

Investigating undergraduate nurse  
responses to simulated interruptions  
during medication administration - a  
qualitative multi-method study

Carolyn Hayes

A thesis to fulfil the requirements of a Doctor of Philosophy (Nursing)

University of Technology Sydney

Faculty of Health

2019

# Certificate of original authorship

I, Carolyn Hayes declare that this thesis is submitted in fulfilment of the requirements for the award of Doctor of Philosophy with 92984 Nursing, in the Faculty of Health at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise reference or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

This research is supported by the Australian Government Research Training Program.

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Carolyn Hayes

26 July 2019

# Acknowledgements

This thesis document is the culmination of a journey that has been both enjoyable and challenging. It is one I would never have completed without the support of many people.

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Special thanks to my primary supervisor, Professor Debra Jackson who is a fountain of knowledge. She has generously shared her time and wisdom over the last few years and pushed me beyond what I thought possible. She has been a constant voice of reason and advice whenever I needed it.

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The team in the UTS Health research office who have made interesting and insightful ongoing education opportunities available throughout my candidature.

The students and staff who gave up their time to participate in the study.

Finally, I would like to thank my husband Tim and my children Hannah, Matthew and Michael who have been my biggest motivators and supporters. They have had unending confidence in me, encouraging me to continue this journey and keep the faith.

## Statement of format of thesis

This thesis presents a thesis by compilation. It includes a single manuscript comprised of a combination of chapters and published works. In order to increase the accessibility of information, key material, such as research questions, are repeated in individual chapters.

## Anthology of dissertation

Disseminating new knowledge is key to the PhD process. Therefore, a distinct choice was made to present my PhD by compilation rather than by thesis. Managing medication administration errors is an ongoing area of concern within the literature. I therefore felt it was important to add to the existing body of knowledge by publishing work that reports on the planning, design, application and impact of an innovative medication administration role-play simulation for undergraduate nurses. Dissemination throughout also gave an opportunity to seek ongoing rigorous feedback on the work, beyond the supervision team from international experts in the field, through the peer review process.

Presented in this thesis is a series of seven publications (five journal articles and two editorials). The five journal articles include a literature review which identifies gaps in current research, a method paper which outlines the methodology and framework on which the study is built, and three individual findings papers. Each paper makes a unique contribution to our understanding of existing knowledge, current interruption reduction interventions, the underpinning design and methodology of this research and informs the research questions (see table 1). An exegesis of confirmatory and newly emerging findings provides additional evidence that completes the story within the thesis. The accompanying editorials provide commentary on the safe and effective administration of medications as a cornerstone of nursing practice and the preparation of nurses to navigate interruptions confidently during medication administration in the clinical environment.

Throughout this journey, the work has been presented at peer-reviewed conferences. Conference choice afforded the opportunity to reach a variety of relevant groups of both national and international audiences which in turn



provided an opportunity for further feedback from an expert audience. The Nurse Education Today Nurse Education in Practice (NETNEP) conference targets a combination of the readership of two journals Nurse Education Today (NET) and Nurse Education in Practice (NEP). It provides an opportunity to share nursing and midwifery education-based knowledge and experiences with an international audience. The conference administered by the Society in Europe for Simulation Applied to Medicine (SESAM) targets an international community of nurses, midwives, doctors and other allied health professionals who are directly and indirectly involved in providing simulation education. The Australian College of Nurses (ACN) National Nursing Forum (NNF) is an opportunity to network and share innovations, with nurses who are interested in making an impact on nursing education and practice. As a result, I was chosen by the NNF to be profiled in ACN publications and on social media in the lead up to the Forum. The Research Student Forum (RSF) and 3-minute thesis competition provide opportunities for researchers to present their work for peer review within a university setting.

## Choice of journals

Journals selected for the publication of this work employ a peer review process and are specific to nursing practice. *Nurse Education Today* (impact factor 2.067) was selected to publish the method paper (Hayes et al. 2015b) as it is a leading nurse education journal that specialises in theory and pedagogy. The *Journal of Clinical Nursing* (impact factor 1.635) and *Contemporary Nurse* (impact factor 0.673) are forums for national and international nurse educators, researchers and practitioners to access research of a high standard that supports the practice and discipline of nursing. The literature review (Hayes et al. 2015a), three findings papers (Hayes et al. 2017, 2018a; 2018b) and one of the editorials (Hayes et al. 2014); have been published across these two journals to ensure a wide audience for the work. The *Journal of Nursing Management* (JONM) (impact factor 1.912) addresses nursing management, concerning itself with issues as they impact clinical nursing, resources, and systems management. The editorial published in JONM (Hayes et al. 2018c) brings issues associated with transitioning the skill of safe medication administration from undergraduate to new graduate nurse, to an audience who can directly impact change in the clinical environment. The unique contribution of each publication to nursing knowledge is found in table 1.

## Conference presentations

Hayes, C., Jackson, D., Daly, J., Davidson, P.M. & Power T. 2018, 'Challenging students with the reality of clinical practice through role play simulation', *7<sup>th</sup> International Nursing Education Conference 2018*, NETNEP, Banff, Canada.

Hayes, C., Jackson, D., Daly, J., Davidson, P.M. & Power T. 2015, 'Simulating reality: preparing undergraduate nurses to administer medications in the real world', *The University of Technology Research Student Forum 2015*, RSF, Sydney, Australia.

Hayes, C., Jackson, D., Daly, J., Davidson, P.M. & Power T. 2015, 'Simulating reality: preparing undergraduate nurses to administer medications in the real world', *Society in Europe for Simulation Applied to Medicine 2015*, SESAM, Belfast, Northern Ireland.

Hayes, C., Jackson, D., Davidson, P.M. & Power T. 2014, 'Simulating reality: preparing undergraduate nurses to administer medications in the real world', *The University of Technology Research Student Forum 2014*, RSF, Sydney, Australia.

Hayes, C., Jackson, D., Davidson, P.M. & Power T. 2014, 'Nurse interrupted', *The Australian College of Nursing National Nurses Forum 2014*, NNF, Adelaide, Australia.

Hayes, C., Jackson, D., Davidson, P.M. & Power T. 2014, 'Multitasking whilst medicating: exploring how undergraduate nursing students respond to simulated interruption', *5<sup>th</sup> International Nursing Education Conference 2014*, NETNEP, Noordwijkerhout, The Netherlands.

Hayes, C., Jackson, D., Davidson, P.M. & Power T. 2013, 'Nurse interrupted', *The University of Technology 3-minute thesis competition 2013*, Sydney, Australia.

## Publications arising from this research

Hayes, C., Power, T., Davidson, P.M., Daly, J. & Jackson, D. 2018c, 'Simulation: smoothing the journey from undergraduate to new graduate', *Journal of Nursing Management*, vol. 26. No. 5, pp. 495-497 (appendix 1).

Hayes, C., Jackson, D., Davidson, P.M., Daly, J. & Power, T. 2018a, 'Pondering practice: enhancing the art of reflection', *Journal of Clinical Nursing*, vol. 27, no.1-2, pp. e345-e353.

Hayes, C., Power, T., Davidson, P.M., Daly, J. & Jackson, D. 2018b, 'Learning to liaise: using medication administration role-play to develop team work in undergraduate nurses', *Contemporary Nurse*, August, pp.1-10.

Hayes, C., Jackson, D., Davidson, P.M., Daly, J. & Power, T. 2017, 'Calm to chaos: engaging undergraduate nursing students with the complex nature of interruptions during medication administration', *Journal of Clinical Nursing*, vol. 26, no. 23-24, pp. 4839-4847.

Hayes, C., Power, T., Davidson, P.M., Daly, J. & Jackson, D. 2015b, 'Nurse interrupted: development of a realistic medication administration simulation for undergraduate nurses', *Nurse Education Today*, vol. 35, no. 9, pp. 981-986.

Hayes, C., Jackson, D., Davidson, P.M. & Power, T. 2015a, 'Medication errors in hospitals: a literature review of disruptions to nursing practice during medication administration', *Journal of Clinical Nursing*, vol. 24, no. 21-22, pp. 3063-76.

Hayes, C., Power, T., Davidson, P.M. & Jackson, D. 2014, 'Interruptions and medication: is 'Do not disturb' the answer?', *Contemporary Nurse*, vol. 47, no. 1-2, pp. 3-6 (appendix 2).

See appendix 3 for Journal permissions to reproduce articles in this thesis.

# Statement of contribution of authors

Contribution of graduate research student Carolyn Hayes: lead author

Contribution of Professor Debra Jackson: primary supervisor, joint author

Contribution of Dr Tamara Power: co-supervisor, joint author

Contribution of Professor John Daly: co-supervisor, joint author

Contribution of Professor Patricia Davidson: co-supervisor, joint author

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Carolyn Hayes

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Professor Debra Jackson

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prior to publication.

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Doctor Tamara Power

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prior to publication.

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Professor John Daly

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Signature removed  
prior to publication.

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Professor Patricia Davidson

## Researcher's story: the position of the researcher

I began my personal journey as a nurse in 1982, once registered I began working with patients who had sustained a spinal injury. After several years working in the same specialty I felt it was time for a change and moved into emergency care nursing. Among the opportunities afforded me during my time in these two areas the teaching components of my roles emerged as an area of particular interest for me. I then moved to clinical facilitation where I was responsible for mentoring undergraduate student nurses and facilitating learning experiences for them in the clinical environment. In my role as a clinical facilitator, I was frequently exposed to large numbers of both undergraduate and newly graduated nurses who were struggling in their transition between university and the clinical setting. Whether it was the undergraduate in clinical practicum or newly graduated nurses in full-time employment, novice and advanced beginner nurses were finding it difficult to manage the constant interruptions that they faced when undertaking nursing care tasks.

The task that stood out clearly to me as placing novice and advanced beginner nurses in a vulnerable situation was that of medication administration. I recall one specific encounter with a newly graduated nurse that highlighted this vulnerability to me and became a major impetus for this study. The encounter with the nurse in question (Sarah - a pseudonym) went like this: one of the undergraduate nursing students was allocated to a busy medical-surgical ward, and I was looking for her when I stumbled on Sarah. Sarah was in the centre of a four bedded room with a look of fear on her face. Sarah was turning in circles looking at one patient, then turning to the next, and then turning around again and looking at the next patient. I asked her if she needed help, at which point Sarah looked back at me and said 'well actually I don't know what to do. I've got to give these medications, and I've got to empty this drain and take that patient to the toilet, and the other wants unscheduled pain relief'. Sarah knew she had to give some oral medications and I could see she had intravenous antibiotics in her hand ready to administer; she also knew she had several other tasks due. At the same time patients were interrupting her and asking her for help

to the bathroom and requesting pain relief. Sarah felt she had to do everything at once; she had no idea of how to prioritise the tasks and manage the situation.

Reflecting on the events of that day set in motion the journey that I have undertaken to consider how and when nurses learn the skills needed to prioritise and manage multiple competing demands and concurrent tasks, with a specific focus on medication administration. In order to have a direct impact on the pre-clinical educational experiences that prepare undergraduate nurses for clinical practicum, I chose to move from hospital-based facilitation into a formal role in the university setting.

As a specialist in simulation-based education, I aspire to encourage engagement in immersive experiences that utilise a variety of simulation modalities to mimic the reality of clinical practice. I believe that challenging and inspiring students to develop individual knowledge and skills requires a student-centred approach to learning. To me a student-centred approach facilitates new knowledge and skill development through a partnership between teacher and student. I believe that faculty-student and peer-peer relationships are key and are fostered in a place where participants feel safe to explore, make mistakes, make connections and consider learning in a broader context.

Simulation-based education was the vehicle I used to develop a unique experience that exposed undergraduate student nurses to a reality-based medication administration scenario. It was from this medication administration scenario that the findings from this study were elucidated. Although my role is based within in the university in which this simulation and study took place, I maintained clear distinctions and boundaries between my work and my study.

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# Abstract

**Aim:** The aim of this thesis is to explore undergraduate nursing student responses to interrupted medication administration and facilitate new insights into interruption management strategies.

**Background:** Medication administration incidents and errors are a significant patient safety issue that often occur as a direct result of the inappropriate management of interruptions and distractions. Undergraduate nursing students are mostly taught how to administer medications in a calm and uninterrupted environment. In the clinical environment however, they are faced with the reality of administering medications amidst competing demands and multiple interruptions. Improving patient safety requires realistic, innovative and creative methods of teaching medication administration to undergraduate nurses.

**Design:** A qualitative multi-method research study was undertaken within a large Australian University. This study was designed to elicit student responses to a simulated role-play that purposefully placed students in an interrupted and pressured environment. Participants included second-year undergraduate nursing students (n=528) and nursing faculty (n=8). Data were derived from; student written reflective responses (n= 451), student semi-structured individual interviews (n=13), student feedback surveys (n= 28), and faculty email questionnaires (n=8). Data were subject to thematic analysis.

**Findings:** Student participants reported that they had gained a new understanding of the impacts of interruptions while administering medications. Improved awareness of management strategies and an increased level of confidence was revealed. Students identified the role they played was significant to their individual experience and learning from the simulation. Some roles were reported to have contributed to increased levels of stress and others were reported to facilitate enhanced patient and team member empathy. Students expressed a desire to experience more complex scenarios during simulation experiences to enhance in their preparation for real-world clinical practice. Students also described the positive impact the written reflective experience had on their ability to consolidate and integrate prior and new

knowledge and skills. Data collected from nursing faculty supported the findings from the student participant data.

**Conclusion:** Study findings highlighted that student confidence and understanding of the impact of interruptions during the medication administration process improve if they are given the opportunity to practice in realistic and safe settings. Empathy for both patients and other members of the nursing team can be enhanced as a result of immersive role-play experiences. Simulated experiences that incorporate system and process complexities, together with opportunities for extended reflection to facilitate deeper learning, show promise in developing proficiency.

Table 1: Unique contribution of individual publications to knowledge

DETAILS OF EACH PUBLICATION	UNIQUE CONTRIBUTION TO KNOWLEDGE
<b>Preliminary Editorial</b> <p>Hayes, C., Power, T., Davidson, P.M. &amp; Jackson, D. 2014, 'Interruptions and medication: is 'Do not disturb' the answer?', <i>Contemporary Nurse</i>, vol. 47, no. 1-2, pp. 3-6.</p>	<p>Describes safe and effective administration of medications as a cornerstone of nursing practice drawing on processes requiring multiple clinical judgements, professional vigilance and critical thinking during all phases of the administration process.</p> <p>Comments on how tailored, realistic and focused learning that involves critical thinking to problem solve and make decisions can better prepare nurses to navigate deviations such as interruptions confidently during medication administration.</p>
<b>Literature Review</b> <p>Hayes, C., Jackson, D., Davidson, P.M. &amp; Power, T. 2015a, 'Medication errors in hospitals: a literature review of disruptions to nursing practice during medication administration', <i>Journal of Clinical Nursing</i>, vol. 24, no. 21-22, pp. 3063-76.</p>	<p>Explores what is known about interruptions and distractions during medication administration in the context of undergraduate nurse education.</p> <p>Highlights the need for further exploration into the way nurses learn to manage interruptions and distractions during medication administration.</p>
<b>Method</b> <p>Hayes, C., Power, T., Davidson, P.M., Daly, J. &amp; Jackson, D. 2015b, 'Nurse interrupted: development of a realistic medication administration simulation for undergraduate nurses', <i>Nurse Education Today</i>, vol. 35, no. 9, pp. 981-986.</p>	<p>Describes a simulated role-play experience that was developed to enable undergraduate nurses to experience, reflect on and analyse their responses to interruptions during medication administration.</p> <p>Outlines the methodology and pedagogical principles underpinning the intervention design.</p> <p>Describes the study method including; setting, participants, ethical considerations, data collection and analysis.</p>
<b>Findings</b> <p>Hayes, C., Jackson, D., Davidson, P.M., Daly, J. &amp; Power, T. 2017, 'Calm to chaos: engaging undergraduate nursing students with the complex nature of interruptions during medication administration',</p>	<p>Focusses on understanding the impacts of interruptions during the medication administration process and use of interruption management strategies.</p>

<p><i>Journal of Clinical Nursing</i>, vol. 26, no. 23-24, pp. 4839–4847.</p>	<p>Establishes an improved awareness of management strategies and improved confidence.</p> <p>Describes the impact of fidelity in simulation on participant experience.</p>
<p><b>Findings</b></p> <p>Hayes, C., Power, T., Davidson, P.M., Daly, J. &amp; Jackson, D. 2018b, 'Learning to liaise: using medication administration role-play to develop team work in undergraduate nurses', <i>Contemporary Nurse</i>, August, pp.1-10.</p>	<p>Reports undergraduate nursing students' knowledge and understanding of their responsibilities as part of a team when managing interruptions during medication administration.</p> <p>Identifies crucial links between understanding the roles of others in collaborative teamwork and clear communication within the team as fundamental to safe medication administration.</p>
<p><b>Findings</b></p> <p>Hayes, C., Jackson, D., Davidson, P.M., Daly, J. &amp; Power, T. 2018a, 'Pondering practice: enhancing the art of reflection', <i>Journal of Clinical Nursing</i>, vol. 27, no.1-2, pp. e345-e353.</p>	<p>Reports the effect that immersive simulation experiences and guided written reflection can have on the undergraduate nurses' understanding of how stressful environments influences their emotions, performance and ability to implement safe administration of medications.</p> <p>Reports an increased consciousness of the importance of reflection for evaluating performance and gaining self-awareness.</p> <p>Describes effective communication, compassion and empathy as significant factors in facilitating self-efficacy and improved patient care outcomes.</p>
<p><b>Editorial JONM</b></p> <p>Hayes, C., Power, T., Davidson, P.M., Daly, J. &amp; Jackson, D. 2018c, 'Simulation: smoothing the journey from undergraduate to new graduate', <i>Journal of Nursing Management</i>, vol. 26. No. 5, pp. 495-497.</p>	<p>Comments on the transition from undergraduate nurse to registered practice.</p> <p>Highlights that newly graduated nurses often struggle with time management and multitasking in complex environments which can leave them feeling insecure and vulnerable.</p> <p>Correlates low levels of self-efficacy with susceptibility to making errors during the medication administration process.</p> <p>Suggests the use of simulation experiences as a tool for assessment of practice readiness, where critical thinking capabilities can be exposed through the reflection in and on action.</p>

## Structure of the thesis

The introduction to the thesis is found in **Chapter 1**. It provides an overview of the background and significance to the study, outlining acknowledged causes of medication error and positioning interruptions as one of the leading causes of those errors. The clinical and tertiary responses to enhance the safe administration of medications are described, and the nurses' role and responsibilities in the medication administration process are highlighted. The impact of multitasking and the use of simulation as an innovative teaching method to enhance nursing knowledge and experience are identified.

A published literature review (Hayes, Jackson, et al. 2015a) which explored what is known about interruptions and distractions to medication administration in the context of undergraduate nurse education can be found in **Chapter 2**. An overview of the literature examining simulation in nursing education is also provided. As the original literature review (Hayes et al. 2015a) was published early in the thesis journey, reviewing literature spanning January 2005 – December 2012, more recent literature specific to this thesis is included in later publications (Hayes et al. 2017; Hayes et al. 2018 a; Hayes et al. 2018b) and throughout the discussion chapter of this thesis.

An exegesis of the methodology and a published method paper (Hayes, Power, et al. 2015b) are presented in **Chapter 3**. The thesis is constructed through the lens of an interpretive, social constructivist perspective in which both the experience itself and the interpretation of that experience are central. The study is underpinned by educational and nursing theory, including Kolb's (1984) experiential learning theory, Benner's (2001) novice to expert and Tanner's (2006) model of clinical judgment. The published paper describes a simulated role-play experience that was designed to facilitate exposure to a realistic clinical scenario to encourage deeper learning through experience and personal reflection. A qualitative multimethod approach was taken to elucidate findings. The three individual findings papers (Hayes et al. 2017; Hayes et al. 2018a & Hayes et al. 2018 b) derived from student-written reflective data are presented in **chapter 4**. Each of these papers explores separate themes, providing an in-depth discussion. There is a discrete section within the chapter outlining confirmatory data findings. The confirmatory findings are derived from student semi-structured

individual interviews, student feedback surveys and academic email questionnaires.

**Chapter 5** provides the discussion in which the findings from all the data sets are synthesised. Key concepts that arose are explicated including; student awareness of the impacts of interruptions during medication administration, development of interruption management strategies, the value of written reflections and the importance of engagement in each 'role' during the simulation experiences. Study strengths and limitations are also identified in this chapter. Researcher conclusions, implications and recommendations for future research, nursing education and clinical practice are presented in **Chapter 6**.



## List of definitions

**Clinical Reasoning:** 'The process by which nurses collect cues, process the information, come to an understanding of a patient problem or situation, plan and implement interventions, evaluate outcomes, and reflect on and learn from the process'. (Lapkin et al. 2010 p. e209). It is used interchangeably in the literature with the following; clinical judgment, problem-solving, decision making and critical thinking (Lapkin et al. 2010).

**Confederate:** a scripted role undertaken by an experienced faculty member who, when required, can guide a scenario according to key learning objectives (Nestel et al. 2014).

**Empathy:** the ability to convey a level of understanding of another's perspective and experience. Empathy in action incorporates the communication of a desire and intention to help (Hojat 2016).

**Fidelity:** often described as high, medium or low fidelity, with high fidelity being most closely aligned to reality and low fidelity being least closely aligned to reality (Alanazi, Nicholson, & Thomas 2017). Nursing literature commonly links fidelity to the type of manikin/s used in the simulation (Lapkin et al. 2010). However, for this study fidelity incorporates more than just the manikin and includes the scenario and the environment. The environmental fidelity describes 'the degree to which the simulated environment (manikin or 'actor', room, tools, equipment, moulage, and sensory props) replicates reality and appearance of the real environment' (Lopreiato 2016, p.10). Fidelity of a scenario relies on the narrative being aligned with realistic and researched clinical scenarios that address specific learning objectives (Alinier 2011).

**Immersion:** 'the level to which the learner becomes involved in the simulation; a high degree of immersion indicates that the learner is treating the simulation as if it was a real-life (or very close to real-life) event (SSH)' (Lopreiato 2016, p.16).

**Interruptions:** any distraction or disruption caused by either internal or external stimulus that results in a shift in attention from the primary task.

**Manikin:** 'Full or partial body simulators that can have varying levels of physiologic function and fidelity' (Lopreiato 2016, p.21).

**Medication administration:** the phase within the medication administration process which includes the meting out of the medication along with monitoring the patient condition following administration.

**Medication error:** broadly defined as being either an error of commission or omission leading to actual or potential harm to a patient (AHRQ 2015; Roughead, Semple & Rosenfeld 2016). They are either preventable, potential, ameliorable or non-preventable (AHRQ 2015). An example of a non-preventable error might include an adverse drug reaction.

**Modality:** 'the type(s) of simulation being used as part of the simulation activity, for example, task trainers, manikin-based, standardized/simulated patients, computer-based, virtual reality, and hybrid' (Lopreiato 2016, p.22).

**Multitasking:** undertaking concurrent, interleaved or sequential tasks, sometimes referred to as dual-task performance or task-switching (Walter et al. 2015).

**Role-play:** 'a learning method designed to build first person experiences in a safe and supportive environment' (Baile & Blatner 2014, p.220). Role-play participants are actively involved in their learning which facilitates critical thinking, develops new knowledge and skill retention and improves understanding of both their own and another person's experience (Clapper 2010b).

**Scenario:** 'includes the goals, objectives, debriefing points, and narrative description of the clinical simulation' (Lopreiato 2016, p.30).

**Simulation:** 'a technique—not a technology—to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner' (Gaba 2004, p.2).

**Situational Awareness:** 'is the perception of environmental elements within time and space, and a perception of their meaning; it involves being aware of what is happening around you to understand how information, events, and your own actions impact the outcomes and objectives' (Lopreiato 2016, p.36).

**The medication administration process:** is often described as a complex process that involves five key elements or phases; prescription, transcription, dispensing, meting out (also known as the administration phase, which includes patient

monitoring), and finally accurate documentation (Choo, Hutchinson & Bucknall 2010; Jennings, Sandelowski & Mark 2011).

**Undergraduate nurse:** 'any individual enrolled within a recognised nursing program leading to registration as a nurse' (Australian Nursing and Midwifery Federation 2017 p. 1). Also referred to in literature as pre-licensure nurses.

‘Tell me, and I forget,  
teach me, and I may remember,  
involve me, and I learn’

(Commonly attributed to Benjamin Franklin<sup>1</sup>)

<sup>1</sup>Commonly attributed to Benjamin Franklin although no evidence of this has been found. A similar idea has been located in Dubbs' (1966) translation of the works of the Hsüntze.

# Chapter 1: Introduction

## 1.1 Background and significance

The effective preparation of undergraduate student nurses' transition to clinical practice is a global priority for nurse wellbeing and patient safety (El Haddad, Moxham & Broadbent 2013; Spector et al. 2015). Maintaining patient safety is a fundamental tenant of nursing practice (Usher et al. 2017). If errors are made during the administration of medications patient safety is compromised. Therefore, the way in which nurses transition the learned skill of medication administration from the calm environment of the tertiary setting to the dynamic clinical environment is significant.

It is difficult to accurately measure international medication error rates as definitions of what constitutes an error and methods of reporting vary globally. The most recent figures from the USA report 1.5 million medication errors annually (da Silva 2016). Available figures from NSW Australia report that 10,475 errors occurred over a six-month period, and the UK report 525,186 incidents over a six-year period (Clinical Excellence Commission & Health 2013; da Silva & Krishnamurthy 2016; Flanders & Clark 2010; Medicines and Healthcare products Regulatory Agency (MHRA) 2014). In addition to reported errors, it is accepted that many more errors go unreported (Flynn et al. 2012; Reid-Searl, Moxham & Happell 2010), leaving patients vulnerable to potential harm. Each error carries with it the potential to change the life of a patient, their relatives and the administering nurse, and places a significant financial burden on the health care system. The cost in the USA has been estimated up to 3.5 billion dollars each year (da Silva & Krishnamurthy 2016).

Nurses are primarily responsible for the final two phases of the medication administration process; meting out and documentation. These two steps in the process are particularly susceptible to both system and human error, occurring in up to 20% of administrations (Jennings, Sandelowski & Mark 2011; Reid-Searl & Happell 2012; Roughead, Semple & Rosenfeld 2016; Reason 2000; Runciman et al. 2003).

The leading causes of medication errors are human factors such as interruptions and distractions to the administering nurse (Reid-Searl, Moxham & Happell 2010). Recognizing, prioritising and effectively managing interruptions that may impact the safe delivery of medications is an important part of the medication administration process (Page & McKinney 2007).

Current discourses regarding medication error prevention strategies revolve around eliminating interruptions and distractions during medication administration using a multifaceted approach. Research has investigated the value of clinical (see figure 1) and tertiary education (see figure 2) interventions to reduce the number of medication errors caused by interruptions (Anthony et al. 2010; Flanders & Clark 2010; Relihan et al. 2010).

Clinical interventions (see figure 1) include the introduction of 'do not disturb' tabards to be worn by the administering nurse (Fore et al. 2013; Pape 2005; Relihan et al. 2010), 'no-go zones' that demarcate spaces for nurses to stand in whilst administering medications (Anthony et al. 2010; Prakash et al. 2014), and patient literature and signage explaining the importance of not disturbing nurses while they are administering medications (Pape et al. 2005; Relihan et al. 2010). These interventions have had differing levels of success (Anthony et al. 2010; Fore et al. 2013; Relihan et al. 2010).

Within the tertiary sector, interventions focus on generic medication error reduction (see figure 2). Undergraduate student nurses are most often taught the six rights of medication administration and the requisite pharmacology and mathematics (Latimer et al. 2016). Students then practice in an educational environment that is calm and uninterrupted (Aggar & Dawson 2014; Woodrow, Colbert & Smith 2010). However, these interventions do not guarantee the safe administration of medications. Research has shown that even essential strategies such as the six rights have compliance issues amongst nurses (Kim & Bates 2013). A recent study reported that as undergraduate nurses progress through their degree, they pay less attention to the rights of medication administration, frequently skipping steps, and becoming less safe (Schneidereith 2014).

Irrespective of the strategy, not all interruptions can or should be ignored and can even prove to be in the patients' best interests (Clark & Flanders 2012; Walter et al. 2014; Sasangohar et al. 2014; Hopkinson & Wiegand 2017). Examples of interruptions that can prove beneficial to a patient include; phone calls conveying blood results contraindicating the administration of a medication (for example warfarin levels), alarms signifying abnormal vital signs, patients displaying symptoms of emergent medical issues, and patients, relatives or other staff members with information specific to changes in patient condition or treatment that may not have been passed on to the administering nurse (Rivera-Rodriguez & Karsh 2010).

Medication administration is a commonly interrupted nursing task (Sasangohar 2015; Westbrook et al. 2010). Preventing nonessential interruptions is important in reducing medication errors (Sasangohar 2015). However, possessing the critical thinking processes required to understand the difference between essential and non-essential interruptions is difficult for nurses, yet vital to safe patient care. Currently, there are limited tertiary experiences offered that provide medication administration practice in a dynamic, interrupted environment (Thomas, McIntosh, & Allen, 2014). For student nurses to appropriately manage interruptions and reduce the risk of errors, opportunities to practice requisite skills in a range of simulated environments with varying levels of complexity must be offered.

Multitasking is a natural consequence when faced with interruptions during nursing care (Forsberg, Athlin & von Thiele Schwarz 2015). For nurses in the clinical environment, this translates to assessing and managing the physical and emotional wellbeing of patients, while simultaneously dealing with interruptions and distractions as they arise. Multitasking during medication administration involves a complex set of skills, employing critical thinking, making clinical judgments, increased cognitive load, and professional vigilance (Eisenhauer, Hurley & Dolan 2007). Although multitasking has been found to be intuitive with experienced nurses, it is well recognised as being a

difficult skill for novice nurses with limited clinical experience (Forsberg, Athlin & von Thiele Schwarz 2015).

Simulation has long been utilised within undergraduate nursing education to achieve specific learning outcomes, providing participants with skills and knowledge that can be transferred to the clinical setting (Aebersold 2016; Buerhaus & Norman 2001; The International Nursing Association for Clinical Simulation and Learning (INACSL) 2016; Paparella et al. 2004). Introducing interruptions during simulated medication administration experiences mimics what would be reasonably expected to be faced in the clinical environment. The increased cognitive load produced in simulations that require multitasking skills have been shown to lead to improved performance in subsequent activities that require multitasking (Adams & Rho 2017). Therefore, a simulated role-play experience was developed to guide students to identify strategies to manage medication administration in an interrupted environment.



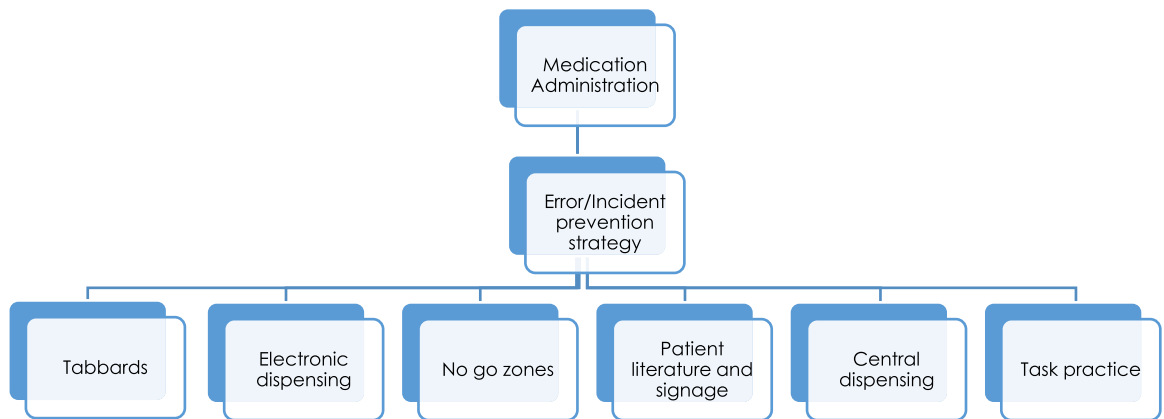


Figure 1: Clinical initiatives for medication error prevention (Pape et al, 2005; Anthony et al. 2010; Relihan et al. 2010; Westbrook et al. 2017)

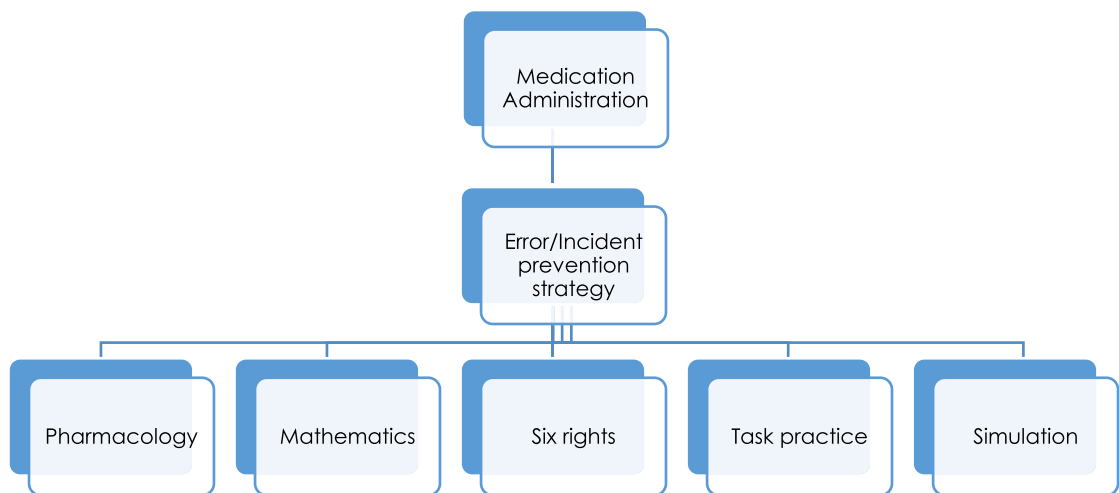


Figure 2: Tertiary education initiatives for medication error prevention (Sears et al. 2009; Lee & Lin 2013; Pauly-O'Neill & Prion 2013; Latimer et al. 2017)

## 1.2 Study aim

The aim of this thesis is to explore undergraduate nursing student responses to interrupted medication administration and facilitate new insights into interruption management strategies.

## 1.3 Research questions

How do novice and advanced beginner undergraduate student nurses respond to interruptions during the medication administration process?

Does the introduction of a simulated role-play experience involving interrupted medication administration raise awareness of the impact of interruptions and facilitate new insights into interruption management strategies?

## 1.4 Chapter conclusion

Interruptions to the medication administration process increase the risk of error and impact patient safety, yet nurses are most often taught the skills associated with medication administration in a calm and uninterrupted environment. For many undergraduate nurses, the first time they are exposed to interruptions during the medication administration process is when they attend clinical practicum, placing themselves and their patients at risk of error. Literature recommends the development and delivery of simulation experiences that aim to understand how undergraduate nurses best learn to manage interruptions during medication administration and the critical relationship to error rates (de Ruiter & Demma 2011; Sears, Goldsworthy & Goodman 2010; Westbrook, Woods, et al. 2010).

Simulation provides a platform to build experiences, confidence and competence in a safe learning environment. Well designed, realistic and expertly delivered simulation opportunities that incorporate managing the intricacies of interruptions during the medication administration process enhance understanding of the impacts of interruptions and guide the formulation of a variety of strategies to manage which may result in reduced medication errors.

# Chapter 2: Literature review

## 2.1 Introduction

The previous chapter provided a synopsis of the background and significance of the study, stating the study aim and research questions.

This chapter is managed in two sections:

**Section one** presents a published literature review (Hayes, Jackson, et al. 2015a) that explores what is known about interruptions and distractions during medication administration in the context of undergraduate nurse education. As the original literature review (Hayes et al. 2015a) was published early in the research journey, other more recent literature is woven into the published papers that follow (Hayes et al. 2017, Hayes et al. 2018a & 2018b; Hayes, Power, et al. 2015b), the confirmatory data section within the findings chapter, and throughout the discussion chapter of the thesis.

**Section two** presents an overview of the literature specific to simulation in undergraduate nurse education. The inclusion of this section of the chapter responds to the key aim of the thesis that arose out of the published literature review. In order to report on undergraduate nursing student responses to a simulated role-play experience exposing them to interruptions during medication administration, it was considered important to explore simulation pedagogy literature, as it relates to undergraduate nursing education.

## 2.2 Section one - Literature review

### REVIEW

## Medication errors in hospitals: a literature review of disruptions to nursing practice during medication administration

Carolyn Hayes, Debra Jackson, Patricia M Davidson and Tamara Power

**Aims and objectives.** The purpose of this review was to explore what is known about interruptions and distractions on medication administration in the context of undergraduate nurse education.

**Background.** Incidents and errors during the process of medication administration continue to be a substantial patient safety issue in health care settings internationally. Interruptions to the medication administration process have been identified as a leading cause of medication error. Literature recognises that some interruptions are unavoidable; therefore in an effort to reduce errors, it is essential understand how undergraduate nurses learn to manage interruptions to the medication administration process.

**Design.** Systematic, critical literature review.

**Methods.** Utilising the electronic databases, of Medline, Scopus, PubMed and CINAHL, and recognised quality assessment guidelines, 19 articles met the inclusion criteria. Search terms included: nurses, medication incidents or errors, interruptions, disruption, distractions and multitasking.

**Results.** Researchers have responded to the impact of interruptions and distractions on the medication administration by attempting to eliminate them. Despite the introduction of quality improvements, little is known about how nurses manage interruptions and distractions during medication administration or how they learn to do so. A significant gap in the literature exists in relation to innovative sustainable strategies that assist undergraduate nurses to learn how to safely and confidently manage interruptions in the clinical environment.

**Conclusions.** Study findings highlight the need for further exploration into the way nurses learn to manage interruptions and distractions during medication administration. This is essential given the critical relationship between interruptions and medication error rates.

**Relevance to clinical practice.** Better preparing nurses to safely fulfil the task of medication administration in the clinical environment, with increased confidence in the face of interruptions, could lead to a reduction in errors and concomitant improvements to patient safety.

### What does this study contribute to the wider global clinical community?

- Provides insights into the lack of knowledge regarding how nurses currently manage interruptions during medication administration.
- Identifies the need for the development of sustainable programmes that include high quality learning experiences that teach interruption management techniques to undergraduate nurses in a safe environment.
- Identifies the need for further solution-focussed research into the impacts of interruptions on error interception rates.
- Highlights the need for research into the effects of interruptions on nonscheduled medication administrations.

**Authors:** Carolyn Hayes, RN, BHSc, Technical Officer, Faculty of Health, University of Technology Sydney, NSW; Debra Jackson, PhD, RN, Professor of Nursing, Faculty of Health, University of Technology Sydney, NSW; Patricia M Davidson, PhD, RN, FAAN, Professor, Dean, School of Nursing, Johns Hopkins University, Baltimore, MD; Tamara Power, PhD, RN, Lecturer, Faculty of Health, University of Technology Sydney, Broadway, NSW, Australia

**Correspondence:** Carolyn Hayes, Technical Officer, Faculty of Health, University of Technology Sydney, Building 10 level 7, 235 Jones Street, Broadway, NSW 2007, Australia. Telephone: +61 02 9514 4916.

**E-mail:** Carolyn.Hayes@uts.edu.au

**Key words:** disruption, distractions, interruptions, medication errors, multitasking, nurses

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## Introduction

Medication and intravenous fluid (IV) incidents and errors are the second most reported clinical incident in Australian health care settings. Figures from NSW, Australia, revealed 10,475 medication and IV incidents and errors over a six-month period (Clinical Excellence Commission & Health 2013). Similarly, medication incidents and errors remain a significant problem in North America, Canada and the UK (Kohn *et al.* 2000). An average of 450,000 preventable medication errors are reported each year from the USA (Flanders & Clark 2010). The Australian Commission on Safety and Quality in Health Care developed a set of 10 National Safety and Quality Health Service Standards aimed at improving the quality of care within the health care service (The Australian Commission on Safety and Quality in Health Care 2011). Standard number 4 addresses medication safety and outlines the need for systems to be implemented to ensure that the health care workforce are competent when administering medications, to reduce medication incidents and errors, improve safety and quality care for patients.

Interruptions to the medication administration (MA) process have been identified as one of the leading causes of medication errors (Reid-Searl *et al.* 2010). These errors have the potential to have long-term negative effects on the life of a patient, their relatives and the administering nurse, and result in financial burdens on the health care system (Roughead & Semple 2009). The primary responsibility for the majority of hospital-based MAs remains with the nursing staff (Palese *et al.* 2009, Reid-Searl *et al.* 2010). Combined with the inevitability of interruptions within the clinical environment (Flynn *et al.* 2012), the way in which the nursing staff learn to manage interruptions during MA is a key element in ensuring patient safety. Consequently, a literature review exploring the impact of interruptions and distractions on MA was undertaken in the context of undergraduate nurse education. Literature addressing how nurses currently learn to manage interruptions and distractions during MA was reviewed to identify existing gaps and encourage research into the identification of new strategies that may support this ongoing health care safety issue.

## Background

Approximately 20% of all MAs result in error (Runciman *et al.* 2003, Reid-Searl & Happell 2012). In addition to reported errors, between one and two errors per patient per day remain unreported (Reid-Searl *et al.* 2010, Flynn *et al.* 2012). Financial and personal costs attached to these errors include increased lengths of stay, readmissions, patient mortality, postdischarge disability and emotional distress of the patient, relatives and administering nurse (Roughead & Semple 2009, Choo *et al.* 2010, Flynn *et al.* 2012).

There are five identifiable phases within the process of MA in which errors occur: prescription, transcription, dispensing, administering and monitoring patient condition/documenting (Choo *et al.* 2010, Jennings *et al.* 2011). The administration phase is particularly vulnerable to errors (Jennings *et al.* 2011). Simultaneous demands or interruptions during these complex processes, increases the likelihood of errors occurring (Choo *et al.* 2010).

Between 16 and 40% of nurses' time is engaged in MA (Potter *et al.* 2005, Westbrook *et al.* 2011). Jennings *et al.* (2011), p. 1448) highlight the fact that MA does not occur in isolation from other work and found that rather than consuming a set portion of the nurses' day, it was difficult to separate the impacts of MA from other tasks, and therefore concluded that MA in fact 'constitute[s] the day'. With this heavy emphasis on MA, the way interruptions to the process are managed impacts on nurses' ability to deliver safe and effective patient-centred care (Hayes *et al.* 2014).

## Aim

The purpose of this review was to explore what is known about interruptions and distractions on MA in the context of undergraduate nurse education.

## Methods

This review draws together and critically examines dominant and recurring themes existing in the literature in relation to the impact of interruptions and distractions on MA, and strategies used by undergraduate nurses to manage

them. It raises questions as to whether or not current strategies that aim to reduce or eliminate interruptions and distractions are appropriate as standalone measures to reduce interruption related medication errors in the clinical environment. To present a comprehensive background and advance the understanding of this multifaceted yet common problem in nursing, and highlight gaps in current knowledge a critical review approach was taken.

Combining both electronic and hand searching, a total of 1854 articles were retrieved. Duplicated articles were excluded ( $n = 126$ ). Title review excluded literature reviews, studies specific to multidisciplinary teams, medical practitioners or other health care professionals ( $n = 1549$ ). The remaining 179 studies were subject to abstract and/or full text review. Nonprimary research, discursive studies

and those that were not specific to registered or undergraduate nurses or not related to interruptions or distractions, medication incidents and/or errors during MA were rejected. Studies considered to be methodologically unsound based on the Critical Appraisal Skills Program (CASP) checklists were also excluded (Critical Appraisal Skills Programme 2013). CASP guidelines were cross-referenced with studies in search of clear aims, appropriate methodology, recruitment strategy, record of ethical considerations and rigorously analysed data with clear findings. If these guidelines were not adequately addressed the study was excluded. As a result 160 studies were excluded, generating 19 studies which met the inclusion criteria (see Fig. 1). Analysis of the remaining articles was completed by the primary author, and validated by the entire author team.

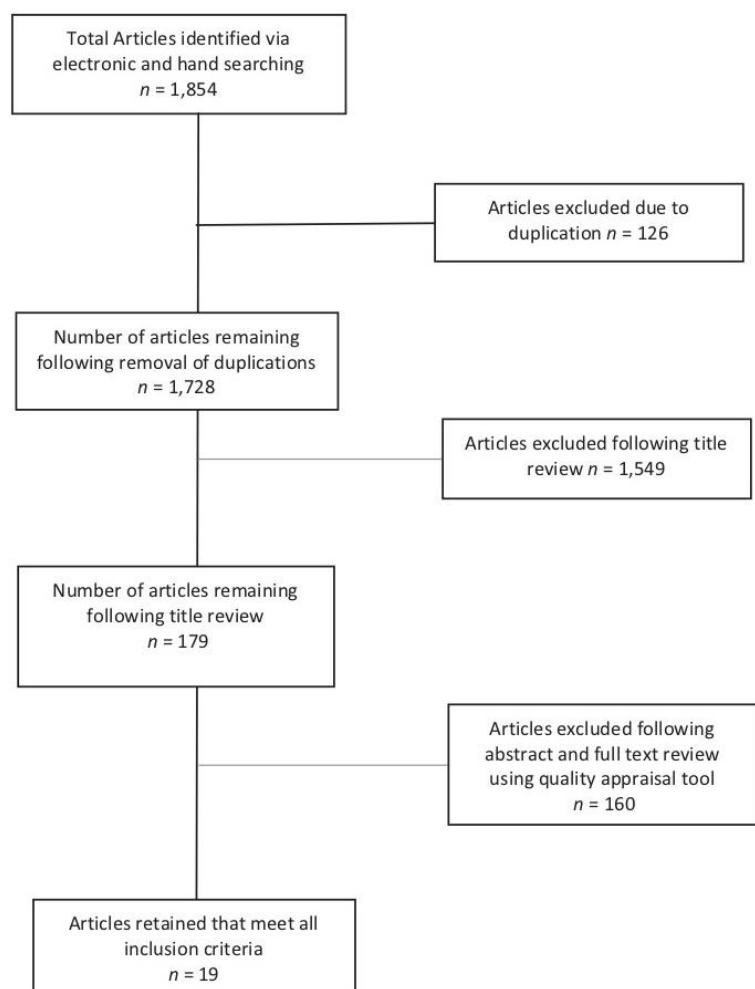


Figure 1 Retrieved articles.



### Search strategy

The literature search was conducted utilising the online databases: Medline, Scopus, PubMed, CINAHL and Google scholar. In addition, the reference lists of retrieved articles were hand searched. Keywords included nurses, medication incidents or errors, interruptions, disruption, distractions and multitasking.

### Inclusion criteria

Electronic literature searches were limited to English language, humans and articles published from Jan 2005–Dec 2012. Suitability for inclusion in the review was evaluated against clear inclusion and exclusion criteria (see Table 1). Included studies comprised peer-reviewed, research-based articles, where the domain was undergraduate nursing. Due to the scarcity of literature examining undergraduate nurses' responses to interruptions during MA, the search was broadened to include both registered and undergraduate nurses. The main focus of the articles was interruption, distraction, disruption, multitasking and/or MA.

Although interruptions and distractions during the MA process has been an issue for nurses for many decades, the recognition within the literature that interruptions are inevitable in the clinical environment is a reasonably new concept (Flynn *et al.* 2012), establishing the need to focus on safe and effective interruption management strategies. Literature reviews have examined characteristics and rates of interruptions, the relationship between interruptions and medication errors, and the effectiveness of interruption minimisation strategies (Biron *et al.* 2009, Brady *et al.* 2009, Raban & Westbrook 2014). However, strategies used by nurses to manage interruptions, and the way in which undergraduate nurses learn them, are yet to be reviewed.

