There is a portion of participants that will feel emotional distress and cases of participants that will consider the study as a cathartic experience (Crowther and Lloyd-Williams, 2012). Both findings are confirmed by other studies on MEs research and on other healthcare topics (Arndt, 1994, Rassin et al., 2005, Crigger and Meek, 2007, Schelbred and Nord, 2007, Wilson, 2009). Both identified in the meta-synthesis of nurses' experiences of MEs (chapter 2): 'theme one: moral and emotional impact'. So, quick pauses (3-10 seconds) should be always provided if any signs of emotional distress occurred and the interviewer should be compassionate and check with participant when ready to move on.

4.3.6. Management of medication error incidents

This section refers to the possibility that a participant mentions (during the interview) a ME experience that has not been reported properly accordingly to hospital's policy. The report of the ME incidents or not is a dilemma that perhaps might arise while exploring MEs. It is a dilemma because the incident happened in the past and any harm caused by it to the patient should have been addressed immediately. This field is a grey area and depends on researcher's moral codes how to handle this situation. Above all, the researcher has to make sure that the incident was reported accordingly to hospital's policy and dealt with; to ensure that patient safety was preserved. Their reporting or the reporting of any unsafe practices should be ensured that have already been reported, exactly after the occurrence of the incident, independently of their type and degree. It would be expected that the nurse in charge or the nurse who made the ME will have reported it properly or if it is a ME that resulted to patient harm, that the line manager is aware of the incident.

Finally, if any of the participants mention that MEs happen very often in their wards, then these issues will be discussed with the nurses in order to reach conclusions and recommendations about ways to handle every contributory factor or situations prone to ME occurrence. All suggestions and recommendations will be provided by the author of the dissertation based on the knowledge obtained from personal published papers and literature evidence on MEs management. The discussions will take place after the interview or any other time convenient for the nurses. Confidentiality will be adhered throughout the process.

4.3.7. Qualitative researcher or nursing professional?

The nurses, either researchers or professionals, face ethical challenges in their practice. For the present project, conflict emerges between the two roles of the interviewer: researcher or nurse? Being nurse and qualitative researcher simultaneously, generates a conflict between them and needs attention (Ashton, 2014). The discrimination between my role as qualitative researcher and nursing professional is developed in this section and ways to handle it.

The exploration of nurses' experiences of MEs can cause emotional distress to the nurses while they narrate their experience, especially when they explain how they realised their error or their serious consequences. In order to handle interviewees' distress, I would remember to be careful and not break participants' periods of silence. Also, expressions of my responding confirmations are encouraging for the participants to carry on narrating their experiences, unless they feel very distressed. At the end of the interview, I would ask the participants if there is any additional information they would like to add and they consider it valuable for the research project. These three features belong to the adoption of *'empathetic distance'* (p.29, Ashton, 2014).

It is likely that nurses' emotions would be very tense. Ashton (2014) reported that when she conducted interviews with vulnerable individuals, she acknowledged the periods of emotional tense and remained calm. Adopting this practice for the suggested protocol for nurses' experiences, the calmness of the researcher is substantial to be alert and try to obtain as much as possible data, when participants' emotions will be tranquil and ready to carry on.

As a qualitative researcher, there is a need to care for participants' welfare post-interview. The systematic review (chapter 2) included a study (Schelbred and Nord, 2007) wherein the authors followed up the participants to make sure that the interview was not a very heavy burden for them. Caring for participants' psychological status post-interview (between one week and two months) is crucial to make sure that the process did not cause further harm to them and if it did, refer them to specialist services. This aspect would be considered as a mode of improvement of the suggested protocol (chapter 3).

Dickson-Swift, James, Kippen et al. (2006), from the feministic perspective, mention that interviewer's self-disclosure to interviewee is defended as a part of the strategies to establish trust between them. However, in the case of MEs research, this would not

be entirely accepted. It may be a blurring boundary, as the risk of losing the balance between researcher and researched is high. If a qualitative researcher decides to self-disclosure to the researched, should decide its intensity and frequency and its justification, as well (Houghton et al., 2010). Contrarily, I consider by remaining a researcher and adhere the plan of the study would help me to keep the other half of my identity (RN) out of the study.

4.4. Summary

This chapter summarises the methodological and ethical challenges in the investigation of nurses' experiences of MEs. It reveals certain points of how to manage every stage of the study and how these can be modified and improved. This chapter in conjunction with further study and work on the methodological and ethical challenges contributed to the formation of a PhD proposal.

Chapter five: Research PhD proposal

This chapter presents a research PhD proposal that is the outcome of the reflexive chapter. The proposal concerns an interview study design to investigate nurses' experiences of MEs. The rationale, philosophical underpinnings, methodology and methods are presented.

5.1. Rationale

The rationale behind the formation of the PhD proposal originates from the research proposal and reflections of chapters 3 and 4, respectively. My understanding is that IPA is still suitable methodology to investigate nurses' experiences of MEs and within the time framework (3 years) of PhD studies the ethics approval can be achievable; especially since aspects of methodological and ethical challenges of the under-investigation topic and phenomenon have been considered and analysed in the present dissertation. The PhD proposal maintains the phenomenological features and expands on an interview study design, while maintaining the characteristics of the proposal (chapter 3) and integrates elements of the reflexive chapter (chapter 4), as well.

5.2. Background

The first two chapters of the dissertation would be used as evidence to support the PhD proposal.

