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

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

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Faculty of Health
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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
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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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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’, 7th 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.


Publications arising from this research


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

Carolyn Hayes

Professor Debra Jackson

Doctor Tamara Power

Professor John Daly

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 facilities 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

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<tr>
<th>DETAILS OF EACH PUBLICATION</th>
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<td><strong>Preliminary Editorial</strong></td>
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<td>Hayes, C., Power, T., Davidson, P.M. &amp; Jackson, D. 2014, ‘Interruptions and medication: is ‘Do not disturb’ the answer?’, Contemporary Nurse, vol. 47, no. 1-2, pp. 3-6.</td>
<td>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. 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.</td>
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<tr>
<td><strong>Literature Review</strong></td>
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<td><strong>Method</strong></td>
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<td>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’, Nurse Education Today, vol. 35, no. 9, pp. 981-986.</td>
<td>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. Outlines the methodology and pedagogical principles underpinning the intervention design. Describes the study method including; setting, participants, ethical considerations, data collection and analysis.</td>
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<tr>
<td><strong>Findings</strong></td>
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<td>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’.</td>
<td>Focusses on understanding the impacts of interruptions during the medication administration process and use of interruption management strategies.</td>
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Describes the impact of fidelity in simulation on participant experience. |
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<td><strong>Findings</strong></td>
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| 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. | Reports undergraduate nursing students’ knowledge and understanding of their responsibilities as part of a team when managing interruptions during medication administration.  
Identifies crucial links between understanding the roles of others in collaborative teamwork and clear communication within the team as fundamental to safe medication administration. |
| **Findings** |  |
Reports an increased consciousness of the importance of reflection for evaluating performance and gaining self-awareness.  
Describes effective communication, compassion and empathy as significant factors in facilitating self-efficacy and improved patient care outcomes. |
| **Editorial JONM** |  |
Highlights that newly graduated nurses often struggle with time management and multitasking in complex environments which can leave them feeling insecure and vulnerable.  
Correlates low levels of self-efficacy with susceptibility to making errors during the medication administration process.  
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. |
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. 2018a; 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. 2018b) 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
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 Franklin¹)

¹Commonly 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.