### Data analysis

Thematic analysis was chosen as it generates patterns or themes which can be categorised and analysed. The key advantages of thematic analysis for this study included the ability to identify both explicit and implicit themes. The analysis approach and final report involved several key steps as outlined by Guest *et al.* (2012). Broad/common themes and patterns were identified as the literature was read then re-read. This was followed by coding to identify recurring features of the literature. Each study was categorised according to the central themes, allowing deeper analysis and comparison. Themes were identified by the first author and validated through discussion with the writing

**Table 1** Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Published in English Language	Not published in English language
Primary research article or thesis	Not considered be primary research
Published Jan 2005 onwards	Published prior to 2005
Specific to registered and undergraduate nurses	Not specific to registered or undergraduate nurses
Specific to interruptions, distractions or disruption	Not specific to interruptions, distractions or disruption
Specific to medication administration	Not specific to medication administration
Specific to medication incidents and/or errors	Not specific to medication incidents and/or errors

team until consensus was reached. Team discussion and consensus was considered to be an essential part of the process to minimise the risk of omitting outlying themes inherent when individual researcher interpretation is used to decide on codes, code application and central themes (Guest *et al.* 2012). The data findings from each article were then transcribed and interwoven.

### Findings

Relevant literature included a combination of qualitative, quantitative and mixed methods studies (Table 3). Broad and recurring themes included frequency, types, causes and effects of interruptions, interruption elimination strategies and coping with interruptions. Four central themes were identified across studies: setting the scene – interruptions and distractions impacting care; reducing interruptions – current research responses; shifting focus – multitasking and prioritising and strategising care – managing interruptions.

#### Setting the scene – interruptions and distractions impacting care

##### *Frequency and causes*

Interruption or distraction of the administering nurse during the process of managing the six rights of MA (see Table 2) has been widely acknowledged as a leading cause of error (Deans 2005, Biron *et al.* 2009, Westbrook *et al.* 2010). In fact 'Setting the scene – interruptions and distractions impacting care' was identified as a theme in 18:19 of reviewed studies. Between 25 and 55% of MAs are subject to interruption (Palese *et al.* 2009, Kalisch & Aebbersold 2010, Westbrook *et al.* 2010). A recent Australian study conducted in two major teaching hospitals, reported that nearly 85% of interrupted MAs resulted in either clinical error (e.g. wrong dose, timing or route) or procedural error

**Table 2** Six rights of medication administration (Woodrow *et al.* 2010)

Right
Patient
Drug
Dose
Time
Route
Documentation

(e.g. not checking patient identification, or inadequate hand hygiene) or both (Westbrook *et al.* 2010). Fry and Dacey (2007), reported that 94% (127:135) of study participants felt distractions during MA had an impact on medication incidents. The impact of interruptions to nurses' work was examined by Westbrook *et al.* (2011). They found that the number of interruptions during MA were over-represented compared to other nursing tasks.

In a descriptive observational study, Biron *et al.* (2009) reported an average frequency of 6.3 interruptions/hour during MA. The preparation phase produced 5.2 interruptions/hour with an increased risk rate of error of 60%. During the administration phase 6.8 interruptions/hour were recorded. Error rates were reported per administration in another study of 56 observed MA rounds, at rate of one interruption for every 3.2 medications administered (Palese *et al.* 2009). Observational data collected over 46 hours in two hospitals, revealed that nurses were interrupted by patients 28% of the time and were initiated by the administering nurse up to 30% of the time (Kalisch & Aebersold 2010). Anthony *et al.* (2010) reported similar self-initiated interruptions rates of 26.4%. Self-initiated interruptions may include occurrences of communication unrelated to the MA, being distracted by events occurring in proximity to the administering nurse, or unexplained loss of focus (Anthony *et al.* 2010). Other nurses have been identified as accounting for 22.3–25% of interruptions, and other members of the health care team 25–26.2% (Kalisch & Aebersold 2010, McGillis Hall *et al.* 2010a). Figures as high as 73.6% of interruptions being initiated by someone other than the administering nurse have been reported (Anthony *et al.* 2010).

The types and causes of medication errors were described by Deans (2005) as resulting from three key factors; environmental, e.g. interruptions and distractions (25.3%); human, e.g. stress (25.3%); and miscommunication, e.g. illegible handwriting (16.5%). Interruptions that stem directly from the MA procedure itself were identified by Jennings *et al.* (2011). These included medications requiring varying routes of administration; unavailable medications

and medications that require patient monitoring. Secondary tasks causing interruption were triggered by a range of causes, the most significant being direct patient care issues. Moreover, 88% (118:134) of participants in a cross-sectional survey of registered nurses stated interruptions by patients were the most challenging, and 87% (116:134) felt phone calls were the next most distracting interruption (Fry & Dacey 2007).

In a study of 945 MAs over a three-month period, interruptions during MA differed in cause and frequency according to time of day (Palese *et al.* 2009). Obtaining medications that were not on the trolley dominated as interruptions to early morning (38.5%) and mid-afternoon (26.4%) administrations. However, patient management issues dominated as interruptions to mid-morning (33.3%) and early evening (34.4%) administrations. Technology such as intravenous pumps and monitors alarming, have also been identified as a source of interruptions during MA (Biron *et al.* 2009, McGillis Hall *et al.* 2010a, Relihan *et al.* 2010).

Undergraduate nurses are a significant sub-group within the nursing workforce who, under the direct supervision of registered nurses, administer medications in clinical environments. A review of 1305 incidents/errors that had been made by undergraduate nurses during MA over a five-year period revealed the most significant of the contributing factors to be inexperience (77.1%) and distraction (20.5%) (Wolf *et al.* 2006).

### Effects

Increasing number of interruptions were linked to increasing error rates in an observational study in two Australian hospitals (Westbrook *et al.* 2010). Of the 4271 administrations observed, only 19.8% were found to be error free. Just over half (53.1%) were subject to interruptions. The observed error rate increased in direct relationship with the number of interruptions experienced. When exposed to one interruption, a procedural error followed in 82.1% of cases and a clinical error in 43.5% of cases. As the number of interruptions increased so did the error percentages. Procedural errors were observed at 100% when there were between two and three interruptions, and when there were between four and five interruptions clinical errors were observed in 70% of the cases. Westbrook *et al.* (2010) also found that as interruption numbers intensified so did the severity of the errors, doubling when the interruption rate reached four or more per administration attempt.

Limited studies are available in relation to the effects of interruptions on medications administrations by undergrad-



uate nurses. However, undergraduate nurse participants (9:28) in one Australian study reported an error or near miss occurring while they or their supervising registered nurse was interrupted or distracted in some way (Reid-Searl *et al.* 2010).

#### *Inevitability, outcomes and limitations*

Medication interruptions and distractions appear to be inevitable in the clinical environment (Flynn *et al.* 2012); in fact the very process by which one attempts to control interruptions can become an interruption in and of itself (Tucker & Spear 2006, McGillis Hall *et al.* 2010a, Jennings *et al.* 2011). It should be acknowledged, however, that some interruptions can have positive outcomes for patient care (Jennings *et al.* 2011). McGillis Hall *et al.* (2010b) reported that 10.8% (83:1687) of observed interruptions had the potential to improve patient care, e.g. a patient may question the accuracy of medications being administered, preventing a medication error. These findings were reflected in the parent study where 10% (1315:13,025) of observed interruptions were considered to have had a positive impact (McGillis Hall *et al.* 2010a). It was noted during the course of the review that although discussed these assertions were not elaborated on. Nurses are the largest group of health professionals responsible for administering medications in hospitals, and as such are in a key position to identify, prevent or intercept errors before they occur, irrespective of the cause, through appropriate attention to and prioritisation of interruptions (Eisenhauer *et al.* 2007, Jennings *et al.* 2011, Flynn *et al.* 2012).

The majority of research in this area focuses on scheduled medication rounds. There was a paucity of studies distinguishing between the effects of interruption and distractions on scheduled and unscheduled MAs. Unscheduled medications can be either STAT/satim (required immediately) or PRN/pro re nata (as required). Jennings *et al.* (2011) highlighted the distinction between scheduled and unscheduled MAs in relation to actual administration numbers but did not identify any differences in error rates. They reported an average of 22 to 25 scheduled doses per patient to be administered, with STAT or PRN doses accounting for between 7–14% of the recorded doses.

One key limitation within the reviewed studies for this theme related to the method of data collection. None of the studies collected data on weekends or night duty. It may be possible that the behaviours of nurses during MA vary outside of what is considered 'normal working hours', this represents a significant gap in the literature. Research is needed to address differences in interruption rates, and related error rates, between scheduled and unscheduled MAs.

#### **Reducing interruptions – current research responses**

In response to research findings indicating that interruptions and distractions to the MA process are one of the leading causes of error, current research continues to focus on prevention of errors by utilising strategies that aim to reduce or eliminate interruptions and distractions to the administering nurse (Pape *et al.* 2005, Biron *et al.* 2009, Anthony *et al.* 2010, Relihan *et al.* 2010, Westbrook *et al.* 2010). This was identified as a theme in 5:19 of the studies reviewed. Several current strategies such as wearing tabards asserting 'do not disturb', and creating 'no interruption zones' (NIZ) are based on the 'sterile cockpit rule'; an aviation industry innovation to eliminate distractions in the cockpit area during take-off and landing. The premise of adopting this approach is that eradicating interruptions during MA will prevent errors (Anthony *et al.* 2010, Relihan *et al.* 2010).

Anthony *et al.* (2010) reported a 40.9% decrease in overall interruptions following introduction of NIZ. Following the introduction of the intervention 100% of interruptions were reported as being initiated by someone other than the administering nurse. Relihan *et al.* (2010) also noted decreases in interruptions from 26/hour to 11.4/hour following the introduction of a range of interventions. These interventions included checklists, signage, staff education and behaviour modification, as well as discouraging patients, relatives and other health care professionals from interrupting nurses during MA. However, it was not outlined within the study which of the reported interventions specifically affected interruption rates, nor if some were more successful than others. One would need to maintain caution when considering implementing any of the interventions in this study without further research and clarification.

While all of these studies were able to report a decrease in the interruption rates during MA following the introduction of the interventions, direct links to the decreased medication error rates are tenuous. Interruptions though decreased in number, were not eliminated in the reviewed literature. The inevitability of interruptions and the concurrent need for nurses to be taught to manage interruptions effectively is reinforced by these findings. The impact and sustainability of these strategies over the long-term is also an issue for consideration.

#### **Shifting focus – multitasking and prioritisation**

Multitasking involves the performance of concurrent thoughts or tasks (Jennings *et al.* 2011). The clinical nursing environment includes frequent interruptions and requires regular multitasking (Kalisch & Aebersold 2010).

Table 3 Summary of articles meeting inclusion criteria – as several studies incorporated multiple themes articles are presented alphabetically

Author, year, country	Purpose of study	Sample and setting	Design and methods	Key findings	Limitations	Themes captured in this study
Anthony, K., Wieneck, C., Bauer, C., Dal, B. and Anthony, M.K. 2010, United States	Evaluated the impact of no interruption zones during MA (medication administration)	2 × 20 bed intensive care units	Quasi experimental pilot study. Three phase study	Postintervention decrease in interruption rates of 40.9%	Conducted only in intensive care units. Short period of data collection. Data collected by member of team being observed. Observation periods allocated by unit manager.	Setting the scene- interruptions and distractions impacting care. Reducing interruptions – current research responses
Biron, A.D., Lavoie-Temblay, M. & Loisel, C.G. 2009, Canada	Identified characteristics and frequency of interruptions during MA	18 Registered nurses from a medical ward in a tertiary teaching hospital, with minimum 6 months experience	Descriptive direct observational study. 102 MA rounds over 59.5 hours	Identifies MA as one of the most often interrupted nursing activities and links this to a 60% increased risk rate of error. Overall interruption rate of 6.3/hour. Acknowledges that nurses need to learn to identify, prioritise and learn to manage interruptions at the undergraduate level and that little is known about management strategies used by nurses	One hospital one ward. Convenience sampling. Hawthorne effect	Setting the scene- interruptions and distractions impacting care. Reducing interruptions – current research responses. Strategizing care – managing interruptions
Deans, C. 2005, Australia	Identified and described the incidence, type and causes of medication errors	79;154 registered nurses. Three surgical, two medical and one palliative care wards	Self-reporting survey: qualitative and quantitative responses	Identified types and three leading causes of errors: miscommunication, human factors and environmental factors. Also identified error reporting behaviours noted following introduction of bar coding. Participants thinking processes unchanged. Identified 10 characteristics of thinking	Single regional hospital. Self-reporting surveys. Unreported errors were not considered	Setting the scene- interruptions and distractions impacting care
Eisenhauer, L.A., Hurley, A.C. and Dolan, N. 2007, United States	Explored thinking processes of nurses during MA and impacts of point of care technology	40 registered nurses' within a variety of wards in a tertiary teaching hospital	Pre- and postintervention, retrospective semi-structured interviews and real time recorded thought processes	Behaviour changes noted following introduction of bar coding. Participants thinking processes unchanged. Identified 10 characteristics of thinking	Sample included only experienced nurses	Setting the scene- interruptions and distractions impacting care. Shifting focus – multitasking and prioritising
Flynn, L., Liang, Y., Dickson, G.L., Xie, M. and Suh, D.C. 2012, United States	Explored the effects of staffing levels, environment and medication error interception rates	686 nurses from 82 medical/surgical units in 14 hospitals	Nonexperimental mixed methods study over an 8 month period	Nurse interception rates impacted error rates	Out of hour's administrations not captured. Hawthorne effect	Setting the scene- interruptions and distractions impacting care

Table 3 (continued)

Author, year, country	Purpose of study	Sample and setting	Design and methods	Key findings	Limitations	Themes captured in this study
Fry, M.M. and Dacey, C. 2007, England	Explored reporting habits and causes of medication incidents and errors	139 of 240 registered nurses in 15 medical wards in a teaching hospital	Quantitative cross-sectional survey	33% reported involvement in medication incidents, 94% of participants stated distractions impacted on incidents/errors	The experience level of the pilot study participants was not equivalent to that of the actual study participants	Setting the scene- interruptions and distractions impacting care
Jennings, B.M. Sandelowski, M. & Mark, B. 2011, United States	Explored complexities involved in MA	143 registered nurses and 18 licensed practicing nurses, one surgical and one medical ward	Ethnographic observational study, 267 hours of field observations, 29, 1-hour interviews	Both MA and other 'nursing work' can interrupt each other and do not occur in isolation, Describes management techniques by registered nurses	Hawthorne effect, Limitations of the study were not reported by the authors	Setting the scene- interruptions and distractions impacting care, Strategising care – managing interruptions, Shifting focus – multitasking and prioritising
Kalisch, B.J. and Aebbersold, M. 2010, United States	Explores the extent of interruptions, measured multitasking and links with errors	36 RN's in two hospitals, seven wards	Direct observational field design, 136 hours of observation	Total of 3441 events, 1354 interruptions, 46 hours of multitasking and 200 observed errors, 10 interruptions observed/hour (one every 6 mins), 28% of interruptions by patients; 25% by other nurses, Errors associated with interruptions and multitasking observed 34% of the time, Overall error rate of 1.5/hour	No night duty observations recorded, Hawthorne effect, Observer error possible	Setting the scene- interruptions and distractions impacting care, Shifting focus – multitasking and prioritising
McGillis Hall, L., Pedersen, C., and Fairley, L. 2010, Canada.	Explored interruptions to nurses' work	Six medical and surgical wards in three acute care teaching hospitals, 30 nurses observed, 29 attended focus groups	Mixed methods study using observations and focus groups	Total number of interruptions observed over 2 week period was 1687, Leading causes: other nurses, and other health care professionals, 10.8% of the interruptions noted to have the potential to improve patient safety outcomes 13,025 interruption observed, Causes: administering nurse, other nurses and other members of the health care team, 10% of interruptions resulted in positive outcomes	Constitutes part of a larger study, Limitations were not reported by the authors	Setting the scene- interruptions and distractions impacting care
McGillis Hall, L., Feguson-Pare, M., Peter, E., White, D., et al. 2010, Canada	Observed interruptions to nurses work and related outcomes	360 nurses, 113 attending focus groups, 36 medical and surgical wards over nine hospitals	Mixed methods using 2880 hours of observation over a 2 week period, and focus groups		Hawthorne effect	Setting the scene- interruptions and distractions impacting care

Table 3 (continued)

Author, year, country	Purpose of study	Sample and setting	Design and methods	Key findings	Limitations	Themes captured in this study
Palese, A., Sartor, A., Costaperaria, G. and Bressidola, V. 2009, Italy	Examined interruption frequency during medication rounds	56 medication rounds; eight rounds in each of seven surgical wards	Observational study	945 MA's observed, one interruption/3-2 administrations. Interruption frequency and causes dependent on number of drugs administered and time of day. 96% were managed immediately by administering nurse, 3-6% managed on completion of medication round and 0-3% delegated to other staff	Conducted only in surgical wards. No documented training of data collectors. No night duty observations collected	Setting the scene- interruptions and distractions impacting care. Strategising care – managing interruptions
Pape, T.M., Guerra, D.M., Muzquiz, M., Bryant, J.B., Ingram, M., <i>et al.</i> 2005, United States	Explored the impact of signage, checklists and set protocols on distractions during MA	Seventy-eight nurses, five wards, one hospital	Process improvement study using a self-reporting distraction instrument. Also included observations of randomly selected nurses	81% nurses avoided distractions and interruptions when using the set protocols. Medical practitioners continued to cause interruption or distraction regardless of interventions	Individual impact of each intervention unclear. Hawthorne effect. No night duty or weekend observations collected	Reducing interruptions – current research responses
Porter, P., Wolf, L., Boxerman, S., Grayson, D., Sledge, J., Dungan, C. and Evanoff, B. 2005, United States	Analysed the characteristics of nurses' cognitive load and environmental factors causing disruption and increased risks of errors	Seven registered nurses in a large tertiary hospital	Mixed methods (43 hours field observation and summative interviews), ethnographic study	16% of nurses time involved in MA. Overall average of nine cognitive shifts/hour or every 6-7 mins, majority occurring during MA	Small nonrandomised sample observed over short period of time. Primary researcher was the lead observer in the field	Setting the scene- interruptions and distractions impacting care. Shifting focus – multitasking and prioritising
Reid-Scarle, K., Moxham, L. and Happell, B. 2010, Australia	Explored factors influencing MA practices by nursing students	28 final year undergraduate nursing students in one university	Qualitative in-depth semi-structured interviews	9:28 reported either making a medication error or being involved in a near miss. In most cases the errors occurred as a result of inadequate RN supervision	Participants from single university	Setting the scene- interruptions and distractions impacting care. Strategising care – managing interruptions
Reihan, E., O'Brien, V., O'Hara, S. and Silke, B. 2010, Ireland	Assessed if interruptions and distractions during MA decrease as a result of the introduction of a set of interventions	31 nurses in 59 bed medical unit in an acute teaching hospital	Pre- and postintervention observational study over 30.5 hours	Identified 10 sources of interruption and that the source of interruption impacted the effectiveness of the interventions. The overall most significant source of interruptions was nurses themselves. Overall decrease in interruptions postintervention	Conducted in one high dependency ward. Hawthorne effect. No control group. Individual impact of each intervention unclear	Setting the scene- interruptions and distractions impacting care. Reducing interruptions – current research responses

Table 3 (continued)

Author, year, country	Purpose of study	Sample and setting	Design and methods	Key findings	Limitations	Themes captured in this study
Tucker, A.L. and Spear, S.J. 2006, United States	Examined nurse productivity related to hospital work systems	Three phases: 11 nurses, six hospitals observed for average of 9 hours; 6 of those 11 nurses interviewed; 520 nurses from 21 hospitals surveyed	Mixed methods – direct observation, interview and survey	95% of interruptions caused by patient care issues and family members. On average nurses were observed to experience 8.4 operational failures/8 hour shift, most frequently during MA	Purposive sampling of both observed and interviewed nurses by unit manager. Hawthorne effect	Setting the scene: interruptions and distractions impacting care. Strategising care – managing interruptions
Westbrook, J.J., Woods, A., Dunsnuir, W.T.M. and Day, R.O. 2010, Australia	Explored the impact of interruptions during MA on error rates	98 of 120 nurses from six wards in two major teaching hospitals, 4271 MAs	Observational study conducted over 520 hours	55% of administrations interrupted. Overall error rates: 1/pd/day. 74.4% procedural errors; 25% clinical errors. Overall interruptions increased procedural errors by 12.1% and clinical errors by 12.7%. Nurses spent 19% of their time on medication related tasks yet attracted 27% of interruptions. Multitasking was reported in 25% of medication tasks. Leading factors contributing to errors: inexperience of staff, and distraction. 70.57% of errors reached patient with in harmful effects. 25.59% of errors required extra care to be provided to patients. 3.83% of errors prevented prior to reaching the patient	Hawthorne effect. No night duty or weekend observations collected	Setting the scene: interruptions and distractions impacting care. Reducing interruptions – current research responses
Westbrook, J.J., Duffield, C., Ling, L. and Creswick, N. J. 2011, Australia	Reviewed how nurses distribute time across tasks	Fifty-seven nurses, two wards in one hospital	Prospective observational study over 191 hours		Single hospital. Hawthorne effect. No night duty or weekend observations collected. Data were voluntarily reported	Setting the scene: interruptions and distractions impacting care. Shifting focus – multitasking and prioritising
Wolf, Z.R., Hicks, R. and Serembus, J.F. 2008, United States	Reviewed the characteristics of medication errors made by nursing students during MA	Analysis of 1305 incidents or errors made by student nurses	Descriptive retrospective study over a 5 year period			Setting the scene: interruptions and distractions impacting care. Strategising care – managing interruptions

Indeed, nurses have been described as 'multitasking in action and thought' (Eisenhauer *et al.* 2007, p. 86). This theme was identified in 5:19 studies.

In a study measuring the number and types of interruptions in the nurses' working day, the extent of multitasking and the errors that resulted, registered nurses were observed to be involved in multitasking 34% of the time; 13% of the time during MA with an average error rate of 1.5 errors/hour (Kalisch & Aebersold 2010). Westbrook *et al.* (2011) found that nurses were engaged in multitasking 25% of the time they spent in medication related tasks. Cognitive shifts, or shifts in focus, were reported by Potter *et al.* (2005) while observing nurses' cognitive load, they occurred at an average rate of nine/hour or every six to seven minutes; the majority occurring during MA. Jennings *et al.* (2011) support these findings, reinforcing that nurses have to manage a variety of competing tasks simultaneously rather than consecutively. It has been suggested that to work effectively as a nurse, requires the ability to engage in multiple tasks and cognitive shifts during the course of the day, while being subjected to interruptions that may mean rapid shifts in focus from one patient to another (Potter *et al.* 2005, Kalisch & Aebersold 2010).

Despite the recognition that prioritising care and multitasking skills are essential in providing safe care during MA, literature specifically addressing how nurses learn these skills during MA remains unavailable. There is a clear need for targeted approaches that further unpack the effects of multitasking and managing interruptions on the cognitive thought process occurring of both registered and undergraduate nurses during MA.

### Strategising care – managing interruptions

Nurses encounter multiple interruptions in the course of their day, and are expected to manage these to function effectively, while making sound clinical judgments and performing MA (Kalisch & Aebersold 2010, Jennings *et al.* 2011). It has been recognised that little is known about strategies used by nurses to manage interruptions and that nurses need to learn to identify, prioritise and then manage interruptions at the undergraduate level (Tucker & Spear 2006, Biron *et al.* 2009). Limited studies exist in this area and are specific to registered nurses. Elements of this theme were identified in 5:19 studies.

In an observational study of registered nurses in Italy, the frequency, causes and risk of interruptions leading to errors, along with nurses' management techniques during MA, were examined (Palese *et al.* 2009). Interruption management techniques observed in the study showed that:

96% were managed immediately by the administering nurse, 0.3% were delegated to other staff members and 3.7% were managed at completion of the medication round. Although the study outlined when and by whom, the interruptions were managed, specific management techniques were described on only one occasion. This involved delegation to another staff member, limiting the readers understanding of the interruption management techniques and thought processes used by the nurses.

An ethnographic observational study by Jennings *et al.* (2011) identified techniques used by registered nurses to manage what are described as temporal and physical demands that occur in tandem with MA. Prioritisation and re-prioritisation, multitasking, grouping of tasks and task sequences, and working around systems to expedite MAs were reported as strategies experienced nurses use to manage their time and improve work flow in the face of interruptions (Jennings *et al.* 2011). Reprioritisation was also observed by Tucker and Spear (2006) as a method nurses used to adapt to changing patient needs within any given shift. They also described 'interweaving' which involved moving between multiple patients to administer care (p. 5). How and when the nurses learnt these skills was not reported in the study.

### Discussion

The literature reviewed in this study explores the impact of interruptions and distractions on MA, current research responses to those impacts and techniques used by nurses to manage those interruptions and distractions. Due to the nature of nursing, interruptions and distractions to the MA process are part of the nurses' everyday work. While designing, implementing and evaluating strategies to reduce and eliminate interruptions may appear to be efficacious, current approaches have neglected to acknowledge the complexity of the health care system or the dynamic nature of the interaction that occurs between nurse and patient (Jennings *et al.* 2011, Hayes *et al.* 2014).

The complexities of nursing practice require that nurses are available to their patients, rather than undisturbed and consequently isolated from them. Strategies that work successfully to eliminate interruptions for other professional groups, such as the sterile cockpit for pilots, are not necessarily appropriate or directly transferrable to the nursing environment (Hayes *et al.* 2014). It is not possible, or in some cases in the patients best interest, to eliminate all interruptions and distractions from the task of MA (Tucker & Spear 2006, McGillis Hall *et al.* 2010a). The development of sustainable programmes that include high quality learning



experiences teaching interruption management strategies in a safe environment is required.

Attempting to reduce medication errors that occur as a result of interruptions or distractions requires that the theory behind MA be considered. Current theory related to MA, commonly known as the six rights of MA (Woodrow *et al.* 2010) assumes through omission, that nurses will be left to administer medications in a calm, uninterrupted environment. Undergraduate nurses are currently taught the related mathematics and pharmacology, along with how to administer the six rights of MA in a clinical laboratory. Although it is each nurse's responsibility to ensure patient safety by following the six rights, it is not a stand-alone skill. Of significance is the dynamic context in which nurses actually work. This includes the nurses' ability to appropriately manage interruptions *when* they occur, and recognise and intercept potential errors *before* they occur.

Limited studies provided insights into understanding how registered nurses respond to or manage interruptions during MA, and where interruption management strategies were identified, how and when nurses learnt them was not (Tucker & Spear 2006, Jennings *et al.* 2011). No primary research articles were located specific to undergraduate nurses. The scarce number of studies unpacking concepts such as prioritisation, re-prioritisation and multitasking, in relation to MA for either registered or undergraduate nurses provides a clear gap in the research literature.

Of further concern is the sole focus on reducing or eliminating interruptions during 'scheduled' MAs. There is a significant gap in the literature pertaining to 'unscheduled' MAs. Jennings *et al.* (2011) made the distinction between the number of MA occurrences in scheduled and unscheduled administrations. However, they did not discuss the differences between scheduled and unscheduled administrations in relation to the impacts of interruptions and distractions or the relationship with error rates. Further research would verify if differences exist, and whether or not nurses require different skills to manage them.

Clinical competence related to MA requires the ability to make 'independent, quick and correct decisions' and to be able to 'act out of the box' (Schmalenberg *et al.* 2008, p. 57). This involves being able to listen, think and act simultaneously, all within a rapidly changing environment, and to be able to multitask when faced with interruptions. These concepts were identified in a study reporting on the findings from three linked studies reviewing structures for best practice. It found that of all the educational opportunities afforded to registered nurses at all eight institutions involved in the study, prioritising care and multitasking

were the only areas lacking adequate educational input (Schmalenberg *et al.* 2008). To be able to successfully accomplish the possible multiple cognitive shifts of focus that are at times required, and to be considered clinically competent, nurses need to be taught these skills at an undergraduate level.

Interruption reduction rates resulting from various intervention strategies were noted in several studies (Pape *et al.* 2005, Biron *et al.* 2009, Anthony *et al.* 2010, Relihan *et al.* 2010). However, conclusive evidence of individual strategies being responsible for decreased rates of interruption or error were difficult to establish. This was due to the clustering of interventions, along with a lack of pre- and postcontrolled design studies. As such further research is required where individual strategies are comprehensively examined. Findings of these studies, and as a result the efficacy of each strategy, would be further enhanced if data were available directly linking the introduction of the intervention to medication error rate reduction.

Thirteen of the included studies incorporated observational data. The Hawthorne effect must be taken into consideration when interpreting and generalising these results (Polit & Tatano Beck 2014). Further to this, the majority of data collected includes week day and evening shifts. This is an important confounder as behaviours around MA may vary on weekends and night duty leaving a gap for further research potential.

The leading causes of medication incidents and errors within the undergraduate nursing cohort have been identified. They include inexperience, combined with insufficient time spent in the clinical environment, and inadequate supervision (Wolf *et al.* 2006, Reid-Searl *et al.* 2010). Effective carefully supervised education during undergraduate study would offer nurses the opportunity to develop skills that better enable them to fulfil the task of MA confidently and safely. Practical and sustainable interventions that take into consideration the inevitability of interruptions during MA, require consideration within the broader health care environment (Hayes *et al.* 2014). This includes skills that focus on learning to navigate deviations such as interruptions, distractions and multitasking; and encourage transfer of the knowledge and skills gained to the clinical setting (Reid-Searl *et al.* 2010).

## Limitations

MA errors in the hospital environment have been a longstanding issue for nurses and as such there are a multitude of studies discussing and researching this topic dating back for many years. This review only included studies dating

from 2005 and, therefore, may have omitted some relevant older research. The inclusion of studies published in English language only may have further limited the number of studies examined. As the focus of this study was registered and undergraduate nurses, literature related to enrolled nurses, endorsed enrolled nurses and those in other nursing roles who also administer medication within hospital environments was not included and is an area for further study.

## Recommendations

A combination of strategies, involving interruption reduction techniques along with well-designed programmes teaching nurses strategies to manage, and appropriately prioritise, in the face of interruptions is necessary to improve patient safety around MA. However, there is a paucity of research combining these concepts. The limited studies that are available are specific to registered nurses. There is a significant gap in the literature pertaining to undergraduate nursing students.

The issue of how we adequately educate nurses to manage interruptions, and prioritise according to individual patient needs, through critical thinking, analysis and assessment of each individual situation, needs further exploration (Hayes *et al.* 2014). It is incumbent on nurse educators to equip nurses to take human factors such as distraction and interruption into consideration, and understand the role these factors play in the risk of medication error.

There is a need for studies that explore the impact of innovative educational experiences that enhance nurses' ability to manage interruptions, distractions and multitasking during MA. The critical relationship between these strategies and error rate reduction also requires further examination (Westbrook *et al.* 2010).

## Relevance to clinical practice

Acknowledging that interruptions and distractions are not only one of the leading causes of medication errors, but are also inevitable during MA, is vital to patient safety. This

literature review has revealed that a significant gap in the literature exists in relation to innovative sustainable solutions that aim to teach undergraduate nurses how to safely and confidently manage interruptions in the clinical environment.

## Conclusion

Administering medications involves processes that require multiple clinical judgments, professional vigilance and critical thinking. The task of MA occurs in a dynamic often chaotic environment. Nurses need to be able to manage more than one task at a time while maintaining clinical competence and patient safety, including during the process of MA.

Understanding the responsibility to manage human factors such as interruptions that may impact the safe delivery of medications and patient care is an integral part of the MA process. Adapting and utilising interruption and distraction reduction strategies, along with existing and emerging teaching methods to enhance the nurses' ability to navigate their way through situations where interruptions and distractions are inevitable, and multitasking unavoidable, may be the key to effectively empowering nurses to manage interruptions and distractions during MA.

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Study Design: CJ, DJ, PD, TP; Data collection and analysis: CJ, DJ, PD, TP; Manuscript preparation: CJ, DJ, PD, TP.

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## Conflict of interest

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## 2.3 Section two - Simulation in nursing education

The conversion from hospital to tertiary education in nursing brought with it increasingly large intakes of students, increased costs of training, limited clinical placement availability and reduced opportunities to practice (Arthur, Kable & Levett-Jones 2011; Larue, Pepin & Allard 2015). The impact for many was the perception that nurses were no longer ready for practice on graduation (El Haddad, Moxham & Broadbent 2013). However, the practice readiness debate predates this change.

Within the Australian context, a committee that predated tertiary education for nurses was set up to investigate the educational needs of the nursing workforce and served to highlight some of the issues of concern associated with hospital-based training. The key issues included but were not limited to; identifiable theory-practice gaps, low levels of input regarding workplace stressors, cramming of theory into short blocks, inadequate levels of qualified teaching staff, and focus on service and task provision (Committee of Inquiry into Nurse Education and Training 1978).

As a result of a rapidly evolving healthcare environment, what once constituted adequate preparation for nurses was no longer considered adequate in preparing nurses for practice (Wolff, Pesut and Regan 2010). It was understood that nursing needed to evolve from the constrained era of task specific care to a new era that values critical thought, holistic care, and nurse driven research that supports evidenced based reflective practice (Grealish & Smale 2011). Within the new order nurses began, and continue to grapple with what constitutes practice readiness and as a result a universally accepted, clear definition of practice readiness is hard to locate in the literature. Findings from a 2010 study of 150 Canadian nurses reported practice readiness as; a broad base foundational knowledge combined with job-specific competencies, an ability to adapt to changes in patient conditions and circumstances, and apply practical knowledge that is grounded in theory while ensuring the provision of safe care (Wolff et al. 2010).

In an attempt to facilitate practice readiness, immersive simulation-based learning pedagogy has been embraced within undergraduate nursing education, both in place of and as an adjunct to clinical practicum (Aebersold 2018; Hayden et al. 2014; Kelly et al. 2014; Olsen et al. 2018). Healthcare simulation incorporates a range of teaching technologies, including part task trainers, full-size human simulators, augmented reality, virtual reality, serious gaming, role-play, standardised patients, and hybrid simulations (Jones et al. 2015; Ferguson et al. 2016), with the first full-sized manikin introduced to teach nursing skills in 1911 (Aebersold 2016). Parts of the USA permit up to 50% of clinical practice to take place in simulated environments and in the UK the figure is up to 13% (Hayden et al. 2014; Larue, Pepin & Allard 2015). In the Australian context, simulation-based learning as a replacement for clinical practice remains under discussion, and as such simulation experiences are currently wholly used as an adjunct to clinical practicum.

Within healthcare simulation, learning occurs within three commonly identified phases; the briefing, the scenario itself, and the debriefing (Dieckmann et al. 2013; INACSL 2016). The briefing provides the ground rules for the simulation, an orientation to the environment, and case study specific background information (INACSL 2016). The scenario itself immerses participants in a carefully planned clinical experience, and the debriefing completes the simulation, providing a purposeful and structured opportunity for participants to reflect on what transpired (INACSL 2016).

The International Nursing Association for Clinical Simulation and Learning (INACSL) developed the INACSL Standards of Best Practice: Simulation<sup>SM</sup> (INACSL 2013; INACSL 2016) identifying 11 criteria that are required to achieve successful simulation experiences. The criteria combine best practice adult education and experiential learning theory with clinical standards and simulation pedagogy (INACSL 2016). Elements of these guidelines are integral in the development of effective simulation experiences. These elements include; the Template of Events for Applied and Critical Healthcare Simulation (TEACH Sim) (Benishek et al. 2015); Analysis, Design, Development, Implementation, and Evaluation Model (ADDIE) and instructor's care (I-CARE) provide systematic approaches to simulation design that 'develop cognitive, psychomotor, and affective learning domains'

while maintaining a student-centred approach (Robinson & Dearmon 2013, p. 206).

Despite the majority of literature reporting enhanced learning opportunities and positive student experiences resulting from well-planned, framework-based simulations, there remains a wide variety of design processes and reporting methods which makes comparisons difficult (Cant & Cooper 2017a; Olsen et al. 2018). Groom, Henderson and Sittner (2014) suggested the need for research that identifies the design, implementation and learning outcomes of simulation experiences so that standardisation and validation of the simulation process can be achieved.

Scenario-based simulation experiences have been reported to enhance critical thinking and clinical reasoning (Sullivan-Mann, Perron & Fellner 2009; Kaddoura 2010). Following exposure to a simulation experience, a recent study of 205 nursing students employed an internally validated simulation evaluation survey to report a 95% (n=195) increase in student critical thinking ability (Wallace & Moughrabi 2016). Simulation has also been reported to facilitate undergraduate nurses' ability to close the gap between what they know (the theory) and what they do (the practice) (Prescott & Garside 2009; Rochester et al. 2012).

Providing a simulated environment in which nurses can practice skills before attempting them in clinical practice reduces patient risk (Seaton et al 2018; Rochester et al. 2012). Nurses who are given the opportunity to practise their skills in a safe, simulated environment describe an improvement in confidence, self-efficacy, and competence (Bambini, Washburn & Perkins 2009; Howard et al. 2011; Lin 2016; Lubbers & Rossman 2016; Mould, White & Gallagher 2011). In a study by Prescott and Garside (2009) students (n=45) in their second year of undergraduate nursing who were exposed to a simulation experience provided positive feedback about simulation as a learning tool. Of the 45 respondents, 58% reported that they felt more competent and confident, 98% felt their level of understanding and confidence levels had improved, and 100% reported feeling more ready for practice. These findings were supported by Lubber and Rossman (2016) who reported pre and post-test ( $p < .001$ ) increases in confidence, as well as improvements in knowledge, skills, communication and documentation, and elevated levels of satisfaction with the learning experience.

Foronda, Liu and Bauman (2013) undertook a review of undergraduate nurse simulation studies and found that 25:26 studies described improved confidence and self-efficacy; 16:16 reported positive student satisfaction scores; 11:11 revealed overall improved understandings of interdisciplinary roles; and all the studies reviewed showed improvements in student performance in a range of clinical skills. A further systematic review of 30 studies measured the impact of simulation-based education on improved knowledge, skills and confidence levels (Alanazi, Nicholson & Thomas 2017). Although the included papers varied in design, simulation modality and included a variety of health disciplines, the evidence presented supported previous findings that simulation experiences positively impact knowledge, skills and confidence levels (Alanazi, Nicholson & Thomas 2017). Improvements in clinical knowledge and increased student satisfaction were also noted in a recent review of healthcare simulation education experiences that included web-based simulations (Cant & Cooper 2017 a). However, Alanazi, Nicholson and Thomas (2017), suggested caution when drawing overall conclusions due to variance in study design and data collection methods.

Measuring self-efficacy, performance and skill acquisition in the simulation environment, must then be translated to practice. Simulation pedagogy has been positioned as a method whereby self and situation awareness and improved performance in the practice environment results in decreased risk of error (Dieckmann & Krage 2013; Kneebone et al. 2004). This is evidenced by several studies that report positive results in pre and post-testing of a variety of skills for healthcare professionals (Issenberg et al. 2005; Jarvill et al. 2017; Stayt et al. 2015). However, the findings of these studies reflect the impact of simulated experiences on performance in the simulated rather than clinical environment and fail to relate direct impacts on patient safety. A recent scoping review of 15 studies explored the impact of simulation-based education on transferability to practice and patient safety noting that there was indeed a correlation between the simulations and improved patient outcomes (Seaton et al. 2018).

Developing participant knowledge and skill level to minimise error and improve patient safety are basic tenants of simulation pedagogy (Seaton et al. 2018). Simulation provides the opportunity to expose undergraduate nursing students to realistic clinical scenarios in a safe and supported learning environment. One

such scenario involves the administration of medications. Practicing medication administration scenarios in a simulated clinical environment has been shown in a randomised control trial of 54 undergraduate nursing students to produce significantly fewer medication errors when on clinical practicum (chi-test comparing error rates between control and intervention groups  $p < 0.0001$ ) (Sears, Goldsworthy & Goodman 2010). A more recent pretest-posttest study of 85 undergraduate nursing students showed higher levels of medication administration competence following exposure to a simulated medication administration learning experience as opposed to that of traditional teaching modalities (Jarvill et al. 2018). However, to date, there is limited simulation literature that investigates the impact of simulated experiences in which undergraduate student nurses are exposed to realistic interruptions during medication administration. One study (Thomas, McIntosh & Allen 2014) utilised simulated auditory distractions via headphones and visual stimulus and found that students reported increased awareness of risks associated with distraction during medication administration. Schneidereith (2014) suggested that increasing the number of diverse simulation experiences involving medication administration may improve the levels of safe administration of medications, potentially contributing to improved patient safety.

Simulation-based learning has been integrated throughout undergraduate nursing education curricula globally in an attempt to provide a safe environment for nurses to learn their craft. The evidence that simulation is an effective pedagogical approach to learning is clear however gaps remain in the literature regarding the impact of simulation learning for undergraduate nurses on clinical practicum. This thesis aims to address a gap in the simulation literature pertaining to medication administration education. Subsequent chapters of the thesis explore how undergraduate nurses respond to realistic interruptions during medication administration, understand the impact of interruptions and then develop strategies to manage them. An exegesis of the methodology underpinning the study and a published method paper can be found in the following chapter.

## Chapter 3: Method and methodology

### 3.1 Introduction

The previous chapter established an existing gap in the literature pertaining to the limited educational opportunities for undergraduate nursing students to learn how to manage interruptions during the administration of medications. In direct response to this identified gap, a qualitative multimethod research study was undertaken to report on undergraduate nursing student responses to simulated interruptions during medication administration.

A simulation role-play was designed and implemented to provide an opportunity for students to gain an awareness of the impact of interruptions and to facilitate new insights into interruption management strategies. Following participation in the role-play, participating students were given the opportunity to complete guided written reflections which were collected as a primary data set. The resulting findings prompted secondary data collection via individual interviews and student feedback surveys. To gain the nursing faculty perspectives, those who participated in facilitating the role-play simulation were invited to take part in email questionnaires.

This chapter of the thesis describes the underpinning methodology and methods used in the design and implementation of the research that was undertaken. The chapter is divided into two sections:

**Section one** presents a published method paper (Hayes et al. 2015b) which outlines the methodology and methods used in designing a relevant and sustainable interrupted medication administration simulation role-play experience.

**Section two** provides an exegesis of the supporting philosophy, methodology, research methods, and data sources used in the study.

## 3.2 Section one - Method paper

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### Nurse interrupted: Development of a realistic medication administration simulation for undergraduate nurses



Carolyn Hayes<sup>a,\*</sup>, Tamara Power<sup>a,1</sup>, Patricia M. Davidson<sup>b</sup>, John Daly<sup>c,2</sup>, Debra Jackson<sup>d,e,3</sup>

<sup>a</sup> University of Technology Sydney, Faculty of Health, Building 10, 235 Jones Street, Broadway, NSW 2007, Australia

<sup>b</sup> John Hopkins University School of Nursing, United States

<sup>c</sup> University of Technology Sydney, Faculty of Health, PO Box 123, Broadway, NSW 2007, Australia

<sup>d</sup> Oxford Brookes University, Oxford, UK

<sup>e</sup> University of New England, NSW, Australia

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#### SUMMARY

**Background:** Medication errors are a global phenomenon. Each year Australia-wide there are up to 96,000 preventable medication errors and in the United States there are approximately 450,000 preventable medication errors. One of the leading causes of errors is interruption yet some interruptions are unavoidable. In the interest of patient safety, nurses need to not only understand the impact of interruptions, but also be empowered with the knowledge and skills required to develop effective interruption management strategies. Well-planned simulation experiences have the potential to expose students to authentic clinical cases, otherwise unavailable to them, building critical thinking and clinical reasoning skills and preparing them for practice.

**Aim:** This paper describes a simulated role-play experience that was developed to enable undergraduate nurses to experience, reflect on and analyse their responses to interruptions during medication administration.

**Methods:** The simulation design presented in this paper was underpinned by both nursing and educational theorists, in combination with established simulation frameworks.

**Setting and Participants:** Embedded within a clinical subject in 2013, the simulation experience was run over two campuses within a large Australian University. Participants included 528 second year undergraduate nursing students and 8 academic teaching staff.

**Outcome Mapping:** To stimulate reflective learning debriefing immediately followed the simulation experience. Written reflections were completed and submitted over the following 4 weeks to extend the reflective learning process and review the impact of the experience from the student perspective.

**Conclusions:** Undergraduate student nurses often have limited experiential background from which to draw knowledge and develop sound clinical judgements. Through exposure to clinical experiences in a safe environment, simulation technologies have been shown to create positive learning experiences and improve deductive reasoning and analysis. The heightened awareness of interruptions and their impacts on the medication administration process, along with techniques to manage interruptions more effectively serves to better prepare nurses for practice.

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#### Introduction/Background

Medication errors are a major threat to patient safety and remain a significant global health care issue (Clinical Excellence Commission,

NSW Health, 2013; Cloete, 2015; Kohn et al., 2000). A leading cause of medication errors are interruptions and distractions during the medication administration (MA) process (Jennings et al., 2011; Reid-Searl et al., 2010). Nurses are primarily responsible for MA (Palese et al., 2009; Reid-Searl et al., 2010), therefore, understanding how nurses learn the essential skills required to safely administer medications in spite of interruptions is crucial in achieving patient safety goals.

The clinical environment in which nurses find themselves is frequently unpredictable and there are unavoidable interruptions, including during MA (Westbrook et al., 2010). Safe and effective MA is a cornerstone of nursing practice and it is incumbent on nurses to be cognisant of the associated risks as well as the causes of medication errors (Page and McKinney, 2007).

\* Corresponding author. Tel.: +61 2 9514 4916; fax: +61 2 9514 4927.

E-mail addresses: [Carolyn.Hayes@uts.edu.au](mailto:Carolyn.Hayes@uts.edu.au) (C. Hayes), [Tamara.Power@uts.edu.au](mailto:Tamara.Power@uts.edu.au) (T. Power), [pdavidson@jhu.edu](mailto:pdavidson@jhu.edu) (P.M. Davidson), [John.Daly@uts.edu.au](mailto:John.Daly@uts.edu.au) (J. Daly), [djackson@brookes.ac.uk](mailto:djackson@brookes.ac.uk) (D. Jackson).

<sup>1</sup> Tel.: +61 2 9514 4552; fax: +61 2 9514 4927.

<sup>2</sup> Tel.: +61 2 9514 5045; fax: +61 2 9514 5049.

<sup>3</sup> Tel.: +44 1865 482736.



Interruption reduction strategies have been the main focus of current research to prevent medication errors (Anthony et al., 2010; Flanders and Clark, 2010; Relihan et al., 2010). These strategies include the introduction of 'do not disturb' tabards or sashes, demarcated 'no go and quiet zones', ward signage, technology, and safety checklists (Anthony et al., 2010; Fore et al., 2013; Relihan et al., 2010). Although these initiatives are reported to have been successful in reducing interruptions, they are unable to eliminate them. Caution in utilising these strategies as standalone measures has been suggested, until sufficient pre- and post-testing has been undertaken (Raban and Westbrook, 2014).