5.3. Philosophical underpinnings-Methodology

Interpretivism and qualitative methodology will be adopted, as developed in subchapter 3.2. and 3.3.. In this section, further details are provided about interviews as a study design. Undoubtedly, interviews are a research tool (Whiting, 2008) and *'a data collection method in which an interviewer asks questions of a respondent, either face-to-face or by telephone'* (p.731, Polit and Beck, 2008). The relationship between the qualitative researcher and participants is an essential structure to establish rapport in-depth interviews and is builded gradually. Rapport acts as a means of a comfortable environment where the interviewee feels safe and ready to narrate the inner themselves and how they experienced a phenomenon (Dicicco-Bloom and Crabtree, 2006).

5.4. Aim and objectives

The aim would be to investigate RNs' lived experiences of MEs in-depth. The primary objective would be the understanding of how nurses make sense of their experiences of MEs. The research question would be the following: **What are the meanings that nurses assign to the lived experience of making a medication error in their practice?.**

5.5. Methods

5.5.1. Sampling

The sample of the study is purposive, as the population would be RNs who experienced their own MEs in their practice, have clinical experience of over 6 months and be competent with medication administration. Snowball sampling will be followed. The nurses will be approached via their hospital e-mail accounts, receive an invitation letter, reply slip and information sheet of the study. Any queries would be answered at this point of the study. The choice of face-to-face or telephone interviews would be provided. Also, posters and leaflets on hospital's announcement boards would be considered as they would be beneficial to disseminate the study.

Access to their e-mail accounts will be provided through the researcher's e-mail account in the same hospital. RNs who work within medical, surgical wards and the emergency department will constitute the sample for the study. The actual number of the sample will be defined by the data saturation. If data will not be saturated, then nurses from other wards will be invited.

The positive reply by nurses would lead to negotiation of location and time for the interview if they wish to undergo a face-to-face interview. Otherwise, if they prefer telephone interviews, a meeting would be agreed to provide written consent and then decide when the interview would take place. The nurses' identity will only be known to the principal researcher.

5.5.2. Data collection

The data collection process is similar to subchapter 3.4.2.. The difference is that the individual semi-structured interviews would be In-depth. This will contribute to the co-creation of meanings of the nurses' experiences. Alteration of the questions of the interview protocol would be considered, if any question is not effective or does not elicit

the relevant data (Dicicco-Bloom and Crabtree, 2006). The duration of each interview will last between 1 ½-2 hours. The semi-structured interviews will be facilitated by a protocol and offer flexibility to the interviewer to, either diverge the discussion accordingly to interviewee's responses or deepen further to what is discussed when it is discussed. Of course, open-ended questions will be included in the interview protocol (How…?, Why…?, What…?) which will allow interviewees to fully express themselves and thereby enrich the data (Turner, 2010). Finally, the location and time will be negotiated with the nurses, so that they feel comfortable with where and when they will be ready to share their experience. The data collection will cease when data saturation will be achieved (Morse, 2015).

5.5.3. Data analysis and management

The data analysis and management will be performed with IPA as it is presented in subchapters 3.4.3. and 3.4.4., respectively.

5.5.4. Ethical approvals and considerations

Ethical approvals by the REC of the UoN and the hospital the nurses would come from. All further ethical considerations as presented in subchapter 3.4.5. would be adhered. Further, the reflexive subchapters 4.3.1. and 4.3.6. of how to manage ME incidents would be integrated into the present proposal.

Written and verbal consent will be obtained from every participant. This stage of the study would be challenging, may result in not planned methodological and ethical issues that perhaps would be highlighted for further explanation by the RECs. Nevertheless, the safety of the researcher/interviewer, participants/interviewees and data would be the priorities during every stage of the study.

5.6. Dissemination

The dissemination of the PhD findings will include the writing and submission of the dissertation, its viva voce, its presentation at conferences and prepare it for publication in peer-reviewed journals.

5.7. Timescale

The timescale is presented in Table 8.

Table 8. The timescale of the PhD proposal (A, B and C).

It is likely that it would be reviewed occasionally for modifications. Also, resources will be identified while preparing the ethics forms.

A. 1st academic year										
October	*November*	*December*	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*
Preparation for the PhD Choose modules to attend Make decisions regarding the literature review part		Preparation of the ethic forms and submission Registration to attend course to improve interview skills				Review of the first draft of the dissertation with supervisor Amendments on ethic forms			Begin communicating the study's commencement	

B. 2nd academic year										
October	*November*	*December*	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*
Review of the draft-Set new aims about the literature review part Review the methods of the proposal Arrange the carrying out of more interviews		Commence data analysis with ongoing data collection Review of the literature review part Identify further improvement of skills				Making of final decisions about the literature review part Prepare and review the methodology chapter Prepare first results of the analysis at a conference or seminar Commence data analysis			Carry on and finish with data analysis	

C. 3rd academic year										
October	*November*	*December*	*January*	*February*	*March*	*April*	*May*	*June*	*July*	*August*
Begin the writing of the dissertation-Connect the literature review and the methodology part Finalise the data analysis Improve data analysis skills-Attendance of relevant seminar							Start reviewing the whole dissertation-Making of last changes Prepare for oral presentation Look for ways to disseminate the findings			

5.8. Summary

This chapter presented a PhD proposal based on learning from previous chapters and concerns a qualitative interviews study design with characteristics of IPA.