The inevitability of interruptions and distractions in the clinical environment, and the recognition that not all interruptions have negative outcomes are documented (Clark and Flanders, 2012; Flynn et al., 2012). There is little doubt that there is a direct relationship between the delivery of safe and effective patient care and the way in which nurses manage interruptions (Cloete, 2015; Rochman et al., 2012). The traditional methods of teaching MA to undergraduate nurses include learning the relevant pharmacology and mathematics, and the six rights of MA (Woodrow et al., 2010). Once availed of theoretical elements, students are then supervised practising MA within a constructed, uninterrupted, clinical laboratory environment (Aggar and Dawson, 2014). Although these are all necessary steps in teaching novice nurses safe MA, translating skills learnt within the university setting, into the dynamic clinical environment can present students with significant challenges. Undergraduate nurses are often expected to learn interruption management strategies 'on the job', leaving both nurses and patients vulnerable. To contribute to more 'real life' experience of MA, innovative techniques such as role-play simulation that incorporate interruption management strategies are proposed.

#### Methods/Protocol

##### Aim

This paper describes a simulated role-play experience that enables undergraduate nurses to experience, reflect on and analyse their responses to interruptions during medication administration.

##### Methodology

The conceptual foundation for the design of this role-play drew on the work of both nursing and educational theorists including; Benner's

novice to expert, Tanner's model of clinical judgement, and Kolb's theory of experiential learning (Benner, 2001; Kolb, 1984; Tanner, 2006). It was further informed by Jeffries adaptation of Kolb's work as it applies to simulation in nursing (Jeffries, 2005). The integration of these ideas is presented in Diagram 1.

Benner described five stages of learning specific to nursing practice: novice, advanced beginner, competent, proficient and expert (Benner, 2001). During the planning of this simulation role-play experience it was deemed that student participants were functioning within the first two stages, the novice and the advanced beginner.

Tanner's model (Tanner, 2006) was utilised as a guide to ensure that student participants were given the opportunity to notice, interpret, respond to and reflect on their experience within a safe environment. Academic facilitators were encouraged to act as coaches guiding the learning experience, culminating in a planned debrief where students could make informed and reasoned judgements, incorporating appropriate prioritisation and optimal patient care choices.

The understanding that students vary in their preferred learning style and that concrete experiences lay the foundation for reflective observation was also considered (Kolb, 1984). Therefore, following the simulation and debriefing, students were encouraged to complete written reflections to enhance transfer of the experience into abstract concepts, fostering an awareness of actions or responses to create new experiences and insights.

Jeffries (2005) simulation framework was used to underpin the design, implementation and evaluation of the simulation, to facilitate and develop critical thinking and reasoning skills that lead to enhanced clinical judgement. Within the design of this experience all five elements of the Jeffries Simulation Framework were taken into consideration and are presented in Table 2. These approaches emphasise the impact of previous experiences on learning, and the ability to apply theory into practice through active involvement, problem solving, decision making, and reflection, leading to cognitive development and acquired knowledge (Howard et al., 2011).

##### Setting and Participant Characteristics

The simulation was instituted across two campuses of one large Australian University. Participants included a convenience sample of 528 second year undergraduate student nurses enrolled in a clinical subject in the Bachelor of Nursing programme; male ( $n = 85$ ) and female ( $n = 443$ ), with a mean age of 26.56 years. The cohort comprised a combination of direct entry, graduate entry, and enrolled nurse

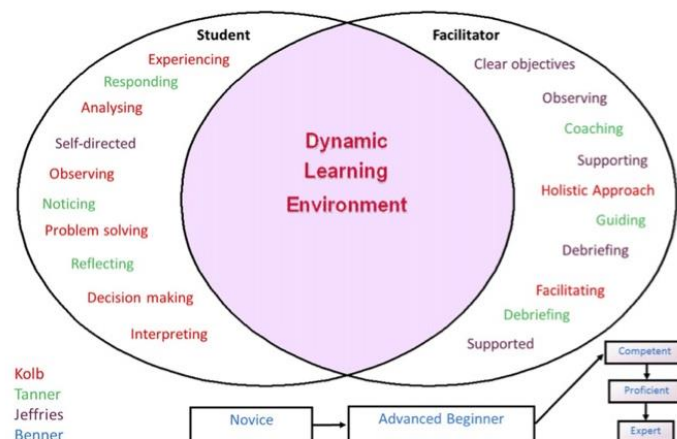


Diagram 1. Theorist informed dynamic learning environment.

**Table 1**  
Quality indicator statements (Arthur et al., 2010).

Quality indicator	Statement	Achieved by
Pedagogical principles	<ol style="list-style-type: none"> <li>1. The simulation experience is aligned with curriculum and course objectives.</li> <li>2. Simulation experiences increasing in intensity are integrated throughout the course.</li> <li>3. Learning objectives guide the design of the simulation.</li> </ol>	<ol style="list-style-type: none"> <li>1. The faculty developed a programme where “enquiry-based, scenario-based and solution-focused approaches” p. 119 (Rochester et al., 2012), heavily utilise simulation as a learning tool.</li> <li>2. All students have been exposed to large cohort dedicated sim weeks in their first year of study along with more complex scenario based embedded simulation experiences within clinical laboratory classes.</li> <li>3. The learning objectives guiding this experience included: clinical reasoning when interrupted during the task of medication administration, linking theory and practice, prioritisation of care, communication skills, and review of medications specific to the case study.</li> </ol>
Fidelity	<ol style="list-style-type: none"> <li>1. Range of methods used align to learning objectives.</li> <li>2. Environmental fidelity is appropriate to the simulation experience.</li> <li>3. Clinical equipment used is applicable to the scenario and enhances realism.</li> </ol>	<ol style="list-style-type: none"> <li>1. Role play was used in this simulation experience to increase student immersion.</li> <li>2. The learning space was set up as if in a ward environment, and included the availability of props for each role.</li> <li>3. Medication trolley, IV fluids and appropriate charts were supplied for use.</li> </ol>
Student preparation and orientation	<ol style="list-style-type: none"> <li>1. There is an introduction to learning objectives, timing and process of the experience, the environment in which they will be immersed, and available equipment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Students were provided with information regarding the simulation in their course workbooks as well as by information handouts and verbal orientation at the time of the simulation.</li> </ol>
Staff preparation and training	<ol style="list-style-type: none"> <li>1. Staff designing and/or involved in the simulation are provided with appropriate training.</li> <li>2. Staff designing the simulation are familiar with the curriculum and course objectives.</li> </ol>	<ol style="list-style-type: none"> <li>1. All staff involved in the simulation attended course content briefing at the beginning of the semester along with regular email updates and information and were also briefed individually prior to the simulation experience.</li> <li>2. One of the staff members involved in designing the simulation included the subject co-ordinator ensuring alignment with curriculum and course objectives.</li> </ol>
Debriefing	<ol style="list-style-type: none"> <li>1. Structured debriefing is facilitated directly following the simulation which allows for student reflection, self-evaluation and feedback of the experience.</li> </ol>	<ol style="list-style-type: none"> <li>1. The students were provided with a debriefing experience following each cycle of the simulation and then again as a large group at the end of the class. Suggested debriefing questions were provided to the facilitators that encouraged student reflection on how they felt ‘in role’, as a part of the team, identifying clinical reasoning to explain how they interacted/reacted to the experience and communication issues that arose.</li> </ol>

transition students. The second year of study was chosen as it is when students begin to consolidate MA skills. Casual and permanent academic teaching staff ( $n = 8$ ) were directly involved in facilitating the simulation.

#### Design

Guiding students through the processes required to transfer theory into practice, is dependent on educators understanding the complex

**Table 2**  
Five elements of Jeffries Simulation Framework (Howard et al., 2011; Jeffries, 2005).

Educator characteristics	Facilitate and/or observe the students learning; both provide and require support; act as debriefer; should be engaged with the technology and/or process
Student characteristics	Encouraged to be self-directed and self-motivated, given clearly defined roles
Educational practices	Includes seven pedagogical principles: <ol style="list-style-type: none"> <li>1. Active, engaged learning e.g., role playing, to facilitate links between concepts</li> <li>2. Open communication between staff and students encouraging reflection and critical thinking</li> <li>3. Constructive, timely two way feedback that guides learning outcomes and assesses understanding</li> <li>4. Maintaining high expectations of students, and encouraging high student expectations</li> <li>5. Recognising and accommodating diverse learning styles</li> <li>6. Establishment and maintenance of time on task to facilitate focussed learning</li> <li>7. Creation of collaborative learning environments where decision making is shared to encourage critical thinking, shared knowledge, exposure to alternate approaches, and teamwork</li> </ol>
Design characteristics	Includes five key areas: <ol style="list-style-type: none"> <li>1. Clear objectives to guide learning and outcomes</li> <li>2. A level of fidelity that ensures realism and authenticity in the scenario</li> <li>3. Appropriate levels of complexity</li> <li>4. Cues, both facilitator and student prompted, that assist progression through the simulation</li> <li>5. Inbuilt debriefing to reinforce positive points and stimulate reflective learning that encourages deep critical thinking and a link between theory and practice</li> </ol>
Outcomes	To equip students with the skills to transfer newly learned skills into practice and increase self-confidence and efficacy, resulting in improved clinical judgements by: <ol style="list-style-type: none"> <li>1. Sustained knowledge attainment</li> <li>2. Practising and improving skill performance in a safe environment</li> <li>3. Development of critical thinking skills</li> <li>4. Student satisfaction</li> </ol>



matrix involved in this progression. A valid framework was considered essential as the foundation for the design and content of this simulation to ensure that the simulation was of high quality and elicited maximum learning opportunities. A Delphi study involving contributions from national and international simulation experts, developed five evidenced based quality indicator statements, that when incorporated into simulation design and implementation provide high quality, effective teaching and learning experiences (Arthur et al., 2010). The outcomes of this consensus, the related statements produced, and how the study addressed those statements in the planning of the experience are outlined in Table 1.

The most effective high fidelity simulations provide a realistic scenario and environment to encourage student immersion. Krautscheid et al. (2011) reviewed what students perceived as effective forms of MA education. They found that the students requested increased fidelity of experiences, incorporating learning how to manage interruptions and distractions.

Producing low cost, high fidelity simulation experiences can be a challenge. One approach to manage this issue is the utilisation of carefully planned role-play simulations where limited equipment is required. Literature specific to team training in the health care environment found that role-play simulation is not only cost effective, but also encourages maximum retention of new knowledge and skills through active participant involvement (Will and Weinschneider, 2012). Jenkins and Turick-Gibson (1999) identified high levels of active student participation, whereby feeling, thinking and acting in another person's place promoted learning using critical thinking skills.

Key to the success of this teaching strategy was enabling participants to make meaning of the experience through debriefing and reflection (Cant and Cooper, 2011; Jeffries, 2005; Kolb, 1984; Tanner, 2006). Reflecting on practice encourages deep thinking (Kolb, 1984). To that end students were encouraged to complete guided written reflective responses independent of the debriefing process. Guided reflections provide a depth of reflection, which is believed to increase the potential for clinical learning (Lasater, 2009). A guide for reflection designed by Nielson et al. (2007) was adapted to offer students some points for consideration including; how or if the interruptions affected concentration, identifying skills they had used to manage the situation, how or if they would approach the interruptions differently next time, and how or if the simulation prepared them for practice.

#### *Ethical Considerations*

The importance of maximising benefit for both the participants and the patients they care for in the future was paramount when designing this intervention. Exposure to the simulation afforded the student participants an opportunity to reflect on interruption management strategies that they will be able to call on in clinical practice. As the written reflections will be used as data to explore student perceptions of the experience, issues of power and autonomy including consent, participant privacy, emotional considerations and self-disclosure were considered. Participants were supplied with information sheets and given the opportunity to ask questions prior to the commencement of the simulation, ensuring informed consent. It was made clear that the written reflection was a non-compulsory exercise and that participation was voluntary. The right of eligible participants to exclude themselves from the experience was respected.

#### *Outcome Mapping*

Each class group was observed to validate consistency of the experience, at which time some anecdotal evidence of the impact of the simulation was collected. Students were observed to react positively, displaying an increased understanding of the impacts of interruptions on MA, and an improved awareness of management strategies. Student feedback was collected for analysis using the written reflections. To

obtain the academic teaching staff perspective, email interviews were conducted. Ethics approval was received from the relevant Ethics Committee.

#### *Creating the Scenario*

A case study was designed and presented in two, two hour sessions delivered one week apart. Knowledge and skills covered within the case study included: revision of respiratory physiology, oxygen therapy, administration of nebulised and metered dose medications, safe oral MA, case study specific pathophysiology, relevant pharmacology, clinical reasoning and communication. A creative learning experience that aimed to actively engage students by utilising simulation role-play was embedded within the clinical laboratory session during the second week of the case study.

Creation of the simulation experience was designed to reflect reality and incorporated both the Arthur et al. (2010) framework, and a simulation scenario template created by Kelly (2013). Key skills addressed in line with the course curricula included: linking theory and practice, the use of clinical reasoning to manage the task of MA, prioritisation of care, communication skills, and review of medications specific to the case study.

The interruptions were chosen by reviewing literature for realistic and common causes of interruptions during MA (Biron et al., 2009; Palese et al., 2009; Relihan et al., 2010). Exposing undergraduate nurses to realistic and common interruptions in a safe simulated environment, aims to provide opportunities for students to recognise and prioritise interruptions that either do or do not require immediate attention (Biron et al., 2009).

All participants had previous exposure to both embedded simulation and dedicated simulation weeks. Previous involvement in large cohort simulations and 'knowing what to expect' of the environment encourages students to willingly engage and be less fearful of the impending experience. Students have reported positive learning experiences highlighting the efficacy of this teaching tool (Rochester et al., 2012).

Students were supplied with information regarding the simulation within laboratory workbooks and were also briefed on the five available roles. Each role was designed to elicit critical thinking and clinical judgement. The roles included a registered nurse who was required to administer morning medications, a patient with a history of asthma, a confused patient, a second nurse who interrupts the administering nurse to have an intravenous fluid order checked, and an observer. To help the students orient themselves to the experience, they were also shown a short video clip with staff portraying the five roles. The vignette example did not provide solutions, but merely illustrated the roles and level of expected interruption. The classes were then divided into groups of five and the students self-selected the role they felt most comfortable with.

To increase engagement, props were utilised that could be easily donned and removed to signify the beginning and end of role immersion. These included: character lanyards with role identifiers and tips for role engagement, a wig and scarf for the confused patient, intravenous fluids and fluid order chart for the interrupting nurse, patient gown and wrist band for the asthmatic patient. Students were requested to wear their uniform to the laboratory session so that those taking on the role of administering nurse were able to embrace the role (Kesten et al., 2010; Prescott and Garside, 2009).

Student centred debriefing is an essential part of the simulation experience (Neill and Wotton, 2011). Therefore, immediately following the simulation a short debrief was conducted for each group. In addition a full class debrief occurred at the end of the laboratory session to encourage consolidation of new concepts. A safe environment where students are free to reflect on identified areas for learning enhances the transfer of knowledge to practice (Arthur et al., 2010). The reflective process was extended by providing students with the opportunity to complete written reflections over subsequent weeks. Fostering further



reflection allows time for deeper thinking around what has been learnt and how that might be able to transform practice.

Regular teaching staff facilitating the simulation fostered a comfortable and familiar learning environment. Academics involved in the simulation were briefed during an initial semester team meeting, via email with updates, and again on the day of the simulation. This ensured all participating academics had an understanding of how the simulation 'fit in' with the curricula and continuity could be assured. They were also supplied with information related to appropriate debriefing styles and methods. The majority of the academic staff members involved had previous simulation experience. Those new to simulation were offered additional support.

### Challenges

To avoid overzealous character portrayal of the confused patient, the teaching staff briefed the student playing the confused patient so that they did not diminish the objective of the scenario. However, there were some instances where students began to dominate the scenario. This was managed by either calling a time out for discussion, or signalling the student in question to decrease the intensity of the role.

Several members of the teaching team reported observing some male students resorting to physical restraint to control the confused patient. This was also managed by calling a time out to discuss options before returning to the simulation. Similarly it was reported that some students who had previous experience as enrolled nurses were requesting pharmacological restraint for the confused patient. These issues were discussed during the debrief that followed the scenario.

### Discussion

Administering medications requires multiple clinical judgements, professional vigilance and critical thinking (Cloete, 2015; Eisenhauer et al., 2007). Understanding the external impacts on the safe delivery of medications and patient care is an integral part of the MA process (Cloete, 2015; Page and McKinney, 2007), yet most current methods of teaching MA neglect to teach the critical thinking skills required to manage interruptions.

Biron et al. (2009) recognised that little is known about strategies used by nurses to manage interruptions, and that nurses need to learn to identify, prioritise and then manage interruptions at the undergraduate level. This is particularly important for beginning practitioners, as interruptions and distractions combined with inexperience, significantly increase the risk of errors and have been identified as the leading cause of errors in this cohort (Wolf et al., 2006). To facilitate the identification of interruption management strategies and individual areas of knowledge deficit, this role-play simulation experience acknowledged each of the steps in Tanners clinical judgement model, where complexity of the processes behind clinical reasoning and judgement are highlighted, accounting for external influences such as diversity in clinical situations, experiences and individual values (Tanner, 2006).

When planning learning experiences for undergraduate nurses, with limited experiential background from which to draw knowledge, guidance from academic staff and clinical experts is required (Benner et al., 2009). Ideally faculty are able to predict what students can reasonably expect to be exposed to, along with any obvious exceptions to those expectations. As students gain clinical exposure they build a repertoire of clinical experience. Sound clinical judgement is significantly enhanced by the experiential learning that occurs from exposure to clinical cases (Lasater, 2007). This simulation was designed to build the repertoire of novice and beginning practitioner students by exposing them to a realistic clinical situation from which they could draw knowledge when in the actual clinical environment.

Some recent studies have utilised simulation technologies in an attempt to improve the MA skills of undergraduate nursing students

resulting in positive learning experiences, and improved deductive reasoning and analysis (Ferguson et al., 2014; Harris et al., 2014). One study (Thomas et al., 2014) created simulated auditory distractions using headphones to develop student understanding of the relationship between distractions and medication error rates during MA. Identification of management strategies was discussed during the debriefing that followed the simulation, however the opportunity to extend the reflective process outside the simulation laboratory environment was not offered, nor was the chance for the students to immerse themselves in the role of the patient or the interrupter to feel what it was like from the perspective of others.

Taking on someone else's role in a simulation experience has been identified in the literature as facilitating insight into the situations of others (Rochman et al., 2012). However, high fidelity simulators are frequently used to portray the role of the patient, typically with teaching staff as the voice behind the patient. The role-play experience outlined in this paper differs from these experiences, and affords student participants the opportunity to fully immerse themselves in the role of the patient and their story of illness, including the associated emotional impacts, while improving understanding of the impacts of interruptions and identifying interruption management strategies.

Critical thinking begins and clinical judgements are made during simulation experiences, however, timely and appropriate debriefing must then follow to stimulate reflective learning (Ferguson et al., 2014; Harris et al., 2014; Rochman et al., 2012). Schon (1983) describes this as reflection 'on' action where one is able to spend time recalling an event in the pursuit of knowledge. This encourages increased student engagement, improves learning opportunities, and enriches insights into student thought processes. To extend the reflective learning process students were encouraged to complete written reflections independent of the debriefing process. Combining these experiences aligns with Kolb's experiential learning theory and Tanners model of clinical judgement (Kolb, 1984; Tanner, 2006).

Simulation, that employs varying levels of fidelity, has been used as a method for teaching undergraduate nursing at all levels of experience both locally and internationally for many years (Aggar and Dawson, 2014). It has been described as an educational strategy that utilises real world scenarios and environments to accomplish definite learning goals (Arthur et al., 2010). If students are engaged in carefully planned, clinically relevant simulation experiences appropriate to their stage of learning, then improved levels of understanding, self-efficacy, self-confidence, a feeling of being more ready for practice and transfer of new skills into the clinical environment are the likely results (Howard et al., 2011; Mould et al., 2011; Prescott and Garside, 2009).

Support is growing for well-planned simulation experiences that expose undergraduate student nurses to real world scenarios, including interruptions during MA (Aggar and Dawson, 2014; Raban and Westbrook, 2014). Deep learning can occur and new knowledge can be transferred into practice through transforming experiences such as the one presented in this paper (Kolb, 1984). Encouraging undergraduate nurses to use critical thinking and reflect on the thought processes used to make sound clinical judgement, is essential to not only build reflective practitioners but also provide safe care (Eisenhauer et al., 2007).

### Implications for Research

The simulation described in this paper has potential for building knowledge and expanding understanding. The written reflections will provide extensive qualitative data from which to draw an understanding of the impact of the experience from the student perspective. To enhance understanding of student written reflections, the addition of individual interviews will be beneficial. It would also be advantageous to determine impacts of the intervention on students following clinical practicum, including the impacts on medication error rates. The inclusion of documented medication error and near miss data collected



during the simulation would provide quantitative data to review the impact of the student learning experience.

## Conclusion

It is impossible to completely eliminate interruptions and distractions in the dynamic environment in which nurse's work. Current medication error prevention strategies revolve around eliminating interruptions and distractions during MA. Therefore it is incumbent on educators to ensure that undergraduate nurses are able to manage interruptions as they occur. In order for student nurses to appropriately manage interruptions, and reduce errors, we must provide opportunities in which they are encouraged to discover the skills necessary to cultivate innate clinical reasoning that will lead to sound clinical judgements. Providing simulation of the real world in training should facilitate transfer of skills from theory to practice.

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See appendix four for Corrigendum to this journal article.

### 3.3 Section two - Exegesis of methodology and method

#### 3.3.1 Research Approach

##### 3.1.1a Research context

Nurses are primarily responsible for administering medications within healthcare facilities (Reid-Searl, Moxham & Happell 2010). Student nurses are most commonly taught medication administration skills by learning the 'rights' of medication administration (Miller, Haddad & Phillips 2016), the requisite theory including pathophysiology and pharmacology (Craft et al. 2017), and relevant mathematics (Fleming, Brady and Malone 2014). Before entering 'real world' clinical settings, students are given varying numbers of opportunities to practice under controlled conditions, most often within the educational facility in which they study. The research study described in this thesis provided undergraduate nurses with the unique opportunity to experience and reflect on the dynamic nature of medication administration in a safe, simulated environment.

##### 3.3.1b Research questions

1. How do novice and advanced beginner undergraduate student nurses respond to interruptions during the medication administration process?
2. Does the introduction of a simulated role-play experience involving interrupted medication administration raise awareness of the impact of interruptions and facilitate new insights into interruption management strategies?

##### 3.3.1c Study design and methodological position

This research study has used an interpretive, social constructivist framework for investigation in which experiences are central to generating knowledge and understanding (Guba & Lincoln 1994; Scotland 2012). Examining the impact of interrupted medication administration through role-play to explore undergraduate student nurses' understanding of the impact of interruptions and the development of strategies to manage them, to my knowledge is previously

untested in the nursing literature. The desire to challenge traditional medication administration education practices, using innovative methods to develop an understanding of the individual experiences of undergraduate student nurses drove the research design. Therefore, a qualitative multimethod approach was identified as appropriate.

Underpinning philosophy guides how research is conducted and how data is collected (Gray 2013). The choice between qualitative and quantitative research methodology begins with the researcher acknowledging their ontological and epistemological position (Lincoln & Guba 2000). Ontology, or the understanding of knowledge, dictates epistemology, the theory or meaning behind that knowledge (Gray 2013). Ontological perspectives originate from either realism or relativism (Guba & Lincoln 1994), which align with positivist/scientific, interpretive, or critical paradigms (Whitehead 2007).

The positivist paradigm lends its self to realism, where a single truth exists. This etic, scientific approach is measured and objective, utilising quantitative methods for data collection, where the researcher remains distant from the data to minimise bias (Scotland 2012). The critical approach 'seeks to enable empowerment, emancipation and equality for research participants' (Whitehead 2007, p. 23). It acknowledges yet rejects the relevance of historical realism that has been influenced by gender, ethnicity, and politics (Guba & Lincoln 1994). This critical stance is often favoured by disenfranchised or repressed groups who seek to question and confront social establishments to elicit change (Creswell 2009; Whitehead 2007).

The interpretive paradigm lends itself to relativism, where multiple realities exist relying on searching for the meaning that is attached to any given truth (Scotland 2012). This emic approach is subjective, and by its' nature aims to communicate research participant experiences, utilising qualitative research methods for data collection (Creswell 2009; Lincoln & Guba 2000). Interpretive perspectives have been described as 'an appropriate approach for exploring the depth, richness, and complexity of nursing phenomena' and for bringing 'perspective to the forefront of knowledge development in nursing' (Gillis & Jackson 2002, p. 20), and is therefore considered appropriate to this study.

### 3.3.2 Knowledge acquisition

Understanding what knowledge is, and how individuals acquire it, has been extensively debated (Corcoran 2006; Dewey 1933; Kolb 1984). There are three important considerations: who is in possession of knowledge; what kind of knowledge are they in possession of; and, how that knowledge is transferred and demonstrated (Poikela 2012). As a researcher and educator, I subscribe to the belief that truth is dynamic, that it evolves and changes, is created and shaped by experiences and context, and that it does not exist without context and meaning (Gray 2013).

In the context of safe administration of medications, not only is the understanding of what constitutes safe administration of medications debated amongst the academic fraternity but so too, the way in which nurses best learn to safely administer them (Choo, Hutchinson & Bucknall 2010; Koharchik & Flavin 2017). Some subscribe to the belief that the teacher dictates content, imparting requisite procedural and theoretical knowledge to the student. Social constructivists would argue that 'the priority in learning is to ensure that experiential knowledge is formed in a meaningful way' (Poikela 2012 p. 20), and that each student has individual knowledge goals and deficits which, in consultation with the teacher, are used to inform and guide the learning experience.

Understanding how students learn and retain new knowledge, along with what they and academic teaching staff both consider constitutes an optimum learning opportunity is a challenge. Consider a novice nurse who is interrupted while administering medications by a patient who is becoming short of breath; how does the nurse know or interpret the significance of this interruption – does it require immediate action or not and if so what would those actions be and why? These questions employ varied patterns of knowledge acquisition and can be broken into three parts. Part one; 'how does the nurse know or interpret the significance of this interruption', references personal, procedural, intuitive and propositional knowledge capabilities. Part two of the question, 'does it require immediate action or not', demands critical thinking and clinical judgement often relying on experiential knowledge. Part three, 'what would those actions be and



why' again requires critical thinking employing propositional and procedural knowledge to make sound clinical judgements. To unpack complex questions such as these and create meaning from the answers, one must establish the hierarchy of knowledge; what knowledge is, what it is to 'know' (Poikela 2012; Chinn & Kramer 2013).

### 3.3.3 Hierarchy of knowledge

Defining knowledge in the context of nursing is complex and continues to evolve within the literature. Chinn and Kramer (2013 p.1) noted that 'in the field of nursing, what we believe our disciplinary focus to be will determine what we value as knowledge and how we go about developing that knowledge for our practice'.

Two key classifications of knowledge were described by Ryle (1947) as knowing 'how' and knowing 'that'. Later work by Carper (1978) identified four patterns of knowledge in nursing; empirical (the science of nursing), aesthetic (the art of nursing), personal (in the context of situation and self-awareness), and ethical (moral) knowledge. Chinn and Kramer (2013) included emancipatory knowledge as a fifth pattern of knowledge which requires reflection and action following interactions. Poikela (2012) divided knowledge into three categories; theory (propositional knowledge), practice (procedural knowledge), and experience (personal knowledge; recognition/perception/self-awareness). In addition to these, experienced or expert nurses are often described in the literature as possessing intuitive knowledge (Benner, Tanner & Chesla 1992; Benner & Tanner 1987; Billay et al. 2007).

For this study the patterns of knowledge in nursing are understood as follows:

**Aesthetic knowledge** (the art of nursing), 'a wide consideration of conditions, situations and experiences in nursing...including the creative process of discovery in the empirical pattern of knowing' (Carper 1978 p.16). For nurses, it is expressive, experiential and requires empathy driven by patient needs (Carper 1978).

**Empirical knowledge** (the science of nursing) the systematic and logical structuring of information 'into general laws and theories for the purpose of

describing, explaining and predicting phenomena of special concern to the discipline of nursing' (Carper 1978 p.14).

**Emancipatory knowledge** 'focuses on developing an awareness of social problems and taking action to create social change' (Chinn & Kramer 2013 p. 2).

**Ethical knowledge (moral)** 'focusses on matters of obligation or what should be done... it includes all voluntary actions that are deliberate and subject to the judgement of right and wrong – including judgments of moral value in relation to motives, intentions or traits of character' (Carper 1978, p. 20).

**Intuitive knowledge** results from experience (Young 1987), incorporating unconscious understanding without a logical explanation (Melin-Johansson C., Palmqvist & Rönnberg 2017). Within nursing, it is described as clinical intuition which by its nature 'allows cues to be recognised and decisions made' (Young 1987 p 60). Nurses often report that they had a 'gut feeling' that something was wrong before they made a clinical decision to act (Melin-Johansson, Palmqvist & Rönnberg 2017). This ability is the result of a combination of propositional knowledge and procedural knowledge (Young 1987) and is seen in the expert nurse (Benner Tanner & Chelsa 1992; Billay et al. 2007). For the novice and advanced beginner with limited experiential knowledge, making opportunities available for them to practise new skills and knowledge provide the building blocks towards a level of understanding that is seen in experienced nurses.

**Personal knowledge** requires an understanding of ones 'philosophy of nursing and beliefs about practice' (Read & Crawford-Shearer 2011 p. 70). It is concerned with the 'Knowing, encountering and actualizing of the concrete, individual self...It is an interpersonal process involving, interactions, relationships and transactions between the nurse and the patient-client...the relation is one of reciprocity, a state of being that cannot be described or even experienced – it can only be actualized' (Carper 1978, p . 18). Put simply it is in the context of situation and self-awareness.

**Procedural knowledge** is the nurse 'knowing how' to fulfil a nursing task (Mantzoukas & Jasper 2007). It is accrued by either repetitive practice of a task or by observation of that task (Mantzoukas & Jasper 2008). Once a nurse's

procedural knowledge for a given task is robust, the nurse can modify the task to account for specific contexts and environments.

**Propositional knowledge** or the 'knowing that' is having an understanding of theory and facts behind a task or process (Chinn & Kramer 2013). It also includes being cognizant of the inherent and projected risks associated with the task or process.

#### 3.3.4 The Knower

Where one's knowledge can be communicated, the concept of knowing is 'internal to the knower' (Chinn & Kramer 2013 p. 4), is fluid and impacted by educational or personal experiences (Chinn & Kramer 2013). When developing undergraduate educational experiences for nurses, understanding the relationship between the patterns of knowledge and knowing is essential.

Reflecting on knowledge in the context of an example where an undergraduate nurse is required to safely administer medications to a patient with a history of drug abuse, the distinctions and relationships between some of the patterns of knowledge and knowing might appear as follows:

The novice undergraduate nurse in question is aware that his/her role requires that the six rights of medication administration are followed to safely administer medications. This procedure has its roots in **empirical and propositional knowledge**. As the nurse approaches the patient and engages with them, the nurse is also aware of their personal feelings about drug abuse. The ability to ensure that the nurses' own perceptions of people that abuse drugs do not negatively impact the interaction with the patient applies **personal knowledge**. The nurse then engages in **procedural knowledge** as she/he metes out the medications under the supervision of an experienced registered nurse in the clinical environment. This, in turn, offers a new level of **personal, aesthetic and procedural knowledge**. In this instance, **intuitive knowledge** is generally poorly developed in the nurse as he/she has limited experience on which to draw. However, the registered nurse can offer this knowledge to the scenario. In summary, until the novice has learnt the theory behind medication administration (**propositional knowledge**), and experiences administering medications

(**procedural knowledge**), they cannot say that they have begun to 'know' how to administer medications safely (Chin & Kramer 2013).

Nursing, as with every other discipline, not only has a unique structure or hierarchy of knowledge but also a way in which to determine who the 'knower' is (Reed & Crawford Shearer 2011). In qualitative research the definition of the 'knower' is clearer, the research participant is the holder of the knowledge, and the researcher is the one who wants to access to that knowledge (Ponterotto 2005). The 'knower' in modern healthcare and more specifically nursing research and education, was initially rooted in scientific findings by a male-dominated medical profession, the 'knower', most often the medical practitioner, interpreted the science and dictated patient care decisions to the nurse (Schulz & Meleis 1988). With the evolution of time, theorists developed a deeper understanding of women's knowledge and self as knower (Hofer 2001). These new understandings challenged the traditional hierarchy of knowledge to make way for the possibility that the 'knower' could be the nurses themselves (Schulz and Meleis 1988). A hierarchy amongst nurses does however remain, with the dominant belief being that knowledge most frequently rests at the feet of nursing educators, university faculty and senior nurses, which in turn suggests that undergraduate or novice nurses are the recipients of knowledge (Hall 2005).

While this hierarchy is necessary for many clinical situations, understanding how novice nurses best 'learn' their craft requires a shift of focus from nursing faculty as the 'knower', to a more collaborative environment which encourages and includes the learner. Listening to novice nurses; their reality, their experiences, concerns and learning needs results in a clearer understanding of which learning experiences are effective in best preparing them for practice. Therefore, this study supports a student-centred approach to learning, positioning the student, in consultation with the academic, as the 'knower'.

### 3.3.5 Knowledge acquisition through simulation

As described in the previous chapter simulation-based learning promotes experiential learning, facilitating knowledge acquisition by mimicking real-world scenarios in a safe environment (Gaba 2004; Rudolph, Raemer & Simon 2014). It encourages critical thinking, reflection both in and on action, and a deeper

understanding of the soft and hard skills that are required in the clinical environment (Abersold 2018; Alinier, Hunt & Gordon 2004; Brannan, White & Bezanson 2008; Hoffmann, O'Donnell & Kim 2007; Howard 2007; Weaver 2011). Simulated learning experiences for nurses align closely with both student-centred learning and problem-based learning pedagogy.

Student-centred learning is a constructivist approach to learning that is diverse and interactive (Jonassen & Land 2012). Knowledge is created or 'constructed' by students as individuals and in groups and facilitated by faculty (O'Neill & McMahon 2005). Simulation aligns with student-centred learning in combination with elements of independent learning as it promotes the significance of 'doing', then examining, questioning and reflecting on performance to reveal understanding (Aebersold 2018; Carlile & Jordan 2005).

Most commonly undergraduate nursing students in the simulated learning environment can expect that the scenario itself and the initial learning objectives are predetermined by academic teaching staff implementing approved curriculum (Aebersold & Tschannen 2013). These are then played out by students who are supported by fellow participants, under the watchful eye of the academic, who may at times participate in the scenario as a confederate. During the debriefing phase of the simulation, students are encouraged to reflect on their experience, describe and question their understanding, and identify areas of knowledge deficit and new understanding (Aebersold & Tschannen 2013; Fanning & Gaba 2007; Murphy et al. 2011).

The reflective process employed during debriefing facilitates discussion that can support new knowledge acquisition (Boud, Keogh & Walker 1985; Bussard 2017). To be successful, debriefing requires a change in emphasis from teaching to learning and shifts in power from the academic to the student (O'Neill & McMahon 2005). It has long been acknowledged that well-run simulations, supported by solid frameworks and theories, result in improved participant skills and knowledge within a safe learning environment (Gaba 2000; Issenberg et al. 2005; Nestel & Bearman 2015). The idea of shifting the power and responsibility for the acquisition of knowledge from teacher to student is not new, it can be found in Plato's seminal works as he transcribed Socrates understanding that one

*'cannot teach anyone anything...only make them think'* (commonly attributed to Socrates<sup>2</sup>).

Problem-based learning 'moves students towards the acquisition of knowledge and skills through a staged sequence of problems presented in context, together with associated learning materials and support from teachers' (Boud & Feletti 1997, p. 2). Matching the experiential learning that simulation offers with problem-based learning seems a natural fit. In simulation learning experiences, participants are presented with appropriate stimulus material and verbal briefing specific to a realistic clinical scenario or 'problem'. They are then required to employ critical thinking and clinical reasoning, either within a team or as an individual, to actively manage patient care, aiming to solve the problem.

### 3.3.6 Role-play

Role-play is a simulation modality and form of experiential learning, and for it to be successful, it must be grounded in clearly articulated theory. It relies heavily on adult learning theory requiring participants to be engaged and active in their learning experience. There are four principles of adult learning (see figure 3), and five characteristics of adult learners that are linked to those required for successful role-play (Knowles 1984). Adult learners are said to be ready, and motivated to learn, self-directed, keen to problem solve and apply theory to practice and have life experience on which to draw (Knowles 1984).

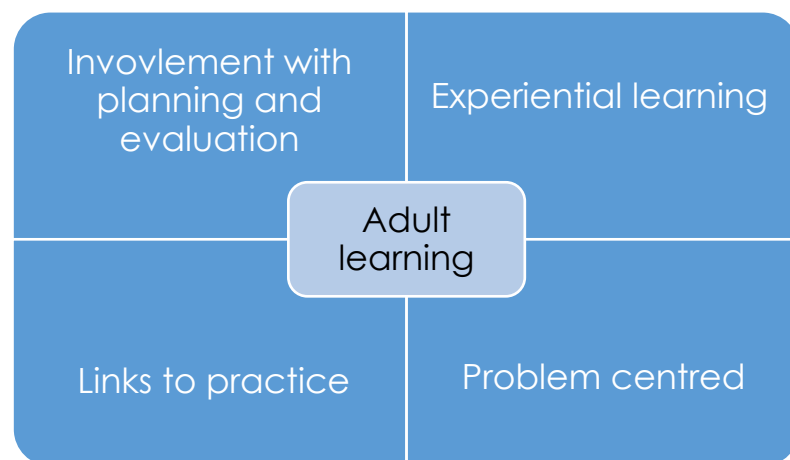


Figure 3: Four principles of adult learning (adapted from Knowles 1984).

<sup>2</sup>Commonly attributed to Socrates although believed to be adapted from Platos Meno (Long & Sedley 2011).

Adult learners most often thrive in an environment that provides reality-based opportunities for them to freely and safely express themselves without fear of repercussion (Clapper 2010a). Role-play enables nurses to practice managing clinical issues that may be challenging, in conjunction with non-clinical issues which can be explored from multiple perspectives, offering insight into the situation of others, new levels of empathy, teamwork and improved communication skills (Clapper 2010b; Baile & Blatner 2014). Role-play design and implementation should address five key elements (see figure 4).



Figure 4: Key elements for successful role-play (adapted from Baile & Blatner 2014)

During preparation key learning objectives (KLOs) are identified, followed by the conceptualisation and building of the scenario to meet them. Participants should ideally be provided with an outline of the KLOs, scenario information and associated pre-readings. The facilitator, or in this case, nursing faculty must create a safe non-judgmental environment where confidentiality is assured. Adequate briefing facilitates immersion in the scenario. Participants are encouraged to suspend disbelief, be spontaneous and imaginative, and roles are either self-selected or allocated by the facilitator/nursing faculty. Following immersion in the role-play scenario, debriefing presents an opportunity to process the scenario as a group and as an individual, KLOs are revisited, and participant expectations are discussed.

### 3.3.5 Snapshots of the simulated role-play scenario used in this thesis

The two photographs below are stills from video footage made available to students before the simulation experience. The photographs portray nursing faculty enacting the initial sequences of the simulation experience. Figure five depicts the nurse addressing one of the six rights of medication administration, checking the patient identification (ID). It was at this point a second patient requesting assistance to go to the toilet, was introduced to provide the first interruption. Figure six depicts the scenario unfolding with three interruptions occurring simultaneously; a nurse requesting an intravenous fluid check, the first patient experiencing shortness of breath and the second patient continuing with her requests for assistance to the toilet at which point the nurse turns and asks 'What should I do first?'.



Figure 5: Checking the patient



Figure 6: The interruptions - what should I do first?



### 3.3.6 Theorists

#### 3.3.6a Kolb's experiential learning theory

Kolb's experiential learning theory (1984), building on Dewey's (1933) early work, describes learning as a lifelong process that establishes critical links between theory and practice as 'a continuous process grounded in experience' (p. 28). Consequently, it highlights the impact of previous experiences on learning and attributes active involvement, 'problem solving, decision making, and active reflection' as responsible for the cognitive development, acquired knowledge and the application of theory to practice (Howard et al. 2011, p. e3). Furthermore, Kolb's experiential learning theory (1984) establishes a framework for understanding the diversity of learning styles inherent in providing effective student-centered learning experiences. Grealish and Smale (2011) undertook a critical reflection on clinical education practices that have developed since the transfer of nursing education to the tertiary sector which also identifies these core concepts as imperative to student learning.

Kolb's four-stage learning cycle (see figure 7), involves a process whereby reflective observations are built on real experiences, which in turn develop into abstract concepts and insights into actions or responses (Kolb 1984). Individuals' preference for learning style and the given situation dictate at which point learners enter the cycle. Kolb (1984) identified four key learning styles; diverging: dominated by concrete experience and reflective observation, assimilating: dominated by abstract conceptualisation and reflective observation, converging: dominated by abstract conceptualisation and active experimentation, and accommodating: dominated by concrete experience and active experimentation.

Kolb's theory which emphasises the reflective process and the resultant cognitive learning has been used extensively as a foundation in nursing education and research (Aebersold 2018; Adamson 2012; Hussein Rassool & Rawaf 2008; Kolb 1984). The dynamic nature of clinical practice requires nurses negotiate different knowledge acquisition styles for different situations, aligning well with simulation experiences that are embedded within curricula (Howard et al. 2011).

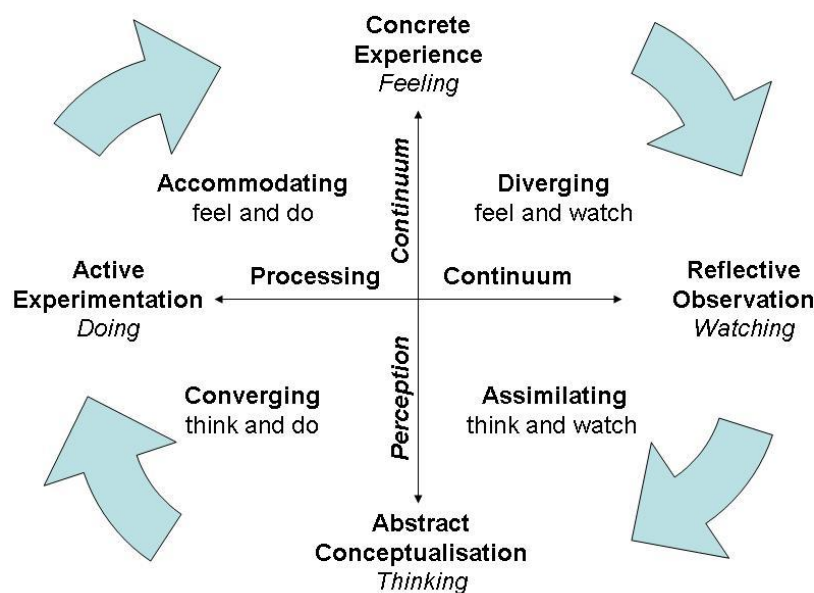


Figure 7: Kolb's four stage learning cycle  
<http://www.nwlink.com/~donclark/hrd/history/kolb.html>

### 3.3.6b Benner's novice to expert

Where Kolb's theory of experiential learning describes styles of learning, Benner (2001), whose work was guided by but not restricted to the Dreyfus & Dreyfus (1980) model of experiential learning and skill acquisition, describes stages of learning specific to nursing practice; novice, advanced beginner, competent, proficient and expert. According to Benner (2001) the novice has no nursing experience, the advanced beginner has limited experience, the competent has a conscious awareness, the proficient displays perception in given situations and the expert has a wealth of experiences from which to draw and works intuitively. The wealth of experience acquired by the expert nurse informs the essential difference between the expert and the novice nurse – the ability to apply context and use intuitive knowledge to make discretionary judgements that guide and inform care provision (Benner 1982).

Benner (2001) emphasised that nurses move through the spectrum of skill levels as they gain clinical exposure and build a repertoire of clinical experiences that are guided by academic staff and clinical experts (Benner, Tanner & Chesla

2009). The nurses at the centre of this research study had limited clinical experience and were therefore considered to reside in either the novice or advanced beginner stage in Benner's continuum.

### 3.3.5c Tanners model of Clinical Judgement

Tanner (2006) proposed a model whereby sound clinical judgements are reached through clinical reasoning, is dependent on five key elements (see figure 8).



Figure 8: Elements of clinical judgment (adapted from Tanner 2006)

According to Tanner's model, reasoning behind decisions and thinking varies according to the situation. It is either analytical, intuitive or narrative, or any combination of the three. The work environment, workplace expectations and values, cultural background and socioeconomic status of staff and patients, and interdisciplinary relationships form the context and culture. Each nurse carries individual levels of experience and value-based knowledge on which they construct meaning. How well the nurse knows the patient is integral to the decisions that are made. The final element is reflection on practice and is

essential in clinical knowledge development and cultivation of clinical reasoning skills.

Tanners' model is a useful guide for undergraduate nursing students as they learn to identify areas of knowledge deficit. Nurses are faced with multiple, rapidly changing environments, situations, and patients, all of whom come with a unique story of illness and its resultant effect on social and emotional domains and the patients loved ones. Successful clinical judgement occurs in the presence of a process that involves noticing, interpreting, responding and reflecting, to reach a place where the nurse can make informed and reasoned judgements that result in optimal patient care choices (Tanner 2006). During well-designed simulation experiences each of the steps in the process that Tanner outlines can be addressed in a safe environment, benefitting the student and their future patients.

#### 3.3.5d Additional theorists who have influenced understanding

Gibbs Model of Reflective Practice: Gibbs reflective cycle (1988) (see figure 9) facilitates understanding of a given situation, both what was done well and what could be improved. It draws on the work of Dewey (1933) and uses the work of Kolb (1984) as a framework. Gibbs aligned student-centred learning experiences with active learning, students pre-existing life experience and ability. According to Gibbs, active student-centered learning experiences occur when learning is guided by the student, but supported by the academic. This relates to 'what is to be learnt, how and when it is to be learnt, with what outcome, what criteria and standards are to be used, how the judgements are made and by whom these judgements are made' (Gibbs 1995, p. 1). The reflective cycle is often used along with Kolb's experiential learning theory as the foundation for producing simulated learning experiences for nurses and other healthcare professionals. As such it was utilised during the design of the role-play simulation represented in this thesis.

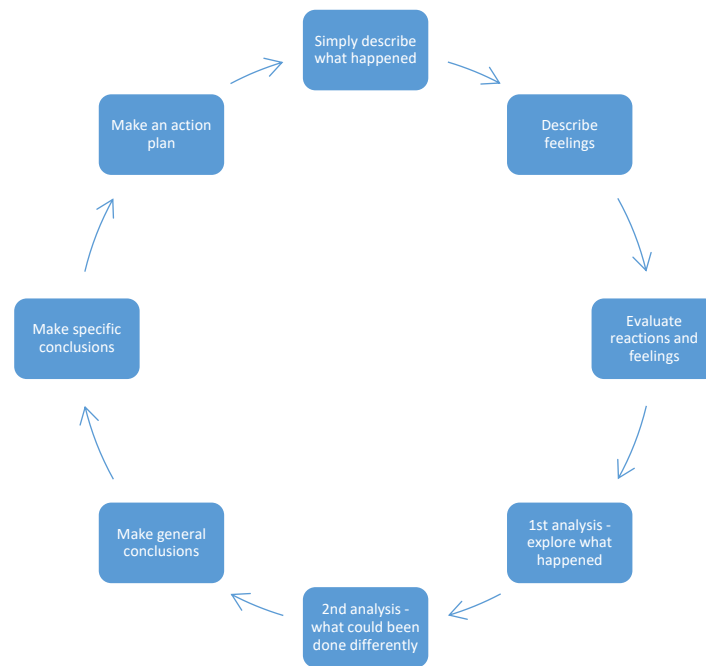


Figure 9: Gibbs reflective cycle (Gibbs 1988)

Schon's Reflective Practitioner: Schon's work (1983) examined how learners reflect in and on practice was also built on the work of Dewey (1933) and is often used to inform simulation design. Within undergraduate nursing education, 'doing' or 'practising' skills has long played a significant role. However, the 'doing' is only one part of the learning continuum. Reflection on that which has been 'done', both at the time of the 'doing' and after the 'doing' is the lynchpin in achieving effective learning outcomes (Schon 1983). The action and reflection inherent in Shon's work are supported by Tanner (2006) who also encourages active learning or 'doing' in combination with reflection.

### 3.3.7 Frameworks

To complement underpinning theory, solid frameworks are required when planning student-centred simulated learning experiences. Jeffries simulation framework (2005) was used in the development of the simulation used within this thesis and is outlined in the preceding method paper.

### 3.3.8 Design

As described in the previously presented method paper, undergraduate nursing students were exposed to a role-play simulation experience. The simulation was designed to expose students to a realistic clinical environment in which multiple interruptions occurred during medication administration. Nursing faculty were provided with a tutorial plan to guide the simulation, presented in appendix five in a template format. Students were then asked to complete written reflections, attend semi-structured individual interviews and complete an anonymous student feedback survey (SFS). Nursing faculty were invited to take part in email questionnaires.

### 3.3.9 Participants

All participants were recruited using convenience sampling from two campuses of an urban university in Australia. Convenience sampling was used as all students enrolled in the undergraduate nursing program, second-year subject, Medical-Surgical Nursing, who took part in the interrupted medication administration simulation role-play exercise were considered eligible for inclusion. Nursing faculty who facilitated the simulation were also considered suitable for inclusion.

To ensure informed consent, posters and flyers were displayed with information outlining; study aims, participation risks and requirements, a method for voicing ethical concerns and identifying members of the research team. This information was also provided verbally on the day of the simulation, and consent forms were completed.

Nursing faculty who participated in email questionnaires (n=8) consisted of both permanent and casual staff teaching in a second-year undergraduate Medical-Surgical subject, all of whom were responsible for facilitating one or more of the simulation experiences. Thirteen students took part in the individual interviews, three male and ten female students; nine mature age students and four direct entry school leavers. The SFS sample size consisted of 199 students across two campuses. The SFS sample size was significantly lower than the written reflective data sample size as SFS were included as confirmatory data in the second semester only. As this was a centrally collected anonymous survey, no

demographic data is available. Student demographic details relevant to the student written reflection data are disclosed in the three findings papers provided in the following chapter of this thesis.

### 3.3.10 Data collection

In keeping with the philosophical approach to the study, a qualitative multi-method approach was taken to elicit data. Interpreting and understanding shared values, behaviours, and interactions amongst research participants is consistent with social construction (Creswell 2007). The initial dataset was limited to the collection of student written reflections. Information specific to the data collected from the written reflections are described in the finding papers in the following chapter. Once analysed the written reflections revealed that students had been able to identify the emotional and clinical impacts of interruptions, develop new interruption management strategies, increase patient empathy, and articulate the importance of reflection, teamwork and effective liaison and communication.

The relevance and validity of the findings from studies that use qualitative methodology can be confirmed if sequential confirmatory data is collected (Halcomb & Andrew 2005). Hoffman (2009) described 'communicative preferences' as a reason for eliciting data from multiple sources. He asserted that many participants will have a preference towards a particular type of communication modality be it written reflection or journaling, responding to an online or posted survey, focus group or either face to face or phone interview (Hoffman 2009). Therefore, it was felt that the findings would be enriched by a deeper probing of identified concepts and themes, prompting the inclusion of three further data collection techniques. Preference for engaging with one data source over another was born out in this study with a small number of students who attended the individual interview reporting that they had chosen not to complete the written reflection, supporting the understanding that offering a variety of data collection options did in fact lead to increased participation. The three additional data sets included student semi-structured individual interviews, anonymous SFS, and email questionnaires with nursing faculty. Data collected from student and nursing faculty participants occurred in phases, taking place over two semesters (see figure 10).

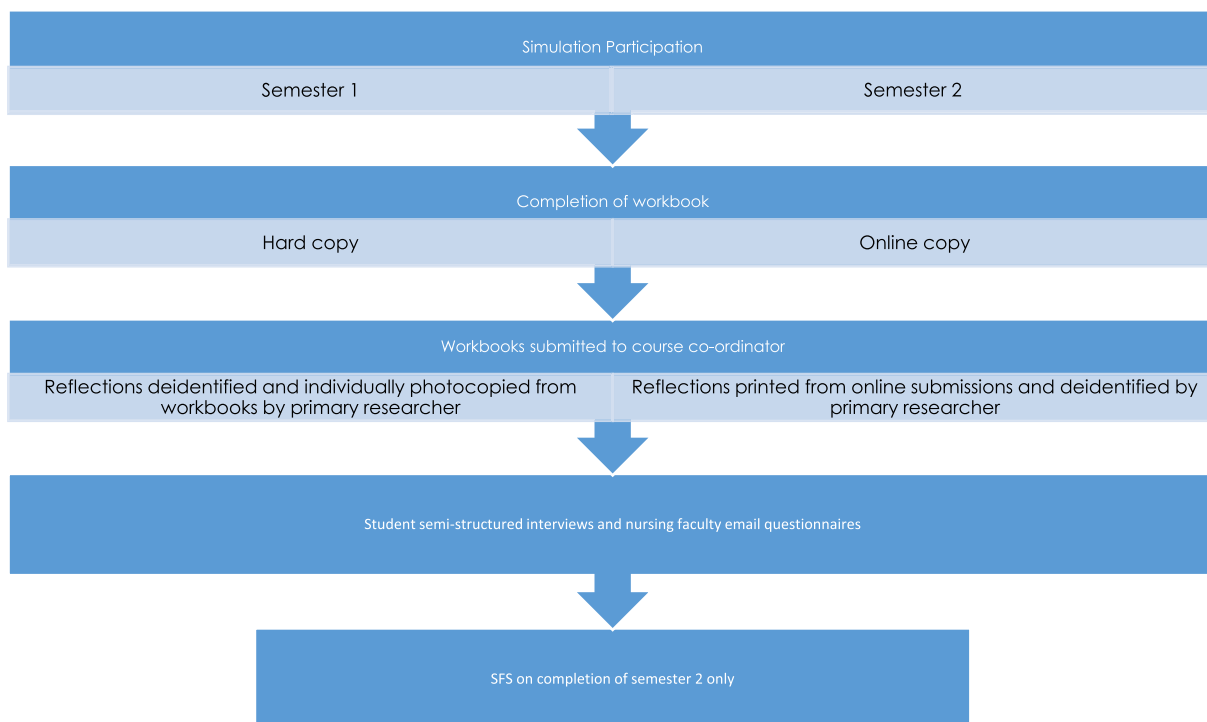


Figure 10: Sequence of data collection

### 3.3.10a Semi-structured interviews

Semi-structured interviews are frequently used in qualitative nursing research to elicit deep insights into research questions (Creswell 2007; Gill et al. 2008; Schneider. et al. 2007). The researcher and participant interact using a predetermined framework of guiding questions that cover key concepts for investigation and are designed to encourage the flexibility to explore concepts as they arise during the interview (Britten 1999; Gill et al. 2008; Schneider. et al. 2007). The semi-structured interview for this study consisted of a series of open-ended questions. The template for which can be found in appendix six.

Ensuring positive interview experiences for the participants was considered paramount to generate good quality data (Schneider et al. 2007). Attention to participant comfort and the environment in which the interviews took place included; a mutually agreed meeting time and place, use of a reserved office to maintain confidentiality, and the provision of water.



Students were offered the opportunity to be involved in the individual interviews through flyers displayed on the walls of the clinical laboratory spaces and by email announcements. A total of 13 students took part in the interviews. Students interviewed declared that they had undertaken varied roles during the simulation scenario including; seven students playing the role of the nurse administering the medication, one student playing the role of the nurse causing interruptions, and five students playing the role of the confused patient.

The individual student interviews were conducted by myself, lasted up to 35 minutes in duration and were audio recorded. To enhance my interview technique, I undertook individual interview training during a qualitative research subject for higher degree students. Techniques such as funnelling, encouraging story-telling, probing and paraphrasing were used to stimulate participant responses and maximise understanding of the student experience (Schneider et al. 2007). The recordings were then transcribed; some by the primary researcher and some by a reputable transcription service frequently used by the university in which the research was undertaken.

### 3.3.10b Student feedback surveys (SFS)

It is an accepted practice within many universities, at the end of each teaching period, session or semester, to collect online SFS's. The SFS is a confidential, centrally administered university survey that elicits student evaluations of teaching and learning (Kirkup 2016). All students at the university are automatically eligible to partake in SFS's at the completion of each subject. It is made clear by the university governing body who collect SFS data, that the survey is not compulsory, that the responses are collected confidentially, and that no one is aware of individual student participation.

University SFS's traditionally consist of questions that require a response on a Likert scale from strongly disagree to strongly agree and short answer qualitative questions. Four short answer qualitative questions specific to the role-play simulation designed to enhance existing data findings and capture new student perspectives were sent for inclusion in the SFS during the spring semester. The qualitative response questions can be found in appendix seven. Once centrally

tabulated, anonymous SFS responses are released for review and analysis. Unfortunately, the fourth question was incorrectly entered by the central administrators, and therefore data was only collected from three of the four initial questions. Only 26:199 (13.1%) students completed the SFS qualitative questions. Students who did not complete the SFS were considered to have 'opted out' of research participation via this method of data collection.

### 3.3.10c Qualitative email questionnaires

Qualitative email questionnaires provide access to difficult to reach populations and are suitable in situations where finding a time to interview participants proves difficult, allowing participants to choose a time and place in which to respond that is convenient to them (Clarke & Braun 2013). Email questionnaires are believed to facilitate the collection of rich data that deepens understandings of participants' experiences and perceptions (Clark & Braun 2013). The key focus of the questionnaires was to gain the nursing faculty perspective of the experience. The survey consisted of twelve open-ended qualitative questions that can be found in appendix eight.

All identifying data was removed from each data source at the time of collection. The inclusion of documented real-time medication error and near-miss data was discussed but rejected due to time and resource restraints of this project, but may be considered for further work.

### 3.3.11 Data analysis

Thematic analysis is a fundamental method of analysis for qualitative research and was therefore chosen as the preferred method of analysis for this study. It facilitates the recognition, examination and description of patterns or themes from within data (Braun & Clark 2006; Guest, MacQueen & Namey 2012). It has been described as a method that is appropriate to both 'reflect reality and to unpick or unravel the surface of reality' (Braun & Clarke 2006, p. 81).

For this study, data analysis occurred in stages guided by a process for data analysis described by Guest, Macqueen and Namey (2012). The first phase involved becoming familiar with the data through multiple readings of the written

reflections, SFS and questionnaires, and by repeatedly listening to the audio recordings of the student semi-structured individual interviews and reading the interview transcripts multiple times. Colour coding was used to identify similar characteristics and group the data into broad concepts. Coding was followed by further analysis revealing broad themes. Data extracts were attached to these themes, and the formation of subthemes emerged. This process was discussed with the supervisory team which led to further analysis and refining of the themes and subthemes. Although the SFS data was brief and perfunctory, it was also included to ensure that the voice of those who completed the survey was heard.

### 3.3.12 Data storage

In keeping with accepted research data storage solutions as suggested by Creswell (2007), all data was de-identified and safeguarded in a locked cupboard in a secured location and will remain stored for five years.

### 3.3.13 Ethical considerations

Initial ethics approval to collect student written reflections and nursing faculty focus group data was sought and received from the faculty in which the research took place and the university human research ethics committee. Issues of beneficence, justice, power and autonomy including; consent, participant privacy, emotional considerations, self-disclosure and fear of repercussions should a participant decline to be involved in data collection were considered. As a mutually suitable time for the nursing faculty to meet was not possible, a request was made to the ethics committee to amend the method of data collection to an email format. Additional amendments including the inclusion of individual student semi-structured interviews and SFS data also received ethics approval.

Participation in the individual student interview required a time investment from each student of approximately 30 minutes. The interviews were conducted on the campus of the students' choice to minimise the inconvenience of travel time. The only perceived inconvenience for the students who chose to complete the

SFS questions was the additional time involved in completing four short answer qualitative questions included at the end of the customary SFS.

Participants were supplied with information sheets and consent forms and advised that they were able to opt out of the study by not completing the SFS questions, not partaking in the student interviews or nursing faculty questionnaires. Participants were advised that once collected, all data would be de-identified and kept in a locked office.

### Power and Autonomy

Both student and nursing faculty participants were identified as vulnerable groups as they were considered to be in dependent relationships with some members of the research team (NHMRC 2014). Students were considered vulnerable as they may have felt obligated to participate in research being conducted by members of the faculty in which they were studying (Schneider et al. 2007). A large percentage of the participating nursing faculty were employed under casual contracts. This was considered relevant as some academic participants could have had concerns that choosing not to participate could have ramifications for re-employment. Therefore, they were informed that their choice to participate or not, would not be divulged to the subject coordinator. The right of each eligible participant to exclude themselves from the study was respected, and strict adherence to the elements of informed consent as described by Schneider et al. (2007) was maintained (see figure 11).

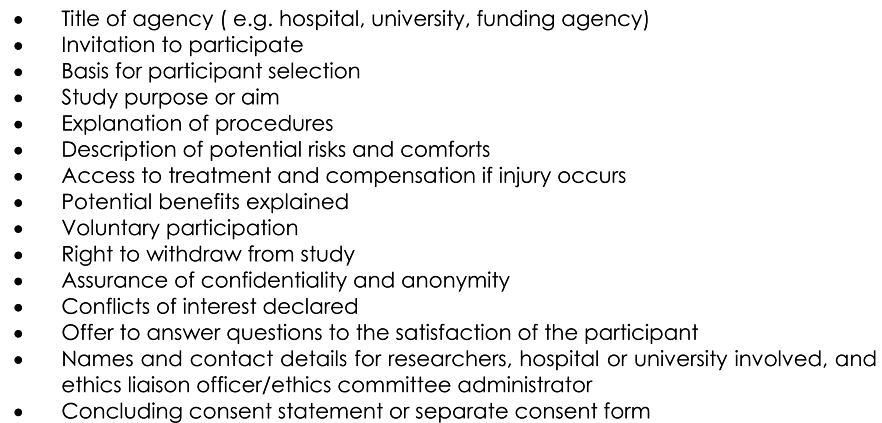
- 
- Title of agency ( e.g. hospital, university, funding agency)
  - Invitation to participate
  - Basis for participant selection
  - Study purpose or aim
  - Explanation of procedures
  - Description of potential risks and comforts
  - Access to treatment and compensation if injury occurs
  - Potential benefits explained
  - Voluntary participation
  - Right to withdraw from study
  - Assurance of confidentiality and anonymity
  - Conflicts of interest declared
  - Offer to answer questions to the satisfaction of the participant
  - Names and contact details for researchers, hospital or university involved, and ethics liaison officer/ethics committee administrator
  - Concluding consent statement or separate consent form

Figure 11: Elements of informed consent (Coup & Schneider, p.84)

### Justice

Equity of experience for participants was paramount (Schneider et al. 2007). Although each participant played a different role during the simulation experience, debriefing was provided at the conclusion of the scenario, and the opportunity to partake in a written reflective exercise was also offered. Debriefing following the simulation and the written reflective exercise ensured that each student participant had the opportunity to discuss the experience collaboratively then reflect on that discussion to inform understanding of the purpose, meaning, and key learning objectives afforded by each of the roles.

### Beneficence and non-maleficence

Qualitative interviewing by its very nature can elicit benefit or cause harm to the participant (Hewitt 2007). Researchers are required to weigh up benefits (beneficence) with risks so that no harm (non-maleficence) befalls the participant (Hewitt 2007). Therefore, attempts to maximise benefits and minimise harm, not only for the participants but also for the patients they will care for in the future were considered. Exposure to the experience of the role-play simulation afforded the students a raised awareness of the impacts of interruptions and an opportunity to reflect on methods for managing interruptions in the future.

Reflecting on stressful situations can elicit feelings of insecurity, anxiety and impact self-esteem (Hewitt 2007) therefore participants were assured of confidentiality and reassured that no response was incorrect or would be subject to judgement. Participants were also informed that if at any stage they felt concerned counselling services were available. The simulation scenario itself and the opportunity for extended reflection that resulted from the research were believed to provide experiences that were otherwise unavailable to these nurses. It was hoped that building students' propositional and procedural knowledge would be transferrable to practice and ultimately improve patient outcomes.

### Rigour

There are four keys elements necessary to ensure rigour; credibility, dependability, confirmability, and transferability (Streubert & Rinaldi Carpenter 2011). Accurate representation of participant experiences requires 'prolonged engagement with the subject matter' (Streubert & Rinaldi Carpenter 2011, p. 48). Data was reviewed by members of the research team and strategies for ensuring maximum inter-coder agreement were applied in the analytic process. The initial analysis of data, identification of codes, and preliminary themes were reviewed by the research team who worked collaboratively to produce final themes and subthemes. Reliability can be established if replication of analysis is possible (Kurasaki 2000) therefore a recorded structure of how findings were revealed was maintained. The large cohort numbers increased the possibility of transferability of the findings.

### Perceived risks

Although this research study was categorised as a low level risk for the academic teaching staff, students and researchers, it was important to consider any possible risks that might have been encountered. A critical thinking decision pathway (see figure 12) devised by Schneider et al. (2007) provided a clear method for determining the risk-benefit ratio of this study.

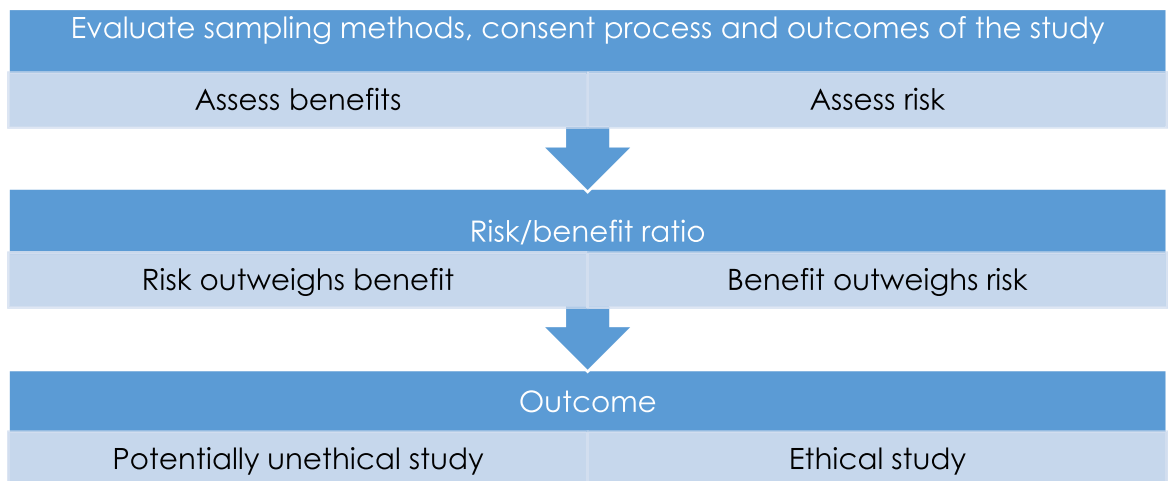


Figure 12: Critical thinking pathway for evaluating the risk-benefit ratio  
(adapted from Schneider et al. 2007, p 89)

Perceived risks for student participants included concerns of academic repercussion if they chose to decline inclusion in the project or wrote negative comments within the reflection. To mitigate this risk all data was de-identified at time of collection, and individual tutors were not, at any stage, made aware of any student who declined to participate in the study. Consideration was also given to the inconvenience caused by the time it took to complete the reflections, SFS and interviews.

Nursing faculty were inconvenienced by the time it took to complete the email survey, in particular for those who were employed on a casual basis and were therefore on an hourly stipend. The perception by sessional nursing faculty that if they were to decline to partake in the email interview process, it could influence further employment opportunities was considered; however, none of the members of the research team has any involvement in the employment process, and participants were made aware of this.

### 3.4 Chapter conclusion

This chapter presented a published paper outlining the research study and an exegesis of the study methodology and methods situating the work from an interpretive, social constructivist perspective. The collected data for this qualitative multi-method study included written reflections, SFSs, individual

interviews and email questionnaires that were analysed using thematic analysis to draw conclusions and relevance to practice. The subsequent chapter presents the findings from the collected and analysed data in two sections. The first section provides three published papers generated from the written reflective data and the second presents findings from confirmatory data.



# Chapter 4: Findings

## 4.1 Introduction

The previous chapter presented the underpinning methodology and method for this thesis, including the design and implementation of a simulated role-play experience to explore undergraduate student nurse responses to interruptions during medication administration.

This chapter is arranged in two sections with the intention of presenting findings that inform the following research questions:

1. How do novice and advanced beginner undergraduate student nurses respond to interruptions during the medication administration process?
2. Does the introduction of a simulated role-play experience involving interrupted medication administration raise awareness of the impact of interruptions and facilitate new insights into interruption management strategies?

The presented findings arose out of four separate data sources; 451 student written reflections, 13 student semi-structured individual interviews and 26 SFS responses. Email questionnaires were collected from eight out of a possible eight nursing faculty who engaged in the facilitation of the role-play simulation sessions. A synthesised discussion of the findings from these data sources is presented in the following chapter of the thesis.

Section one presents three independent published findings papers that examine undergraduate nursing students' written reflective responses following the previously described simulated role-play. The first paper 'Calm to Chaos: engaging pre-registration nursing students with the complex nature of medication administration using role-play simulation' (Hayes et al. 2017) establishes an improved awareness of management strategies, and the impact of interruptions during the medication administration process. The second paper 'Learning to liaise: using medication administration role-play to develop team work in undergraduate nurses (Hayes et al. 2018b) reports student insights into their responsibilities as part of the healthcare team, when faced with interruptions

during the medication administration process. It identifies the importance of effective communication and collaborative teamwork as requisite for a smooth transition to workplace readiness. In the third paper 'Pondering practice: enhancing the art of reflection' (Hayes et al. 2018a), students describe the importance of reflection for evaluating performance and gaining self-awareness. They identify the impact of altered emotions on performance and their ability to provide safe, compassionate and empathetic care during medication administration.

The three findings papers demonstrate that simulated learning experiences involving targeted interruptions during the process of medication administration facilitate an increased awareness of the impact of interruptions. The realistic and safe setting in which the simulation occurred supported students in the development and consolidation of new interruption management strategies. The experience was also reported to have fostered an understanding of the patient experience and increased self-confidence.

Collection and analysis of confirmatory data ensures accurate representation of participant perceptions, experience and understanding, and increases the validity of final findings (Creswell 2003; Schneider. et al. 2007). Alongside the opportunity to inform and enrich the original findings additional data sources afford the potential for new insights to be revealed. Therefore, to provide the opportunity to facilitate greater exploration of these themes data were collected from three additional sources; semi-structured individual interviews, SFS and nursing faculty email questionnaires.

Section two of this chapter provides a synthesis of confirmatory data. Thematic analysis of the data supported the original themes identified from within the written reflections. The confirmatory data enriched original research findings through both the deepened understanding of original themes and the emergence of new findings.

## 4.2 Section one - Publication of initial findings

The three published findings papers are presented in the following order:

Hayes, C., Jackson, D., Davidson, P.M., Daly, J. & Power, T. 2017, 'Calm to chaos: engaging undergraduate nursing students with the complex nature of interruptions during medication administration', *Journal of Clinical Nursing*, vol. 26, no. 23-24, pp. 4839–4847.

Hayes, C., Power, T., Davidson, P.M., Daly, J. & Jackson, D. 2018b, 'Learning to liaise: using medication administration role-play to develop team work in undergraduate nurses', *Contemporary Nurse*, August, pp. 1-10.

Hayes, C., Jackson, D., Davidson, P.M., Daly, J. & Power, T. 2018a, 'Pondering practice: enhancing the art of reflection', *Journal of Clinical Nursing*, vol. 27, no.1-2, pp. e345-e353.


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ORIGINAL ARTICLE

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## Calm to chaos: Engaging undergraduate nursing students with the complex nature of interruptions during medication administration

Carolyn Hayes RN, BHSc, Manager, Simulation and Laboratoris<sup>1</sup>  | Debra Jackson RN, PhD, FACN, Professor of Nursing<sup>1,2,4</sup>  | Patricia M. Davidson RN, PhD, Dean<sup>3</sup> | John Daly RN, PhD, FACN, Dean<sup>1,4</sup> | Tamara Power RN, PhD, Lecturer<sup>1</sup>

<sup>1</sup>Faculty of Health, University of Technology Sydney, Broadway, NSW, Australia

<sup>2</sup>Faculty of Health & Life Sciences, Oxford Brookes University, Oxford, UK

<sup>3</sup>Johns Hopkins University School of Nursing, Baltimore, MD, USA

<sup>4</sup>Faculty of Health, Head, WHO UTS Collaborating Centre for Nursing, Midwifery & Health Development, University of Technology Sydney, Broadway, NSW, Australia

### Correspondence

Carolyn Hayes, Faculty of Health, University of Technology Sydney, Broadway, Sydney, NSW, Australia.  
Email: Carolyn.Hayes@uts.edu.au

### Funding information

The study was carried out as part of doctoral work. No funding was requested.

**Aims and Objectives:** To describe undergraduate student nurse responses to a simulated role-play experience focussing on managing interruptions during medication administration.

**Background:** Improving patient safety requires that we find creative and innovative methods of teaching medication administration to undergraduate nurses in real-world conditions. Nurses are responsible for the majority of medication administrations in health care. Incidents and errors associated with medications are a significant patient safety issue and often occur as a result of interruptions. Undergraduate nursing students are generally taught medication administration skills in a calm and uninterrupted simulated environment. However, in the clinical environment medication administration is challenged by multiple interruptions.

**Design/Methods:** A qualitative study using convenience sampling was used to examine student perceptions of a simulated role-play experience. Data were collected from 451 of a possible 528 student written reflective responses and subject to thematic analysis.

**Results:** Students reported an increased understanding of the impacts of interruptions while administering medications and an improved awareness of how to manage disruptions. This study reports on one of three emergent themes: "Calm to chaos: engaging with the complex nature of clinical practice."

**Conclusions:** Interrupting medication administration in realistic and safe settings facilitates awareness, allows for students to begin to develop management strategies in relation to interruption and increases their confidence. Students were given the opportunity to consolidate and integrate prior and new knowledge and skills through this role-play simulation.

### KEYWORDS

distractions, interruptions, medication errors, role-play, simulation, undergraduate nurses

## 1 | INTRODUCTION

Medication administration incidents and errors adversely impact on patient outcomes internationally (Cloete, 2015; Hayes, Jackson, Davidson, & Power, 2015). They are caused by either systems or human errors. Examples of systems errors include patient acuity and staffing levels and medication availability. Examples of human errors include poor policy adherence, fatigue and stress (Keers, Williams, Cooke, & Ashcroft, 2013; McBride-Henry & Foureur, 2005). However, one of the leading causes of errors is interruption and distraction of the administering nurse (Cloete, 2015; Jennings, Sandelowski, & Mark, 2011; Westbrook, Woods, Rob, Dunsmuir, & Day, 2010). Strategies to minimise interruptions result in decreased incidents and errors (Anthony, Wiencek, Bauer, Daly, & Anthony, 2010; Fore, Sculli, Albee, & Neily, 2013). However, it is not possible to entirely eliminate distractions and interruptions and some interruptions are in the patient's best interests (Clark & Flanders, 2012; Flynn, Liang, Dickson, Xie, & Suh, 2012; Hayes, Power, Davidson, & Jackson, 2014; Hayes et al., 2015).

Newly registered nurses are responsible for administering medications to patients and are expected to demonstrate competence, using critical thinking and sound clinical judgement (Cloete, 2015; Hayes et al., 2015). The responsibility for ensuring undergraduate nurses make the transition to workplace readiness lies with the education facilities where initially they learn their skills, registered nurses and nurse managers within clinical facilities, and the nurse themselves (Mooney, 2007; Wolff, Pesut, & Regan, 2010). As a crucial link within this collaborative relationship, undergraduate nurse educators must actively facilitate the development of the knowledge and skills students require to administer medication with confidence in a variety of settings and circumstances.

## 2 | BACKGROUND

Undergraduate nurses are most often taught medication administration by first learning the theory related to the pharmacology and mathematics (Hayes et al., 2015; Woodrow, Colbert, & Smith, 2010). They then practise these skills under the supervision of academic staff, uninterrupted in a laboratory environment (Aggar & Dawson, 2014); yet, they are often faced with an added level of complexity during clinical practicum (Hayes et al., 2015).

The impacts of interruptions are far-reaching. If an error results, patients may be exposed to increases in patient morbidity and mortality (MacDonald, 2010; Roughead & Semple, 2009). Consideration must also be given to the relatives and friends of the patient, as well as the administering nurse who may suffer professionally, physically and emotionally (Flanders & Clark, 2010). A further concern is the financial burden on the healthcare system (MacDonald, 2010; Roughead & Semple, 2009). Considering that the administration of medications can absorb up to 40% of a nurses time (Hughes & Blegen, 2008), and the undeniable links to medication

### What does this paper contribute to the wider global clinical community?

- Well-planned simulation experiences result in better understanding of clinical concepts and stimulate critical thinking.
- Simulation is an educational strategy that uses real-world scenarios and environments to accomplish learning goals.
- Immersion into realistic clinical scenarios through the use of role-play fosters the development of new knowledge, skills, understandings of clinical expectations and increased confidence supporting transition to practice.

errors (Cloete, 2015; Jennings et al., 2011; Westbrook et al., 2010), it is imperative that nurses are taught to effectively manage interruptions.

Undergraduate nurses administering medications to patients are under the direct supervision of a registered nurse (RN). However, this does not necessarily guarantee patient safety. In a study by Reid-Searl, Moxham, and Happell (2010), 32% of participating undergraduate students reported being involved in either errors or near misses that had occurred as a direct result of the supervising RN being distracted or interrupted. Without appropriate educational experiences that aim to teach essential interruption management strategies, the risk of medication error occurring is heightened.

Role-play simulations foster the use of critical thinking skills and enable students to better understand both their own experience and another person's (Ertmer et al., 2010; Jenkins & Turick-Gibson, 1999; Kaddoura, 2010). Success of role-play simulation lies in students being given the opportunity to make meaning of their experience through deep thinking, debriefing and reflection (Cant & Cooper, 2010; Jeffries, 2005; Kolb, 1984; Tanner, 2006).

In a recent study, student participants highlighted the need for high-fidelity simulations that include opportunities to manage interruptions and distractions (Krautscheid, Orton, Chorpennig, & Ryerson, 2011). Fidelity, or reality of experience, is a key element in achieving successful simulation experiences (Arthur, Levett-Jones, & Kable, 2010; Jeffries, 2005). It is often assumed that high-fidelity simulations require the use of high-fidelity manikins, yet this can be difficult to manage with large cohorts and may be out of the financial reach of many institutions. Providing environments which facilitate the suspension of disbelief, participant engagement and the ability to transfer what has been learnt into practice is in fact the real indicator of a successful high-fidelity simulation (Hamstra, Brydges, Hatala, Zendejas, & Cook, 2014). Role-play simulation that offers realistic environments and scenarios in which the simulation takes place is one alternative to simulations that require the use of manikins. Realistic environments and scenarios encourage maximum student immersion, and can produce meaningful and cost-effective learning experiences (Will & Weinschreider, 2012).



The study presented in this article responds to the need for undergraduate nursing students to be provided with opportunities to manage interruptions and distractions during medication administration.

### 3 | THE STUDY

#### 3.1 | Aim

This study describes undergraduate student nurse responses to a simulated role-play experience that was developed to encourage them to formulate strategies to manage interruptions during medication administration.

#### 3.2 | Design

The conceptual and theoretical frameworks guiding this study were informed by nursing and educational theorists including Tanner's model of clinical judgement (Tanner, 2006), Kolb's theory of experiential learning (Kolb, 1984) and Benner's "novice to expert" (Benner, 2001). To ensure that sound nursing and educational theory was combined with simulation-based frameworks, Arthur et al. (2010) quality indicators and Jeffries' simulation framework (Jeffries, 2005) were consulted.

Benner (2001) theorised that nurses navigate five stages in their journey to clinical competence. This role-play was specifically designed to cater for second-year undergraduate nurses who are situated in the novice and the advanced beginner stages, and as such have limited clinical experiences upon which to draw.

Student participants were encouraged to notice, interpret, respond and reflect throughout the simulation experience itself, as well as in the written reflections, in order to reinforce newly learnt strategies and gain new insights (Kolb, 1984; Tanner, 2006).

A qualitative approach was taken to elicit reflective responses from students. It was recognised that context has a direct relationship with, and impact on, the ways in which individuals make meaning of their experience (Braun & Clarke, 2006; Tanner, 2006).

#### 3.3 | Sample/participants

The simulation experience was introduced across two campuses of one large urban Australian University. A convenience sample of 528 second-year undergraduate student nurses enrolled in a medical-surgical nursing subject in an undergraduate Bachelor of Nursing programme took part in the embedded simulation. These students had previously completed two clinical practicums in their first year of training and included a mixture of enrolled nurse transition and graduate entry students, as well as direct entry students. All students who took part in the embedded simulation were considered suitable for inclusion in the study; 451 of a possible 528 students provided written responses. Students were male ( $n = 85$ ) and female ( $n = 443$ ), ranging in age from 18–55 years with a mean age of 26.56 years.

#### 3.4 | Ethical considerations

Ethics approval was received for this study from the relevant university ethics committee. Information related to the study was disseminated prior to the commencement of the simulation activity on posters and handouts and verbally to each participant group, ensuring informed consent. Participants were made aware that completing the written reflection was voluntary, and consent forms were completed. All collected data were de-identified at the time of collection and will remain stored in a secure location for a minimum period of 5 years.

#### 3.5 | The intervention

A simulation role-play designed to reflect clinical reality was embedded in the second week of a 2-week case study. The first week of the case study incorporated a review of directly related pathophysiology, pharmacology and clinical skills. Students had access to relevant information related to the role-play within a course workbook given to them at the start of semester.

In groups of five, the students within each class were rotated through the simulation experience (Table 1). Students were oriented to the simulation environment and were given a patient handover, which included the patient history. Students self-selected into one of the five available roles (Table 2). Once individual roles were selected, students were briefed about their roles and given a lanyard containing prompts derived from the role descriptors (Table 2) to assist them throughout the experience. Some classes with uneven numbers of students required the introduction of a second observer role. Props such as wigs, handbags, patient gowns, intravenous fluids for checking and medication trolleys were provided to increase engagement and were donned, then removed, to denote the start and finish of the scenario and role immersion (Kesten, Brown, Hurst, & Briggs, 2010; Prescott & Garside, 2009).

Students were required to administer case study-specific medications, cause a variety of interruptions and conduct peer observations according to the role they had chosen. The student undertaking the registered nurse role was required to administer charted medications to one of the two patients, and manage interruptions as they occurred. The student undertaking the interrupting nurse role was required to calculate the appropriate drip rate and then request a

**TABLE 1** Simulation timings

Simulation phases	Duration
Briefing	10 min
Role-play	10–15 min
Individual Group debriefing	10 min
Class debriefing	20 min
Written reflection	Noncompulsory addition to student workbook. Completed at home within 2 weeks of the experience

**TABLE 2** Role descriptors

Role	Requisite actions and prompts
Nurse administering medications	<ul style="list-style-type: none"> <li>• Administer 2 medications</li> <li>• Manage patient shortness of breath (SOB)</li> <li>• Manage confused patient requests</li> <li>• Appropriately check/verify IV fluid order with interrupting nurse</li> </ul>
Patient 1—Receiving medications	<ul style="list-style-type: none"> <li>• Respond to administering nurses questions</li> <li>• Question administering nurse regarding indications for medications</li> <li>• Becomes SOB requiring Ventolin administration</li> </ul>
Patient 2—Confused older female	<ul style="list-style-type: none"> <li>• Intermittently call out to administering nurse <ul style="list-style-type: none"> <li>○ Request food and drink</li> <li>○ Request help to go to the toilet</li> <li>○ Request help to go back home</li> </ul> </li> </ul>
Interrupting nurse	<ul style="list-style-type: none"> <li>• Calculate drip rate</li> <li>• Interrupt administering nurse to request check of order prior to hanging fluid</li> </ul>
Observer	<ul style="list-style-type: none"> <li>• Observe: <ul style="list-style-type: none"> <li>○ The process of medication administration—what was done well, note any errors and omissions and when they occurred</li> <li>○ Interpersonal interactions and reactions</li> <li>○ Interruption management strategies</li> </ul> </li> </ul>

check of IV fluid order. The student undertaking confused patient role was required to cause a variety of interruptions such as request to go to home or to the toilet. The student undertaking the observer role was required to write down their observations of the role-play, including interpersonal interactions, interruption management strategies employed and adherence to the six rights of medication administration. Commonly identified causes of interruptions during medication administration were informed by the literature (Biron, Lavoie-Tremblay, & Loisele, 2009; Palese, Sartor, Costaperaria, & Bresadola, 2009; Relihan, O'Brien, O'Hara, & Silke, 2010) and embedded in the role-play scenario.

To facilitate reflection, student-centred debriefing was conducted for each group of five immediately following the scenario, followed by a whole-class debrief at the end of the laboratory session. Student-centred debriefing focusses on the learners' needs and experiences. It requires a careful blend of learning objectives identified by the student with those of the academic; therefore, key learning objectives were provided to the academic teaching staff to ensure consistency of experience (Palaganas, Fey, & Simon, 2016).

Subsequently, students were encouraged to extend the reflective process allowing for more considered and well-structured responses, by completing a noncompulsory written reflection to be handed in 2 weeks after the simulation. This coincided with the end of semester. The reflective exercise for the students was guided by some points for consideration (Table 3).

The simulation activity was facilitated by the academic staff member responsible for each individual clinical laboratory session. All phases of the simulation structure and flow were reviewed and discussed during the presemester subject briefing attended by the academic teaching staff. This included the following: required briefing content, simulation flow and debriefing techniques. Staff were given an opportunity to practise and ask questions. This was supported with literature pertaining to all aspects of the simulation being sent

**TABLE 3** Guided reflection

Students were asked to consider:
How they felt participating in the simulation
If and in what ways, they felt the interruptions affected concentration
What skills they noticed being used to manage the situation
If and in what ways, they might approach this situation in future
If they felt that there was something they may have learnt from this experience
If they felt the simulation had prepared them for practice or not. If so in what ways.

by email. Additional support with specific reference to debriefing methods and styles was offered to those new to simulation.

### 3.6 | Data collection

Data collection was undertaken over two semesters between May and November 2013. Students were encouraged to undertake a written reflective exercise after the simulation which was handed in within 2 weeks of the simulation experience. They were de-identified at the time of collection by the primary researcher. Nonidentifiable demographic data including student participant course pathway, gender and age were also obtained from a university database.

### 3.7 | Data analysis

The written reflections were analysed using thematic analysis. Thematic analysis has been described as "a method for identifying, analysing and reporting patterns (themes) within data" (Braun & Clarke, 2006, p. 79). To ensure accurate representation of the data, the analysis process was guided by an approach outlined by Guest, MacQueen, and Namey (2012). This process involved multiple readings



of the raw data to identify broad or common themes and patterns. Coding was undertaken, and the first author then identified preliminary themes and subthemes. These preliminary themes were discussed amongst all members of the research team which led to consensus and validation of findings.

## 4 | RESULTS

### 4.1 | Summary of findings

The total number of students who completed the written reflection was 451 of a possible 528 (85.42%). Students who did not complete the reflection were considered to have "opted out" of research participation. Following analysis of the data, three key themes emerged. These were as follows: "Calm to chaos: engaging with the complex nature of clinical practice," "Learning to Liaise: team work for positive patient outcomes" and "Pondering practice: enhancing the art of reflection." This study examines the first of the three identified themes, Calm to chaos, and its associated subthemes (see Table 4). The other two key themes are the subject of further papers. The first of them, "Learning to Liaise: team work for positive patient outcomes," explores students' perceptions of their role within the healthcare team. The remaining theme, "Pondering practice: enhancing the art of reflection," focusses on the use of debriefing and guided written reflection to gauge the students' understanding of the impacts of stress on emotions, performance and patient outcomes.

The decision to report the findings from this study in three separate papers was made to allow full exploration and elucidation of the key themes described above and convey a deeper understanding of the data (Jackson, Walter, Daly, & Cleary, 2013).

Student responses were categorised according to their role in the simulation: medication recipient (MR), confused patient (CP), interrupting nurse (IN), administering nurse (RN) and observer (OB).

## 5 | CALM TO CHAOS: ENGAGING WITH THE COMPLEX NATURE OF CLINICAL PRACTICE

The theme *Calm to chaos* describes students coming to terms with a clinical laboratory setting that was chaotic rather than calm, with frequent environmental distractors designed to mimic the clinical environment. This theme is comprised of three subthemes (see Table 4), described below.

**TABLE 4** Key theme and subthemes

Key theme	Subtheme
Calm to chaos: engaging with the complex nature of clinical practice	<ul style="list-style-type: none"> <li>Experiencing complexities of practice: increasing knowledge, skills and confidence in the context of challenging environments</li> <li>Meeting workplace expectations: acknowledging the importance of prioritisation, time management and planning</li> <li>Keeping it real: learning through immersive and enjoyable experiences</li> </ul>

### 5.1 | Subtheme: experiencing the complexities of practice: increasing knowledge, skills and confidence in the context of challenging environments

The first subtheme *experiencing complexities of practice* illustrates the students' understanding of the impact of interruptions on their ability to concentrate, and the development of newly formulated strategies to manage interruptions.

Adding a level of complexity previously not experienced elicited many comparable responses from students. They identified the significant impact that interruptions had on the nurses' cognition and were able to link that to patient safety issues.

*[the simulation] highlighted how when presented with environmental conditions that are conducive to error the nurse has to make timely and relevant clinical decisions. The simulation demonstrates how interruptions in a nurse's work affect clinical decision making.* IN

Students reported recognising and understanding that to be able to effectively manage in the real clinical environment they need to be exposed to challenges in the laboratory setting. The unpredictable nature of nursing and how to manage in disrupted environments was reported.

*[the role-play] was helpful in preparing us for clinical placement by helping us develop skills in multi-tasking, to help us learn the importance of concentrating on the task we are doing right at the moment, to help us realise that nursing is unpredictable.* MR

Students were able to articulate the importance of concentration combined with the skills of thinking and listening and thinking and doing in order to prioritise.

*Tends to remind you of all the other things surrounding the skills you practice in labs. It's easy to forget that a patient may be constantly talking while you are conducting assessments and other patients may have needs that require immediate attention while you are in the middle of another task.* CP

Students also frequently reported that this learning experience had "improved confidence" or simply that they felt "more confident." They described how the new knowledge and skills gained from the



simulation experience had prepared them for practice in the “real-world” clinical environment.

*[the simulation] prepared me for clinical practice by allowing me to think about what I would do in this situation and ways to better manage common distractions. So far in class we've concentrated on episodic care in ideal, calm and quiet conditions, so it was good to practice in a situation that is more like what we'll experience in real life. RN*

### 5.2 | Subtheme: Meeting workplace expectations: acknowledging the importance of critical thinking, prioritisation, time management and planning

Student recognition that enhanced preparation for clinical practice can be achieved through realistic simulated clinical experiences that facilitate improved levels of critical thinking and appropriate clinical judgements is described in the second subtheme, *meeting workplace expectations*.

*[the simulation] provided me with expectations I need to have when placed at busy clinical ward and helped me to realize the importance of critical thinking and judgement. RN*

Students described how the simulation experience had facilitated their learning. They recounted how they had formulated strategies to manage the interruptions using sound clinical judgements.

*It [the simulation] emphasised the importance of taking your time with medication administration and remaining focussed as possible, despite possible distractions. Finally, the simulation was a great way of teaching us how to prioritise care by using our clinical judgement. IN*

The importance of prioritisation, planning care and time management were most commonly reported and were often linked with critical thinking.

*the skills of prioritising and time management were evident throughout the simulation and made me critically think about what the most important plan of care that I needed to complete first and what was not as important. RN*

### 5.3 | Subtheme: Keeping it real: learning through immersive and enjoyable experiences

The final subtheme—*keeping it real*—describes how students perceived the reality of this role-play experience.

*[The simulation] fitted in well with an actual clinical setting. Being a part of the accelerated program and*

*already working as an enrolled endorsed nurse we face situations like this every shift. CP*

They related the significance of working with real people with real reactions and interactions rather than manikins and its impact on their learning.

*This simulation is the best one so far as we are dealing with real people not manikins. IN*

The provision of props and the resulting change in appearance further enhanced student experience and facilitated role immersion for the students.

*I was required to wear a grey wig which made me look strange but assisted me taking on the role very quickly. CP*

Students noted that fidelity and adaptability of the roles and overall enjoyment led to a positive learning environment.

*Out of all the simulations in nursing so far this would have to be the most real. The roles were adaptive rather than forced .....it was fun. RN*

However, not all students enjoy learning within the simulated environment. Although the role-play simulation was reported in a positive light by most students, it did prove challenging for others.

*I struggle with simulation scenarios in terms of being watched by teachers and peers. RN*

## 6 | DISCUSSION

The aim of this study was to explore the undergraduate nurse response to simulated interruptions during medication administration. Participants reported an increased understanding of the impact of interruptions while administering medications and an improved awareness of management strategies. They articulated the positive impact the experience had on their confidence and perceived ability to provide optimum patient care and positive outcomes.

Although many studies describe the links between simulated experiences and a feeling of being better prepared for practice (Aggar & Dawson, 2014; Hope, Garside, & Prescott, 2012), simulation experiences that incorporate interrupted medication administration scenarios for undergraduate nurses are hard to find. This is concerning given the impact of medication error (Flanders & Clark, 2010; MacDonald, 2010; Roughead & Semple, 2009). One study (Thomas, McIntosh, & Allen, 2014) exposed undergraduate nurses to auditory distractions using headphones during medication administration which highlighted to students the impact of auditory distractions and the increased risk of medication errors, but did not report

the formulation of management strategies to manage multiple and varied interruptions, nor did it describe the students feeling better prepared for practice as a result. In contrast, the opportunity to practise difficult skills such as medication administration in a simulated chaotic environment was reported by students in our study as a positive step towards feeling better prepared for practice.

Beginning practitioners often have limited clinical exposure and varied quality of experience, and as a consequence limited understanding of clinical expectations, which commonly results in low levels of self-confidence (Pike & O'Donnell, 2010). Preparing students with the ability to identify management strategies for use in the clinical environment could contribute to improved self-efficacy and increased confidence. Student participants in this study articulated the importance of being in a safe and supported environment in which to make mistakes and learn from them, which in turn led to increased confidence levels. Increased self-efficacy and confidence through simulated experiences was a finding that was consistent with other simulation-based studies (Howard, Englert, Kameg, & Perozzi, 2011; Lubbers & Rossman, 2016; Mould, White, & Gallagher, 2011).

Students also reported feeling more prepared for practice related to interrupted medication administration, and other interrupted nursing tasks. This finding was consistent with preceding research which suggests that simulation is an effective method by which nurses are able to close the theory–practice gap in a safe environment, minimising risk to both nurse and patient (Aggar & Dawson, 2014; Bambini, Washburn, & Perkins, 2009; Lapkin, Levett-Jones, Bellchambers, & Fernandez, 2010; Ricketts, 2011).