Chapter six: Conclusion

6.1. Summary of the dissertation

The present dissertation is about RNs' experiences of MEs which is approached as a lived phenomenon. A meta-synthesis of nurses' experiences of MEs is presented first, followed by a relevant research proposal to investigate them with IPA, a reflexive chapter about the methodological and ethical challenges for their investigation and finally, PhD research proposal is presented.

The meta-synthesis included eight studies and was conducted by using thematic synthesis. The focus is gathered exclusively on nurses' experiences of MEs which were approached as lived phenomena. The themes and subthemes that emerged out from the synthesis were six and twenty, respectively. The themes were: 'moral and emotional impact', 'constructive learning', 'impact on professional registration and employment', 'nurses' coping strategies', 'patient and family' and 'identification of contributing factors of and preventive measures for medication errors'.

The review contributes to the understanding of nurses' making sense of experiences of MEs and towards to this direction a holistic view about the value and dimensions of the experience itself is provided. As frontline nurses are responsible for the medication administration to patients, the moral and emotional impact of the errors is devastating for their professional identity, employment status, and personal life. Yet, the experience of MEs by nurses poses a constructive aspect and nurses detect strategies to cope with the error occurrence and its consequences. They also detect ways to translate their experience into a beneficial and constructive lesson for themselves, their practice and the organisation they work for.

The meta-synthesis revealed that none of the previous studies used IPA to explore nurses' experiences of MEs and only a few studies focused exclusively on their meaning. Thereby, a research proposal presents the rationale for using IPA, methods, methodological and ethical challenges that such a study entails. However, within the context of the master course, it was impossible to achieve ethical approval to carry out the proposed study and a reflexive chapter about the methodological and ethical challenges faced is developed instead. Examples of the challenges faced concerned nurses' recruitment and management of emotionality during the interview.

The above research proposal and reflections about the methodological challenges led to the formation of a future PhD proposal of a qualitative interviews design study

combined with characteristics of the IPA. Finally, the dissertation concludes with implications for further research.

6.2. Implications for future research and recommendations

- The knowledge of the research proposals and reflections presented in this dissertation contributes to the development of a theoretical framework about nurses' experiences of MEs.
- The benefits of studying nurses' experiences of MEs help the researchers to identify certain pathways of participants' behaviour while they are experiencing it, how they construct it and how they make sense of it.
- Further studies would be beneficial to identify ways to handle the methodological and ethical considerations of exploring nurses' experiences of MEs and especially by using IPA; and how researchers reflect on them.
- The nursing administrators should recognise the value of frontline nurses' experiences of MEs and provide suitable support to them.
- It is important to assess each case of experience MEs carefully in order to improve the overall learning climate and hospital's policies about medicine safety towards the transformation of nurses' experiences to learning opportunities.

Turnitin number: 79562100

Word count: 15.000 words

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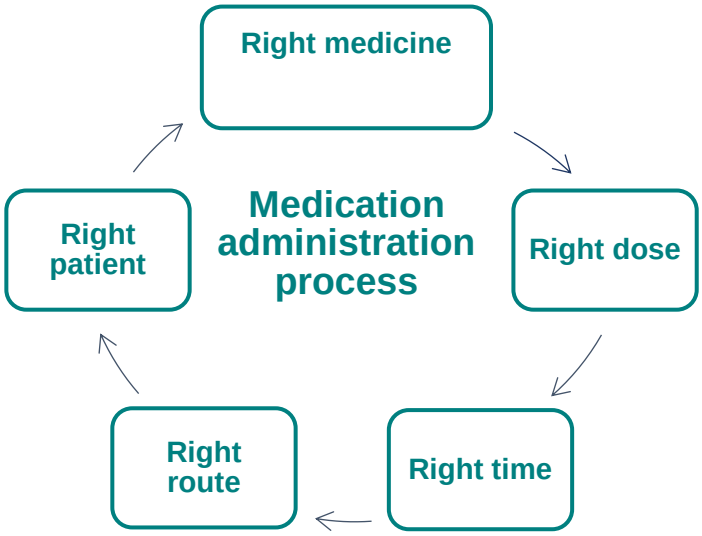
Appendix

Appendix A. The categories of medication errors.

Errors in the medication administration process		
	Prescribing	
	Preparation/dispensing	
	Presentation/packaging	
	Delivery	
	Administration	
	Supply/ordering	
	Storage	
	Monitoring	
Errors in the administration stage		
	Wrong medication	Contraindication
	Wrong patient	Expired medication
	Wrong dose	Drug incompatibility
	Wrong route	Adverse drug reaction
	Wrong time	Wrong dispensing label
	Wrong rate	Wrong formulation
	Wrong quantity	Omission
	Wrong storage	

Appendix B. The '5 Rights' of the medication administration process. It is the RN's responsibility to ensure that all the 5 factors are accurate prior medication administration to patients. Any deviation in the medication administration process has the potential to cause no harm up to severe harm to the patients.



Appendix C. Search strategy for the PUBMED database.

Search strategy in PUBMED			
Column terms combined with	**Population AND**	**phenomenon of Interest AND**	**Context AND**
OR	1. Registered nurses (keyword)	1. Experiences (keyword)	1. Nursing (MeSH)
OR	2. Nurses (MeSH)	2. Medication error (MeSH)	2. Nurs* (MeSH)
OR	3. Trained nurses (keyword)	3. Medication errors (MeSH)	3. Hospital settings (keyword)
OR	4. Charge nurse (MeSH)	4. Drug administration error (keyword)	4. Hospital/s (keyword)
OR			5. Qualitative research (MeSH)
OR			6. Interviews (MeSH)
OR			7. Mixed methods research (keyword)
	5. Combine 1-4 using 'OR'	6. Combine 1-4 using 'OR'	8. Combine 1-7 using 'OR'

MeSH: *Medical Subject Headings*

Appendix D. The basic features of the studies included in the systematic review.