Although under direct clinical supervision, there remains an increased risk of error when undergraduate students are exposed to an interruption-rich environment in which to administer medications (Cloete, 2015; Hayes et al., 2015; Raban & Westbrook, 2014). The disconnect between how medication administration is commonly taught and the reality of the clinical environment was remarked on by students in this study. Most nurses are taught the skills required to fulfil the task of medication administration in an environment that isolates the task from all others. To navigate interruptions safely, students require the ability to employ critical thinking skills resulting in sound clinical judgements in realistic scenarios and settings. Findings from this study parallel other scenario-based simulation experiences reported in the literature as significant in enhancing analytical skills, critical thinking and clinical reasoning (Prescott & Garside, 2009; Rochester et al., 2012; Sullivan-Mann, Perron, & Felner, 2009).

Students are more likely to be able to build critical thinking and clinical judgement skills if the simulation is designed on a sound platform which incorporates the provision of a realistic or high-fidelity experience (Aebbersold & Tschannen, 2013). This is especially important for the novice and advanced beginner with limited clinical exposure, and to whom context is essential (Benner, 2001; Tanner, 2006). Providing realistic or high-fidelity scenarios and environments such as the one described in this study is a key strategy to maximise the learning experience (Benner, 2001).

Fidelity of experience must be accompanied by effective debriefing and reflection which facilitates deep learning and

improved critical thinking and clinical judgement skills (Cant & Cooper, 2011; Ferguson, Delaney, & Hardy, 2014; Harris, Pittiglio, Newton, & Moore, 2014; Rochman, Aebbersold, Tschannen, & Cambridge, 2012; Sullivan-Mann et al., 2009). Written reflections offer the potential for increased depth of reflection and learning outside of the debrief, resulting in more thoughtful and well-structured responses (Lasater, 2009). Although students did not directly attribute learning gained from this experience to the debrief that followed the role-play, it was clear in the written reflections that they had engaged in learning throughout the process. Students recounted that they had been given the opportunity to have the role-play and its outcomes “clarified and emphasised,” and that they had “gained pointers” and had their “eyes opened” as well as being “encouraged to think about new approaches.” This is comparable to other studies that report findings emerging from simulated learning experiences as a whole experience rather than breaking it down into the component parts to discover from which part the learning resulted (Kaddoura, 2010). Having the opportunity to reflect on previous experiences provided students with a context and background to solidify new knowledge.

It is also judicious to consider those unsuited for this style of learning. Kolb (1984) described how students' learning styles differ which may explain why some students do not engage with the learning process in the simulated learning environment. Although student written reflections were overwhelmingly positive, 7:451 (1.55%) of students in this study identified that they did not like, or learn from simulation experiences.

## 7 | LIMITATIONS

Generalisability of the final outcomes from this learning experience will be limited by the use of convenience sampling and the fact that it was conducted in a single metropolitan university. The data were collected 2 weeks after the simulation which may have impacted on some participant's recall of the experience. As the data came from unidentifiable written reflections, it was not possible to isolate demographics specific to those who wrote reflections. Therefore, it is not possible to know whether one particular group had a stronger voice than any other. In addition, while all eight academic facilitators were appropriately briefed, it is possible that individual interpretation may have affected equity of experience; therefore, academic demographic data related to clinical and teaching experience may have given further insights into findings. Medication error data collected at the time of the role-play simulation including what, why and when errors occurred would have enriched the findings. The findings would be further supported with the inclusion of a control group.

## 8 | CONCLUSION

Role-play simulation is a valid and easily accessible form of simulation that is not only enjoyable for the majority of students but can

provide them with the connections required to use critical thinking and sound clinical judgements.

Providing realistic teaching experiences to undergraduate nursing students is crucial if we are to prepare them adequately to meet the demands of professional practice. Ensuring students were exposed to common interruptions during medication administration using role-play simulation may improve students' understanding of the implications of interruptions and allow them to consider the need for strategies that are transferable to the clinical environment.

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## CONFLICT OF INTEREST

Three of the authors work within the research setting.

## CONTRIBUTIONS

Study design: CH, TP, DJ; data collection and analysis: CH, TP, DJ, PD; and manuscript preparation: CH, DJ, TP, PD, JD.

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## Second findings paper: Learning to liaise



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## Learning to liaise: using medication administration role-play to develop teamwork in undergraduate nurses

Carolyn Hayes<sup>a\*</sup>, Tamara Power<sup>b</sup>, Patricia M. Davidson<sup>c</sup>, John Daly<sup>d</sup> and Debra Jackson<sup>d</sup>

<sup>a</sup>Faculty of Health, University of Technology Sydney, Building 10 level 6, 235 Jones Street, Broadway, NSW, 2007, Australia; <sup>b</sup>Faculty of Health, University of Technology Sydney, Building 10 level 7, 235 Jones Street, Broadway, NSW, 2007, Australia; <sup>c</sup>Johns Hopkins University School of Nursing, 525 N. Wolfe Street, Baltimore, MD, 21205-2110, USA; <sup>d</sup>Faculty of Health, University of Technology Sydney, PO Box 123, Broadway, NSW, 2007, Australia

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**Aim:** To describe undergraduate nursing students' situational awareness and understanding of effective liaison and collaboration within the nursing team during interrupted medication administration.

**Background:** Medication errors related to interruptions are a major problem in health care, impacting on patient morbidity and mortality and increasing the burden of related costs. Effective liaison, teamwork and situation awareness are requisite skills for nurses to facilitate the safe management of interruptions during medication administration.

**Method:** A role-play simulation was offered to 528 second-year undergraduate Bachelor of Nursing students. Qualitative written reflective responses were subsequently collected and subject to thematic analysis to derive themes.

**Results:** Participants (451:528) reported an improved understanding of an unfamiliar and challenging situation that required cooperation and collaboration amongst the nursing team to improve outcomes.

**Conclusion(s):** This simulation exposed undergraduate nurses with limited clinical experience to a situation otherwise unavailable to them. The skills required to engage in effective liaison and teamwork in dynamic situations are vital elements in achieving quality care and must begin to be taught at an undergraduate level.

**Keywords:** nursing; medication errors; interruptions; distractions; teamwork; role-play

### Background and introduction

Medication administration involves complex processes from initial prescription through to post administration documentation (Jennings, Sandelowski, & Mark, 2011). Errors to the process of medication administration remain a central patient safety issue (Clinical Excellence Commission CA and Health N.D.o, 2013; Cloete, 2015; Hayes, Jackson, Davidson, & Power, 2015; Westbrook, Woods, Rob, Dunsmuir, & Day, 2010; World Health Organisation [WHO], 2014). Medication errors and incidents occur at an alarming rate (Clinical Excellence Commission CA and Health N.D.o, 2011; WHO, 2014), and are caused by several contributing factors (Hayes et al., 2015; Hayes, Jackson, Davidson, Daly, & Power, 2017), including interruptions to the administration process and breakdowns in communication (Westbrook et al., 2010). Effective

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\*Corresponding author. Email: [carolyn.hayes@uts.edu.au](mailto:carolyn.hayes@uts.edu.au)



communication is an important component of practice for nursing students and clinicians, that requires effective liaison within a team and is often the subject of discourse related to practice readiness (Hofler & Thomas, 2016; Nursing and Midwifery Board of Australia [NMBA], 2016; Oermann, Poole-Dawkins, Alvarez, Foster, & O'Sullivan, 2010; Wolff, Regan, Pesut, & Black, 2010).

Effective liaison within teams incorporates critical thinking, situation awareness, collaboration, communication, an understanding of the motivations and goals of others, active listening, and empowering others by offering guidance and support (Day-Calder, 2016). There is an expectation that nurses (albeit at varying levels of ability); liaise between patients, the extended health-care team and each other during all aspects of care including during medication administration (NMBA, 2016; Royal College of Nursing [RCN], 2010). Despite the expectation that nurses liaise effectively with all these groups, the majority of available nursing liaison literature focuses solely on empowering patients, fostering relationships between patients and facilities and patients and members of the greater healthcare team providing their care (Day-Calder, 2016; McNab, Paterson, Fernyhough, & Hughes, 2016).

Novice and advanced beginner nurses often have limited capacity to effectively liaise within the teams in which they work. The close working relationships required within healthcare teams can be difficult for less experienced nurses to navigate due to lack of confidence (Oermann et al., 2010) and inequities in power with more senior nurses (Smith, Andrusyszyn, & Spence Laschinger, 2010). Interruptions and distractions to the administering nurse have been reported to take place in over 50% of medication administrations (Westbrook et al., 2010). Therefore developing effective liaison skills in preparation for working in dynamic, interruption prone clinical environments is critical. However, there are limited reports about how to effectively prepare undergraduate students in the area of disrupted medication administration. Deliberately crafted simulation experiences offer authentic clinical scenarios that can prepare undergraduate students for the crucial transition skill of effective liaison between nurses during interrupted medication administration.

Current undergraduate education aims to provide experiences that are designed to develop professional identity and prepare undergraduate nursing students for clinical practice as both a student, and as a registered nurse (Moscaritolo, 2009). However, experienced registered nurses, nurse managers and nurses transitioning into the workplace have all identified that newly graduated nurses are often under-prepared for the challenges that face them in practice (Wolff et al., 2010). Challenges may include inadequate knowledge and/or skill base, inadequate socialisation processes or lack of understanding of their role in the workplace (The International Council of Nurses, 2009).

A clear and widely accepted definition of practice readiness is yet to be firmly established. One Canadian study concluded that practice readiness involves several key attributes whereby nurses are able to safely undertake nursing tasks and skills using critical thinking and underpinning knowledge (Wolff et al., 2010). In the Australian context, the skills required for practice readiness are measured against the NMBA standards for practice (NMBA, 2016). The NMBA (2016) identified two of the key skills required for practice readiness as having an understanding of how to work within a team and being able to communicate effectively. This requires nurses to collaborate and liaise with each other across varied situations, including interrupted medication administration.

To improve communication and team work skills and enhance practice, students need to develop an awareness how they fit into, and impact, the environment and situation in which they find themselves (Horton-Deutsch, 2013). The importance of situation awareness in the high-risk health environment has been acknowledged in the literature (Sitterding, Broome, Everett, & Ebright, 2012). Situation awareness and self-awareness are informed by personal reflection (Boud, Keogh, & Walker, 1985; Hayes, Jackson, Davidson, Daly, & Power, 2018),



encouraging a cognisance of self that most often results in an ability to make well thought through decisions that incorporate the needs of others within a team, profession and organisation (Hayes et al., 2018; Horton-Deutsch, 2013).

This paper focuses on the direct liaison relationships between nursing teams during interrupted medication administration. It is drawn from a larger doctoral study which aimed to enable undergraduate nurses to experience, reflect on and analyse their responses to interruptions during medication administration. To facilitate richer consideration and understanding of these key themes from the large pool of data the findings were separated into three papers, a suitable strategy according to Jackson, Walter, Daly, and Cleary (2014). Findings addressing the complexity of medication administration (Hayes et al., 2017) and reflection on practice (Hayes et al., 2018) have been published elsewhere. Although the need for teamwork and communication are common across all themes, as they are in the execution of all nursing tasks, it was considered important to separate and explore these concepts as they pertain to learning to liaise with other members of the nursing team. To consolidate and validate these findings as standalone concepts, yet situate them as part of the larger study, this paper presents the results from the third theme 'Learning to Liaise: team work for positive patient outcomes' and its associated sub-themes.

### Research questions

How do novice and advanced beginner undergraduate student nurses respond to interruptions during the medication administration process?

Does the introduction of a simulated role-play experience involving interrupted medication administration raise awareness of the impact of interruptions and facilitate new insights into interruption management strategies?

### Methods

This study sought to describe and interpret the student experience to achieve an in-depth understanding. Therefore, qualitative research methodology and data collection techniques were employed. Students were provided with five questions designed to identify the role they had played during the simulation and stimulate thought.

Educational and nursing theorist perspectives (Benner, 2001; Kolb, 1984; Tanner, 2006) supported the design of this study and are described in Table 1. To increase understanding of concepts surrounding safe medication administration a role-play simulation was designed that

Table 1. Supporting educational and nursing theorist perspectives (Benner, 2001; Kolb, 1984; Tanner, 2006).

Theorist	Theory Outline	Impact on this research
Benner	Novice to expert	The simulation was designed to target undergraduate nursing students who reside within the first two stages of Benner's (2001) novice to expert continuum; the novice and the advanced beginner. These students have most often had nominal exposure to clinical experiences.
Kolb	Experiential learning	Kolb's experimental learning theory (1984) provided an understanding that in order to learn one must have opportunity to experience a scenario, and then reflect on that experience.
Tanner	Clinical judgment model	Tanner's model of clinical judgement (2006) identifies that context has an impact on how students notice, interpret, respond to and then reflect on learning experiences.



utilised a four-step process: briefing, immersive role-play scenario, debriefing, and written reflections (see Table 2). During the immersive scenario students were exposed to interruptions during the process of medication administration. The simulation intervention was supported by validated simulation frameworks and is described in Table 3 (Arthur, Levett-Jones, & Kable, 2013; Jeffries, 2005).

### ***Study participants***

Potential participants were undergraduate nurses ( $n = 528$ ) enrolled in a requisite second year medical-surgical nursing subject within a bachelor of nursing programme, in a large metropolitan university. All 528 students partook in the simulation experience and a total of 451 students completed written reflections which represented 85.42% of those who took part in the simulation. The student participants included 85 males and 443 females with a mean age of 26.56 years.

### ***Ethical considerations***

Participants were provided with information sheets and verbal communications regarding the project and were advised that they could opt out of the study by not completing the reflection. Information sheets and consent forms emphasised that participation was voluntary. As some members of the research team work within the faculty in which the research took place, the possibility of students feeling obligated to participate was considered. Students were therefore informed that their choice regarding participation would not be revealed to the subject coordinator and that all collected data would be de-identified and stored in a secure location. The ability to withdraw from the study prior to de-identification was reinforced. Institutional ethics approval was obtained for this study HREC REF NO 2013000094.

### ***Data collection and analysis***

Students submitted non-assessable reflections varying in length from one paragraph to two pages within a fortnight of the simulation. Reflections were photocopied and de-identified by the

Table 2. Four-step process of intervention.

Briefing	Information specific to the simulation scenario supplied to the students at the start of semester with other course notes and information. Students allocated into groups of five to rotate through the simulation. Students were able to choose from five roles (two registered nurses (RN), two patients and one observer), and were supplied with role specific lanyards which they could refer to during the simulation. Props provided to increase engagement and signal the start and finish of the simulation. Students also supported through orientation to the environment.
Role-play	Clinical handover given by academic facilitator. During the course of the simulation students engaged in administering medications, observing their peers and/or causing interruptions and distractions such as the patient experiencing shortness of breath or wanting to use the bathroom, or and RN requesting IV fluid order check.
Debriefing	To initiate the reflective learning process, a period of facilitator led debriefing followed each simulation experience using the gather, analyse and summarise (GAS) framework (O'Donnell et al., 2009).
Written reflections	The guided written reflections provided an opportunity for students to develop deeper thought processes and understandings in an environment outside the simulation laboratory.

Table 3. Validated simulation frameworks.

Researcher	Framework	Impact on this research
Jeffries (2005)	Simulation framework	Required consideration of educator and student characteristics, educational practices (pedagogy), simulation design characteristics and outcomes.
Arthur et al. (2013)	Quality indicator statements for simulations	Required engagement with 5 key principles for simulation design; clearly defined pedagogical principles, student preparation and orientation, facilitator preparation and training, and debriefing.

primary researcher. Thematic analysis was chosen as it facilitates identification and examination of patterns within data (Braun & Clarke, 2006). Accurate interpretation and reporting of findings was supported by using a recognised approach to the analysis process as described by Guest, MacQueen, and Namey (2012). The raw data were read numerous times. Coding facilitated the identification of preliminary themes and subthemes by the first author, which were then deliberated on by members of the research team. Once consensus was reached, findings were considered valid. The primary researcher maintained engagement with literature addressing related themes, and the large participant numbers added to the credibility and validity of the study (Streubert & Rinaldi Carpenter, 2011).

## Results

In presenting the findings, responses from student participants were grouped according to role; medication recipient (MR), confused patient (CP), interrupting nurse (IN), administering nurse (RN), observer (OB).

### Key theme: learning to liaise: team work for positive patient outcomes

To ensure safety of self, other members of the nursing team, and most importantly the patient; nurses need to demonstrate the social and cognitive skills associated with situation awareness. This includes the nurse identifying the needs of those around them so that they can effectively liaise and collaborate within a team. Two subthemes were identified from the data 'Considering the team: gaining awareness of the roles of others' and 'Engaging effectively: recognizing the relationship between staff interactions, collaboration and patient safety'. Elsewhere we have discussed how students managed interruptions to the medication administration process, describing employing critical thinking, prioritisation, time management, creative strategies such as trying to distract the confused patient, or negotiating with the interrupting nurse (Hayes et al., 2017, 2018).

### Subtheme: considering the team: gaining awareness of the roles of others

Participants were able to look beyond themselves and recognised the role they played in the simulation experience from the perspective of other nurses within the team.

This simulation has helped me to understand that as a registered nurse, it's not just about me and my allocated patients. OB

Several students reported that the situation highlighted the need to enlist the help of other members of the team.

The simulation was extremely helpful. It reminded me of the need to be able to ask for help and to delegate when necessary. IN

They reported a deeper understanding of their role in respect to the delegation of others. They described that they had learnt the importance of a holistic approach when liaising with the team to provide solutions and effect changes in workflow.

Looking at the holistic picture and effectively tackling issues that arise – multitasking effectively and delegating – team work. IN

Some expressed feelings of guilt, regret, and empathy for not considering the needs of team members. This was most often communicated by those who had played the role of the IN.

I felt quite bad for the nurse I was interrupting. IN

**Subtheme: engaging effectively: recognising the relationship between staff interactions, collaboration and patient safety**

Positive relationships and collaborations with staff in the clinical environment, with student peers and teaching staff in the educational facility, can impact each students' ability to provide a safe environment for patients. One of the first collaborative relationships that participants identified was that of the relationship with each other as peer to peer learners and the opportunity to improve knowledge and skills.

It (simulation) is the only place where we can improve on our mistakes and learn through each other – our co-students. CP

Liaising implies a relationship, requiring modifications to ones actions and interactions with others. Students were able to consider changing their actions within an interrupted environment.

It gave me perspective of when are and are not the right times to interrupt. IN

Some students recognised not only appropriate times to interrupt, but also noting opportunities to make themselves approachable, and assist where possible.

Having had this experience during the SIM I feel that I will make a conscious effort to avoid interrupting during critical patient care moments, and to offer any help that my colleague may need. IN

Students recognised the significance of being an active participant within the team and effectively liaising as a way of achieving identified interruption management goals.

[we need to] engage and communicate with the other RNs so we can assist each other to coordinate and prioritise care. RN

Collaboration within the nursing team was repeatedly reported by students as essential in order to cope with the situation in which they had found themselves (managing multiple interruptions).

In this situation I think collaborative working is most important. RN



Others reported the possibility of utilising broader resources for collaboration and assistance, considering liaising with the wider health care team.

Collaborative strategies in interaction with other healthcare professionals. TG

Importantly there was an understanding that being part of a team and collaborating effectively within that team is necessary for safe care.

Working as a team with collaboration and cooperation to minimise disturbances which lead to medication errors. CP

## Discussion

During the medication administration process, the administering nurse, patient, and other members of the health care team all play a part in maintaining patient safety (Bolster & Manias, 2010). These individuals can be either the source of interruptions; or contribute to solutions aimed at managing them (Hayes, Power, Davidson, & Jackson, 2014; McGillis Hall et al., 2010). The simulation described in this paper was designed to mimic the real clinical environment and enhance practice readiness. Students were placed in a situation where they would be put under pressure from interruptions whilst administering medications to build situation awareness and facilitate effective liaison through communication and collaboration between the team to manage those interruptions.

Safe and effective care requires high levels of situation awareness (Sitterding et al., 2012). Building improved situation awareness requires reflection on practice, which encourages the examination of actions as they relate to self and others (Boud et al., 1985; Epp, 2008; Schon, 1983). Elsewhere we have argued the importance of reflection on effective nursing practice (Hayes et al., 2018), and the significance of the reflective process following experiences as described in this paper is again acknowledged. The written reflections that followed the simulation experience revealed the students ability to articulate a beginning understanding of the impact of their decisions and actions on the team around them. Students showed a burgeoning ability to perceive what had happened, comprehend the meaning of what had happened, and then predict possible impacts and outcomes (Hayes et al., 2017, 2018). These three attributes have been described in the literature as being associated with situation awareness (Sitterding et al., 2012).

Knowing how and when to ask for help or indeed how and when to offer it, are essential when aiming to provide safe and effective nursing care and as such are essential in the nursing role (NMBA, 2016). The students in this study revealed an understanding that disrupted medication administration may require them to either offer or call on other nurses for assistance, recognising others expertise and learning from the experience. These key skills and abilities are crucial elements in minimising patient risk and are requisite in all aspects of nursing care – including medication administration.

In a recent study, Ekström and Idvall (2015) found that nurses' ability to prioritise and delegate within a team environment was enhanced if they understood the organisation in which they were working. Encouraging undergraduate nurses to take on challenging experiences in the simulated environment where they are required to consider what it will be like for them in clinical practice, provides the opportunity to gain new insights into what it means be a part of a team. Role-play simulation was utilised to provide a realistic clinical experience and proved significant in the student journey to understanding the importance of team interactions and their relationship to providing optimum patient care during medication administration. This aligns

with previous studies that have highlighted the importance of communication within the health-care team to reduce medication errors (Wilson, Palmer, Levett-Jones, Gilligan, & Outram, 2016).

Facilitating simulation experiences for undergraduate nurses that encourage them to explore their role and liaise and collaborate for effective inter-team communication and improved situation awareness when faced with interruptions, can only serve to reduce the risk of error and improve patient safety. Practicing these positive collaborative relationships, team work and liaison skills should begin within the academic learning environment where nurses first learn their craft. The simulation experience presented in this paper provided an authentic, simulated environment in which these skills could be practised and reflected on. Providing simulated experiences in the university setting that expose students to the reality of practice through authentic environments and realistic scenarios, such as the experience discussed in this paper, is one way of assisting transition to practice.

### **Study limitations**

Convenience sampling at a single university reduces transferability of findings, however the collection of data over two campus' and the large participant numbers strengthened the validity of the study. No identifiable demographic data was attached to the reflections; inclusion of this data may have provided additional insights. This research paper provides a subjective perspective of situation awareness, achieved by collecting student written reflections of both observed and actual experiences in a simulation. Findings may be supported and enhanced by investigating improvements to situation awareness following this role-play by using objective measurement tools such as the Situation Awareness Global Assessment Technique (Endsley & Garland, 2000). Moreover, exploring this issue within a broader interprofessional context may further elucidate situation factors.

### **Impact statement**

Teaching undergraduate nurses to administer medications in simulated dynamic environments that parallel the real world of clinical practice, provides an opportunity for them to develop both technical and non-technical skills. Understanding their responsibilities as part of a team when faced with interruptions facilitates authentic responses and opportunities for collaboration in an error prone situation. Exposing students to similar simulation experiences both during and following clinical practicum may further impact the student experience.

### **Conclusions**

Facilitating a smooth transition from student to newly registered nurse, competent in the safe administration of medications, has been a long-standing issue for nurse managers, students and educators alike. Ensuring students learn to manage interruptions effectively and safely during medication administration requires situation awareness, effective liaison between the nursing team, and honed communication skills. If undergraduate nurses are not adequately prepared for the often abrupt transition to becoming a registered nurse medication errors are more likely to occur. The simulation scenario and environment used in this study established a safe place for undergraduate nurses to explore concepts underlying liaison, collaborative team work, communication and safe management of interruptions during medication administration.

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ORIGINAL ARTICLE

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## Pondering practice: Enhancing the art of reflection

Carolyn Hayes RN, BHSc, Manager, Simulation and Laboratories<sup>1</sup>  | Debra Jackson RN, PhD, FACN, Professor of Nursing<sup>1,2,3</sup>  | Patricia M. Davidson RN, PhD, Dean<sup>4</sup> | John Daly RN, PhD, FACN, Dean<sup>1</sup> | Tamara Power PhD, RN, Lecturer<sup>1</sup>

<sup>1</sup>Faculty of Health, University of Technology Sydney, Sydney, NSW, Australia

<sup>2</sup>Oxford Brookes University, Oxford, UK

<sup>3</sup>University of New England, Armidale, NSW, Australia

<sup>4</sup>Johns Hopkins University School of Nursing, Baltimore, MD, USA

### Correspondence

Carolyn Hayes, Faculty of Health, University of Technology Sydney, Broadway, Sydney, NSW, Australia.  
Email: Carolyn.Hayes@uts.edu.au

**Aims and objectives:** The aim of this study was to describe the effect that immersive simulation experiences and guided reflection can have on the undergraduate nurses' understanding of how stressful environments impact their emotions, performance and ability to implement safe administration of medications.

**Background:** Patient safety can be jeopardised if nurses are unsure of how to appropriately manage and respond to interruptions. Medication administration errors are a major patient safety issue and often occur as a consequence of ineffective interruption management. The skills associated with medication administration are most often taught to, and performed by, undergraduate nurses in a controlled environment. However, the clinical environment in which nurses are expected to administer medications is often highly stressed and nurses are frequently interrupted.

**Design/Methods:** This study used role-play simulation and written reflections to facilitate deeper levels of student self-awareness. A qualitative approach was taken to explore students' understanding of the effects of interruptions on their ability to undertake safe medication administration. Convenience sampling of second-year undergraduate nursing students enrolled in a medical-surgical subject was used in this study. Data were obtained from 451:528 (85.42%) of those students and analysed using thematic analysis.

**Results:** Students reported increasing consciousness and the importance of reflection for evaluating performance and gaining self-awareness. They described self-awareness, effective communication, compassion and empathy as significant factors in facilitating self-efficacy and improved patient care outcomes.

**Conclusions:** Following a role-play simulation experience, student nurses reported new knowledge and skill acquisition related to patient safety, and new awareness of the need for empathetic and compassionate care during medication administration. Practicing medication administration in realistic settings adds to current strategies that aim to reduce medication errors by allowing students to reflect on and in practice and develop strategies to ensure patient safety.

**Relevance to clinical practice:** Experiencing clinical scenarios within the safety of simulated environments, offers undergraduate student nurses an opportunity to reflect on practice to provide safer, more empathetic and compassionate care for patients in the future.

### KEYWORDS

interruptions, medication administration, reflection, role-play, undergraduate nurses



## 1 | INTRODUCTION

Despite considerable efforts to mitigate, medication error reduction remains a global issue of concern (Cloete, 2015; Hayes, Jackson, Davidson, & Power, 2015). Interruptions during medication administration have been acknowledged as a primary causes of errors producing stressful environments for both nurses and patients (Jennings, Sandelowski, & Mark, 2011; Westbrook, Woods, Rob, Dunsmuir, & Day, 2010). Given that not all interruptions during medication administration can or indeed should be eliminated (Clark & Flanders, 2012; Flynn, Liang, Dickson, Xie, & Suh, 2012), interruption management strategies are essential to minimise associated stress, reduce medication errors and improve patient outcomes. Supporting undergraduate nurses to manage their emotions and performance in stressful environments during medication administration is an area which to date has received little attention in research. Building self-awareness in undergraduate nurses through simulation experiences and reflection on individual performance is one step towards improved understanding and self-efficacy.

## 2 | BACKGROUND

Reflection and reflective thinking are not new concepts. Educational and nursing theorists have long described the impact that reflection has on the individuals' response to new or challenging experiences (Benner, 2001; Kolb, 1984; Schon, 1983; Tanner, 2006). The reflective process includes three key skills: describing the experience, critically analysing the experience and developing self-awareness (Boud, Keogh, & Walker, 1985; Horton-Deutsch & Sherwood, 2008). Using reflective learning in undergraduate nurse education encourages a deeper understanding of experiences, related underlying concepts and can result in more positive patient care and outcomes (Tanner, 2006).

When planning reflective learning experiences for undergraduate nurses, it is important to consider that each individual undergraduate student nurse brings with them a unique story and level of experience which will impact on their interactions and decision-making (Tanner, 2006). These experiences may have been lived, witnessed or heard and can have occurred within the clinical environment or educational facility, or elsewhere. Immersive experiences that are followed by considered reflection enhance learning, improve understanding of differing perspectives, encourage questioning of actions and emotions and commonly result in improved levels of self-awareness (Boud et al., 1985; Kolb, 1984).

Reflective practice is expected of health professionals (Smith & Trede, 2013). Applying this concept to nursing is a process whereby the clinician is able to review experiences through thoughtful analysis and evaluation, in order to guide or improve future practice (Bulman & Schutz, 2008). This includes reflection on and in practice (Schon, 1983) and is ideally instinctive during all aspects of nursing care. However, reaching a point at which reflection becomes instinctive requires guidance and repeated training and should be

### What does this paper contribute to the wider global clinical community?

- Simulated strategies in controlled settings can enhance student nurses' skills in managing interruptions during medication administration
- Highlights the effects of interruptions on stress levels
- Reinforces the importance of reflection for undergraduate nurses

considered as an everyday process. Thoughtful evaluation of outcomes encompassing identification of new knowledge is essential to progress understanding.

Transferring the skills required by undergraduate nurses to reflect on practice must also be encouraged when teaching medication administration, particularly in relation to interruption management strategies. The significance of learning these skills is clear considering nurses spend between 16–40% of their time in medication administration-related activities (Potter et al., 2005; Westbrook, Duffield, Li, & Creswick, 2011) and that interruptions to those activities are one of the leading causes of medication errors (Clinical Excellence Commission & Health, 2013).

Tanner (2006) described the importance of noticing, interpreting, responding to and reflecting on experiences and "thinking like a nurse" (p 209). Thinking like a nurse is complex and involves engaging with patients; being empathetic and compassionate; and maintaining the patient's well-being as central to all care. It also requires incorporating expert knowledge and clinical reasoning to each situation in order to achieve sound clinical judgements and optimal patient outcomes (Tanner, 2006). Making sound clinical judgments when managing interruptions to the medication administration process requires consideration of individual patient's needs. However, many of the current approaches to interruption management strategies such as the wearing of tabards with "do not disturb" written on them discourage communication and spontaneous response to those individual needs and are potentially counterproductive. Nursing relies on appropriate and timely communication with both colleagues and patients, and isolating the nurse from these interactions brings with it concerns for patient safety (Hayes, Power, Davidson, & Jackson, 2014). Furthermore, the rigidity with which some current strategies are undertaken can compromise the delivery of compassionate care (Flynn & Mercer, 2013).

Caring, empathy and compassion sit at the core of the nurse-patient relationship and have been associated with nursing since its inception (Jackson & Borbasi, 2010; Rider et al., 2014; Straughair, 2012). The British Nursing and Midwifery Council have embraced a "culture of compassionate care" or the 6Cs in which caring and compassion are considered to be essential competencies (Commissioning Board Chief Nursing Officer & NH Chief Nursing Adviser, 2012). Caring is a complex concept involving emotional responses such as connectedness, as well as more tangible physical responses such as

gentleness (Daly, Speedy, & Jackson, 2014), and is intrinsically bound with empathy and compassion. Empathy runs deeper than simply imagining what it would feel like to be in the place of another; it requires an appreciation of the impact that their actions may have on another's situation. Compassion then incorporates empathy, caring, reflection and self-awareness and requires a level of engagement, intervention and action (Rider et al., 2014).

Caring, empathy and compassionate care are enhanced through reflection and self-awareness (Sanso et al., 2015). Self-awareness allows the nurse to move beyond what is in front of them to discover what lies beneath. This is of particular importance when faced with dynamic and stressful situations that may elicit heightened emotions. A lack of understanding of the manifestations of those emotions can affect a students' ability to perform (Smith, 2008). Being able to reflect on and evaluate practice and performance is a key component in enabling appropriate responses to difficult situations. Nurse educators are tasked to develop appropriate teaching and learning strategies to facilitate an increased understanding of the significant role that compassion, empathy and caring play in all aspects patient care (Pryce-Miller & Emanuel, 2014; Straughair, 2012).

The environment and individuals with whom undergraduate student nurses work are ever changing. Effectively evaluating complex situations in the clinical environment can be challenging for beginning practitioners. This is particularly true of identifying and applying suitable interruption management strategies and understanding the role of caring and compassion in that process. Pryce-Miller and Emanuel (2014) suggest that a variety of teaching methods including role-play simulation should be embraced to encourage students to view patients holistically and build essential communication skills. Combining simulation with opportunities for students to reflect on practice can be one way to enhance the holistic nature of patient care related to medication administration.

### 3 | THE STUDY

#### 3.1 | Aim

The aim of this study was to explore the effect that immersive simulation experiences and guided reflection could have on the undergraduate nurse's understanding of how stressful environments impact their emotions, performance and ability to implement the safe administration of medications.

#### 3.2 | Design

Three main themes were formulated from analysis of the study: Calm to chaos: engaging with the complex nature of clinical practice; Learning to liaise: team work for positive patient outcomes; and Pondering practice: enhancing the art of reflection. With the intention of disseminating a meaningful understanding of the identified themes, the findings were divided into three separate papers (Jackson, Walter, Daly, & Cleary, 2014). This paper presents results from

**TABLE 1** Key theme and subthemes

Key theme	Subtheme
Pondering practice: enhancing the art of reflection	<ol style="list-style-type: none"> <li>1. Reflecting on the patient perspective: gaining insights into compassionate care</li> <li>2. Evaluating performance: identifying, consolidating and integrating management strategies</li> <li>3. Confronting reality of self: building awareness of the manifestations of emotion and performance ability</li> <li>4. Connecting the dots: linking interruptions with making mistakes</li> </ol>

the theme "Pondering practice: enhancing the art of reflection" and its associated subthemes (see Table 1).

The role-play simulation experience from which the data and findings in this study were drawn was designed to represent a realistic scenario in which students may find themselves in the clinical environment. The study design was underpinned by both nursing and educational theoretical perspectives (Benner, 2001; Kolb, 1984; Tanner, 2006). Jeffries Simulation Framework (Jeffries, 2005) and Arthur's quality indicator statements for simulation (Arthur, Levett-Jones, & Kable, 2010) were used to further inform the scenario design. A qualitative approach to this study was taken to elicit a meaningful understanding of the student perspective.

Benner's "novice to expert" describes a nurse's journey to competence as a five-stage process. These stages include novice, advanced beginner, competent, proficient and expert (Benner, 2001). The simulated experience described in this paper occurred within the second year of a three-year undergraduate nursing degree. By this stage in their journey to registration, nurses have had limited clinical experience and as a consequence limited medication administration experience, placing them within either the novice or advanced beginner phase. The level of complexity of this intervention was therefore tailored to be appropriate for novice and beginning practitioners. Combining Tanner's clinical judgement model (Tanner, 2006) which requires students to notice, interpret, respond and reflect, with Kolb's theory of experiential learning (Kolb, 1984) paved the way for an interactive environment and scenario that not only encouraged engagement and role immersion but also deep reflection on that experience. Literature informed the choice of interruptions used during the simulation to those commonly reported within the clinical environment (Biron, Lavoie-Tremblay, & Loiselle, 2009; Palese, Sartor, Costaperaria, & Bresadola, 2009; Relihan, O'Brien, O'Hara, & Silke, 2010).

The simulation took place in the clinical laboratory environment as part of a 2-week case study. In the week prior to the simulation, students were given the opportunity to review the case study and the relevant pathophysiology and pharmacology, as well as practice related clinical skills in the second week of the case study. Prior to the commencement of the simulation activity, students were oriented to the scenario environment. Working in groups of five, students self-selected one of the five available roles. The role chosen by each student dictated whether they administered or received



medications, caused interruptions or observed peer performance. The roles comprised medication recipient (MR), confused patient (CP), interrupting nurse (IN), administering nurse (RN) and observer (OB). They were briefed on each of the roles and given role-specific lanyards to prompt actions during the simulation. Each student was also supplied with role-specific props to encourage engagement (Kesten et al. 2010; Prescott & Garside, 2009). Immediately preceding the simulation experience, they received a clinical handover.

To encourage reflection and deep learning, each student was then involved in two debriefing experiences. The first on completion of the role-play within their group of five, then again as a larger class group prior to the finalisation of each laboratory session. The importance of continuing the reflective process beyond debrief is paramount to deep learning and understanding (Kolb, 1984; Lasater, 2009). Therefore, the students were encouraged to submit written reflections that were completed in their own time prior to the end of semester.

### 3.3 | Sample/participants

The role-play was embedded as a routine learning activity for second-year undergraduate nursing students ( $n = 528$ ) enrolled in a medical-surgical nursing subject at two campuses of a large urban Australian University during 2013. Students were recruited to provide reflective data using convenience sampling.

### 3.4 | Data collection and analysis

To draw on the individual student perspective, data were collected from nonassessable student written reflections. Students were considered to have opted out of the study if they did not complete the reflection. All data were gathered by the first author and de-identified at the time of collection. Thematic content analysis was used to identify, analyse and inform emerging patterns or themes within the data (Braun & Clarke, 2006). Braun and Clarke (2006, p. 81) describe it as a method that is appropriate to both "reflect reality and to unpick or unravel the surface of reality." Due to the large amount of data generated, it was necessary to use a clear and systematic process. A framework described by Guest, MacQueen, and Namey (2012) was used to guide the analysis. The raw data were read and reread until broad or common themes and patterns were identified and coded. Key themes and subthemes were initially identified by the first author and then examined by the research team until consensus and validation of findings were reached.

### 3.5 | Ethical considerations

Participant autonomy, privacy, emotional well-being and right not to be involved were recognised. Informed consent stressed the voluntary nature of participation and that all data would be de-identified. Posters, handouts and verbal communications outlined the risks and benefits of the experience. To ensure safe storage of data and participant confidentiality and anonymity, all data remain locked in a

secure location. Ethics approval was obtained from the relevant ethics committee.

## 4 | RESULTS

### 4.1 | Summary of findings

Of the 528 students enrolled, 451 submitted a written reflection. Students identified the importance of reflection to evaluate performance, identify impacts of interruptions and formulate management strategies, and gain self-awareness. They described self-awareness, effective communication, compassion and empathy as significant in facilitating self-efficacy and improved patient care outcomes.

Role identification was used to categorise student responses: medication recipient (MR), confused patient (CP), interrupting nurse (IN), administering nurse (RN) and observer (OB).

### 4.2 | Key theme: pondering practice: enhancing the art of reflection

The realistic nature of this role-play simulation experience provided participants the time to thoughtfully consider their current practices, resulting in a deeper level of understanding of their existing skill set and consideration of new possibilities for improved practice. Academic teaching staff facilitated student discussion during debriefing which enabled students to make links between these discussions and strategy formulation which could be expanded on in the written reflections.

#### 4.2.1 | Subtheme: Reflecting on the patient perspective: gaining insights into compassionate care

Taking on the role of the patient and reflecting on the experience during debriefing facilitated group discussions related to what it felt like to be in a vulnerable position. Unexpected anxieties and shifts in power were highlighted by students who played the patient role in their written reflections and at times exposed self-absorbed reactions:

*It was a good opportunity to reflect on the patient experience, what made me anxious and powerless and how I [as the patient] did not have insight or interest in what the nurse had to achieve.* (MR)

The deep role immersion and reflective exercises that followed the role-play simulation afforded students an opportunity not only to feel the raw emotions that can be elicited for some patients when their healthcare needs are not being met, but also discuss and reflect on the impacts of those feelings:

*As a patient I felt more worried that my condition is deteriorating and the nurse is not being able to concentrate on me due to the interruption caused by another*

*patient. Though I knew the nurse was having a hard time, I needed to focus on my problem and try to get her attention.* (MR)

As a result of the role immersion, students described new insights related to the concepts of compassion and empathy, reporting increased understanding of how patients may feel in the clinical environment:

*Acting as a patient assisted helping me learn about a patient's feelings and how they would want to be treated in hospital.* (CP)

*It's a fun experience and does open up your eyes to the importance of prioritising care, time management and empathy.* (OB)

As a direct result of new insights into the patient experience, students went on to describe strategies that both acknowledged and addressed the patients emotional needs.

*Giving the patient a time frame enables the patient to feel that they are not being ignored.* (MR)

Regardless of the role they played in the simulation, it was important to ensure each student had the opportunity to gain similar insights. Debriefing exposed all participants to fresh perspectives and an improved understanding of what it had felt like to be "on the other side," highlighting the need for holistic, empathic and compassionate care:

*I can understand the patients' feelings when they are in hospital. Therefore I can care for them more holistically.* (RN)

#### 4.2.2 | Subtheme: Evaluating performance: identifying, consolidating and integrating management strategies

When evaluating performance of both self and others, students reported how the experience highlighted the significance of team work, and timely and appropriate communication with both patients and team members. Making links between interruptions and loss of concentration is necessary before management strategies can be formulated. Students were able to articulate that they had not previously considered the impacts of interruptions and were able to identify the effects of interruptions on cognitive ability:

*I did not pay much attention to interruptions before the simulation. Now based on my experience, I can conclude that interruptions can affect concentration significantly.* (OB)

*It's hard to focus on your work when someone is distracting you.* (CP)

Others remarked on how the interruptions had affected their ability to think clearly or even at all:

*The interruption influenced logical thinking and undertaking the tasks that had already been planned... the brain just went blank.* (CP)

Students acknowledged the importance of experiencing scenarios in which they might find themselves in the clinical environment. Being afforded the time to reflect on the pros and cons of strategies that could be used in an interrupted environment allowed students to gain insights into their own performance whilst in a safe space:

*It showed a realistic scenario in which I am likely to find myself after graduating, it allowed us time to break it up and analyse it, and reflect on positives and negatives and come up with strategies to perform better next time.* (IN)

*I can see that this is a very likely scenario and it has allowed me to reflect upon my own assumptions of my practice and how they can be challenged in order to develop my own clinical skills.* (MR)

*It allows for the opportunity to debrief and plan how you'd handle this type of situation in real life.* (CP)

As a result of being exposed to this reality-based scenario, students were able to reflect on how to use a variety of strategies. They displayed differing levels of insight into how to manage the interruptions, some described employing creative strategies such as trying to distract the confused patient or "striking a deal" (MR) with the interrupting nurse for assistance in return for checking her fluids. Several students expressed the need to "...offer help and work as a team..." (IN), rather than wait to be asked for help. Others were prescriptive in their appraisal, focussing solely on the "importance of performing the 6 rights" irrespective of what was happening around them. Some students simply stated that they felt "...prioritising care is essential" (OB), and however did not expand on what that meant to them.

#### 4.2.3 | Subtheme: Confronting the reality of self: building awareness of the manifestations of emotion and performance ability

Reflecting on, acknowledging and confronting emotions that may arise as a result of challenging situations are necessary as part of the process towards self-awareness and the provision of good quality and compassionate care. Once it was acknowledged by the students that loss of concentration and challenging emotions had occurred, the next crucial step was to be able to identify the flow on effects.

Linking poor concentration and difficult emotions such as frustration with lowered levels of care was identified by several students:

*It caused the RN to become frustrated, flustered at times, and nearing a state of [being] overwhelmed. There were moments when the RN nearly forgot simple tasks like washing hands and checking allergies because the intense stress she was under skewed her actions of practice. (OB)*

*I found it extremely difficult to concentrate on the main priorities and began to forget the basic needs for the patients. The interruptions were frustrating. (RN)*

The foundation for learning began during the briefing and role-play which was then built on during debriefing and further extended into the written reflection. The variety in strategy development was discussed during debriefing to encourage student reflection and identification of appropriate interruption management strategies for use in the clinical environment. The importance of exposing students to challenging experiences to improve knowledge and skills required in practice was identified by students:

*... it gave me an idea of how I can handle a situation where there are many tasks at hand, and to be able to keep calm. It also helped me to understand that during times of stress and pressure it is quite easy to forget many of the basics learnt... it was also a good revision of knowledge of how to handle this kind of situation in a safe environment; where mistakes are able to be made without anyone getting hurt. (MR)*

The possible negative manifestations that the stressful situation in which they had found themselves, and the frustration levels they may have felt, were reported by some students:

*There is a fine line between assertive and rude and this needs to be considered... I learnt to use other resources available to me. (CP)*

In these situations, expert debriefing is required to facilitate an understanding of how heightened emotions can manifest within stressful environments. It allows the opportunity to reflect on alternate strategies to manage and the possibility of improved outcomes:

*[debriefing] was an opportunity to brainstorm options. (MR)*

#### 4.2.4 | Subtheme: Connecting the dots: linking interruptions with making mistakes

Linking theory to practice is an ongoing struggle in undergraduate nursing education. This is especially true for interruption management during medication administration. It is accepted that well-

designed simulation experiences can facilitate improvement in bridging this divide often referred to as "closing the gap." The role-play simulation described in this study elicited student responses in which they reported being guided to make links to practice:

*Simulation is the platform where we can make mistakes, reflect, correct and learn as much as we can. It resembles clinical practice where we acquire, develop, and explore knowledge and skill into reality. I enjoyed my role as RN and experienced how interruption can interfere with the nursing role. (RN)*

The students made links between the interruptions they had experienced during the role-play and how their resulting emotional state might affect patient care and outcomes:

*Interruptions can be very annoying and time consuming that can affect productivity, patient's outcome and cause major consequences which may be costly and life threatening. (RN)*

Direct links between inadequately managed interruptions and the risks of errors were frequently reported by the students:

*The interruption affected concentration as I was unsure how to prioritise the task at hand, and it was hard to think about what should be done next. Important details in giving medications were easily forgotten... I may have made a medication error. (RN)*

These impacts were not only identified by the students as pertaining to the patient receiving the oral medications but also to the intravenous medication that required checking under pressure from another RN. Students reported a heightened understanding of their responsibilities related to appropriate and thorough checking of all medications, in all situations, and gained improved awareness of how easy it was to make a mistake:

*I could see how easily it could create an error in giving the wrong medication, not observing the patient actually swallow the medication and whether the nurse I was interrupting actually paid enough attention to what I was asking her to check. (IN)*

## 5 | DISCUSSION

This study reports on the effect that immersive simulation experiences and reflective learning can have on the student understanding of the impact of stressful environments on emotion and performance during the administration of medications. Nurses are expected to reflect both on and in practice in order to learn to navigate the



dynamic environments in which they find themselves and provide optimum patient care (Ebb, 2008; Schon, 1991). Written reflections and role-play simulations such as the one described in this study provide an opportunity for students to participate in this reflective process. They are challenged and empowered through the discovery of new knowledge, skills and strategies that they can call upon when faced with the real world of clinical practicum.

Patient safety related to medication administration involves more than just methodically working through the six rights of medication administration. Safe care and improved patient outcomes related to medication administration insist that nurses are cognisant of not only the patients' physical safety by attending to the six rights but also take into consideration the patients' emotional well-being by responding appropriately, and maintaining compassion and empathy (Daly et al., 2014; Straughair, 2012). This study fostered student reflection, facilitating thoughtful responses. Students reported improved understanding that choices they made when interrupted impacted patient physical and emotional well-being. Students identified the need for a holistic approach to care incorporating concepts related to empathy and compassion whilst maintaining a process for safe medication administration. Although not specific to interrupted medication administration, findings from another simulation-based study involving role-play also reported an improved concept of the need for holistic care (Kaddoura, 2010).