Study, Year, Country	Aim-Phenomenon under investigation	Methodology & Methods	Major findings (The themes and subthemes are reported as they have been mentioned to every study)	Strengths & Limitations
Arndt (1994) Scotland	To make sense of the meaning that was expressed by RNs discourse about their experiences of MEs.	Qualitative design: Discourse analysis with adoption of interpretative data analysis. Data collected from multiple sources (triangulation): - 2 groups discussions: 8 nurses in Germany and 6 nurses in Scotland - 12 unstructured interviews - 6 anonymous self-reports - documents of 6 cases in which the dealt with MEs. RNs participated in the study. Ward sisters and senior nurses participated at the groups, interviews and the self-reports.	5 themes emerged: a. 'procedure dealing with MEs' b. 'role of medical staff' c. 'image of the nurse and of nursing' d. 'the situation of student nurses' e. 'support in the situation of MEs'. 3 more key issues were identified: a. 'Subjection and power-identification and change': identification (responsibility and accountability regarding the adherence of medication administration policy and the policy of reporting MEs, individual's ethical codes, rules of medication policies, willingness to own up to mistakes), counteridentification (to act against rules, quiet about minor errors, to not follow the rules, covering up the mistake, disciplinary actions, negative experience when the consequences of errors are harsh), disidentification (changes to prevent future MEs, provide support to nurses	Collection of data from multiple sources-triangulation-The RNs reflected on their personal MEs-The researcher reflected, as well. The involvement of the regulatory body of RNs in the study. Well-developed clarification of the methodology approach. The ethics considerations of the study are not developed. Not clear explanation about the type and severity of the MEs that the nurses experienced.

			involved, teleological stance, constructive change) b. 'guilt and shame reconciliation with human precariousness': guilt, being humiliated, ashamed, embarrassed, place self within the sphere of human fallibility, loss of self-confidence, the disciplinary procedure, cathartic action c. 'learning from mistakes, teaching and learning ethics in nursing education': learning at personal level, learning at collectively level, change in the organisation's culture, learning regarding changes in the clinical practice.	
Rassin et al. (2005) Israel	The examination of the influence of MEs on the mental and social state of the nurses.	Qualitative design. Semi-structured and in-depth interviews of 1 ½ hour. Convenience sample. 20 RNs who worked in surgical or internal medicine wards of a major medical centre. The RNs were found via a list of the risk unit supervisor and were rang by the researchers and asked to participate in the study. RNs who participated had made ME for the first time in their career. The professional seniority of the RNs was 9.2 years.	3 periods and 8 themes emerged: The day the error occurred and the events preceding: a. 'stress, pressure, and inattention': increased workload-increased fallibility, distractions, lack of concertation b. 'responsibility': seeking help, report the error, monitor patient's status c. 'the double fear, the anger and shame': patient's well-being, rationalisation, loss of confidence, anger, guilt, shame The first month after the error: a. 'I might get fired' b. 'he who works, errs': disclosure of the error to the patient	In-depth interviews-flexibility for the researcher to investigate the topic further. The ME happened the last 2 years before the conduction of the study. 10 out of 30 RNs denied participating in the study. No developed part for study's ethical considerations. Content analysis offered the opportunity to draw many themes. Extensive use of participants' quotations. Clear articulation of the RNs' clinical experience. Clear articulation of the types of MEs, but not their severity.

		Data was analysed with content analysis-coding-themes suggested by Berg (1998). The types of MEs were: inaccurate dosage, inaccurate patient identification, inaccurate medication type, and inaccurate medication entry.	Months later-The third period c. waiting for the inquiry-'every day is like eternity': frightened, worst scenarios, loneliness d. 'absurdly, it got worse with time': dreamt of the event, sleep difficulties, emotional outbursts. Association was identified between MEs and PTSD symptoms. e. 'following the event, I learned my lessons': learning of medication preparation and distribution, self-regulations, caution and attention, being focused on one task every time.	
Santos et al. (2007) Brasil	The identification of RNs' feelings who made MEs.	Qualitative design. Descriptive and exploratory design. Semi-structured interviews. Researchers approached RNs in the wards. Data saturation considered. 15 RNs with 1-20 years of experience from a university hospital. Ethics obtained. Anonymity adhered. Thematic analysis of data according to premises of Bardin.	Two themes emerged: Category I: 'Feelings experienced after the error: panic, despair, guilt, fear, insecurity and shame': shame, preoccupation, fear, insecurity, feeling of concern. Category II: 'looking for someone to share the problem', 'formally communicating the error' and 'looking for information and knowledge' feeling of tranquillity and relief, feelings of tension and disability, generation of a state of alert, seek knowledge.	Not very detailed report about study's methodology. It was out of study's intention to identify where the ME happened. The authors do not report the severity of the MEs, as if it is severe the emotional; impact would be affected seriously. Brief report of the study's ethics. Use of multiple participants' quotations.
Schelbred and Nord (2007)	The description of nurses' experiences of	Qualitative design. Explorative and descriptive.	8 themes emerged from the interviews:	Interviews conducted in Norwegian and translated into English by authors.