The ability to reflect on how to achieve holistic and compassionate care has been identified as necessary in the effective education of nurses (Straughair, 2012). Compassionate care, though accepted as fundamental in all aspects of nursing education as well as when providing quality nursing care, can however be eroded by organisational restraints specific to some nursing tasks (Flynn & Mercer, 2013; Pryce-Miller & Emanuel, 2014). This is especially true of medication administration where initiatives to reduce interruptions include strategies such as wearing tabards displaying the words "do not disturb" and the introduction of "no interruption zones" (Anthony, Wiencek, Bauer, Daly, & Anthony, 2010; Hayes et al., 2014; Relihan et al., 2010). Initiatives such as these can insinuate power and control over patients and contradict the understanding that compassionate care requires collaboration between the nurse and patient. Straughair (2012) identified that compassionate care includes working together with our patients, not assuming power within the relationship. Assumption of power in the nurse-patient relationship was observed within this study as some students playing the role of the RN were reported as attempting to manage the interruptions caused by the confused patient in an aggressive or rude manner. In circumstances where emotions led to these behaviours, expert debriefing was required to facilitate an understanding of how heightened emotions can manifest within stressful environments.

Identifying the risks associated with interruptions and inappropriate management strategies requires a depth of self-awareness whereby students are able to evaluate experiences in order to gain new perspectives (Horton-Deutsch & Sherwood, 2008). Effective communication between nurse and patient that conveys caring and compassion is key to not only ensure that patients feel empowered

within their healthcare journey but also to enable nurses to make sound clinical judgements related to the prevention or interception of medication errors. Unpacking the individual emotional impacts of stressful environments encourages links to be made between outside influences, emotional responses and their effects on patient outcomes. The pressure students were put under during this role-play led to a range of different emotional reactions both positive and negative including enjoyment, anxiety, frustration, anger and powerlessness. These were discussed during debriefing following the role-play, and then further reflected on in the guided written reflections to encourage deep thinking and improved self-awareness.

Compassionate, empathetic care is integral to both the perception and role of the nurse and results from the insightful meditation on experiences and the cultivation of self-awareness through evaluating performance (Sanso et al., 2015). If a nurse is able to engage with the feelings, needs and emotions of their patients at a more visceral level, empathetic and compassionate care is more likely to follow. These are critical skills that must be fostered in undergraduate nurses not only to enhance learning but also to improve patient outcomes. Participants in the role-play experience described in this study reported that students displayed a beginning understanding of self and the impacts of the nurse on the patient experience—the more stressed they became the more errors they made and the more anxious and powerless the patients felt.

Several students recounted displaying limited ability to perform safely in the face of interruptions. Although not specific to interruptions to the medication administration process, The Royal College of Nursing (2013) recently published a report in which nurses reported high levels of stress at work resulted in them not feeling able to carry out their work safely. Heightened emotions and displaying behaviours that directly resulted from being put under pressure were commonly reported as a direct result of the interruptions encountered during the role-play described in this study, including loss of focus, poor concentration and overwhelming feelings of frustration. The direct correlation between stress from working in pressured environments and altered cognition and performance has long been acknowledged (Reason, 1990). Many of the students reported attempting to prioritise the interruptions; however, they acknowledged that the stress they were under often derailed that process and resulted in errors being made. The link between interruptions, increased stress or pressure, the errors and possible consequences such as missing steps in the medication administration process were also made. Supporting students to make links between interruptions, loss of concentration and their consequences requires a response whereby they are encouraged through debriefing and written reflection to identify strategies to manage when faced with similar situations in the future.

Debriefing is an essential component of the simulation and reflective learning process (Arthur et al., 2010; Jeffries, 2005). Literature confirms that timely and appropriate debriefing leads to improved knowledge and skill levels that are readily transferrable from the classroom into the clinical environment (Cant & Cooper, 2011; Rochman, Aebbersold, Tschannen, & Cambridge, 2012). This

role-play, and the debrief that followed, facilitated the opportunity to discuss a variety of actions and reactions to the stressful environment in which the students had found themselves. It provided a platform for extended and considered reflection in the form of written reflections to deepen the learning experience. Openly discussing what it felt like to be either one of the two patients or the nurses in the role-play provided rich perspectives that revealed how powerless students had often felt in the roles. Students reflected that if the situation had been handled differently, effective communication skills could have been used so that appropriate empathetic and compassionate care could be achieved.

Best practice education that ensures newly graduated nurses are adequately prepared for practice has been a source of debate for many years (Tanner, 2010). It is essential that nurses gain insights into the links between lack of self-awareness, poor communication, inadequate management of interruptions and the risk of error. Introducing immersive and reflective learning experiences that encourage undergraduate nurses to develop a beginning understanding of the impact of stressful environments on emotion and performance in a safe environment may lead to improved patient safety during undergraduate training and beyond. This study demonstrates that students can gain otherwise unattainable insights into the patient perspective and providing compassionate care through facilitated debriefing of immersive simulation experiences and reflection on practice.

### 5.1 | Limitations

As this study took place in a single urban university, further work would be required in different settings to enhance potential for generalisability. However, there is potential for transferability. Although the high participation rates strengthen the study findings, individual interviews with the students could facilitate elaboration on some of the identified concepts and may provide a deeper understanding of the data collected and analysed from the written reflections.

## 6 | CONCLUSIONS

This study adds to the pool of current strategies that aim to reduce medication errors. It describes an innovative role-play simulation in which students were able to identify new strategies to manage interruptions, gain a deeper level of self-awareness and consider not only patient safety but how empathetic, compassionate care must be incorporated into tasks such as medication administration. Empowering nurses with the knowledge and skills required to manage in an interrupted environment at an undergraduate level increases the likelihood of transferring these skills as newly graduated nurses.

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### CONTRIBUTIONS

Study design: CJ, DJ, PMD, TP; Data collection and analysis: CJ, DJ, PMD, TP; Manuscript preparation: CJ, DJ, PMD, JD, TP.

### CONFLICT OF INTEREST

Three of the authors work within the research setting.

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## 4.3 Section two – Sequential confirmatory data findings

### 4.3.1 Introduction

The preceding section of this chapter provided three findings papers drawn from students written reflective responses collected following a simulation role-play in which they had been exposed to multiple interruptions while administering medications. This section of the chapter provides the findings from confirmatory data collected to enhance the validity and relevance of identified findings and themes (Creswell & Plano Clark 2007; Halcomb & Andrew 2005).

As previously described the confirmatory data comprises student semi-structured individual interviews, SFS and nursing faculty email questionnaires. The findings from the confirmatory data sets support and develop understanding of the written reflection data and are presented as they correlate to the original themes (tables 2, 3 & 4). Overall findings closely aligned with those from the written reflections, however, fresh insights were also revealed and are presented as new subthemes.

### 4.3.2 Summary of findings

#### Semi-structured individual interviews

After amended ethics approval, incorporating additional data collection methods, all students who had taken part in the role-play simulation were offered the opportunity to take part in semi-structured individual interviews. Data saturation was considered to have been reached by the end of the thirteenth interview as similar patterns of experience were described by interviewees. The interview process facilitated detailed descriptions of the student thinking that lay behind identified interruption management strategies, perceptions of the emotional and clinical impacts of interruptions and patient empathy. The interviews also highlighted the students desire to experience complex scenarios and gain experience by being put under pressure in a simulated and 'safe' environment. Fresh insights revealed student perceptions of the impact of the role they played, and the importance of post-simulation written reflections on the learning process.

### SFS data

The overall response rate to the SFS was in line with overall SFS response rates received by other faculties within the university (Kirkup et al. 2016); 38% (59:156) at one of the two campuses and 30% (13:43) at the other. Overall response rates include both qualitative short answer and Likert style questions addressing overall subject satisfaction. When drawing distinctions between the qualitative data specific to this study and the non-specific quantitative data, the qualitative questions were found to have received a much lower overall response rate than the Likert style questions. The number of students responding to each question ranged between 11.1% per question and 13.1% per question. The low response rate may have been as a result of perceived data collection repetition with students having undertaken the written reflections in the initial phase of the study. The impact of data repetition on SFS response rate was born out by one student who responded '*I have already answered this on the simulation reflection*'. A second possibility may have been that it takes less effort to complete Likert scale questions than qualitative short answer responses.

Despite the low response rate, the majority of respondents confirmed previous findings and were predominantly positive, outlining newly acquired skills and knowledge specific to managing interruptions during medication administration. They reported having enjoyed the experience and feeling more confident and better prepared for practice. As with the individual interviews student perceptions of the significance of the role they played in the simulation was reflected in the SFS data.

### Nursing faculty email questionnaires

The participant response rate for the email questionnaire was 100% (n=8). The questionnaire data comprised of 12 open-ended questions (appendix eight) and reinforced findings from the student written reflections. Nursing faculty described the opportunity for students to develop new interruption management strategies and a new awareness of the impact that interruptions can have on emotion and safe practice. They commented on the realistic nature of the scenario comparing it to their experiences in the clinical environment. They articulated the

positive impact the experience is likely to have on the students' ability to provide improved patient care when confronted with interruptions during medication administration in the clinical environment.

#### 4.3.3 Elucidation of the findings

The confirmatory data findings are presented as they relate to each of the three existing key themes and associated subthemes. The reader will find tables linking the key theme and its subthemes to confirmatory findings (tables 2, 3 & 4). New insights and resulting subthemes are presented under the relevant key theme.

The 13 semi-structured individual interviews are categorised in the text below using pseudonyms. Nursing faculty email questionnaires are categorised by participant number and appear in the text below demarcated as P1-8. Due to the level of anonymity of SFS's, there is no way of identifying and linking students' responses to each question. Therefore SFS responses are categorised by responses to each of the three questions. Question one received 22 responses, demarcated in the text below as 1.1 – 1.22, question two received 23 responses, demarcated in the text below as 2.1 - 2.23 and question three received 26 responses, demarcated in the text below as 3.1 – 3.26.

#### 4.3.3a Key theme: Calm to chaos: engaging with the complex nature of clinical practice

When undergraduate nursing students enter the real world of clinical practice, they are often confronted by an unexpected level of complexity. When undertaking newly acquired skills such as medication administration, underpinning knowledge and the ability to complete practical skills can be challenged. This theme describes the participants' initial responses to the interrupted environment during medication administration. It focusses on understanding the impacts of interruptions, fidelity of experience, initial strategy use, and student confidence levels.

Table 2: Key theme and initial subthemes: Calm to chaos: engaging with the complex nature of clinical practice

Key theme	Subtheme
Calm to chaos: engaging with the complex nature of clinical practice	<ul style="list-style-type: none"><li>o Experiencing complexities of practice: increasing knowledge, skills and confidence in the context of challenging environments</li><li>o Meeting workplace expectations: acknowledging the importance of prioritisation, time-management and planning</li><li>o Keeping it real: learning through immersive and enjoyable experiences</li></ul>

#### Subtheme 1: Experiencing complexities of practice: increasing knowledge, skills and confidence in the context of challenging environments

Students confirmed the connection between exposure to high-pressure simulations and feeling more prepared for practice, highlighting the opportunity to practice '*handling the stress of multiple distractions*' (1.18) as a valuable learning experience. Immersion in the pressured situation revealed knowledge gaps to students, which once revealed were described as useful in preparation for practice.

*'I definitely do [find it useful being put under pressure] because you don't know – unless you throw yourself in the deep end you don't know. You don't know how to prepare. You don't know what to expect.'* (Hannah)

Having identified knowledge gaps, students also reported new understandings, or 'knowing how' to approach interruptions in the future. The value of experiencing interruptions in the simulation environment provided previously unavailable opportunities to the students resulting in the suggestion of improved confidence to face the clinical environment.

*'Acting it out in real life I think will help me in the future. I was the RN trying to administer the medications. And I feel like I have at least experienced once now, and will know how to better prioritise and act in a safer manner. I think it was the most valuable simulation I have ever taken part in.'* (1.12)

Nursing faculty also acknowledged that the simulation had highlighted the complexities associated with the administration of medications and that the experience had been instrumental in increasing student understanding of interruption management strategies.

*'I think it [the simulation] assisted enormously, especially in knowing how to manage distractions....it was a reminder of how difficult medication administration can be in the clinical area.'* (P2)

The importance of experiencing a reality-based simulation was validated by students who then demonstrated a deeper understanding of what they may face in the clinical environment. They equated this understanding with a newfound level of assertiveness, confidence and at times power. Confidence, assertiveness and perceived power were considered by students to be a positive step towards professional practice and patient safety.

*'It put into reality what can actually happen. I feel I have more power/confidence to act assertively in a professional and safe manner, if I was in such a situation.'* (3.14)

Students reflected on how the experience had changed their frame of reference regarding what is involved in administering medications. Having learnt the theory of medication administration and having practised uninterrupted medication administration, they thought that they were adequately prepared to administer

medications safely. However, the role-play simulation revealed to the students that the reality of practice was likely to be quite different from what they had previously expected or understood it to be.

*'I think what really struck me from the whole thing is that was not something that I had been prepared for. Because of course in class, you go through the procedures, and everything just works really smoothly because it's just theory. That whole experience made me think about it might sometimes work like that in real life, but often times it doesn't. I didn't feel prepared to deal with that.'* (Emily)

While developing the simulation role-play, the level of pressure students would placed under was considered to be appropriate to their course stage within the curriculum. However, students surprisingly reported that they would have benefited from being put under even more pressure.

*'I would have enjoyed it a little more had we been given a little more pressure and expectations.'* (1.8)

Some described the need for increased pressure in simulated experiences as an imperative before facing similar stressors in the real-world clinical environment. They saw the pressured situation as the impetus to reflect on performance and gain new knowledge about the procedure itself but importantly a new level of self-awareness.

*'I personally would like more pressure because I really feel that when you're in those situations, you have to think clearly and be calm, and those are the situations that you're going to reflect on afterwards and think, oh, I could have done this, I should have done that better. I like those situations; I think you learn a lot about yourself in them.'* (Lorna)

The impact of experiencing a dynamic and interrupted environment on cognitive processes was reported, reinforcing previous findings from written reflective data. Students described having lost focus resulting in cognitive chaos.

*'The moment you lose focus, that's it. All bets are off. You've completely lost it.'* (Matt)

Academic staff also reported the negative effect the interruptions had on student cognitive load. The increased pressure leading to loss of stream of thought and errors of omission.

*'The interruptions themselves which lead them [the students] to stop what they were doing and therefore 'lose their step' on the process or simply forget 'a step' in the skill.'* (P3)

Students reflected on what they would reasonably expect to happen when interruptions occur and were able to consider concrete task-based actions that could be taken to counter the cognitive impacts on safe practice.

*'Normally when you get interrupted on something you lose your flow of thought, lose your concentration...you find yourself having to think about your safe practice and that you are going through your checklists and trying to work through those steps. Interruptions are definitely a distraction you know you have to go back to the start and start again.'* (Jackie)

Other students described the need for a versatility of thought and flexibility that allowed them to switch between tasks or multitask if the situation arises.

*'I think you need to be able to focus on the one thing that you are doing, but also be versatile enough to alter that train of thought if something else pops up....I think you need to learn to focus on one thing but be able to diverge and change your plans quickly.'* (Hannah)

As with the written reflections, multitasking was brought up during the student interviews as a strategy to manage interruptions. Students who mentioned multitasking were asked what they understood by the term. While identifying multitasking as a requisite skill for nurses, students felt it was the domain of the experienced nurse. Some students considered that multitasking during medication administration was currently outside their scope of practice, however recognised that the ability to multitask safely would develop over time.

*'Multi-tasking is something that you have to do as part of the job really...it's just something that comes with being more competent about what you are doing. So you are able to layer activities based on your level of competency with like giving the medications so if you're competent at that, then you are able to take on more multitasking roles.'* (Jackie)

Contradicting the written reflections, some students described multitasking as a poor strategy when administering medications, citing the associated risk of error.

*'It's hard when you're doing medications. I don't think that when I'm multitasking medications are one of the things I want to start multitasking with, juggling because it's - that's when errors happen.'* (Maggie)

To be able to multitask effectively and safely one needs to be able to use clinical reasoning to make sound clinical judgements. Nursing faculty explained how teaching clinical reasoning can be difficult. The simulation had provided a previously unavailable practice-based opportunity for students to gain essential clinical reasoning skills required for practice.

*'I think that simulation learning experiences have helped students develop and improve their character in becoming competent registered nurses. While as academics, we give knowledge and teach clinical skills, putting these together and encouraging clinical reasoning can't always or easily be taught; instead they are learned through experience and practice. Simulation provides a safe and encouraging atmosphere for learning and the development of students' clinical reasoning.'* (P7)

#### Subtheme 2: meeting workplace expectations: acknowledging the importance of prioritisation, time-management and planning

Both nursing faculty and student participants reiterated findings from the written reflective data as they described a range of interruption management strategies that were either observed or discussed during the simulation process. Strategies such as prioritisation, teamwork and communication were clearly articulated. Students commonly identified prioritisation as a key management strategy for timely and definitive practice.

*'I think that prioritisation is actually the first thing I thought of, because you just can't do everything at once. Being able to look at a situation where there's a lot going on, and it's all important, that it can't all be equal, you have to choose which is the most important and just get going with it.'* (Emily)

Students elaborated on what prioritisation meant to them, describing the need for situation and self-awareness coupled with a grasp of procedural and propositional knowledge.

*'Prioritisation for me is 1. recognising the situation you are in, 2. What you have to do, 3. What you have got to do to achieve that, 4. What have you got that you can use around you.'* (Matt)



Nursing faculty observed the students attempting to use multiple skills and strategies in tandem to manage the interruptions, identifying elements of both the art and science of nursing in action.

*'The students attempted to address the interruptions and utilise problem-solving skills in an attempt to resume the clinical skill of medication administration safely. The need to problem solve, prioritise the immediate interruption, access resources and communicate with patients and colleagues became evident when trying to enable the administration of medications to continue safely.'* (P8)

Some students had been able to think laterally to achieve their goal of medication administration. Varieties of creative strategies to manage the confused patient were reported, facilitating effective management of both patients simultaneously.

*'Distract the [confused] patient....allowing the patient to stand with them while doing the task.'* (P4)

Effective communication and empathy were central to the success of some of the creative strategies that the students employed.

*'She [the student administering the medications] sort of came over and calmed me [the confused patient] down and also the props that we had as well, we had the bag and we had the wig and stuff like that, she sort of used the bag as a tool to keep me in where I was. Sort of said, here's your bag, you can sit down, calmed me down in that way, which worked... So that was sort of - speaking to me - that's what she used. She did a really good job.'* (Lorna)

According to nursing faculty the level of student insight into how to manage the interruptions varied. As would be expected of nurses with limited clinical experience on which to draw, nursing faculty reported that they had felt that many of the students were *'...very skill focused...'* (P3), others noting that *'very few [students] had a clear strategy of how to deal with the entire scenario.'* (P6).

The varied student responses to the different interruptions were discussed during the student individual interviews to elicit which if any of the interruptions they had found the most distracting. Several of the students reported why they felt the confused patient had been the most difficult to manage.

*'Definitely the [confused] patient; definitely the patient climbing out of bed causing chaos.'* (Mike)

*'I found the confused patient the most distracting because she was the loudest.'*  
(Emily)

The difficulties described in managing the confused patient may have been the result of limited time in the clinical environment combined with either the students' course stage within the curriculum or limited simulated opportunities to practice managing confused patients. However, one student noted that she had thought through possible strategies to manage a confused patient at home before attending the simulation and that the student playing the role of the administering RN in her simulation experience had not. Perhaps this is another reason that some students found managing the confused patient (as described by 'Jan' below) more challenging.

*'I think the more challenging is the patient, the confused patient...when I prepared for the simulation at home, I thought if I was the RN I will ask the interrupting nurse to help with the confused patient, but my group mate, my RN, didn't do it [the preparation], so I think it's more challenging for her.'* (Jan)

The importance of effective communication, when faced with scenarios such as this, was established in the original findings and was strongly supported in the confirmatory data. Students reflected on and appeared to understand the significance of effective communication skills as a general imperative for nurses.

*'You really do have to have fantastic communication skills otherwise you'd just die. You just will not be able to do your job at all...You have got to use effective communication skills that is like number 1 for nursing. You cannot get away from that.'* (Matt)

The simulation drew out of the students a recognition of elements of the art of nursing. The understanding of the impact of human interactions was clear as they began to describe the need to take the individuality of both patients and fellow staff members into account when providing care.

*'I feel like the actual nursing skills is 10-20 per cent of the whole nursing care and then 70, 60 per cent is actual human interaction skills and dealing with different personalities and characters.'* (Jenni)

Effectively undertaking the task of medication administration while managing multiple patients is often expected in practice. Members of nursing faculty noted the importance of students having the opportunity to practice effective

communication within the healthcare team to support the growth of clinical decision-making skills while managing multiple patients.

*'Combining the practical, clinical skill of medication administration, along with the important skill of communication (simultaneously across two patients and another nurse), leads to decision-making around prioritisation and time-management.'* (P3)

### Subtheme 3: keeping it real: learning through immersive and enjoyable experiences

Students described the realistic nature or fidelity of the role-play experience as being enhanced by replacing what would traditionally have been a role earmarked for a high-fidelity manikin with a student. Students reported that the simple change from manikin to student in the role of the patient had facilitated deeper immersion in the reality of the stressors they were facing and may face again.

*'In the simulation, having her [the student playing the first patient role] actually there, and especially having the other patient being an actual person too, it really made me - it made it feel very real, which was very helpful because instead of me thinking, oh I probably would have had felt stress, I can really remember feeling that stress and not wanting to feel that again.'* (Emily)

Students highlighted the importance of realistic, dynamic environments in which to practice responding to, and engaging with, real people as a situation unfolds.

*'I think you need the interaction with other people. Because when you're in clinical situations, it's a human environment that's fluid and it changes the whole time...that's what's really good about it. You get a chance to be in that situation...everyone has a responsibility in their part of the simulation.'* (Matt)

Enhancing believability in simulation provided the opportunity to reflect on previous clinical experiences and draw new meaning and understanding from them. As such, the believability of this simulation was described by students as resulting from it being closely aligned with what they had previously experienced in clinical practicum.

*'I remember saying when it finished this felt like a lot of scenarios on my previous clinical placement, the one before that was a really busy ward where I would constantly have people from other beds saying nurse, nurse, can you help me*

*get out of bed, nurse, nurse can you take me to the toilet? That's exactly what that scenario in class felt like, that I was trying to do something and that I had three things that I was trying to focus on. I thought that was quite realistic.'* (Ruth)

*'It's realistic. It is. Based on my experience on real clinical placement, it [interruptions] always happens.'* (Jan)

Other students who may not have experienced this situation in previous clinical practicum recognised medication administration as fundamental to the nurses work day. However, as a result of the simulation, they were able to transport themselves to a place where they could realistically expect similar interruptions.

*'I think they were realistic interruptions. That's something I guess could happen any time really. I mean giving medications, you're going to give medications every shift that you're on. Someone else trying to help you check something, that's going to happen every day as well I imagine.'* (Tim)

Along with high levels of fidelity, enjoyment when undertaking learning experiences can be helpful in cementing both the memory of the experience and the learning elicited. Students and nursing faculty both described the role-play experience as an enjoyable way to practice skills.

*'It was really good practice which I really enjoyed.'* (Matt)

*'This was a valuable and enjoyable experience for both the learners and myself.'* (P4).

Coupled with the enjoyment of the experience nursing faculty highlighted the importance of learning experiences that take into account the learning environment and practical elements such as time limitations.

*'This was a very 'fun' and 'practical' way to learn a number of skills in a small simulated, but realistic time frame.'* (P3)

New subtheme: Simulation world to real world: linking simulation to changed practice

Demonstrating a direct link between undergraduate simulation experiences in the university environment and changed practice when on clinical practicum has traditionally proved difficult. However, some students in this study described changes in their practice related to patient empathy. The opportunity that this simulation provided for the students to 'be the patient' was valuable in that it

produced a real and lived understanding of the patient perspective which facilitated changes in practice.

*'I definitely think that [the role of the patient] it's an important part of the experience because it definitely gave me a different perspective. Even now, just thinking back to the other day when I was working as an AIN, and I had a patient who was confused, he was continually asking the same questions every time I walked onto that room of the ward, I understand him doing that more because I played that role.'* (Lorna)

Other students explained how what they had learnt the simulation had translated to changed practice specific to newly acquired assertiveness and confidence to fulfil the task of medication administration safely.

*'On clinical placement when I was preparing medications under the supervision of an RN, I have been interrupted many times by patients' family members or other staff but have stood firm and told them that I am currently busy with medications. This type of confidence is something that I have gained from the simulation.'* (3.3)

#### 4.3.3b Key theme: Learning to liaise: teamwork for positive patient outcomes

The second theme 'Learning to liaise: teamwork for positive patient outcomes' and its sub-themes are found below in table three. This theme describes undergraduate nurses understanding of their role within the healthcare team and the role of other members of the healthcare team when managing interruptions to medication administration.

Table 3: Key theme and subthemes: Learning to liaise: teamwork for positive patient outcomes

Key theme	Subtheme
Learning to Liaise: teamwork for positive patient outcomes	<ul style="list-style-type: none"><li>o Considering the team: gaining an awareness of the roles of others</li><li>o Engaging effectively: recognising the relationship between staff interactions, collaboration and patient safety</li></ul>

#### Subtheme 1: Considering the team: gaining an awareness of the roles of others

Irrespective of the role they had played students described placing themselves in the shoes of their peers. Students commonly articulated empathy for, and towards, the students who had played the demanding role of the administering nurse which was perceived by the students as the most stressful/difficult role.

*'I think we could all sympathise with the RN who was trying to juggle all the tasks...I personally could sympathise with him because I feel it's difficult to do all these things at once.'* (Holly)

Correspondingly, those who had undertaken the role of the administering nurse reported that their peers had effectively communicated a level of empathy towards them.



*'The distracting RN said she felt really bad trying to distract me...The breathless patient said she felt really bad for trying to distract me as well.'* (Ruth)

## Subtheme 2: Engaging effectively: recognising the relationship between staff interactions, collaboration and patient safety

Students confirmed findings from the earlier written reflective data describing how the relationships within the team had impacted their ability to engage in effective teamwork. They described relying on collaborative approaches which they described as knowing when and how to ask for help, highlighting the importance of being able to *'delegate where possible'* using assertive and timely decision making within the team to achieve their goals.

*'She [the administering nurse] got another nurse in to try to help her deal with the situation. She just said this is what we need to do...if you just take them to the toilet while I deal with this patient.'* (Hannah)

Some describing multiple instances of delegation throughout the simulation.

*'Towards the beginning of the simulation I got the second RN to go and help with the patient that was trying to climb out of bed, so I tried to delegate that to her, and then asked her to help with something afterwards.'* (Tim)

Several students reported negotiating, compromising or bargaining with the other students in their team to facilitate care for the patients.

*'I just thought it was a great opportunity for someone else to give me a hand. I just turned around and said look, can you help me out? I'll help you out when I'm finished here, but I've just got a bit of a situation.'* (Matt)

Interruptive and challenging patient and team member behaviours led students to recount the collaborative skills that had been required to achieve goals. They linked effective negotiation and collaboration within the team to outcomes.

*'She made a compromise with another nurse to take me to the toilet so that I would stop being as loud...Just making a deal that she will check the fluids... she said [to the interrupting nurse] to take me to the toilet and then I'll do the fluids. So she made an agreement.'* (Caz)

Negotiation skills or a *'quid pro quo'* approach was also observed and reported by nursing faculty as a first line strategy often used by the students to enlist the help of the team.

*'They [students] would 'make a deal' and say, to the interrupting nurse 'if you help me first, I will check/sign your IV medication with you.'* (P1)

However not all students had the same experience. Some who played the role of the administering nurse had not thought to ask for help from their team. One student acknowledging that despite feeling that their fellow students had empathised with their plight and recognised that they were feeling out of their depth and unable to make clear decisions, this did not translate into action. The student did not ask for help and their team member did not offer it.

*'The girl who had that role [interrupting nurse], was like, I really felt like I should have gone in there and helped.... she just felt really bad for me. I think it's because she felt like - she could see that I was really struggling, not only to deal with both [patients] but that I was very out of my depth and I didn't know how to - it wasn't that I just didn't have enough time, it was that I didn't actually know what to do in the first place. She could see that I knew that I had to give meds, but I wasn't sure which one, but I couldn't quite remember. She knew that I should prioritise, but I didn't really know how she could see that I was indecisive, and she was just adding to that.'* (Emily)

The failure of the team member to offer help was seen as a lack of insight which added another layer to the student's emotional response to the simulation. The student continued by reflecting on the possibility that the situation could have been improved if other team members had displayed deeper insights into the situation of those around them, intimating that help should have been offered.

*'I was really frustrated at the other RN because I was like, can you not see that I really need some help? It's really obvious. So, I guess I just felt like everything would have been so much better if she had just seen I really needed some help'* (Emily)

When asked to reflect on how they might respond if faced with similar situations in the future, students described the importance of recognising when they were 'out of their depth' or working beyond their capacity for safe care. Teamwork, especially knowing when to ask for help from the team was acknowledged as an important strategy to manage the situation.

*'Teamwork, definitely... to show that you're - so you were prepared to ask for help, that you weren't alone, that you knew when you were in over your depth and to come in and get someone to help you.'* (Mike)

Along with recognising the need to collaborate, ask for help, delegate, and negotiate as significant elements of teamwork, insights related to being proactive in offering to help when they see a team member who may be struggling were also described.

*'I mean we're all supposed to follow DRSABCD so as the interrupting nurse if I saw what was going on and the managing RN was not picking up on it, as the interrupting nurse, I could then step in.'* (Mike)

Evidence of poor leadership and the negative impact on other members of the team was also identified.

*'She [the IN] felt a bit bossed around – it's supposed to be teamwork, let's look at the situation together, but instead it was just, you do this'* (Hannah)

For those students who experienced evidence of poor teamwork during the simulation, it had been the impetus for them to reflect on how the situation could have been approached differently. The association between teams that function effectively and the impact on patient experience were expressed.

*'With good, positive communication – teamwork – conversation rather than a lecture – then the other nurse wouldn't have been so miffed and would have been happy to help.... that would have passed on to her patients and the other nurse and spiralled down'* (Hannah)

New subtheme: Role allocation: taking it in their stride

As previously noted, new insights emerged from the confirmatory data with students describing the importance of each role to the learning experience. Much of the discussion revolved around the role of the administering nurse, with several students describing a desire to play the role of the administering nurse yet acknowledging the opportunities to learn by observing others in that role.

*'I think I would quite like to have played the registered nurse because it's a safe environment. Even though I was not the registered nurse, I was just able to experience it, I would rather be in a simulation experience having that, than be on a ward as a registered nurse doing it... you can learn a lot as an observer, as a patient, as another registered nurse, just by watching someone else in that situation.'* (Lorna)

Gaining new insights and understanding through observing were echoed by several students. They indicated that by eliciting other student perspectives of

the varying roles they didn't have to be in a particular role to be able to learn from it.

*'Whether it is the patient.... or the observer... or the RN.... because everyone has a part in it. So, you get a bit of information off everyone which I think is really important from their own perspective'. (Matt)*

When reflecting on the experience in the individual interviews, the intricacies of each role were often related by the student to how they had impacted the administering nurse role. The idea that they would one day be faced with similar situations was the impetus to look for learning and strategy development irrespective of role.

*'I was thinking about the person who was playing the RN and about how I would deal with it if I had to deal with a patient that was me. So, I think it doesn't matter what role you are, we were all thinking, we're going to be that RN, regardless if we get it [that role] or not what are we going to do if we were in that situation' (Hannah)*

Unlike the students who took part in the individual interviews, some of the SFS respondents reported that the simulation would have been more valuable to their learning if they had the opportunity to play the role of the administering nurse.

*'I played the role of the main RN, but I don't know if others benefited' (3.19)*

*'I would have liked to change roles and have a chance at experiencing being the nurse' (3.23)*

Interviewed students were asked how the different roles were allocated. Some of the students revealed that as a result of being slow to request a role they had been allocated their role by nursing faculty. The students who received the role of the administering nurse reported it as a positive opportunity to be challenged with a difficult scenario that they may face on clinical practicum.

*'It was given to me. I put my hand up last, so everyone else got to pick first...I actually didn't mind it because that's the sort of thing that you will probably face anyway, so it's kind of good to get a bit of a heads up on what it actually feels like before you are in the actual health care setting.' (Emily)*

The students who made a deliberate choice to play the role of the administering nurse reported that they had done so as they thought the challenge of that role might support their transition to clinical practicum.

*'I chose that role because I wanted to have the exposure I wanted to go through a simulation of what it would be like in real time to experience when you're doing a medication round because obviously within shared rooms there's other patients there's other nurses coming to ask questions, there's lots of different interruptions while you're administering medications so I really wanted to experience firsthand what that would be like so that if it did happen in practice that I hadn't experienced it and knew had spent some time reflecting on what I could have done better.'* (Jackie)

Other students reflected on how the experience of playing the administering nurse role had facilitated an understanding of what it might be like being in the shoes of an RN on a ward. They translated their new understanding from the task of medication administration to include other nursing tasks that may be interrupted in the clinical environment.

*'It was valuable to be the person playing the registered nurse who had been interrupted. Playing this role allowed me to feel exactly how an RN may feel while doing important tasks on the ward.'* (1.8)

#### 4.3.3c Key theme and subthemes: Pondering practice: enhancing the art of reflection

The third theme 'Pondering practice: enhancing the art of reflection' and its four sub-themes are found in table four. This theme describes the effect that the reflective process can have on the undergraduate nurses' understanding of the patient experience and how stressful environments impact their emotions, performance and ability to implement safe administration of medications.

Table 4: Key themes and subthemes: Pondering practice: enhancing the art of reflection

Key theme	Subtheme
Pondering practice: enhancing the art of reflection	<ul style="list-style-type: none"><li>o Reflecting on the patient perspective: gaining insights into compassionate care</li><li>o Evaluating performance: identifying, consolidating and integrating management strategies</li><li>o Confronting reality of self: building awareness of the manifestations of emotion and performance ability</li><li>o Connecting the dots: linking interruptions with making mistakes</li></ul>

#### Subtheme 1: Reflecting on the patient perspective: gaining insights into compassionate care

The data arising from the individual interviews in relation to this subtheme was extensive. The students described a burgeoning understanding of the patient experience. Evidence of patient empathy emerged showing a beginning understanding of the vulnerability of patients. Students reported feeling a range of human emotions including; fear, frustration, anger and empathy.

Fear as reported by those either in or observing the role of Teresa Green resulted from the scripted exacerbation of asthma. Being reliant on the nurse to provide the required medication produced feelings of powerlessness and acknowledging how 'scary' the situation was developed new levels of patient empathy.



*'She [the student who played the role of Teresa] said that putting herself in the patient's shoes she felt really scared. She felt quite helpless, and she felt scared because she knew that she was in huge trouble and nothing was being done... Obviously she's not going to be thinking about the other RN. She's probably not even going to notice the RN or the confused patient. All she knows is, I can't breathe, and I need my Ventolin, and she's not getting it. It was really scary because she just felt like there was nothing that she could do.'* (Emily)

Powerlessness and loss of control were also described in relation to the confused patient role. Students described experiencing what it might be like to have physical or cognitive limitations and have some else in control of what was happening to them.

*'It was just having the experience of how confused patients' feel because you don't have much control with the nurses.... I suppose as a patient you don't have much authority to do things. Yeah, I was very limited in what I could do. ... [I felt] very restrained.'* (Holly)

The challenging behaviours displayed by the confused patient escalated as their needs remained unmet. Students described the frustration that they felt as a result. They displayed a rudimentary understanding of the complexity of caring for confused patients, citing the exacerbation of challenging behaviours and frustration that can result when faced with environments and situations that are unfamiliar to them.

*'I think I sort of understood the patient - as a confused patient, I sort of understood why that would be frustrating to be like that because you're in an environment that you don't really know, and you're also wanting attention, and you're not getting it. So, frustration.'* (Lorna)

Empathy requires that a nurse can see things from the perspective of others, show an understanding of the patient situation and experience while acknowledging and responding to individual patient needs and perspectives. The opportunity to inhabit the patient space and as a result gain firsthand experience of what it felt like to be in the place of a patient was identified by the students as having a direct impact on their level of empathy.

*'I think having the patient experience is good... the experience of being in the patient role is helpful because it does give you a bit of empathy.'* (Ruth)

Effecting student engagement in the role of the patient prompted a consideration of what it meant to be a patient and facilitated a broadened understanding of what it takes to provide compassionate patient care.

*'It's really good to be in the patient role ... to be in the position of the patient - I mean literally - it makes me be more observant and more thoughtful when providing the care for the patient.'* (Jan)

Some students revealed that the simulation had prompted them to consider how their personal life experiences might impact their ability to provide patient care. Acknowledging gaps in personal experience, noticing how they may differ from their patients lived experiences, and linking that to the opportunity to build experiential knowledge.

*'I think these simulations are useful in making nurses or future nurses experience what it's like to sit in a bed as a patient. Because a lot of us haven't been patients' in a hospital, we did experience a little bit of the power taken away. We have to take off our shoes, wear a gown and just have a - like you don't know where you are. You're confused about the environment. You don't know where things are kept and stuff. I think simulations are very useful in that we do gain the experience of what patients feel like.'* (Holly)

Not all the nurses interviewed were able to recognise and embrace the patient perspective. One student who had played the role of the administering nurse recounted that her focus had remained on administering the required medications in a timely fashion without interruption. Interestingly, while she acknowledged that the student playing the role of the confused patient had felt neglected, she showed little empathy nor insight into the impacts of unfamiliar hospital environments on confused patients who may be displaying challenging behaviours. Indeed, she was unable to move past her workload requirements, expecting that patients should be able to see things from the nurses' perspective.

*'The confused patient, she said that she felt really neglected like no one cared about her... The thing is if I would say from a patient's perspective, I would have been patient and let the nurse do their job and then when they're ready they will come to me because I know nurses are super busy and they have a huge workload. I wouldn't want to, nurse, nurse, can you do this, can you - because I know how busy nurses are.'* (Jenni)

In contrast to the individual interviews data, the SFS data was limited in relation to insights on patient empathy, providing limited perfunctory responses.

'I think I have learnt about patients' safety and respect.' (2.15)

## Subtheme 2: Evaluating performance: identifying, consolidating and integrating management strategies

Debriefing following any simulated scenario provides participants with the opportunity to evaluate their performance. During the debriefing of this role-play simulation, the students were encouraged to identify how they felt the interruptions to the medication administration process had been managed. Once the initial strategies had been identified and discussed, students were encouraged to consider them together with alternate options and new management strategies that might be helpful in the future.

Students and nursing faculty reinforced the previous findings from the written reflective data. They described the debriefing process as an opportunity for student-centred peer to peer learning that facilitated analysis of the experience, cementing their learning.

*'It [debriefing] helps you take a step back and reflect. I think you have to reflect on anything you do, any sort of practice. It's like how can I do that better? Or what were things that were quite ordinary? Maybe there's a different way of doing that? Is there any ideas of someone else that was involved in the experience that could add to what was done or any ideas that I've got or they can expand on.'* (Matt)

Several students described the debriefing as having provided them with the opportunity to 'take a step back' and regather their thoughts and emotions. Having struggled to remain calm during the role-play scenario itself, deconstructing the experience in a less emotionally charged atmosphere was reported to have enhanced objective reflection.

*'I think just being able to take a step back from the situation, because everything is happening quite fast, and you want to work fast, but if you get flustered you can't just stop and just objectively see everything.....It's being able to work through it step by step instead of just feeling really stuck in that stressful emotion.'* (Emily)

Debriefing facilitated the opportunity for the discussion of new strategies. Students related several new strategies they had learnt and hoped to translate into practice.

*'The fact that I could have been given some magazines or something to distract or ask to help fold the towels. That was a strategy that the first RN could use to kind of keep me - like not be as distractive...I think the distracting the patient was a good one because it's not something that I would think of myself. I wouldn't think of that... those strategies of getting the disruptive patient to fold towels or something like that I may use in the future.'* (Caz)

Nursing faculty described the post-simulation debriefing as a time that the students had engaged in discussion. They noted the importance of peer learning to build strategies for future practice and manage emotion.

*'I feel it [the simulation] has given them [students] insight into common situations they will be faced with ... as a group, they were all able to discuss their feelings and better strategies to deal with this. Having this exposure will assist them in practice, as it pulled them out of their comfort zone.'* (P5)

### Subtheme 3: Confronting reality of self: building awareness of the manifestations of emotion and performance ability

This theme saw powerful emotive responses from students in the written reflections, with students reporting feeling frustrated, flustered and overwhelmed. Similar feelings were reported in the confirmatory data. Students feeling overwhelmed and out of their depth was commonly reported. For some students the fidelity of the simulation had facilitated full immersion and resulted in confronting emotions being felt, reported and discussed.

*'I immediately actually started to feel a bit out of my depth. Even though it was a simulation, I still felt really frustrated...As soon as I don't feel like I know exactly what I am doing, anything else that then comes in and starts distracting me I kind of feel like, oh, I don't know what I am doing anymore...I didn't handle it very well. I actually just got completely overwhelmed. I was like, I don't even know - because I have to have a structure...So I guess I just felt like I just felt really overwhelmed.'* (Emily)

Having felt overwhelmed by the cognitive and physical demands of the simulation, some students reported being unable to effectively function or complete the task which led to overriding anger.

*'Harassed...I felt really like annoyed because I was trying to find the medications that were on the list that I had to give - try to give these medications...there was the confused patient and the patient that I was giving the medication to kept asking me things and although it was awkward I was like just stop and let me get the medications. So harassed is probably the word I would - annoyed. Harassed and annoyed.'* (Ruth)

The overwhelming nature of the situation for others was reported not as anger but as stressful with feelings of disappointment with their performance and ability to cope.

*'She [the RN] said she was stressed; she was disappointed that she wasn't able to cope. She was overwhelmed, and she just shook her head afterwards and just didn't know how to deal with it. She was overwhelmed and sort of exasperated by it.'* (Mike)

The limited opportunities available for students to practice the skill of medication administration was highlighted as a reason for their anxiety in this simulation.

*'Oh, I definitely had a heightened level of anxiety because you know that clinical experience of medication is something that as a part-time student, I don't get a lot of clinical exposure to.'* (Jackie)

The frustration levels that students reported were reinforced by nursing faculty. However, nursing faculty also described a previously unreported reaction to the level of stress. The interrupted environment was noted to have produced some unexpected and at times aggressive behaviours in some students. Defining what constitutes aggressive behaviours may have differed between the nursing faculty and students. *'Ignoring the patient'* or *'pulling curtains across'* to hide the disruptive confused patient from view may not have been perceived as aggressive by the students but was seen as aggressive by nursing faculty.

*'Ignoring the patient...physical strategies, manhandling.'* (P7)

Further to this, faculty observed that the desire for some students to complete the task in a timely fashion raised anxiety levels to the point where they identified that some of the male students resorted to physical restraint and verbal hostility to control the confused patient. These physically aggressive behaviours were disclosed as gender-specific and were not reported by the students.

*'They [students] got quite anxious at times having someone come in and asking to check fluids and asking for assistance while trying to identify the patient, have the right medication and fulfil the six rights ...some of the male students became quite aggressive verbally and physically with their approach.'* (P6)

Not all of the students were reported to have had such heightened responses. Students' noting that some remained calm and managed well with the task of administering medications despite the stressful situation.

*'I didn't think she did any errors or anything like that. I found her to be quite calm throughout, even though it was, I think, quite a stressful situation.'* (Lorna)

The calm nature of some was attributed to the understanding that this was a simulated scenario. Therefore, they expected to be challenged in what is considered to be a 'safe' learning environment.

*'I think she [the RN] was aware that that's simulation, so she was quite calm.'* (Jan)

The advantage of previous nursing experience as an enrolled nurse (enrolled nurses in Australia can undertake endorsement for the administration of medications) was noted by some students. The students identified this previous nursing experience as significant in how well their peers were able to manage the situation and the resulting emotions of working in pressured environments.

*'My scenario they did it quite well. But I think she works as an EN [enrolled nurse]. I think she might have a little bit more experience just knowing that that does happen in real life. So, I think she was a little bit better and she handled it really well which is why she actually took that role [administering nurse].'* (Caz)

Students also reported a positive correlation between previous life experience outside of nursing (in this case motherhood) and managing stressful situations. At the same time, they recognised the impacts and limitations associated with their own life experiences.

*'My peer...she said that because she's a mother of three children all under the age of five she's used to it, and she would know how to deal with it. But with me, this is not something I'm used to.'* (Jenni)

The ability to manage the interruptions was reported as inversely proportional to the number of interruptions. Students reported that as the number of interruptions increased so their ability to manage them decreased. For some, the cognitive



load became so great that they could no longer continue with the task, at which point the scenario was discontinued, and debriefing commenced.

*'When I was dealing with the first patient, giving the medications, I was like, okay, this is fine. So, I was just doing it like I'm a sheep, just doing it and then as soon as someone started interrupting me I kind of felt like I'm out of my zone... When the interrupting nurse was saying, oh, could you - was it signing...Yeah, I said, when I'm done with the medication, I'll come back to you and then I told her to wait. So, I thought, okay, this is all right. Then the other patient that was trying to get my attention. She wanted to get up I think, and she kept persisting. Then in came three people trying to get my attention at the same time and I was thinking, oh no, I'm just - what do I do now, because we've always been taught we have to prioritise. But at that moment you didn't have the time to think about what you want to prioritise. You just have to prioritise... So, I just shut down completely, and I just stopped doing everything. Then the tutor was like, okay, end of scenario because I wasn't coping.'* (Jenni)

Confusion was another confronting emotion for the students. There were students who disclosed that although they knew that they needed to prioritise struggled to execute effective prioritisation in the dynamic, unfolding and difficult situation.

*'I think it [the interruptions] did make it a lot harder to do my checks for the medication...I guess it was trying to help everyone, but I just couldn't do it. I wasn't capable of doing all those tasks at the one time...The thing I guess I was confused about was where do you prioritise...So I really tried to put most of my attention into getting that [medication administration] done and not getting confused with the checks or missing things.'* (Tim)

Students did, however, describe new levels of situation and self-awareness specific to working in a pressured environment. They recounted how the situation had unfolded for them including their thought processes, their level of stress and frustration. Students recognised their emotions were tied up with expectations of themselves as well as the patients they were caring for and were able to see the positive impact the simulation had on self and situational awareness.

*'I think there was more frustration in my stress than I thought there would be. I felt really ticked off with that RN, and even the confused patient. It was really easy for me to just feel like, what are you doing? Just lie down, can't you see? Of course, you can't see. I can't expect them to. But I felt more frustration than I thought I would. But I think, it was good in a way though because I feel like now,*

*I would be better equipped to handle that kind of situation. I feel like every time I am in a situation where I feel out of my depth, you learn so much through that. You're forced to. So, the next time it's easier, and you know more about what you're supposed to be doing and more about how you're reacting. You're able to catch yourself, like, don't get frustrated at the confused patient because it's not their fault.'* (Emily)

#### Subtheme 4: Connecting the dots: linking interruptions with making mistakes

One of the stated aims of this thesis was to raise awareness of the impact of interruptions. As seen previously in the written reflective data, confirmatory data also revealed that students were able to articulate the connection between interruptions and medication errors.

*'I realise the potential danger of being disturbed and making a mistake.'* (1.21)

Errors of omission were the most commonly reported error by students who noted that the errors resulted from the loss of focus.

*'Well, definitely the six rights. I forgot to check the dose, the expiry date. I even forgot to explain what it's for ... I forgot to check everything because I was just so focused; I need to give this med to her because I'm supposed to do it, and I'm being interrupted by this lady.'* (Jenni)

Errors of omission were also observed by nursing faculty. However, nursing faculty also cited errors of commission.

*'[The students] did not check allergies, did not sign the medication chart, did not check expiry date, did not check MRN.'* (P1)

*'Wrong medications were given at times.... did not refer to the MIMS.'* (P2)

The pressure to administer prescribed medications in a timely manner became a key stressor that compounded once interruptions occurred. Poor time management skills, increased cognitive load and lack of experience under pressure led to errors.

*'In all of that, I forgot to do my hand hygiene. I also forgot a bunch of things. In all of the stress and the time pressure, I forgot to do those basic things. I think I was supposed to ask her name and date of birth and if she was allergic to anything...I didn't do it [the six rights], because I was really stressed and completely forgot. I*

*think I had gotten halfway through it, and then this lady started getting confused, and I kind of forgot the rest and tried to just give it [the medication] to her.' (Emily)*

At times the cognitive load was so great that the students reported a sense of defeat choosing to fulfil the task of administering the medications without taking due care or consider consequences.

*'I was like, oh, just take it.' (Jenni)*

*'I was like, just give it to her and just get it in there.' (Emily)*

For other students an awareness of the risk of error when interrupted coupled with elements of insecurity and the desire to avoid errors led to the repetition of elements of the task.

*'I could remember where I was, but I would still backtrack to make sure. I'd still go over what I had previously done because I just wanted to make sure. Because there was every chance, and because it was an interruption, that you actually might miss something'. (Matt)*

Having made the connection between interruptions and the increased risk of error, students recounted possible ramifications of those errors to patient safety and outcomes.

*'You know, if I make a mistake with the medication, what the hell is going to happen to the patient.' (Matt)*

*'You have to stick to the task at hand, or you will make a mistake, and it could cause someone harm.' (12.4)*

As is expected with novice practitioners the students discussed the desire to follow an identifiable procedure and remain focused to avoid errors and maintain patient safety.

*'Always practising strong routine even under pressure is the safest means of practice'. (2.20)*

New subtheme - Writing reflections: acknowledging the importance of extended learning opportunities

Written reflection data was used to inform the research questions, focussing on student understandings of their individual experiences of the simulation role-play. The individual interviews that followed provided insights into students understanding the importance of written reflection as a post-simulation learning

tool. The positive responses ranged from thinking post-simulation written reflections are simply 'a good idea', to thinking they are 'absolutely necessary'.

Students who are regularly exposed to simulation activities are used to debriefing and acknowledge that it is the time in which the reflective process begins. New to these students was the opportunity to examine the experience through post-simulation written reflections. This new opportunity was reported as a valuable extension to the debriefing process.

*'You can't always get everything from the immediate feedback...I also think doing a written part of it is quite important because then you actually have to sit down and break it down into pieces'. (Matt)*

Being exposed to multiple modalities of reflection was considered by students to have enhanced their opportunities for learning. They linked the written reflection to cementing learning and supporting memory retention.

*'I think it's really good because what you're doing is, you're - this whole Tanner's nursing model, this whole critical thinking, you're getting people to learn it in a classroom environment, but what the SIM does is it gets people to think critically on the fly during a stressful situation. I think the debrief is definitely important... but also afterwards, it is important as part of the nursing thinking model to reflect on your actions. Rather than just sit there and forget about it, you're actually doing ... a reflection on - you're not just talking and thinking about it, you're writing. They [researchers] found that if you talk, you think about it and you write; it stays in your mind so much better...I found that that scenario really stayed in my mind.' (Mike)*

As it was not a compulsory exercise not all of the students who participated in the interviews had completed the written reflections. However, when asked if they felt there was value in the exercise of writing post-simulation reflections, they acknowledged the likely positive addition to the reflective experience.

*'I think it's a great thing to do and practice doing to get as new grads and registered nurses into doing that. But I think it would be a really great thing for the simulation as well, just because there was so much to reflect on afterwards. There was so much going on because everything happened at the same time. I think reflection is really important and I think it should be part of simulation. Not at the risk of giving my peers more work, I still think that it should be part of it...I like the idea of doing the reflection at the end; I think that would be really good and enhance people's learning.' (Lorna)*

However, the importance of the reflective process in learning was tempered by some students who described a desire for the written reflective experience to remain optional and not too onerous, to remain sensitive to student workload.

*'If it's just a paragraph for ourselves that we're writing....it should be optional'*  
(Hannah)

*'I think it's good. It's a great way to learn something, but just make sure that it's short.'* (Jan)

It is always important to consider that students are all different and as such will all have individual learning styles. Although most of the students felt that writing a written reflection would consolidate their learning, one articulated that she preferred to employ different reflective processes.

*'I kept thinking about it lots of times. I kept thinking about the experience in the class, in the lab. Maybe I'm not a person who likes writing, but I keep reflecting on it in my mind... what I learned from that situation'* (Jan)

#### 4.3.4 Chapter Conclusion

This chapter provided three published finding papers elicited from the written reflections, as well as findings from confirmatory qualitative data collected via student semi-structured individual interviews, SFS's and nursing faculty email questionnaires. Initial findings revealed student understandings of the emotional and clinical impacts of interruptions, the identification of new interruption management strategies, enhanced levels of patient empathy, the desire to be exposed to complex, high pressure simulated scenarios and perceptions of the value of the debriefing process. The confirmatory data reinforced and validated the original findings from the written reflections and revealed a direct impact on practice.

New insights, including the importance of each role to the learning experience in simulation, the impact of gender on emotion, and the value of post-simulation written reflections in solidifying learning, were revealed. Findings make it clear that high fidelity clinically relevant simulations can be achieved using cost-effective, easy to replicate role-play scenarios, from which students can make links to clinical practice. In combination, the findings support the understanding

that experiential knowledge is impacted when students are given the opportunity to practice reality based simulated scenarios.

The following chapter of this thesis provides a discussion of new insights and an analysis of the feasibility, sustainability and accessibility of role-play simulation experiences and their impact on student performance in the clinical environment.



# Chapter 5: Discussion

## 5.1 Introduction

This thesis outlines a multi-method qualitative study that describes how undergraduate student nurses respond to interruptions during the medication administration process. The three published papers in the preceding chapter provide an in-depth discussion of the findings arising from student-written reflective responses. It presents a synthesis of confirmatory data that enhances the validity and relevance of the identified findings and themes. The emergence of new findings was also presented to enrich the original findings.

To synthesise initial findings with new data collected from student semi-structured individual interviews, SFS and nursing faculty email questionnaires, and to ensure thorough exploration of new insights and subthemes, this chapter provides a discussion of the overall thesis, with a specific focus on confirmatory data. New insights arising from this thesis show links between the simulation and changed ideas in the clinical learning environment and preparedness that could inform safer practice. Providing the students with the opportunity to 'be' the patient or participate in one of the other roles within the simulation generated a new understanding of the patient perspective and the need for collaboration amongst the nursing team, with students reporting an enhanced level of empathy for both patients and other team members. Students reported the value of the written reflective process in solidifying their learning. While supporting undergraduate student nurses to reflect in and on learning experiences is not new (Schon 1983; Tanner 2006), this study built on existing simulation pedagogy which describes the formal reflective process following simulation experiences concludes with the debrief (see figure 4). Deeper understandings were reported to have resulted from including guided written reflections and stimulated the development of the 'Seven Steps Model' (see figure 13).

A critical explanation of the feasibility, sustainability and accessibility of high-fidelity role-play simulation experiences is provided and the impacts of innovative reality-based role-play experiences on student performance in the clinical environment are also discussed. Study strengths and limitations are also provided.

## 5.2 Confirmation of data and new insights

### 5.2.1 Summary

As previously described three key themes arose from the written reflective responses; 'Calm to chaos: engaging with the complex nature of clinical practice', 'Learning to liaise: teamwork for positive patient outcomes', and 'Pondering practice: enhancing the art of reflection'. While the three themes were supported by the confirmatory data, new insights also emerged.

The chaotic rather than calm scenario that was provided closely mimicked what students could reasonably expect to be exposed to in the clinical environment. All data sources revealed that undergraduate nursing students struggled to administer medications when first exposed to increased cognitive load by way of imposed interruptions. Reported impacts included loss of concentration, heightened emotional responses and the identification of medication errors. Despite the pressures and increased cognitive load students had been placed under they described embracing the challenge and at times suggested that the level of pressure could have been increased.

The opportunity to reflect on the experience during debriefing was reported to have raised awareness of the impacts of interruptions and produced newly developed interruption management strategies. The role-play scenario was endorsed as facilitating student immersion, providing students with insight into the patient perspective and enhancing patient empathy. Confirmatory data revealed new insights into the significance of the role they played within the scenario, the impact of gender on emotion, linking simulation to changed practice, and the value of the written reflective process.

### 5.2.2 Confirmatory data: enhancing initial findings

One of the four main purposes of healthcare simulation is education (Society for Simulation in Healthcare (SSH) 2018). A key goal of any education-based healthcare simulation activity is to provide a scenario that is not only interesting and relevant but also based in reality, so that participants can see clear links between what they have experienced in the simulation and the real world of clinical practice (SSH 2018). In this study, the link between the role-play and reality

was acknowledged in both the student and nursing faculty participant data in which the value of exposing students to realistic interruptions during the medication administration education process was recognised. Students showed evidence of enriched empirical, personal and aesthetic knowledge. They described how having the opportunity to break down the experience, unpack existing knowledge, then enhance that knowledge with new ideas and strategies, had contributed to learning elements of both the art and science of nursing.

The art and science of nursing have long been recognised as mutually dependent in the undertaking of effective nursing care (Harper 2018). The science of nursing engages factual, objective care (McGovern et al. 2012). Specific to this thesis the science of nursing relates to the theory and knowledge associated with relevant pathophysiology, pharmacology, and medication administration policies and procedures used to problem solve and make clinical judgments. The art of nursing, described by Carper (1978) as aesthetic knowledge, represents the application of the science of nursing encompassing the human side of nursing (Henry 2018). Within this thesis the art of nursing incorporates the application of existing medication administration theory and knowledge complicated by human factors that necessitate multitasking, collaboration, responsiveness, and empathy in which 'role' played an important part.

Role-play is 'a learning method designed to build first-person experiences in a safe and supportive environment' (Baile & Blatner 2014 p. 220), with participants filling all available roles. As per INACSL guidelines (2013), during the planning phase of this role-play simulation, specific learning objectives were assigned to each role. Each student was provided with clear objectives and responsibilities for the individual roles which were then reflected on during debriefing. A further opportunity for reflection on the impact of these roles was offered in the written reflections, during the student individual interviews and within the SFS.

Increasing levels of active participation in which students are required to feel, think and act in another person's place were identified by Jenkins and Turick-Gibson (1999), as promoting learning using critical thinking skills. Empathy develops as one has the opportunity to walk in someone else's shoes and

requires that a nurse can understand another's situation and experience while acknowledging individual perspectives and positions (Cunico et al. 2012). For nurses, this might be the patient, their relatives or other members of the healthcare team. However, many healthcare simulation experiences immerse participants in the role of the healthcare provider/nurse, relative, or observer, rather than in the role of the patient (Rochester et al. 2012; O'Regan et al. 2016). High fidelity computerised manikins or standardised patients or actors are most commonly engaged in the role of the patient (Bell et al. 2014; Harder, Ross & Paul 2013; Keiser & Turkelson 2017).

Given that role-play has been noted to be effective in creating 'insight into each other's views, challenges, or perceptions' (Baile & Blatner 2014, p. 225) it is a valuable teaching strategy to convey the patient perspective and elicit empathetic responses. Therefore, undergraduate nursing students were intentionally immersed in the role of the patient resulting in new insights into the patient perspective being recounted by them. The students described newly acquired levels of empathy; reporting wanting to 'be heard' and being 'fearful' of their care outcomes during the role-play scenario.

Although several studies have researched measuring and developing patient empathy in undergraduate nursing students (Cunico 2012; Everson et al. 2015), there is a paucity of literature that brings to light the heightened levels of response seen amongst the undergraduate nursing students in this study where students expressed their vulnerability, fear, frustration, and anger as a result of undertaking the patient roles. However, these findings were supported in one recent qualitative descriptive study in the Netherlands of 96 second-year undergraduate nursing students who underwent a simulation which placed them in the role of the patient to enhance their understanding of the patient perspective (ter Beest, van Bommel & Adriaansen 2018).

Loss of power and control witnessed and experienced by the students during this role-play was reported by them to have been as a direct result of 'being' the patient. As reported in the ter Beest, van Bommel & Adriaansen (2018) study, the opportunity to inhabit the patient space and gain firsthand experience of what it felt like to 'be' a patient was identified by students as impacting their perceived

level of patient empathy, reporting that they felt that the experience would make them more 'observant' and 'thoughtful' in future practice.

The opportunity for the students to actually 'be the patient' produced a real and lived understanding of the patient perspective and highlighted that their own lived experiences may differ from the patients. This finding was supported by a recent mixed-methods study (Levett-Jones et al. 2018) focussing on enhancing patient empathy in undergraduate students utilising 'point of view' simulation. Levett-Jones et al. (2018) elicited responses from 384 students who were involved in a role-play where they took on either the role of the patient with acquired brain injury or the care giver. Findings included the students' perceived value of the experience and that they had gained new insights into the patient experience (Levett-Jones et al. 2018).

Findings linked to newly developed empathy emerging from this role-play experience were not isolated to patient empathy. Newfound empathy was also applied to the student's peers who played the role of administering nurse in the scenario. The students described feeling 'sorry for the administering nurse' and 'guilty for interrupting'. During debriefing, students revealed that this experience would make them consider the situation of nurses working alongside them. Going forward they described a desire to minimise their role in interruptions, as well as look for opportunities to offer assistance when they see team members in pressured situations. Empathy for team members perceived to be under pressure during simulation experiences was also described in a study of 51 nursing students in Sweden as a feeling of powerless to intervene on behalf of the students undertaking primary patient care roles (Lestander, Lehto, & Engström 2016). While the students in the Lestander, Lehto, & Engström (2016) study were reported to have acknowledged that they had learnt from observing or working alongside students in the primary patient care role they also described how the inability to intervene also resulted in an underlying level of frustration and stress for them. A further study investigated the impact of a two week online compassion module for undergraduate nurses describing findings that supported the significance of being compassionate to, and supportive of, colleagues to build resilient and mindful teams (Hofmeyer et al. 2018). An earlier study exploring registered nurses' experiences of the reality of clinical practice identified that caring for and between nurses in stressful workplace situations is imperative to not only build

personal resilience but also improve the quality of care they provide which in turn impacts patient outcomes (Huntington et al. 2011).

It has been argued that nurses often come to undergraduate nursing programs exhibiting elements of 'artful nursing' and aesthetic knowledge such as empathy, compassion and caring (Henry 2018). A study of 676 first-year undergraduate nurses suggests that aesthetic knowledge may be high in nursing students from the time of application to study, as those who are attracted to nursing as a profession are so for altruistic reasons such as the desire to help people (Wilkes, Cowin, & Johnson 2014). In a further study of the 107 respondents, 64 identified altruistic reasons for choosing nursing as a profession (Woods et al. 2015). However, the desire to help does not always equate to the ability to help.

Translating desire to help, to ability to help can be achieved through the simulation process (briefing, scenario and debriefing) which provides opportunities for participants to reflect on pre-existing conceptions providing context for and consideration of the application of new and existing knowledge (McGovern et al. 2013). Evidence of this process was noted in this thesis' study. Undergraduate nursing students and nursing faculty reported that students displayed varying levels of ability and pre-existing knowledge while immersed in the role-play. As the experience of the immersive role-play was unpacked during the reflective exercises of debriefing and written reflections the students reported 'having had their eyes opened' to the impacts of interruptions during medication administration. The students were then able to connect the impacts of interruptions to patient safety concerns and describe possible management strategies.

Several interruption management strategies were disclosed by the students in the data. Debriefing the experience provided students with a range of possible interruption management strategies to counter the cognitive impacts including; prioritisation, teamwork and communication. These strategies have been discussed in the published finding papers in the previous chapter. Other students described the need for the versatility of thought, and flexibility that allowed them to switch between tasks or multitask.

As multitasking was raised as a strategy in the written reflective data, individual student interviewees were asked what they understood by the term multitasking.



In difference to the written reflections, some students described multitasking as a poor strategy when administering medications, identifying the significance of the associated risk of error. Others felt that although they recognised the need for multitasking as a requisite skill for nurses, it was currently outside their scope of practice and would take them (as novice practitioners) some time to develop.

Multitasking and the increased cognitive loads produced when caring for more than one patient at a time or attending to multiple simultaneous nursing tasks occurs frequently in clinical environments and is a difficult skill for nurses to master (Douglas et al. 2017). It is therefore important to provide students with opportunities to practice multitasking in a safe learning environment. However, increasing cognitive load above what could be reasonably expected has been shown to have a detrimental effect on learning (Fraser, Ayres & Sweller 2015). Finding the balance between learning experiences that mimic the reality of the dynamic nature of clinical practice, while maintaining cognitive load at a level appropriate to the experience of novice nurses, is challenging. Research suggests that student cognitive load can be challenged at a level appropriate to their year of study and experience in simulation environments that are titrated to the stage of the learner, maximise learning potential and prepare them for practice (Fraser, Ayres & Sweller 2015; Traynor, Gallagher, Martin, & Smyth 2010). The findings from this thesis' study illustrate the impact of experiencing a dynamic and interrupted environment on cognitive processes. Although several of the students reported feeling 'out of their depth' during the role-play, having engaged in appropriate post simulation reflective exercises they reported the value of the experience to their learning.

Some students reported that they would have benefited from being put under even more pressure and made the connection between exposure to high pressure simulations and feeling more prepared for practice. In fact the need for increased pressure in more simulated experiences was described by the students as imperative prior to facing stressors in the real-world clinical environment. Although student requests to be exposed to increasing levels of pressure in simulation to my knowledge has not been reported elsewhere, studies have reported that students acknowledge the importance of undertaking stressful simulation experiences before entering clinical practice (Lestander, Lehto, & Engström 2016).

High pressure environments and experiences impact cognitive load which is often described under three categories; intrinsic, extraneous, and germane loads (Fraser, Ayres & Sweller 2015). Intrinsic cognitive load is unavoidable, it represents the impact on working memory attributed to the intrinsic quality and complexity of a given learning activity (Fraser, Ayres & Sweller 2015). For the purposes of this role-play it occurred when undertaking the task of a simulated medication administration activity. Extraneous cognitive load occurs when a student is attempting an intrinsically driven learning task but is subject to extraneous demands such as teacher instructions, distractions or increasing complexity of the task similar to those reflected in this studies role-play (Fraser, Ayres & Sweller 2015). The more recently defined germane cognitive load is also of particular importance to this study. Considered to be a component of intrinsic cognitive load, germane cognitive load occurs when students either observe or engage in an experience, including those with increased distractors, which can be called upon for future reference (Fraser, Ayres & Sweller 2015). The acknowledgement that there is a definable cognitive load impact on observers was described by students in this study who identified being 'able to experience it' even when not in the primary care giver role.

Cognitive load was amplified by some interruptions more than others. Written reflective data, supported by the confirmatory data, indicated that managing the confused patient was perceived as the most difficult interruption. Students revealed the high level of frustration that they felt as a result of the challenging behaviours displayed by the confused patient which escalated as the patients' needs remained unmet. The reflective exercises exposed a rudimentary understanding of the complexity of caring for confused patients, with some students noting the exacerbation of challenging behaviours was likely in response to the patient being faced with environments and situations that were unfamiliar to them. However, the majority of students did not disclose effective management of the confused patient. Student difficulties in managing the confused patient was corroborated by the observations of the nursing faculty. The challenges faced may have been the result of; limited time spent practicing the management of confused patients in simulation or clinical environments, individual students' course stage, or order of subject selection.

There are ever increasing numbers of patients admitted to hospitals with some level of cognitive impairment. In Australia, over 30% of elderly patients exhibit some level of confusion either on or at some time during their admission (NSW Agency for Clinical Innovation Aged Health Care Network 2014). In the United Kingdom, it has been reported that more than 97% of hospital staff either have or will care for one or more patients with confusion or dementia during their career (Turner et al. 2016). A recent systematic review of the literature identified that although undergraduate nurses study the theory related to caring for cognitively impaired patients, they report feeling inadequately prepared for the practical application of those skills (Turner et al. 2016). The revelation in this study's findings that students described the confused patients' behaviours as the most difficult interruption to manage, together with the knowledge that students are increasingly likely to encounter confused patients in the clinical environment, requires examination of how and when to best teach strategies to manage. In a study of 23 registered nurses, Brooke and Mammeh (2018) identified that nurses not only struggle to differentiate between delirium and dementia but also struggle to manage some of the associated patient behaviours. The importance of collaborative teamwork in managing the confused patients was also identified as crucial for safe care (Brooke & Mammeh 2018). Lack of adequate training at an undergraduate level was cited as one possible cause for the findings, with recommendations that simulation activities are provided to address these concerns (Brooke & Mammeh 2018). Inadequate undergraduate preparation to care for confused older patients was also noted in a 2014 study of 60 healthcare professionals (Griffiths et al. 2014).

Lack of experience in managing the challenging behaviours of confused patients, as described in this study, revealed direct impacts on time management and participant stress level. Poor time management and the perceived pressure to complete the task of administering medications in a timely manner were reported as resulting in errors of omission, e.g. skipping elements of the six rights, despite the participants having stated the desire to follow procedure and remain focused to avoid errors. While some students compromised safe care by using procedural short cuts to manage their time, other students who were less confident in their ability to safely administer

medications under pressure resorted to repeating elements of the task to avoid making errors.

Although managing in the face of the increased cognitive load produced a heavy focus on procedure for some, other students displayed either few or no strategies to manage their time with some reporting a sense of defeat and being unable to complete the simulation. Waterworth (2003) in a study of 68 registered nurses in the UK found that registered nurses use a range of strategies when faced with managing time under pressure, some of which supported the findings from this thesis' study such as; focusing, avoidance, selective attention, short cutting, saying no, making compromises, delegation and synchronising. For nurses to employ a range of appropriate strategies to manage their time in complex situations they require context, self-awareness and situation awareness (Waterworth 2003). In a further study of 7,604 registered nurses, time management and prioritisation skills were highlighted as essential to manage the adverse impacts of the complex, dynamic and demanding working environments in which nurse find themselves (Huntington et al. 2011).

Situation and self-awareness provide a platform for effective teamwork, the importance of which is reported in literature (Center 2018). The SFS and student semi-structured individual interview data in this study confirmed findings from the written reflective data with some students showing elements of both situation and self-awareness. They recounted the importance of recognising when they were working beyond their capacity for safe care and identifying when they were 'in over their head'. The challenging patient behaviours, like calling out or climbing out of bed, perceived as difficult to manage, motivated some students to rely on collaborative approaches such as knowing when and how to ask for help through; negotiation, compromise or bargaining with the other students to facilitate care for the patient in a timely fashion. Nursing faculty reported that students either used (during the role-play) or described (during debriefing) negotiation skills in the form of a 'quid pro quo' approach as a first line strategy when enlisting the help of their team. The need for the support of team members when strategizing to manage interruptions is described by Waterworth (2003) as providing 'cover for' or 'protection against' interruptions (p. 437).

Students not only recognised the need to ask for help, delegate, and negotiate as a significant elements of team work, but they also described the need to be proactive in offering to help when they see a teammate who may be struggling. They reflected on the possibility that the situation could have been improved if other team members had displayed deeper insight into the situation of those around them. The association between teams that function effectively and the impact on patient experience were expressed. For those students who experienced evidence of poor team work during the simulation, it had been the impetus for them to reflect on how the situation could have been approached differently.

Asking for and offering help in a healthcare team requires assertiveness and confidence. Assertiveness is an essential skill for nurses requiring good communication skills that can enhance interactions with patients and healthcare teams and lead to improved outcomes (Center 2018; İlhan, Sukut, Akhan & Batmaz 2016). Being assertive implies that one articulates 'feelings, opinions, beliefs and needs openly and clearly, directly and honestly, without adopting an aggressive tone and with feelings that do not reflect anxiety or violate another's rights' (İlhan, Sukut, Akhan & Batmaz 2016 p. 73), however, one's ability to be assertive is directly impacted by self-confidence. In a descriptive study of 96 novice student nurses who completed a survey eliciting fears, concerns and confidence levels prior to clinical practicum, students reported low levels of confidence in both soft and hard skills (Cowan, Hubbard & Hancock 2016). Building self-confidence prior to entering the clinical environment is important for undergraduate nurses and is often reported in simulation literature (Bambini, Washburn & Perkins 2009; Howard et al. 2011; Lin 2016; Lubbers & Rossman 2016; Mould, White & Gallagher 2011). Students participating in the study described in this thesis, reported feeling empowered and more confident with an improved understanding of when to be assertive, equating these characteristics with professionalism and an enhanced ability to perform in clinical practice.

Performing effectively in clinical practice requires that nurses are not only assertive and confident but are also aware of how emotion can manifest and impact performance. Positive and negative interactions that occurred as the interrupted role-play scenario unfolded directly impacted how the students and

their peers managed the complex situation. The role-play was reported to have produced raw emotional responses in both the written reflections and the confirmatory data including; frustration, feeling flustered, anger, anxiety and stress. The reflective process was important to this simulation experience in that it facilitated the development of insights into the impacts of those emotions.

The desire to reflect on one's emotional responses to stressful tasks has been reported as more common in women than men (Verma, Balhara & Gupta 2011), however, debriefing and reflecting on simulation experiences, especially those that evoke strong emotional responses, is an expectation of well-designed simulations, irrespective of gender (INACSL 2016). The assertion that gender impacts the desire to reflect was not observed in this study. Confirmatory data reinforced the initial findings with students of differing gender describing the debriefing process as an opportunity for them to deconstruct the experience and enhance learning in a less emotionally charged atmosphere. They reported the debriefing had facilitated student-centred, peer to peer discussion of new strategies they had learnt and hoped to translate into practice. Nursing faculty also reported that students had engaged in open dialogue, exposing feelings they had experienced during the role-play and how related strategies to manage might be implemented to impact future patient care.

### 5.2.3 New insights: the significance of 'role' in simulation, the impact of gender on emotion, linking simulation to changed practice, and the perceived value of the written reflective process to learning

#### 5.2.3a The significance of 'role'

Initial findings from the written reflections related to the impact of role on empathy, and those findings were supported in the confirmatory data. New insights emerged from the SFS and student individual interviews that outlined the importance of each role to their individual learning experience. Much of the discussion revolved around the role of the administering nurse, with several students describing a desire to play the role of the administering nurse. While the desire to play the role of the RN was highly-favoured, students also acknowledged the opportunities to learn by observing others in that role.

As previously noted, well-designed simulation experiences that are planned and executed according to best practice guidelines ensure that all roles have clearly defined learning objectives and that students are briefed and engaged in an active learning process (Aebersold 2018). Having followed best practice guidelines to develop roles they are then allocated to the simulation participants, most often during the briefing phase of the simulation. Role allocation occurs in one of three ways; self-selection, random allocation or deliberate allocation (Hober & Bonnel 2014; Kaplan, Abraham & Gary 2012). However, the reason for the choice of allocation method is often arbitrary (Harder, Ross & Paul 2013; Lestander, Lehto & Engström 2016) or not provided (Cummings & Connelly 2016), and there is a paucity of literature that describes the impact of either deliberate or random facilitator/faculty role allocation versus self-selection. In this research study self-selection was chosen as the preferred method of student role allocation. Although students were first offered the opportunity to self-select roles, at times more than one student requested the same role or students may have chosen not to self-select a specific role. In these situations, roles were randomly allocated by the nursing faculty facilitating the session. Those students who identified that they self-selected their role, often chose the administering nurse role. Students explained that they had thought that experiencing the administering nurse role first hand would be more likely to have a direct impact on their ability to safely administer medications in practice. However, having completed the simulation, debrief and written reflection, students were able to distinguish impactful learning from each of the roles.

The observer role is a commonly utilised role in healthcare simulation and is the subject of much discussion in the literature, with mixed participant responses regarding the observer roles impact on learning (Harder, Ross & Paul 2013; Hober & Bonnel 2014; Kaplan, Abraham & Gary 2012; O'Regan et al. 2016; Stegmann et al. 2012). An ethnographic study of 84 undergraduate nursing students reported that the student participants preferred what was described as more 'active' roles than that of the observer (Harder, Ross & Paul 2013). Indeed, several students in this thesis' study described the 'active' roles as those other than the observer role, showing a preference for that of the administering nurse.

Vicarious learning has been reported in simulation literature as producing equity in experience for those undertaking observer roles (Kaplan, Abraham & Gary



2012; Thidemann & Söderhamn 2013) and at times as being responsible for the acquisition of new knowledge over and above that of participants in the more 'active' roles (Stegmann et al. 2012). Vicarious learning was also reported by students in the study presented in this thesis who identified the importance of each role to their learning, remarking that they didn't have to be in any particular role to learn from the experience of others. This finding was further supported in a two-year study of 144 second year undergraduate nursing students, who having been exposed to a high-fidelity simulation described improved knowledge, confidence and satisfaction scores irrespective of role (Thidemann & Söderhamn 2013). The opportunity to learn from the observer role was also reported in an American study of 50 undergraduate nursing students who described the opportunity to see the simulation from a wider perspective and provide helpful feedback to the team during debriefing (Hober & Bonnel 2014). Students in the Hober and Bonnel (2014) study also credited feeling lower levels of stress during the simulation to being in an observer role which they felt allowed them time to identify and consider others ideas and actions that might benefit their own practice.

Best practice when allocating roles in healthcare simulation (INACSL 2016), recommends that faculty provides opportunities for students to move between roles that facilitate what Kolb (1984) describes as reflective observation, abstract conceptualisation, active experimentation and concrete experience. This can be achieved by repeating a simulation scenario multiple times with the same participant group, encouraging them to switch between roles. However, large student numbers along with time, infrastructure and cost constraints can make it difficult to repeat non computer-based simulations multiple times (Kelly et al 2016). Alternatively, vicarious learning where 'students learn from their peer's second-hand experiences' (Roberts 2010 p. 13) can be encouraged from differing roles during large cohort simulation experiences through expertly facilitated briefing, debriefing, the use of guided written reflections, and ensuring deliberately embedded opportunities for role progression within each role.

#### 5.2.3b The impact of gender

The level of pressure students were placed under in this study's role-play simulation revealed some unexpected responses. None of the participants in the study were asked if there were any gender specific responses to the pressure,

however, nursing faculty observed that at times male students had resorted to physical restraint and verbal hostility to control the confused patient. Faculty used gender specific language such as manhandling when describing negative student responses they had observed. Positive responses to stress were associated by students with previous life experiences, at times using gender stereotypes such as motherhood as a good foundation for managing stressful situations. These gender differences were not found to be reported elsewhere in simulation literature and are therefore an area for further interrogation and research.

Psychology and psychiatry literature identifies differences in responses to stress and high pressure situations as being dependent on both physiology and biology (Turton & Campbell 2007; Nickels, Kubicki & Maestriperi 2017; Verma, Balhara & Gupta 2011). Stress responses are often characterised according to the 'fight-or-flight' and 'tend-and-befriend' model (Verma, Balhara & Gupta 2011) which applies gender stereotypes to the response. This model attributes 'fight and flight' as a male stress response and 'tend and befriend' as a female stress response. Gender response theory may provide further explanation for the findings in this thesis as it asserts that when exposed to similar levels of stress male and female emotional responses differ (Mirowsky & Ross 2003). According to gender response theory males are reportedly 'socialized for competitive and combative roles that allow, and even encourage, the outward expression of anger and hostility. Women are socialized for nurturing and supportive roles that discourage it' (Mirowsky & Ross 2003 p.107). The level of complexity attributed to these theories and models as they relate to context is acknowledged. It is important to recognise that outside of traditional gender identification each student is an individual with individual responses who may not follow traditionally recognised stereotypes. Therefore, it is worth considering a deeper exploration of the impact of gender when planning educational experiences that deliberately place students under stress.

### 5.2.3c Linking simulation to changed practice

Evidence linking simulation experiences to changed practice in undergraduate nurses on clinical practicum is hard to find. Several review studies measure and

report knowledge and skill acquisition as well as improved self-confidence in the simulation setting (Cant & Cooper 2010; Fisher & King 2013; Stroup 2014). A USA multisite longitudinal randomised control study of undergraduate nursing students who undertook up to 50% of their clinical practicum time in simulation highlighted the positive results and impact of best practice simulation pedagogy on learning outcomes, overall pass rates and perceived preparedness for practice (Hayden et al. 2014). The students were then followed into registered practice and at the six month mark a survey of their managers was conducted finding that there was no perceived difference between the groups by way of preparedness for practice (Hayden et al. 2014). While these findings serve to validate simulation pedagogy for undergraduate nursing, only tenuous links can be made between the findings and evidence that undergraduate simulation experiences directly impact nursing care during clinical practicum (Cant & Cooper 2017a).

As with the majority of simulation research literature that reports on undergraduate simulation experiences, many of the students in this study stated that they felt the simulation would change their practice in the future. However, some students who took part in the individual interviews divulged that they had already been able to use the strategies learnt in the simulation to change their practice when on clinical practicum, noting that the role-play had broadened their understanding of holistic patient care.

#### 5.2.3d Written reflections to encourage critical thinking and to cement learning

The reflective process facilitates discovery of new insights into the impacts of complex tasks on working memory and learning (Fraser, Ayres & Sweller 2015). The reflective process is fundamental to simulation learning pedagogy and is r555ee4through scenario immersion, and commonly culminates with debriefing (INACSL 2016; Issenberg et al. 2005; Deikmann et al. 2012). Student-centered debriefing is generally considered to be where the majority of the learning occurs in simulation (Husebø, O'Regan & Nestel 2015). More recently the addition of written reflections has been reported in some literature as a method of

maximising learning potential following simulation activities (Bussard 2017; Lestander, Lehto, & Engström 2016).

The value of the written reflective process in solidifying understanding and learning is well documented in education literature (Boud, Keogh & Walker 2013). Boud (2001) describes reflection after events as a vehicle to return to the experience, attend to feelings elicited by the experience, and then re-evaluate the experience. The study presented in this thesis utilised a student-centred approach during the immediate post scenario group debriefings, however it was felt that the inclusion of optional guided written reflections would build on current simulation-based reflective processes to encourage a deeper level of personal reflection and learning. The opportunity for students to return to the experience, attend to feelings elicited by the experience, and then re-evaluate the experience was attributed by students in this study to have enhanced understanding and cement learning. Of the few studies that report the use of post-simulation written reflection, one recent study of 51 undergraduate nursing students (Lestander, Lehto, & Engström 2016) acknowledged the importance of written reflections in improved understanding, and highlighted student perceptions of group verbal reflection, however, no data was collected that described the student perception of the written reflective process. Similarly, Bussard (2017) promoted the use of the written reflective process following simulation but did not elaborate on the student perspective of the process. A further qualitative study of 79 undergraduate nurses exposed to an emergency response simulation reported that 79.5% of the participants in the study either strongly agreed or agreed that the briefing and debriefing facilitated understanding, however, while the content of the written reflection were analysed by the researchers students were not asked about the value of the written reflective process (Morrison & Catanzaro 2010).

Student support for post-simulation written reflection along with the clear potential for enhanced learning opportunities stimulated me as author of this thesis in conjunction with the supervision team to develop an enhanced model for effective simulation. Grounded in theory the 'Seven Steps to Simulations Cementing Student Learning' model (see figure 13) builds on accepted simulation frameworks and is responsive to my research findings. The seven elements are depicted as a cycle. The model insists that; validated principles and

frameworks are used in planning and design, there is an acknowledgement that all students come with an existing background on which to draw, and a thorough briefing is required. The model continues through scenario immersion where the facilitator should, where possible, stick to the plan but be ready for student-led deviations. The facilitator then provides a structured and supported student-centred debrief which is followed by a guided written reflective exercise. Finally new insights are acknowledged through feedback and fed into the next simulation experience.

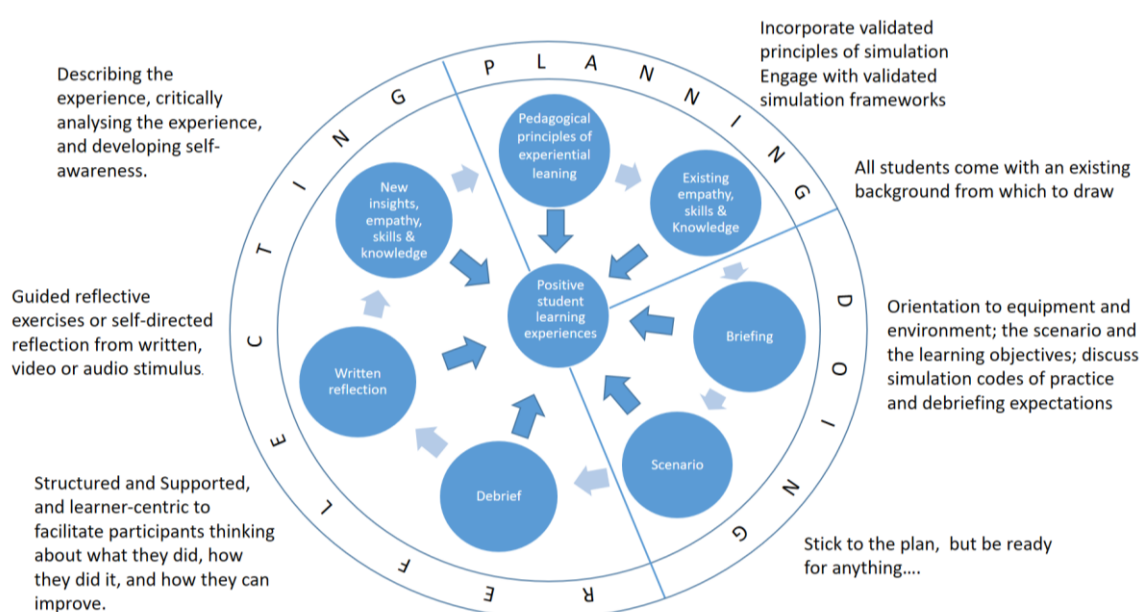


Figure 13: Seven elements for simulations cementing student learning

#### 5.2.4 Feasibility, sustainability and accessibility of simulation

Increasing numbers of undergraduate student nurses place increased pressure on not only student clinical placements but also on the way in which nursing faculty provide engaging learning experiences that foster critical thinking, knowledge and skill acquisition (Olsen et al. 2018). Simulation pedagogy is commonly employed in undergraduate nursing programs to fulfil these demands (Aebbersold 2018). However, limited access to or underutilisation of technology rich environments, transient or non-specialist nursing faculty, and the high cost of

technology-rich manikins make maintaining and supporting technology rich simulation unsustainable for many (Nehring 2010; Prescott & Garside 2009).

Feasibility, sustainability and accessibility of simulation experiences and programs are associated with their perceived or real value. Feasibility implies how easily and conveniently a simulation can be conducted; sustainability suggests maintaining a high quality, easily replicable experience, and accessibility requires that the simulation is easy to facilitate, engage with and understand. Although they can be defined individually, they are co-dependent in the context of healthcare simulation.

Feasibility, sustainability and accessibility of simulation experiences and programs are often believed to be reliant on the fiscal capacity of an organisation as to set up and maintain the required infrastructure, equipment and human resources can prove prohibitive (Lin et al. 2018). Although the perceived value of simulation as a teaching strategy is frequently measured in relation to fiscal value or return on investment (Lin et al. 2018), the human value of simulation experiences such as improved communication and patient experience is equally important (Nestel et al. 2018 a; Nestel et al. 2018 b).

Moving the focus from technology to the learning process and desired educational outcomes that employ a range of simulation modalities serves to lower resource demands and costs, increasing both accessibility and sustainability. Although the research presented in this thesis did not measure the cost of the role-play simulation against the use of a high-fidelity manikin-based simulation, literature supports role-play as a vehicle to incorporate reality-based scenarios that encourage active involvement in the construction of learning at a low cost (Baile & Blatner 2014; Clapper 2010a; Nestel & Tierney 2007).

Outside of initial infrastructure and equipment outlays, maintaining sustainable high-quality simulation experiences for all students requires that faculty must have the time, capacity and desire to manage simulation experiences effectively and should be trained in simulation specific pedagogy (Bogossian et al. 2018). A reliance on high tech simulators can also pose a barrier to the implementation of high-fidelity manikin based simulation (Ryan et al. 2017). One of the key concerns for nursing faculty is feeling ill prepared and unsupported when using the technology, especially in relation to trouble shooting if problems

occur (Ryan et al. 2017). Bogossian et al. (2018) surveyed 61 nursing faculty participants across 32 institutions in Australia and New Zealand and found that human resource constraints were noted as one of the key challenges facing nursing faculty when attempting to provide quality simulations. In the aforementioned study (Bogossian et al. 2018) between 48% and 68% of participants stated that insufficient support, staff development and lack of time to design simulations were major challenges which was higher than barriers associated with environment, funding and equipment which were reported as barriers for between 28%-40% of participants.

As suggested in literature the true indicator of high-fidelity simulations is new knowledge and skill acquisition, achievement of learning outcomes and transferability to practice (Aebersold 2018; Hamstra et al. 2014). While there will always be a place for technology-dependent simulations, providing options for simulations that are low tech, user-friendly, easily replicable, sustainable, and outcome focussed could also be included in simulation curricula. Appropriately matching simulation modality to financial capacity is a harsh reality however does not mitigate faculty responsibility or eliminate the possibility of producing high quality simulation experiences. Role-play simulations such as the one described in this thesis facilitate participant knowledge and skill acquisition to meet learning outcomes, without relying on technology-intensive manikins. Reducing technology dependent complexity in simulation design by using alternate simulation modalities such as role-play facilitates affordable, sustainable and accessible solutions for fiscally challenged organisations and can be equally effective in embedding learning (Will & Weinschreider 2012).



### 5.3 Study strengths and limitations

#### Strengths

This study is strengthened by the level of consideration given to linking underpinning philosophy to research design. In line with an interpretive, social constructivist perspective, a qualitative approach was taken to explore and communicate participant experiences. The simulation learning experience lay the foundation for the collection of data. The large written reflection sample size (n=451) and additional multimodal data collection techniques which included student semi-structured individual interviews (n=13), SFS (n=26) and nursing faculty email questionnaires (n=8) facilitated the collection of supporting data that validated original findings and provided new insights.

It is acknowledged that carefully planned simulation experiences provide students with rich student-centred learning opportunities that enhance the development of knowledge, skills and attitudes (Aebbersold 2018). Underpinning educational and nursing theory (Kolb 1984; Benner 2001; Tanner 2006) and the incorporation of accepted simulation frameworks (Jeffries 2005; Arthur, Levett-Jones & Kable 2013) significantly strengthened the simulation role-play design and student experience from which the data were drawn.

Disseminating knowledge under peer review is key to ensuring validity and relevance of a thesis study and as such the number of peer reviewed research outputs also strengthen this study. Publications and conferences drawn from this thesis were submitted for peer review resulting in seven publications (five journal articles and two editorials) and seven presentations at international and national conferences and seminars.

#### Limitations

While the study provided a valuable experience for a large number of students, it may have been beneficial for the students to have a second attempt at the simulation to incorporate and practice new knowledge, skills and alternate interruption management strategies. Although time constraints and large student numbers did not permit a second simulation run through, strategy development was developed for each group of five via the provision of small group debriefing immediately following each simulation. A further debrief for each class group of

25 was also provided at the end of each laboratory session. As previously described debriefing facilitates the sharing of perspectives and develops new learning (Aebersold 2018).

The findings from this study may also be enhanced by the provision of pre and post-simulation data collection. It has been shown that existing simulation studies most often report pre and post-testing using self-reports of improved self-efficacy, confidence competence and satisfaction (Cant & Cooper 2017b). While self-report studies are a valuable and valued amongst the nursing research community, the introduction of pre-test and post-test data that accurately reflects the clinical impact of clinical simulation would serve to strengthen this, as well as other, undergraduate nurse simulation research studies. In addition, the findings from this study would be enhanced by measuring students' self-confidence and clinical competence against an existing instrument such as the Laster's (2007) Clinical Judgment Rubric.

Empathy development for both patients and team members were identified as a result of this study. Incorporating a validated empathy peer assessment model designed for role-play experiences, such as the one described by Percy and Richardson (2018), may have elicited further insights into the student experience of empathy development.

## 5.4 Chapter conclusion

Maximising learning through simulation experiences requires that the learning activity reflects reality, encourages participant immersion, active participation and engagement, and provides an opportunity to reflect on the experience to facilitate transfer of learning to practice (Hamstra et al. 2014). These understandings were interrogated against written reflective data, SFS, student semi-structured individual interviews and nursing faculty email questionnaires that were collected for analysis following an immersive role-play simulation experience. Overall findings from the confirmatory data were consistent with the findings presented in the published findings papers. They also support literature that situates simulation learning as an effective teaching strategy in closing the

theory-practice gap (Aggar & Dawson, 2014; Bambini, Washburn, & Perkins, 2009; Lapkin, Levett-Jones, Bellchambers, & Fernandez, 2010; Ricketts, 2011).

From the collected data it was clear that the experience had challenged the students. The challenges the students faced were reported to have raised their awareness of the impacts of interruptions and facilitated new knowledge and skill acquisition. The value of post-simulation debriefing and the written reflective process in solidifying learning along with the significance and impact of each role in simulation emerged from the data. Insights into the patient perspective and enhanced patient empathy were reported to have resulted from taking on the role of the patient.

The provision of innovative learning and teaching experiences where nurses can practice effective communication skills, interruption management strategies, and critical thinking is a crucial step towards maintaining patient safety. If students are encouraged to make connections between these elements, they are more likely to make sound clinical judgements, minimise error and improve patient safety outcomes. The following chapter provides an opportunity to reflect on the implications of the study findings on undergraduate nursing education, clinical practice and research.

## Chapter 6: Conclusion

The preceding chapter presents an exegesis of findings from confirmatory data and discussion related to the feasibility, sustainability and accessibility of simulation experiences. Study strengths and limitations are also submitted. In this final chapter, I present the implications of this study's findings for nursing education and clinical practice, recommendations for future research, and my final conclusions. The short- and long-term impacts of undergraduate nursing simulation experiences on patient care and safety in clinical practice is considered.

### 6.1 Preamble

This thesis journey began with an unexpected encounter with a newly graduated nurse in a busy surgical ward. The encounter, as described in the preceding researcher story, set in motion a process that led me to question how and when nurses learn the skills needed to manage multiple competing demands, with a specific focus on the process of medication administration. My motivation became, and continues to be, to address a gap in educational experiences for undergraduate nurses specific to interruption management during medication administration.

Failure to effectively prioritise and manage interruptions is known to increase the risk of error (Rivera-Rodriguez & Karsh 2010). To date, research has focused on interruption minimisation, building strategies with a foundation in the 'sterile cockpit rule' originally designed to cater for the unique interruption management needs of the aviation industry during take-off and landing (Fore et al. 2013). The dilemma for nurses when introducing such an approach, is that it excludes the patient from involvement in certain aspects of their care. Excluding patients from involvement in their care is in direct conflict with the Australian Charter on Healthcare Rights and the National Safety and Quality Framework that clearly mandates a patient centred approach in all aspects of care (Australian Commission on Safety and Quality in Healthcare 2010). If a patient centred approach requires a focus on the patient as not just a member of the healthcare team, but the centre of it, listening and responding to the patient and

involving them in their care at all times is implied. This includes during the task of medication administration. For undergraduate nursing students to understand the implications of patient centred care, as it applies to medication administration, providing experiences that equip them for the task of managing the human face of interruptions should be considered.