Norway	serious MEs, their meaning and support nurses received after the MEs.	10 in-depth interviews with RNs who made a ME in the past 1-10 years, 7 of them were face-to-face interviews and 3 by telephone. RNs' clinical experience was 6 months-30 years. 7 out of the 10 RNs were from hospital settings. RNs were recruited via a nursing journal. Use of phenomenological interpretation and analysis of Giorgi (1985, 1997). MEs types included: wrong route, wrong patient, wrong dose, wrong drug. Severity of MEs: 1 of them resulted to no harm and another 1 case, the ME caused severe and permanent harm. All MEs cases were reported and actions taken to avoid causing harm to patients.	a. 'Immediate reactions': had died inside, loss of control, felt shock, felt dread, powerless b. 'emotional responses': traumatic experience, shame, guilt, depressed, thoughts of committing suicide, betrayed the patients, nightmares, insomnia, posttraumatic syndrome, mistrust, worries of patient safety, loss of professional registration, loss of job, self-doubt, lack of confidence, affected self-image, keep distance from things and people c. 'reactions with patients and family': inform patients and family, moral responsibility, failure to disclosure the consequences of the error, nurse was sympathised by patient and family, avoid further contact with patient and family d. 'reactions from colleagues and managers': emotional support by mentioning their previous errors, 'it is not only your fault', silence by colleagues, humans are fallible, physicians blamed them, colleagues' reactions minimised the error, not allow to administer medication, transfer to another clinical setting e. 'help and support after the incident': professional help, help from colleagues, silence as a way to keep distance from	Small nurses' sample. Possible self-selection bias by the sample. Respondents perhaps presented themselves in a favourable way. The types of MEs and their severity are mentioned. Very well-developed data collection and analysis parts. The authors commented on study's reliability and validity and on ethical considerations (written consent, adherence of confidentiality, approval of the ethics committee). Use of participants' quotations. It is described who author performed each task of the study. Pilot study conducted prior the actual study. Follow up of participants.

			the error, not reported to their manager that they need support f. 'nurses' candour': talk to people that understand them, no member of family, sharing experiences of other nurses, strain when describing the error and its possible consequences g. 'coping with the incident': time, talking, reduce the workload, seek further qualifications h. 'impact of the error on nursing practice': tolerance from colleagues, improvement of drug administration skills, consciousness of reporting the error, reproach by management, no practice any more i. the authors added one more theme: National Board of Health that includes: acquisition of dereliction of duty, not brought in conclusion.	
Luk et al., (2008) China	The exploration of the ethical issues relating to the nursing management of MEs.	Qualitative study. Semi-structured and in-depth interviews. 7 RNs who experienced personal MEs. RNs' experience clinical experience was between 1-5 years. The RNs were from: surgical, medical, pediatric, emergency and outpatient departments of a general hospital.	2 main categories with 3 themes each: a. 'ethical issues relating to the management of patients and relatives': - 'no serious harm done to patients', - 'non-disclosure of errors' - 'nurses acknowledging mistakes made in caring for patients' b. 'ethical issues relating to the management of nurses involved in the error': - 'being understood' - 'treated fairly'.	The semi-structured interview guide is presented in the appendix of the study. Consensus obtained by all researchers when the codes were developed. Two researchers performed the interviews. The researchers shared the results with the participants. Authors mentioned that the study lacks full analysis of each case

		RNs were recruited via the nursing administration of the hospital. Data analysis performed with content analysis and coding suggested by Miles and Huberman (1994). The types of MEs were: incorrect drug, incorrect route, incorrect transcription, medication given with no dilution or was omitted and medications given to incorrect patients. No serious harm to patients. Ethical approvals obtained.	No complaints about the MEs by patients. RNs recognised their accountability for the MEs and reported them. MEs disclosure to patients was limited to avoid frightening the patients. Recommendations were suggested.	and no identification of the relationships of nursing administrators and frontline nurses. The MEs were not severe, i.e. did not result to harm or death), therefore, this might be the explanation that the MEs have not been disclosure to the patients.
Jones and Treiber (2010) USA	The description of nurses' perceptions about how and why MEs occur and RNs' experiences with MEs.	Mixed methodology design: survey mailed to a random sample of 202 RNs with 158 RNs who made MEs. Roster of RNs names obtained from regulatory national board of nursing. 62% of the nurses were working in hospital settings. The questionnaire used mixed methodology items. Open-ended survey for the RNs who experienced their own MEs.	The contributory factor of MEs was the illegible or unclear handwriting by the physician. 94% of the RNs agreed to report the MEs, even if they resulted to no harm. 78% of the RNs had at least experienced 1 or more MEs. Quantitative results: - Important contributory factors: 'illegible or unclear handwriting by the physician', 'did not follow the 5 Rights' and 'high patient-nurse ratio'. - Repotting MEs: The 94% of the RNs considered their reporting as important.	Low response rate. It is possible that RNs might were hesitant to disclosure their experiences and personal data. Random sampling method. No explicit report about MEs types. Cross-checking of data. The data collection and analysis parts are explained well, but there is little about the ethics (adherence of anonymity, consent, sensitivity).

		Quantitative data analysed with Microsoft Excel and SAS for Windows. Qualitative data analysed with Benner's interpretative model (1985). MEs happened in the entire range of the years of nursing experience.	- Technology and medication administration procedures: RNs considered the bar coding and the medication-dispensing technology as important measures to prevent MEs. Qualitative results: - Contributory factors for MEs: 'physical exhaustion', 'interruptions and distractions', 'newly graduate/lack of experience' and 'patient/staffing load'. - RNs feelings about the experiences of MEs: 'concerns about patient harm', 'violation of patient trust', 'culpability, shame and self-blame', 'loss of self-esteem and professional self-image' and 'system failed them'.	
Smeulers et al. (2014) Netherlands	The exploration of RNs experiences with and perspectives on preventing MAEs.	Qualitative exploratory design. Semi-structured interviews (60-90 minutes) with 20 RNs who were working in an academic hospital. Senior and research RNs were approached initially, then snowball sampling was obtained. All RNs approached by e-mail. Saturation was reached. The sample included: innovators, directors, ward managers, senior and regular RNs.	3 themes emerged: a. 'nurses' roles and responsibilities in medication safety': strong feels of responsibility, nurses' pivotal role b. 'nurses' ability to work safely in daily practice': risk awareness, circumstances c. 'nurses' acceptance of safety practices': if the safety practice actually improves safety, consultation of the feasibility of the new safety practice, appropriateness of the practice and comfortability. Nurses should work in a safe environment to deliver safe medication administration to the patients, within it, comprehend all the	The experiences and thoughts were explored through in-depth interviews. Transferability: Results present consistency with other studies' results. The authors mentioned no need for ethical approval according to country's laws. Extensive use of participants' quotations. It is described who author performed each task of the study. Participants were asked to reflect on safety practices.

		Variety in years of clinical experience. The data analysis was performed with a software for qualitative research analysis. Coding was applied and themes emerged.	risks, and protect the medication administration.	
Linnard-Palmer and Ngo (2016)	The investigation of nurses' experiences of errors, recovery process, the concept of power distance and poor communication that led to near miss cases occurrence.	Mixed methodology design: on-line survey and open-ended questions, and the data analysis included descriptive statistical analysis and conventional content analysis, respectively. Purposive sampling. Random and purposive sampling techniques. The content analysis was this one suggested by Hsieh et al. (2005). 110 RNs (senior nursing students up to experienced RNs) from a variety of direct patient care settings. RNs had experience of recovery behaviours after the near miss incidents. Only near misses were explored.	Descriptive data: -Near miss definitions: a. 'wrong medication to wrong patient ' b. 'error caught before reaching patient' c. 'recognition of error, correction made before implementation'. Qualitative data: -Examples of near miss experiences: a. 'patient identified near miss' b. 'medication already given by another nurse' c. 'a system error' d. 'breeding te5 Rights' e. 'timing-giving medication at the wrong time' f. 'wrong medication dispensed to nurse from pharmacy'. -Miscommunication and near misses: a. between healthcare team members b. between shifts c. pharmacy verifying and approving wrong med/wrong dose. -Definition of recovery: a. emotional reactions (visceral reactions) b. the need to talk about the near miss	Purposive sampling. RNs from a variety of wards. Generalisability of data not possible. The tool was developed by the authors. Its construct and content validity were checked by experts. The authors explained the instrument development and how it was used. A statistician provided feedback about the tool. Clear articulation of the severity of the MEs. Approvals obtained by ethics review board. Examples of quotations are provided in tables.

	c. how it takes time to recover. -Experiences of power distance: a. not speaking up b. do not question authority c. fear of clarifying misunderstandings.

M(A)E: *Medication (Administration) Error,* ***PTSD:*** *Post-Traumatic Stress Disorder*

Appendix E. The basic features of the dissertations mentioned in the discussion part of the systematic review (chapter 2).

Author, Year, Dissertation, University	Aim	Methods and methodology	Findings and connection with the systematic review's findings in Chapter 2
Maurer (2010) Doctor of Philosophy in Health Education, University of Toledo	The exploration of nurses' perceptions of and experiences with MEs. The aim of the thesis included the examination of several factors: contributory factors, reporting MEs-barriers and facilitators, reporting of the errors to patients, family or agency and the role of MA technology for their prevention.	E-mail survey. The author presented study's hypotheses in the dissertation analytically. An instrument was developed. Participants were 341 RNs across the US. The mean duration of clinical years of experience was 20. Data analysed with SPSS.	Interruptions during medication rounds were the primary contributory factor to MEs. The main barriers to report MEs was fear. RNs considered benefits and decrease of MEs rate, if MA technologies will be used in practice. Regarding the experience of errors, it was revealed that the ¼ of the sample had own experience with MEs that resulted in low or high degree patient harm over a period of 12 months. The experience was examined as a variable of length of professional and clinical experience (novice, experienced) and the relation with education errors occurrence; and did not intend to investigate the experience as a phenomenon.
Belderson (2013) Doctor of Nursing Practice degree, Regis University	The evaluation of nurses' experiences of MEs incidence, responses, coping strategies and support needs.	Descriptive, mixed-methods and non-experimental design. Paediatric haematology, oncology, bone marrow transplant RNs. 66 RNs participated in the study with	Most of the RNs experienced MEs that did not lead to patient harm. The findings showed positive correlation between nurses' negative feelings (fear, shame, guilt), positive adaptive responses recorded and nurses' willingness to discuss the errors with superiors, colleagues and the family. There are couple of differences between the dissertation of Belderson (2013) and the systematic review's: the author examined specific variables: nurses' emotional,