As a direct result of this experience students described how important it had been for them to have the opportunity to raise their awareness of the impacts of interruptions on patient safety and develop interruption management strategies before their next clinical practicum. This new approach to medication administration education also resulted in unexpected and previously unreported insights into; the impact of gender on the emotional response of undergraduate nursing students placed in stressful interrupted environments and revealed a gap in knowledge related to the management of challenging patient behaviours. Key implications and recommendations that have resulted from this study can be found in table 5.

Table 5: Key implications and recommendations

<b>Recommendations for undergraduate education</b>	<ul style="list-style-type: none"> <li>• Provision of increased opportunities for students to inhabit the patient space ('be' the patient) - through role-play.</li> <li>• Provision of opportunities for students to be exposed to challenging interrupted scenarios before facing them in the real world of clinical practice</li> <li>• Provision of targeted experiential learning opportunities that facilitate the management of challenging patient behaviours.</li> <li>• Provision of opportunities to reinforce learning through repetition by utilising innovative methods of simulation delivery.</li> <li>• Introduction of models such as the seven steps model (figure 13) that includes written reflection as an integral part of the simulation process.</li> </ul>
<b>Recommendations for research</b>	<ul style="list-style-type: none"> <li>• Investigation of undergraduate nursing student stress responses before, during, and after ramped complexity simulation experiences to inform the cognitive load impacts.</li> <li>• Investigation and evaluation of student's perceptions of the value and impact of post-simulation written reflections.</li> <li>• Investigation of medication error and near-miss data at the time of interrupted medication administration</li> </ul>

	<p>role-plays to provide evidence linking error type and frequency with individual interruptions.</p> <ul style="list-style-type: none"> <li>Investigation of the impact of gender when planning educational experiences that deliberately place students under stress.</li> </ul>
<b>Implications for practice</b>	<ul style="list-style-type: none"> <li>A raised awareness of the impacts of interruptions during the medication administration process can be developed through immersion in role-play simulation experiences.</li> <li>Interruption management strategies that are transferrable to practice can be developed through immersion in role-play simulation experiences.</li> <li>An improved understanding of the patient perspective gained during immersive role-play simulation experiences can have a direct impact on patient empathy, empathy for the patient's significant others, as well as other team members to impact therapeutic relationships and enhanced capacity for empathy in practice.</li> <li>Supporting undergraduate student nurses to reflect in and on learning experiences encourages development of reflective practitioners who are able to discover and develop strategies to manage difficult situations when on clinical practicum.</li> <li>New knowledge and skill acquisition gained from scenario immersion and reflective activities produces improved self-efficacy and self-confidence.</li> </ul>

## 6.2 Study implications

### 6.2.1 Summary

The results from this study have implications for undergraduate education, nursing practice and research. Data shows that immersion in role-play simulation experiences serves to not only raise awareness of the impacts of interruptions during the medication administration process, but also facilitates the discovery of interruption management strategies that can be transferred to practice to enhance patient safety and outcomes.

The importance of enhancing student understanding of the patient perspective was reported to have had clear implications for future practice. Developing new levels of patient and team empathy was reported by students to have impacted their ability to form therapeutic relationships in practice.

A further implication for both nursing education and nursing practice stems from supporting undergraduate student nurses to reflect in and on learning experiences. Encouraging the development of reflective practitioners who are able to discover and develop strategies to manage difficult situations when on clinical practicum not only extends and solidifies learning but also enhances self-awareness, self-efficacy and confidence.

In addition, the data arising from this study informs the need for future research that investigates nursing student stress responses before, during, and after ramped complexity simulation experiences. Research findings also suggest the need for further investigation and evaluation of student's perceptions of the value and impact of post-simulation written reflections.

### 6.2.2 Study implications and recommendations for undergraduate nursing education

Undergraduate nursing education has transitioned, leaving behind a hospital-based apprenticeship model that most often employed task-oriented, and competency-based teaching methods (Dyson 2018). The move to the tertiary sector brought with it opportunities to broaden nursing's horizons to include public health, primary healthcare and evidenced based practice arising from strong nursing research (Grealish & Smale 2011). There was a focus on theory and



critical thought processes, however, there was a concurrent reduction in experiential learning opportunities (Burns & Glen 2000).

Undergraduate nursing education requires the integration of multiple learning and teaching initiatives and pedagogical approaches to facilitate the growth of students through to registration. Pedagogical approaches such as problem-based learning (Martyn et al. 2014), practice-based learning (Billett 2015), blended learning (Shorey et al. 2018), and flipped learning (Presti 2016) guide the design, implementation and evaluation of teaching initiatives, and have been incorporated into undergraduate nursing education. Simulation pedagogy has also been embraced amongst nursing faculty as it provides an authentic, collaborative, student-centred, experiential learning opportunity for students (Berragan 2011).

The student-centred approach requisite in simulation pedagogy compels one to reflect on the student perspective of the experience itself. Students who participated in this research study articulated the positive impact of the role-play simulation, in particular the opportunity 'be' the patient which resulted in an enhanced understanding of the patient perspective and a new level of patient empathy. The importance of being exposed to challenging interrupted scenarios before facing them in the real world of clinical practice was also acknowledged by students in the study. Students not only saw value in inhabiting the patient space and being exposed to challenging scenarios, but also suggested the introduction of more opportunities that facilitate similar experiences. This finding calls nursing faculty to consider embedding increased numbers of challenging role-play simulations for undergraduate nurses.

One particular area of challenge identified by students and faculty in this study was managing the demanding behaviours of the confused patient. Students disclosed that they felt inadequately prepared to safely care for confused older patients in the clinical environment. Nursing faculty added to this concern identifying aberrant student actions and reactions as they attempted to manage the challenging patient behaviours of the confused patient during the scenario. Nurses are required to act as patient advocates and informants,

prioritise positive patient outcomes and provide individualised care, while displaying empathy, caring and compassion for all patients (Henry 2018). These requirements, while fundamental to therapeutic nursing care, proved difficult to accomplish for some of the student nurses in this study. During debriefing students identified a desire to achieve empathetic and compassionate care at all times but acknowledged that their limited clinical experiences and gaps in underlying knowledge hindered their ability to achieve this goal in the challenging circumstance that they had found themselves. It is therefore incumbent on nursing faculty to identify areas of particular concern such as managing confused patients and provide targeted experiential learning opportunities that facilitate the transition between desire and ability.

Targeted experiential learning opportunities that can be repeated are known to reinforce learning (Kolb 1984). Repeating the interrupted medication role-play simulation in this study was suggested by the students as a consideration for future iterations. Despite reporting that they had learned new strategies and gained new insights and deeper understandings from the scenario and reflective exercises, the students disclosed that they would have liked the opportunity to switch roles and re-run the simulation. However, for large student cohorts such as the one described in this thesis, timetable and fiscal constraints present a barrier that denies repetition of real-time live simulation experiences. To mitigate this concern, faculty could consider the inclusion of pre and post-simulation activities, for example the introduction of virtual or web-based environments. Linked pre-simulation activities would enhance knowledge and skill capacity prior to immersion in the live scenario. Linked post-simulation activities would provide opportunities for students to select and repeatedly participate in any of the available roles in a virtual world, at a time and place convenient to them. Repetition training using web-based, virtual environments and serious games has been shown to be effective in new knowledge and skill acquisition, cultivating clinical reasoning, enhanced self-confidence, and self-directedness when in clinical learning environments (Kovisto et al. 2018; Liaw et al. 2016). Applying serious gaming and virtual reality to this and other simulation scenarios would facilitate low dose high-frequency learning opportunities for students to enhance learning.

The final recommendation for undergraduate nursing education arising from the findings in this study, involves the use of guided written reflections. Guided written reflections were reported in this thesis to have enriched the simulation learning experience by extending and solidifying learning. The seven steps model (see figure 13) was designed in response to this finding and provides a stimulus for nursing faculty to consider the inclusion of written reflections as an integral part of the simulation process. If compiled and maintained in journal format, new knowledge and strategy development acquired through simulation experiences could be called on as a resource to inform practice.

#### 6.2.4 Implications for practice

One of the key aims of this thesis and the simulation that was designed within it is to raise awareness of the impact of interruptions and facilitate new insights into interruption management strategies with a view to making an impact on practice. Students in this study reported a raised awareness of the impacts of interruptions during the medication administration process, were able to articulate new interruption management strategies, with some students describing having used what they had learnt in practice.

Improved understanding of the patient perspective was an area highlighted by the students as having a direct impact on their perceived level of patient empathy. This is significant as patient empathy has been reported by some to diminish as nursing students' progress through their degree (Ferri et al. 2015; Williams et al. 2014). The ability for nurses to feel and display empathy for patients, their significant others, and team members is essential for therapeutic relationships to develop (Percy & Richardson 2018), so experiences such as the one provided to the students in this study are invaluable to enhancing their capacity for patient empathy in practice.

Self-efficacy and self-confidence were also reported to have improved as a result of the simulation role-play. The students explained that new knowledge and skill acquisition gained from scenario immersion and reflective activities was responsible for their improved self-efficacy and confidence. Supporting undergraduate student nurses to reflect in and on learning experiences

encourages them to become reflective practitioners (Bulman 2013) who are able to discover and develop strategies to manage difficult situations when on clinical practicum.

#### 6.2.5 Impacting student performance in the clinical environment through simulation: short and long-term implications for patient safety

The need to clearly link and measure the short and long-term impacts of undergraduate nursing simulation experiences to patient care and safety in clinical practice is frequently described in simulation literature (Seaton et al. 2018). However, measuring the direct impact of undergraduate nursing simulation experiences on patient care and safety in clinical practice has to date been lacking (Kunst, Henderson & Johnston 2018; Olsen et al. 2018). The majority of simulation literature to date provides self-reports of improved confidence and self-efficacy (Blum, Borglund & Parcels 2010; Cato, Lasater & Peeples 2009). Those that report improved levels of knowledge, critical thinking ability and skill acquisition in undergraduate nurses often do so using pre and post-tests within the teaching environment in which the simulation takes place. An example of this is seen in a mixed methods study of 150 undergraduate nurses and 26 nursing faculty that reported on the implementation and impact of undergraduate simulation experiences with findings showing increased self-confidence scores and improved knowledge and skill performance in the simulated environment (Schlairet 2011).

Benishek et al. (2015) noted that when aiming for maximum post simulation impact on practice, a systematic methodological approach to design and planning should be undertaken. However, a recent systematic review reporting on the use of simulation pedagogy in undergraduate nursing students' education found that 'transferability of learning from the simulation to patient care' was not demonstrated in the studies subject to their review (Olson et al. 2018 p2). In difference to the findings in the Olsen et al. (2018) review the findings resulting from the individual student interviews in this thesis provide examples of students who reported having utilised the learned knowledge and skills in practice, thereby demonstrating the transferability of the experience. Although this finding reflects transferability to practice for some students, additional

supporting research is needed to inform the positive impacts of simulation experiences on real world clinical performance.

Transferring the knowledge and skills developed in the simulation environment to clinical practice is important for patient safety and positive patient outcomes. However, to achieve transfer of sound knowledge and safe performance skills to practice existing performance and knowledge gaps must be identified. A mismatch between desired actions and actual actions during simulation highlights these gaps and where students and patients may be at risk of error and poor outcomes.

One area of significant risk is that posed by interruptions to the medication administration process. As a result Krautscheid et al. (2011) highlight the need for simulations that provide nurses with opportunities to practice managing interruptions during the process of medication administration. The role-play simulation described in this thesis addresses these suggestions and was designed to identify and manage knowledge and performance gaps by creating a scenario that predicted error risk points during interrupted medication administration. The participating students were encouraged to experience the reality of those risks and address gaps in their knowledge and ability resulting in students commenting on the positive impact of the experience on learning.

Both 'doing' and 'thinking' to improve actions are equally important if nurses are to be able to effectively transfer knowledge and skills into safe patient care both in the short and long term. Students must be carefully guided to critically think 'in' action as well as 'on' action. However, to accomplish this novice nurses also require clear frameworks. This desire for clear frameworks and protocols was echoed in student responses in this study, who reported trying to follow the six rights protocol but when distracted by the interruptions strayed from the protocol, making them vulnerable to making errors. While some students described following Tanner's (2006) model of noticing, interpreting, responding and reflecting others recounted a flipped order where they noticed then responded by instinct during the role-play. Critical thought processes were used to interpret and reflect on initial responses during debriefing. This change in Tanners (2006) expected order was thought to be caused by the pressured unfamiliar situation which led some of these novice nurses to respond or act

before thinking. An example of this was articulated by members of the nursing faculty who described students becoming frustrated, lashing out and applying physical restraint to the confused patient.

Nursing faculty play a crucial role in guiding student performance, knowledge and skill acquisition in simulation that is hoped will be transferred to practice. Optimum learning occurs in simulation when a safe, non-judgemental learning environment is provided where active engagement in the briefing, scenario and debrief is encouraged (INACSL 2016). However, not all students engage in the simulation experience in the same way; some will freely engage in the scenario and group debriefing while others will prefer to be less interactive, listening and observing. Faculty are required to skilfully incorporate identified learning objectives while practising reflective thinking to support and validate student input (Kolb et al. 2014). As noted in responses from the nursing faculty, some students required additional encouragement to engage in problem-solving and critical thinking skills to make decisions about how to prioritise, communicate and manage their time safely and effectively.

Transferring learning to clinical practice requires the self-confidence and self-efficacy that are afforded through an improved knowledge base, mastering skills and being aware of what they might reasonably be expected to face in the clinical environment (Blum, Borglund & Parcels 2010). While there is a direct correlation between self-confidence and self-efficacy, there are clear distinctions. Bandura (1997a) observed that 'confidence is a nondescript term that refers to strength of belief but does not necessarily specify what the certainty is about... Perceived self-efficacy refers to belief in one's agentic capabilities that one can produce given levels of attainment. A self-efficacy assessment, therefore, includes both an affirmation of a capability level and the strength of that belief' (p.382).

Bandura (1997b) cited four main sources of influence on self-efficacy; achievement, vicarious experience, verbal persuasion, and emotional arousal. When translated to the undergraduate nurse experience of the interrupted medication administration role-play in this thesis, students reported achievements in elements of the model. The students described learning by watching their peers in action and reflecting on positive and negative strategy

development for adoption in practice. While Banduras work (1977) focus' on positive experiences and emotions laying the foundation for building self-efficacy and negative experiences and anxieties diminishing it, the findings elicited from students in this thesis revealed that they were able to reflect on both the positive and negative experiences and emotions encountered in the immersive phase of the simulation to build a positive frame for future experiences of interrupted medication administration. Students described building complex skill capacity involving delicate team interactions through the development of underpinning knowledge and skills. They reported that they had built both self-efficacy and self-confidence that would enable them to be assertive or to challenge other healthcare professionals in practice if patient safety is in question.

Patient safety is dependent on undergraduate student nurses having opportunities to identify gaps in knowledge, gain an awareness of their abilities and limitations to practice, and practice skills to develop self-efficacy and self-confidence. Teaching nurses to manage interruptions to the medication process is fundamental to maintaining patient safety in both the short and long term and is therefore of significance to the discipline of nursing. These opportunities impact learning and practice and facilitate the transition from unconscious incompetence to conscious incompetence and beyond (Benner 2001).

### 6.2.3 Implications and recommendations for research

The presented implications and recommendations for research are closely linked to the implications for undergraduate education. It became clear from the findings emerging from this study that some students would like to be exposed to additional high-pressure simulation experiences that closely mimic the reality of the dynamic clinical environment. It is, however, prudent for faculty to ensure that the pressured environments students are exposed to during simulation experiences do not exceed cognitive load capacity, to the point that learning is diminished. Investigating undergraduate nursing student stress responses before, during, and after ramped complexity simulation experiences may provide valuable data to inform the cognitive load impacts. Wearable physiological data collection devices, salivary cortisol testing, observation, and self-report



stress response scales could be utilised to find links between physiological and emotional responses to stress as they link to performance and care delivery.

Further to this, formalisation of medication error and near-miss data collection at the time of the role-play, would provide valuable evidence linking error type and frequency with individual interruptions. Linking error type and frequency to individual interruptions would highlight where the process of medication administration is most vulnerable to interruption related error and provide a hierarchy of interruption impact that informs relevance of ongoing simulation development.

Despite some students revealing that they had utilised their new found knowledge and skills when on clinical practicum, further work is required to examine and report observable impacts of the role-play on performance and error reduction in the clinical environment. Longitudinal studies of undergraduate nursing students that report the clinical impacts of this and other safe medication administration educational interventions are currently unavailable. The inclusion of randomised control groups in undergraduate simulation studies would facilitate the collection of data to reflect the impacts of the intervention on medication error and near-miss rates both in the laboratory environment and then in practice. However, to date the use of randomised control trials are in the minority in undergraduate nursing simulation research (Cant & Cooper 2017b).

This thesis' study also highlights the value of the guided written reflective process after simulation experiences. However, further research is required to support this finding as the limited number of studies that describe the use of post-simulation written reflections does not evaluate student's perceptions of the value and impact of the written reflective process in and of itself (Reed 2015; Lestander et al. 2016; Bussard 2017). The study described in this thesis is unique in that students clearly articulated that they valued the written reflective process as an opportunity for deeper analysis of the experience, using critical thinking to cement learning.

## 6.3 Final thoughts and conclusions

This thesis sought to answer the following research questions:

1. How do novice and advanced beginner undergraduate student nurses respond to interruptions during the medication administration process?
2. Does the introduction of a simulated role-play experience involving interrupted medication administration raise awareness of the impact of interruptions and facilitate new insights into interruption management strategies?

Raising student awareness of the impacts of interruptions during medication administration and facilitating student development of interruption management strategies were the central and successfully achieved aims of this research. Following participation in a carefully planned role-play simulation that closely mimicked reality, second-year undergraduate nursing students provided feedback in the form of guided written reflections, semi-structured individual interviews and SFS. They reported new understandings of the impact of interruptions on emotions and their ability to safely undertake the task of medication administration. They identified gaps in their knowledge, greater levels of patient empathy and new interruption management strategies that they felt they could, and at times did, transfer to practice.

Interruptions are inevitable in the course of any nurses work day (Rivera-Rodriguez & Karsh 2010), therefore, the correlation between how students respond to high pressure interrupted environments and how they gain new understanding from them is important. Interruptions will continue to occur during medication administration irrespective of interruption reduction interventions and require the administering nurse to engage in varying levels of multitasking. However, existing medication administration educational opportunities for undergraduate nurses that expose them to interrupted, multitasking environments are limited.

Students rose to the challenge of the interrupted, multitasking experience described in this study. During debriefing students discussed strategies they had used during the simulation or could foresee using in future practice, a new

understanding of clinical expectations, and the importance of effective communication and collaborative teamwork. Students not only reflected on and shared new interruption management strategies, they also identified the impact of altered emotions on performance and their ability to provide safe, compassionate and empathetic care during medication administration. While debriefing targeted the intent of the simulation, the inclusion of a written reflection provided students with an additional reflective opportunity that encouraged a deep and conscious evaluation of personal performance and awareness of self and others. This study is unique in that students clearly articulated the value of the written reflective process citing it as an opportunity for deeper analysis of the experience, using critical thinking to cement learning.

Gaining insights into the student learning experience requires a collaborative environment that encourages and includes the learner. The student-centred approach, fundamental to the design of this thesis, focuses on the learning needs and experiences of novice nurses to support preparation for practice. The student desire to be put under increased pressure in the simulation environment in preparation for practice was unexpected and deserves a response.

This research project offers an easily replicable, experiential learning opportunity for large student cohorts beginning to learn the art of administering medications in a authentic, dynamic, simulated clinical environments. While the study describes a discrete role-play simulation experience and research project, it also encouraged the use of innovative, theoretically derived pedagogical approaches to enrich undergraduate student nurse learning experiences and positively impact on patient experience, safety and outcomes.

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# Appendices

## Appendix 1: First editorial

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### EDITORIAL

#### Interruptions and medication: Is 'Do not disturb' the answer?

CAROLYN HAYES, TAMARA POWER, PATRICIA M DAVIDSON\* AND DEBRA JACKSON

University of Technology Sydney, Ultimo, NSW, Australia; \*Johns Hopkins University School of Nursing, Baltimore, MD, USA

Medication related incidents and errors continue to be a significant patient safety issue in health care settings internationally and despite decades of research and quality improvement initiatives, we have failed to identify innovative and sustainable solutions. The importance and significance of this problem not only challenges us, but emphasises the need to develop and implement sustainable interventions that are realistic and appropriate for the clinical setting. Nurses are not only the largest group of health professionals who administer medications, but are also considered to be in the best position to recognise and prevent medication errors before patient safety is compromised (Flynn, Liang, Dickson, Xie, & Suh, 2012). Hence the need to adequately prepare student nurses by providing appropriate learning opportunities.

In 2009 in New South Wales (NSW) (Australia) public hospitals there were 21,717 reported medication and intravenous (IV) fluid incidents; 38% of which occurred within the administration phase (Clinical Excellence Commission Health and NSW Department of Health, 2011). There is a paucity of peer reviewed literature that accurately reports current Australia wide statistics that include both oral and IV incidents. However, some relevant contemporary data was submitted in 2008 as part of a submission to the National Health and Hospitals Reform Commission. One submission stated there are between 77,000 and 96,000 preventable medication/IV fluid errors per annum, and it was further estimated that 27% of these errors caused patient harm (Hospira Pty Ltd, 2008). This problem is not unique to the Australian context, it aligns with a similar situation in many other countries including

North America, the United Kingdom, and Canada (Kohn, Corrigan, & Donaldson, 2000; Smallwood, 2000). In the North American context, an average of 450,000 preventable medication errors is estimated each year (Flanders & Clark, 2010). However, it must be acknowledged that these figures may not be accurate. For every reported medication error or incident, there are many more that go undetected and unreported (Choo, Hutchinson, & Bucknall, 2010; Flynn, Barker, Pepper, Bates, & Mikeal, 2002; Hughes & Blegen, 2008; McBride-Henry & Foureur, 2006).

Projected estimates of up to two errors per patient per day (Wu, Pronovost, & Morlock, 2006) or one in five administrations of medications resulting in error (Reid-Searl, Happell, Burke, & Gaskin, 2013) have been documented. The associated cost Australia wide for medication error related hospital admissions is estimated to be \$660 million/annum (Roughead & Semple, 2009). The costs accrue from a combination of increased lengths of stay, patient mortality and personal impacts including post discharge disability, and emotional distress (MacDonald, 2010; Roughead & Semple, 2009). In addition to the burden for patients and their families, there are also costs to nurses and the health care system. These costs may be professional, financial, physical and/or emotional (Flanders & Clark, 2010).

Interruption or distraction to the administering clinician during the process of medication administration has been widely identified as a leading cause of errors (Hughes & Blegen, 2008; Nichols, Copeland, Craib, Hopkins, & Bruce, 2008; Westbrook, Woods, Rob, Dunsmuir, & Day, 2010). Westbrook et al. (2010) reported

over 50% of observed medication administration encounters were interrupted in some way and nearly 85% of interrupted encounters resulted in either clinical error (e.g., wrong dose, timing, IV administration rate) or procedural error (e.g., not checking patient identification, inadequate attention to hand washing) or both (Westbrook et al., 2010). Palese, Sartor, Costaperaria, and Bresadola (2009) observed one interruption for every three patients given medication.

Even the processes through which nurses attempt to control and reduce the effects of interruptions can be disruptive. Requests for assistance by other team members, even if postponed by the administering nurse, requires suspension of the medication administration task, involving loss of concentration, before resumption of the process can occur. However, on the flip side, interruptions can constitute a reason nurses intercept errors. Patients or their relatives may ask questions that provide cues for reflection or additional checking. Questioning is something that should be encouraged as it can assist patients to understand the appropriate use of their medications. If open channels of communication are nurtured between nurse and patient it places the nurse in an ideal situation to both allay patient concerns and/or intercept possible errors before they occur (Flynn et al., 2012).

Managing interruptions and distractions necessitates an ability to prioritise according to individual patient needs. To do this, nurses need to be able to effectively multitask, in other words; to be able to think and do, or think and listen at the same time (Schmalenberg et al., 2008). As a response to research findings positioning interruptions as culpable, considerable current research foci remains on the prevention of errors, often with the same goal in mind – nurses who are dispensing or administering medications should be free to administer medications with minimal interruptions or distraction (Pape et al., 2005; Relihan, O'Brien, O'Hara, & Silke, 2010).

The 'sterile cockpit rule,' has been offered as a basis for several interventions in the healthcare environment, suggesting

eradicating interruptions during administering of medications will prevent errors (Flanders & Clark, 2010). The sterile cockpit rule was successfully initiated in the aviation industry in the 1980s in an effort to decrease distractions that had been identified as a threat to safety in the cockpit area. However, both the clinical environment and nature of nursing practice do not afford nurses the same opportunities to isolate themselves from communications with the people they are caring for, making transfer of this concept difficult. Strategies such as signage and wearing tabards or sashes that say 'do not disturb,' safety checklists, and the instigation of markings on the floor to indicate 'no go and quiet zones' are currently being trialled, all with varying levels of success (Flanders & Clark, 2010; Kyle, Wiencek, Bauer, Daly, & Anthony, 2010; Relihan et al., 2010).

These approaches deny the complex and multifaceted environment of the health care system and the interactive, dynamic and reflexive process of the nurse–patient interaction. Considering medication administration outside of the context of the broader health care environment is unlikely to contribute to viable and sustainable interventions. Greater consideration needs to be given to how nurses, patients, relatives and other health care workers respond to and embrace measures that isolate the process of medication administration from the broader clinical interaction. It is also important to consider other associated issues; such as the infection control issues surrounding wearing tabards that are not laundered or cleaned, signage that may not be read or adhered to, and quiet zones that are hard to police.

In choosing to display signage, either in the form of posters or articles of clothing, that alert people to 'not disturb' the nurse while administering medications there needs to be awareness of the message that is being sent and to whom it is intended. Nursing is a communication-based craft that often necessitates immediate and acute care. By its nature, nursing is a dynamic, multi-tasking, people oriented profession that occurs alongside



frequent interruptions (DeLucia, Ott, & Palmieri, 2009). It could be argued that in asking patients and their relatives not to 'disturb' the nurse, we are going against the very core and essence of what nursing embodies – communication-based compassionate and responsive care. Compassion and empathy have long been underpinning elements of nursing (Cornwell & Goodrich, 2009; Sabo, 2006) and as we progress towards attaining levels of high quality technical clinical care, it is crucial that this core value of compassion not be eroded (Straughair, 2012). Caring is also strongly associated with nursing, and accessibility or being available to patients is associated with enacting the caring role (Jackson & Borbasi, 2010).

The longer term impact of these strategies is also an issue of concern, as over time the efficacy of these approaches diminishes. (Bennett, Dawoud, & Maben, 2010). Technology such as smart pumps, electronic dispensing, computerised physician order entry, bar code point of care, and dose error reduction systems although having been endorsed by many as effective error reduction methods (Forni, Chu, & Fanikos, 2010), do not in and of themselves reduce interruptions.

It has been reported that up to 40% of nurses' time is engaged in administering medications (Hughes & Blegen, 2008). This raises the question as to whether an intervention that asks for no interruptions or disturbances during this amount of time is realistic. Furthermore, given that many nurses greatly value direct patient contact and engagement with patients, there also needs to be consideration of how reducing the nature and frequency of patient contact with nurses might affect nurses' job satisfaction.

While testing strategies such as signage displays, no interruption zones and electronic dispensing, it is important to acknowledge that interruptions continue to occur and so nurses are required to be able to deal with these while still maintaining safety for patients. Yet there remains a lack of literature addressing how nurses learn to prioritise and cope with

interruptions. Given what is known about the relationship between interruptions and nurse medication error, it is important that interruptions and distractions be addressed as part of nursing curricula. This is crucial in adequately preparing nurses for the 'real world' of nursing practice. Though there is a paucity of literature in the area of undergraduate nursing education in relation to managing interruptions during medication administration and the relational effects on error rates, research by Reid-Searl, Moxham, and Happell (2010) indicated that 32% of student nurses in their sample reported being involved themselves in either a 'near miss' (p. 228) or error while administering medication in the clinical environment.

Safe and effective administration of medications is a cornerstone of nursing practice and draws on processes requiring multiple clinical judgements, professional vigilance and critical thinking during all phases of the process (Eisenhauer, Hurley, & Dolan, 2007). At the undergraduate level, tailored, realistic and focussed learning that involves critical thinking to problem solve and make decisions is essential, and could better prepare nurses to fulfil the task of medication administration, and navigate deviations such as distractions and interruptions confidently and safely. Such approaches are likely able to afford benefits for patients, nurses and others involved in medication administration, and the broader health care system.

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# Simulation: Smoothing the transition from undergraduate to new graduate

Transition to practice can be challenging and stressful for newly graduated nurses who are trying to adapt to a new workplace culture and fulfil role expectations (Laschinger et al., 2016; Parker, Giles, Lantrey, & McMillan, 2014). Mastering time management and multitasking in complex environments can be daunting for new nurses, with literature suggesting they can be left feeling insecure and vulnerable (Stump, Husman, & Brem, 2012). These feelings are exacerbated by inexperience, shortfalls in essential knowledge, or inadequate support networks, either real or perceived (Laschinger & Fida, 2014; Pascale Blakey & Jackson, 2016; Wolff, Regan, Pesut & Black, 2010). If left unresolved, stress levels can escalate. The resulting low levels of self-efficacy and failure to thrive in the demanding clinical environment may lead those impacted to leave the profession (Laschinger & Fida, 2014).

New nurse attrition is a global phenomenon that not only impacts nurses on a personal level (Laschinger & Fida, 2014) but also impacts institutional reputation, efficiency, and budgets (Duffield, Roche, Homer, Buchan, & Dimitrelis, 2014; Li & Jones, 2013). The loss of new nurses incurs both direct and indirect costs to the institution, including the recruitment, training, and support of replacement staff, and the employment of interim casual staff to cover workload during the recruitment process (Duffield et al., 2014). High turnover rates also impact the quality of care, patient safety, and organisational reputation (Ulrich et al., 2010).

Low levels of self-efficacy in newly graduated nurses create a vulnerability that can result in poor performance, the omission or delay of care, and an increased risk of errors, putting patients and nurses at risk (Stump et al., 2012). One example of this can be seen during medication administration, where there is a direct correlation between low levels of self-efficacy and poor medication calculation performance (McMullan, Jones, & Lea, 2012). Medication administration involves more than just medication calculation; numerous predictable and unpredictable issues create vulnerability to errors throughout the administration process (Hayes, Jackson, Davidson, & Power, 2015). Medication administration is a complex skill for undergraduate and newly graduated nurses to master and is often subject to interruptions (Hayes, Power, Davidson, Daly, & Jackson, 2015).

The dynamic and complex environment of clinical practice compounds the risk of errors occurring (Hayes, Power, et al., 2015). Newly graduated nurses with limited clinical experiences on which to draw can be derailed easily by the interruptions they face in the clinical environment. Understanding the complexities of interruption management and having the ability to implement appropriate strategies to address these comes with experience. Along with the

increased risk of error, interruptions have also been shown to increase the time taken to administer medications (Cooper, Tupper, & Holm, 2016). These compounding factors result in decreased efficiency (Cooper et al., 2016), which may place added stress on both administering nurses and those working alongside them.

Providing educational experiences that will expose nurses to realistic clinical scenarios at an undergraduate level is one way of increasing experiential knowledge, improving the transition to practice. Well planned, realistic, simulated clinical scenarios and environments in areas such as medication administration have been directly linked to error reduction both in university environments and during clinical practicum (Jarvill et al., 2017; Sears, Goldsworthy, & Goodman, 2010). Pedagogical approaches such as immersive simulation experiences provide an opportunity for participants to reflect in and on action, and display attributes of critical thinking, new knowledge and skill acquisition, and strategy development (Aggar & Dawson, 2014; Kaddoura, 2010). These experiences can provide consistency in training and assessment, are easily accessible, and afford clinical benefits by reducing patient risk (Lateef, 2010). Nurses who have participated in targeted immersive simulation experiences report improved levels of self-efficacy, knowledge and skill acquisition (Hayes, Jackson, Davidson, Daly, & Power, 2017; Howard, Englert, Kameg, & Perozzi, 2011; Lubbers & Rossman, 2016; Mould, White, & Gallagher, 2011). These types of initiatives provide opportunities to smooth the transition process.

Although the transition process begins at university level, ensuring practice readiness is not the domain of the tertiary education sector alone. Ulrich et al. (2010) note that the "need to assure an ongoing supply of competent RNs who are prepared to practice in acute care settings and who will remain in those settings requires a change in how new graduate nurses are transitioned into professional nurses" (p. 364). Literature has identified gaps between undergraduate education and clinical practice (Benner, Sutphen, Leonard, & Day, 2010). One method of addressing these gaps for undergraduate nurses transitioning to registered practice is through the use of carefully linked, targeted simulation experiences. Educational innovations that regularly expose students to a range of challenging environments, incorporating suitable levels of propositional, procedural, personal, and/or intuitive knowledge are required to support and assess undergraduate nurses for practice readiness. Linking undergraduate learning experiences to new graduate transition programmes is complex, requiring strong collaborative relationships between educational facilities, nurse managers, experienced clinical nurses, and hospital administrators.

Undergraduate education and new graduate programmes and support processes vary globally. In the Australian context, universities are largely responsible for the task of preparing undergraduate nurses for practice, with hospital-based registered nurses and nurse managers playing a significant role during clinical practicum (Wolff, Pesut, & Regan, 2010). Transition programmes are typically the domain of the institution or the area health service by which each new graduate is employed. Several studies have researched the effectiveness of hospital-based transition experiences and programmes for newly registered nurses (Patterson, Mnataganian, & Boyd, 2017; Regan et al., 2017), and others for undergraduate students in preparation for scheduled clinical practicum experiences (Nielsen, Noone, Voss, & Mathews, 2013). There remains a paucity of studies that report university and hospital-based educators working in partnership to formulate programmes that flow seamlessly through from undergraduate to new graduate programmes. Clinically based nurse managers and educators are the crucial link between university and clinical educational experiences. They are in a unique position to champion the use of a range of linked, relevant simulation experiences for new graduates as they transition to practise as registered nurses.

If healthcare providers are serious about smoothing the transition in order to minimize errors, improve patient safety, and facilitate nurse wellbeing and staff retention, it is necessary to establish collaborative partnerships between undergraduate and new graduate transition programmes. The complex matrix of factors that impact transitioning undergraduate nurses into the real world of clinical practice as graduates who are able to build on previous experience, fulfil workplace expectations, and feel supported in their practice, is significantly affected by the authentic leadership of nurse managers. It is incumbent on nurse managers and experienced clinical nurses to ensure newly graduated nurses are abreast of not only how the organisation in which they work functions but also how they, as novice practitioners, fit in and effectively function within it. A consultative approach between university educators and external stakeholder groups during the design and application of nursing education programmes, curriculum development, and delivery is vital when attempting to maximize student nurse clinical practice readiness for transition to registered practice (El Haddad, Moxham, & Broadbent, 2013). Increasing the number of immersive simulation experiences designed in collaboration with transition programme coordinators before each clinical placement, which follow through to the post-graduate year, may well provide a life raft to novice nurses, reducing the risk of error and enhancing the provision of safe patient care.

Carolyn Hayes

RN, BHSn (Nurs), Cert. Emergency Nursing, Cert. Spinal Injuries Nursing, Manager, Simulation and Laboratories, Faculty of Health, University of Technology Sydney, 235 Jones Street, Broadway, NSW 2007, Australia  
Email: Carolyn.Hayes@uts.edu.au

Correspondence

Carolyn Hayes  
Email: Carolyn.Hayes@uts.edu.au

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### Appendix 3: Journal permissions to include articles in thesis

In reference to:

Hayes, C., Power, T., Davidson, P.M., Daly, J. & Jackson, D. 2018c, 'Simulation: smoothing the journey from undergraduate to new graduate', *Journal of Nursing Management*, vol. 26. No. 5, pp. 495-497.

Hayes, C., Jackson, D., Davidson, P.M., Daly, J. & Power, T. 2018a, 'Pondering practice: enhancing the art of reflection', *Journal of Clinical Nursing*, vol. 27, no.1-2, pp. e345-e353.

Hayes, C., Jackson, D., Davidson, P.M., Daly, J. & Power, T. 2017, 'Calm to chaos: engaging undergraduate nursing students with the complex nature of interruptions during medication administration', *Journal of Clinical Nursing*, vol. 26, no. 23-24, pp. 4839-4847.

Hayes, C., Jackson, D., Davidson, P.M. & Power, T. 2015a, 'Medication errors in hospitals: a literature review of disruptions to nursing practice during medication administration', *Journal of Clinical Nursing*, vol. 24, no. 21-22, pp. 3063-76.

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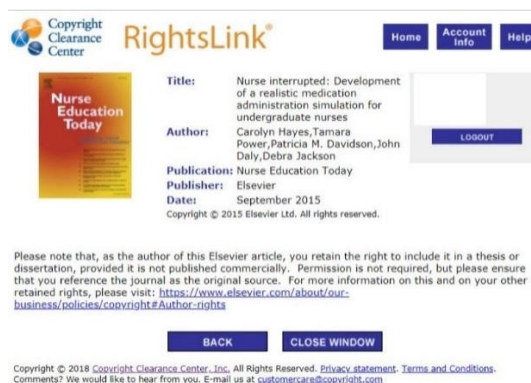
In reference to:

Hayes, C., Power, T., Davidson, P.M., Daly, J. & Jackson, D. 2015b, 'Nurse interrupted: development of a realistic medication administration simulation for undergraduate nurses', *Nurse Education Today*, vol. 35, no. 9, pp. 981-986.

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## Appendix 4: Corrigendum



### Corrigendum

#### Corrigendum to “Nurse interrupted: Development of a realistic medication administration simulation for undergraduate nurses” [Nurse Educ. Today 35 (99), September 2015, 981–986]

Carolyn Hayes<sup>a,\*</sup>, Tamara Power<sup>a</sup>, Patricia M. Davidson<sup>b</sup>, John Daly<sup>c</sup>, Debra Jackson<sup>d,e</sup>

<sup>a</sup> University of Technology Sydney, Faculty of Health, Building 10, 235 Jones Street, Broadway, NSW 2007, Australia

<sup>b</sup> Johns Hopkins University School of Nursing, United States

<sup>c</sup> University of Technology Sydney, Faculty of Health, PO Box 123, Broadway, NSW 2007, Australia

<sup>d</sup> Oxford Brookes University, Oxford, UK

<sup>e</sup> University of New England, NSW, Australia

The authors regret that there is a typographical error in the Abstract section of this article.

The text should read: “Written reflections were completed and submitted over the following 2 weeks to extend the reflective learning

process and review the impact of the experience from the student perspective”.

The authors would like to apologise for any inconvenience caused.

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\* Corresponding author.

E-mail address: [Carolyn.Hayes@uts.edu.au](mailto:Carolyn.Hayes@uts.edu.au) (C. Hayes).

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## Appendix 5: Facilitator Simulation guide

<b>Week/Date</b>	XXXX
<b>Simulation Title</b>	Multi-tasking while medicating: managing interruptions during medication administration.
<b>Scenario Learning Objectives</b>	<p>At the end of this simulation, students will have learnt:</p> <ul style="list-style-type: none"> <li>• To apply clinical reasoning to prioritise care</li> <li>• New strategies to deal with interruptions when administering medications</li> <li>• Build and enhance communication and collaboration between nurses</li> <li>• Build and enhance communication strategies with patients</li> <li>• To demonstrate professional behaviour</li> <li>• To link the theory and practice of safe medication administration in an interrupted environment</li> </ul>
<b>Associated Pre-work:</b>	<p>Students should:</p> <ul style="list-style-type: none"> <li>• Review the student simulation guide provided in the subject workbook</li> <li>• Review the 6 rights of Medication administration</li> <li>• Complete the confidentiality form</li> </ul>
<b>Type of Simulation:</b>	Immersive role play
<b>Scenario Summary:</b>	<p>The Registered Nurse (RN 1) is commencing her/his shift. He/she has received the ward handover and is coming to begin the morning medication round. The first patient he/she attends is Mrs xxx a 36 year old female admitted 7 days ago, via ED, following endoscopy and treatment of bleeding peptic ulcer, constipation and exacerbation of asthma. She is sitting up in bed. There is a second patient in the room, an 85 year old female Mrs xxx, who has been admitted overnight with confusion for investigation. Depending on allocated role students will be required to either administer medications, cause interruptions or observe the role play and conduct peer assessments.</p>
<b>Clinical Issues:</b>	<ul style="list-style-type: none"> <li>• Safe administration of medications.</li> <li>• Management of exacerbation of asthma.</li> </ul>
<b>Non-Clinical Issues:</b>	<ul style="list-style-type: none"> <li>• Managing interruptions in the clinical environment.</li> <li>• Prioritisation of care.</li> <li>• Communication within a team and with patients.</li> <li>• Understanding the patient perspective.</li> </ul>
<b>Participant Briefing:</b>	<ul style="list-style-type: none"> <li>• Orient students to the environment.</li> <li>• Role allocation and background to each role.</li> <li>• Describe the scenario and provide patient handover.</li> <li>• Highlight the learning objectives.</li> </ul>

### Role Allocation

Role:	Actions:
RN 1	<ul style="list-style-type: none"> <li>Communicates with the patient and other staff</li> <li>Explains purpose of medications to patient</li> <li>Manages interruptions as they arise</li> <li>Dispenses and administers 3 medications according to the 6 rights</li> </ul>
Interrupting RN	<ul style="list-style-type: none"> <li>Communicates with the patient and other staff</li> <li>Interrupts RN 1 to have an IV fluid order and associated calculations double checked</li> </ul>
Patient 1	<ul style="list-style-type: none"> <li>Answers RN questions e.g. "No I have no allergies."</li> <li>Asks the RN questions e.g. "What is that pill for?"</li> <li>Becomes short of breath due to exacerbation of asthma</li> </ul>
Patient 2	<ul style="list-style-type: none"> <li>Displays unsafe behaviour, attempting to climb out of bed</li> <li>Calling out, wanting to go to the toilet</li> </ul>
Observer	<ul style="list-style-type: none"> <li>Takes note of reactions to interruptions and subsequent actions</li> <li>Completes oral medication administration checklists</li> </ul>

### Simulation Timing

Briefing:	15mins
Scenario immersion:	10mins
Debriefing	5 minutes with each group immediately after scenario immersion = 25 mins. Additional 20mins as full class
<b>Total Time:</b>	70mins

### Debriefing Guide

Using a debriefing script can improve learning outcomes for students.

For this simulation debriefing will take place in 2 ways:

1. Immediately on completion of each groups simulation. Please address the following at this time: How did it feel participating in the simulation in your role?  
How do you feel the team worked together?
2. As a whole class group at the end of the tutorial. Please follow the suggested script below

	Empathy	How do you feel?	Feedback on group and individual feelings about scenario – enables you to be empathetic to their perspective
OPEN	Summarise	<i>This was a case about .... I am particularly interested in (learning objectives)</i>	Gets everyone (observers and participants) on the same page – outline learning objectives
	Preview	<i>The topics I would like to focus on are ... (3 at the most). Is that okay? Is there anything else you would like to talk about?</i>	Primes and focuses the group for the topics for discussion. Respectful to their needs by asking is there anything else they would like to address.
REFLECT	Topic 1	<i>So first let's talk about ...</i>	This is the topic you want to discuss
	Awareness/Analyse	<i>I am interested in your thoughts about ... Tell me about ... How was ... managed during the case?</i>	Use open questions, seek to understand what happened and why it happened. This analysis phase helps you diagnose reasons for success or challenges.
	Feedback	<i>It's generally accepted that ... The algorithm specifies ... What I saw was ... and I think that ... what do you think?</i>	Against a standard or best practice. Be specific and anchor the feedback to what was observed or heard. Be clear about what you think – don't hide your judgement.
	Coach	<i>How would you do this next time? Can you foresee any problems with that? How can you incorporate this into your practice?</i>	How do they get from where they are, to where they need to be? What are the barriers they envisage and how will they overcome them? How would you or other experts do it?
	Topic 2	<i>Next, I would like to talk about ...</i>	Repeat the process for the next topic/s
CLOSE	Preview End	<i>We are about to finish up. Are there any questions or comments?</i>	Gives a heads up that time is up and an opportunity to raise any final issues. Sometimes in the interest of time you may not ask for any further questions.
	Summarise	<i>So, we have talked about ... and our plan is to ... We also discussed ... and decided that in the future ...</i>	Summarise the key points and coaching plans.

Debriefing guide (adapted from Sydney Clinical Skills and Simulation Centre 2016).

## Appendix 6: Student individual interview template

1. What role did you choose for the simulation experience?
2. Can you explain why you chose that role and what your expectations were?
3. Can you describe how you felt in the role?
4. Can I ask you to think back on each of the interruptions - the confused patient, the RN asking for IV fluids to be checked and the breathless patient?
5. How did you react to each of the interruptions/feel causing the interruption?
6. In your opinion was one more distracting than the other?
7. Did you/ he/she utilise any identifiable strategies to manage?
8. Do you think you/the RN was able to undertake the medication administration safely?
9. Did you notice any errors or near misses that were made as a result of the interruptions?
10. Whilst debriefing the experience:
11. Were management interruption techniques and strategies discussed?
12. If so did they differ from how you managed the interruptions during the simulation?
13. Were you able to identify anything you would do differently in the future?
14. In the student reflections several management strategies were discussed. These included prioritisation, teamwork, effective communication, time management, multitasking, keeping calm and several others.
15. Can I ask you to elaborate on your understanding of some of these concepts? Firstly prioritisation...
16. Some other important concepts arose from the reflections. The importance of being aware of what other nurses in the clinical environment may be trying to achieve, also the significance of gaining insight into how the patient experience.
17. Can I ask you to elaborate on whether the simulation evoked a new level of patient empathy for you?
18. What were your thoughts around the role of the interrupting RN?
19. A few final questions
20. What were your overall feelings during the simulation?
21. In what ways do you feel the experience simulated reality?
22. In what ways did you feel the simulation was unrealistic?
23. Thinking back to your clinical experiences following the simulation
24. Did you notice any interruptions occurring during medication administrations that you either observed or took part in?
25. If so how did the RN you were working with manage them?
26. Were you able to reflect on what you had learnt in the simulation and utilise or consider any new strategies?
27. Is there anything you would like to add?



## Appendix 7: SFS questions

1. Thinking back to the Teresa Green (interruption to medication administration) simulation, which aspects of this simulation experience did you find the most valuable?
2. What do you feel you learned about managing interruptions during medication administration?
3. In what ways do you think the Teresa Green simulation has prepared you for clinical practice?
4. What do you feel that you learnt about yourself during the Teresa Green simulation? For example your responses to stress, ability to problem solve, or, follow procedure under pressure?

## Appendix 8: Nursing faculty email questionnaire

1. Would you please describe your overall experience of the simulation?
2. Would you please describe how the students reacted to the interruptions?
3. In relation to managing the 'confused patient' what strategies did you notice the students using?
4. In relation to managing the 'interrupting nurse' what strategies did you notice the students using?
5. Were either of the interruptions more distracting than the other – if so which one?
6. Did you notice any clearly identifiable decision making processes used by the students to deal with the interruptions they faced? If so can you describe what you observed?
7. Were there any common errors made by the students and if so what were they?
8. During debriefing, did any of the students acknowledge or deny making errors and if so how did this discussion point arise?
9. Were the errors directly related to the interruptions or where they made for other reasons e.g. lack of knowledge of the process/pharmacology?
10. How confident do you feel that the students would be able to translate what they experienced into practice when exposed to interruptions in the workplace?
11. In what ways did you feel this experience enriched the students understanding of how to manage interruptions/distractions during the medication process?
12. Is there any other feedback you would like to give?