		experience of 1-16 years. SPSS was used and a software to analyse the qualitative responses for recurring themes.	psychological, physical distress, coping strategies and support, whereas in this systematic review all categories of the lived experience were considered, included the ones examined by Belderson. Both Belderson and the systematic review referred only to nurses' experiences of MEs.
Mants (2015) Master of Nursing degree, University of British Columbia	The exploration of what the effects of adverse events were on health care professionals when they were involved in them, and the determination of the type of support they had post-error.	Integrative literature review. 11 studies included: 6 qualitative, 4 quantitative studies and 1 mixed-methods. All categories of health care professionals included with 6 of the studies referred to nursing samples, alone or in combination with other professions. Only 3 studies examined MEs.	The findings showed that health care professionals experienced emotional distress on personal and professional level, as well. The findings include: a. emotional effects: guilt-shame, anxiety-fear, anger, sadness b. coping with the error: problem-focused coping, emotion-focused coping c. social support needs d. organisational support needs e. long-term effects. From the above findings, there are certain points similar to the findings of the present systematic review. For instance, the emotional effects, coping strategies and the search for support are common between the dissertation's and the present systematic review's findings. But, there are couple of points that are different between Mant's dissertation and the systematic review's: a) the categories of errors: Mants examined adverse effects in healthcare and the systematic review focused only on MEs, and b) the types of the studies: Mants included all types, whereas the systematic review focused only on qualitative studies.

RN: *Registered Nurse,* ***ME:*** *Medication Error,* ***MA:*** *Medication Administration,* ***US:*** *United States,* ***SPSS:*** *Statistical Package for the Social Sciences*

Appendix F. The invitation letter and participant information sheet of the research protocol.

School of Health Sciences
IRAS Project ID: -

INVITATION LETTER

(Draft Version 1.0 / Final version 1.0: 29/06/2016)

Dear Registered Nurse,

I would like to invite you to participate in a research study to understand nurses' experiences of how medication errors are recognised, the processes in place to report medication errors and their involvement in the management of medication errors.

After reading the enclosed information sheet, if you would be willing to participate in the study please use the contact details below or return the reply slip included. This would involve a short face-to-face or telephone interview, which would be arranged for a place, date and time of your choosing. We would like to assure you that your answers would remain confidential.

I am happy to respond to any queries you may have. In addition, I recognise that your personal and working time are equally valuable. However, little is known about nurses' experiences in this area and your participation in the study would make a great contribution.

Thank you for your time and consideration.

Sincerely,

Efstratios Athanasakis, B.Sc., Master Student

Master of Arts in Research Methods (Health)
School of Health Sciences

Queen's Medical Centre
University of Nottingham
Nottingham
NG7 2UH

Mobile: 07930667418
E-mail: ntxea7@nottingham.ac.uk

REPLY SLIP

Please complete the reply slip if you are interested in participating in the study and be interviewed.

Post to:

Efstratios Athanasakis
Flat 50 C, Madison Court, Faraday Road, Raleigh Park, Nottingham, NG7 2EG

Or

send an email: ntxea7@nottingham.ac.uk by filling the form below:

Name:

Title: Staff nurse or Charge nurse

Years of clinical experience:

Ward:

Tel:

Email:

Thank you.

School of Health Sciences
IRAS Project ID: -

PARTICIPANT INFORMATION SHEET
(Draft Version 1.0 / Final version 1.0: 29/06/2016)

Title of Study: Registered nurses' experiences of identification, reporting and management of medication errors: a phenomenological study.

Name of Researcher(s):
Efstratios Athanasakis (Student of Master in Research Methods)
Dr. Eleanor Wilson (Senior Research Fellow, Faculty of Medicine & Health Sciences)

My name is Efstratios Athanasakis, I am a student on Masters in Research Methods (Health), School of Health Sciences, University of Nottingham. I would like to invite you to participate in a research study entitled *'Registered nurses' experiences of identification, reporting and management of medication errors: a phenomenological study'*. Before you decide I would like you to understand, why the research is being done and what it would involve for you. I will go through the information sheet with you and answer any questions you have. Talk to others about the study if you wish. Please ask me, if there is anything that is not clear.

What is the purpose of the study?
The aim of the present study is to develop an understanding of registered nurses' experiences of identification, reporting and management of medication errors. Specifically, the primary objective is to understand registered nurses' experiences of (one or more of the follow factors): how medication errors are recognised, the processes in place to report medication errors and their involvement in the management of medication errors. The secondary objectives are the analysis of the data by implementation of interpretative phenomenological analysis, enrichment of the relevant primary nursing research and formation of a PhD research proposal.

Why have I been invited?
You are being invited to take part in the interviews that will be conducted in the context of the study. You are eligible to participate in the study, if you have experience of any of the process of identifying, reporting and managing personal medication errors throughout your career. The sensitivity of the current topic is recognised, so you are asked to accept the invitation to participate in the study, only if you feel comfortable to discuss your experience further. The study is addressed to registered nurses who work

in acute medicine wards, the accident and emergency department and the intensive therapy unit/intensive care unit, however nurses from all wards are more than welcomed.

Do I have to take part?
It is up to you to decide whether or not to take part and attend either face-to-face interview or a telephone interview. If you do decide to take part please keep this sheet and you will be asked to sign a consent form soon. 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.

What will happen to me if I take part?
The research will start on 20th May 2016 and will end on 30th September 2016. At some point during this time I will arrange to undertake a one-off short interview. This can be at your work place and at a time and date that is suitable. It is up to you to let us know if you prefer to be informed about the findings of the study.

Expenses and payments
Unfortunately, it is not possible to pay participants (an inconvenience allowance) to take part in the study.

What are the possible disadvantages and risks of taking part?
Please bear in mind that recalling and discussing with the interviewer an experience of medication error may cause distress or discomfort to you, however you will be free to stop the interview at any time.

What are the possible benefits of taking part?
We cannot promise the study will help you but the information we get from this study may contribute to form or reconsider policies for the medication administration practices, enhancement of patient safety, enrichment of the primary nursing research evidence and education provision to nurses.

What if there is a problem?
If you have a concern about any aspect of this study, you should ask to speak to the researchers who will do their best to answer your questions. The researchers contact details are given at the end of this information sheet. If you remain unhappy and wish to complain formally, you can do this by contacting the Research Ethics Committee Administrator, The University of Nottingham, School of Medicine Education Centre, B Floor, Medical School, Queen's Medical Centre Campus, Nottingham University Hospitals, Nottingham, NG7 2UH. E-mail: louise.sabir@nottingham.ac.uk.

Will my taking part in the study be kept confidential?
We will follow ethical and legal practice and all information about you will be handled in confidence. If you take part in the study, the interview recordings will only be looked at by myself and persons from the University of Nottingham who are organising the

research. All will have a duty of confidentiality to you as a research participant and we will do our best to meet this duty.

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 hospital 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 1 year after the end of the study so that we are able to contact you about the findings of the study (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.

If during the interview, information that need reporting or put participants or researcher at risk will be reported to the Research Ethics Committee Administrator, The University of Nottingham, School of Medicine Education Centre and the Research and Innovation Department of the Nottingham University Hospitals.

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?
The findings of the study will be mentioned in a dissertation to obtain master's degree (in October 2016) and later on (first semester of 2017) will be published in a journal, presented in research conference and in leaflets. Participants' names will be encoded and copy of results can be provided after contact with the researchers.

Who is organising and funding the research?
This research is being organised by the University of Nottingham.

Who has reviewed the study?
All research in the NHS is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by the Faculty of Medicine and Health Sciences, Research Ethics Committee, University of Nottingham.

Further information and contact details
Efstratios Athanasakis: email: ntxea7@nottingham.ac.uk
Eleanor Wilson: email: eleanor.wilson@nottingham.ac.uk

Appendix G. The interview guide of the research protocol.

School of Health Sciences

IRAS Project ID: -

INTERVIEW GUIDE

(Draft Version 1.0 / Final version 1.0: 29/06/2016)

Title of Study: Registered nurses' experiences of identification, reporting and management of medication errors: a phenomenological study.

Characteristics: The interviews are semi structured. Their structure includes the questions outlined in the next part, however additional questions will be considered for the further exploration of the topic. Their duration will last up to an hour/participant. The sample is purposive and expected to recruit at least five participants.

Process:

a) Record date and time of interview. Introduction of myself. Thank participants for their involvement and time participating in the study. All the data is confidential and will be reported anonymously. Ensure each participant's consent, understanding of the information sheet, awareness of the aim and the whole process of the study. Participants' questions will be answered at this stage and they will be informed that can ask questions at any time.

b) The first part of the interview is a collection of background information:

Just to get started, can you tell me a bit about yourself and your clinical role?

Prompts:

- *name and email*
- *age*
- *gender*
- *type of ward*
- *band/grade*
- *nursing education*
- *years of clinical experience*
- *type of shifts (day/night)*
- *nurse-patient ratio*

c) In the second part of the interview, questions related to the aim of the study are included:

- **The study is about registered nurses' experiences of medication errors, can you tell me what does this mean to you?**
- **Can you tell me about a time when you have been involved in a medication error in some way?**

Prompts: - what happened?

- what was the type (wrong dose, wrong patient, wrong time, wrong medication, wrong route, etc) of the error?

- what was the error severity (no harm, mild, moderate, severe, death)?

- who was involved?

- how were you involved?

- how was the error identified?

- what did not go right?

- who reported it? To whom, then what happened?

- who else was informed? was the patient/relative informed?

- what support did you received during this time?

- what were the first actions after the error occurrence?

- what were your thoughts and emotions after the error occurrence?

- what was the errors' impact in the ward/nursing practice?

- **What are your thoughts about the reporting process?**

Prompts: - has it been improved over the last years?

- how would you like to see it improved?

- are there key people that should be involved in the process?

- do you have any concerns about the reporting process?

- is the process always followed? facilitators/barriers to report?

- how would you characterise (complicated or easy) the reporting process and why?.

- **What do you think is nurses' role in the management of medication errors?**

Prompts: - inform the nurse in charge and the matron?

- inform the doctors?

- inform the medicine safety team?

- disclosure of the error to the patient and relatives?

- intervene to minimise the results of the error?

- nurses in the centre of multidisciplinary teamwork?

- professional candour?

- acknowledge the risk factors and risk situations for patient safety

- organise meeting with nursing administrators to discuss the efficiency of established protocols/policies?

- organise medication-focused activities, e.g. analysis of previous cases, discuss papers/literature in groups?

- influence the organisations' practice and organisational culture towards medication errors issues?

- recovery and support after the error?.

Before we finish I would like to thank you for your time and your great contribution in the study. Thank you.