

MISS CAROLYN HAYES (Orcid ID : 0000-0003-0495-3186)

PROF. DEBRA JACKSON (Orcid ID : 0000-0001-5252-5325)

Article type : Original Article

**Calm to chaos: engaging undergraduate nursing students with the complex nature of interruptions during medication administration.**

**TITLE PAGE**

**Calm to chaos: engaging undergraduate nursing students with the complex nature of interruptions during medication administration.**

Running head – Engaging with the complexity of clinical practice.

**Authors**

**Carolyn HAYES** –RN BHSc

University of Technology Sydney, Faculty of Health

Building 10 level 7, 235 Jones Street

Broadway. NSW 2007. Australia

ph.: 02 9514 4916

Fax: +61 2 9514 4927

Email: Carolyn.Hayes@uts.edu.au

**Debra JACKSON** – RN PhD FACN

Professor of Nursing.

Faculty of Health & Life Sciences

Oxford Brookes University

Jack Straws Lane

Oxford OX3 0FL. United Kingdom

ph.: +44 (0)1865 482736

Email: djackson@brookes.ac.uk

**Patricia M. DAVIDSON** – RN PhD.

Dean, Johns Hopkins University School of Nursing.

525 N. Wolfe Street

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/jocn.13866

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Accepted Article

Baltimore, MD 21205

Email: pdavidson@jhu.edu

**John DALY** – RN PhD FACN

Dean, University of Technology Sydney, Faculty of Health

Head, WHO UTS Collaborating Centre for Nursing, Midwifery & Health Development

PO Box 123, Broadway NSW, 2007. Australia.

ph: +61 2 9514 5045

F: +61 2 9514 5049

Email: john.daly@uts.edu.au

**Tamara POWER** – RN PhD.

Lecturer.

University of Technology Sydney, Faculty of Health.

Building 10 level 7, 235 Jones Street

Broadway. NSW 2007. Australia

ph.: 02 9514 4552

Fax: +61 2 9514 4927

Email: Tamara.Power@uts.edu.au

There were no forms of funding or conflicts of interests associated with this study.

## **ABSTRACT**

### **Aims and Objectives**

This paper describes 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 out of a possible 528 student written reflective responses and subject to thematic analysis.

### **Results**

Students reported an increased understanding of the impacts of interruptions whilst administering medications and an improved awareness of how to manage disruptions. This paper 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 increase their confidence. Students were given the opportunity to consolidate and integrate prior and new knowledge and skills through this role-play simulation.

### **Key words**

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

## Summary Box

'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 utilises 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.

## INTRODUCTION

Medication administration incidents and errors adversely impact on patient outcomes internationally (Cloete 2015; Hayes et al 2015). They are caused either by 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 et al 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 et al. 2010). Strategies to minimise interruptions result in decreased incidents and errors (Anthony et al. 2010; Fore et al. 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 et al. 2012; Hayes et al 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.

## **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 practice 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 on patient morbidity and mortality (MacDonald, 2010; Roughead & Semple, 2009). Consideration must also be given to the relatives and

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friends of the patient, as well as the administering nurse who may suffer professionally, physically, and emotionally. (Flanders and Clark, 2010). A further concern is the financial burden on the health care 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 errors (Cloete 2015; Jennings, Sandelowski & Mark 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 as well as 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 et al. 2011). Fidelity or reality of experience is a key element in

achieving successful simulation experiences (Jeffries 2005, Arthur, Levett-Jones and Kable 2010). 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 et al 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 that encourages maximum student immersion, and can produce meaningful and cost-effective learning experiences (Will & Weinschreider 2012).

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

## **THE STUDY**

### **Aim**

This paper 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.

### **Design**

The conceptual and theoretical frameworks guiding this study were informed by nursing and educational theorists including; Tanner's model of clinical judgment (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, Levett-Jones and Kable's (2010) quality indicators, and Jeffries simulation framework (Jeffries 2005) were consulted.

Benner (2001) theorized 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).



## **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 program 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 out 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.

## **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, 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 time of collection and will remain stored in a secure location for a minimum period of five years.

## **The intervention**

A simulation role-play designed to reflect clinical reality was embedded in the second week of a two-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 2). 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 3). Once individual roles were selected students were briefed about their roles and given a lanyard containing prompts derived from the role descriptors (table 3) 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, medication trolleys etc., were provided to increase engagement and were donned, then removed, to denote the start and finish of the scenario and role immersion (Kesten et al. 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 check of IV fluid order. The student undertaking confused patient role was required to cause a variety of

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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, adherence to the 6 rights of medication administration. Commonly identified causes of interruptions during medication administration were informed by literature (Biron, Lavoie-Tremblay & Loiselle 2009; Palese et al. 2009; Relihan et al. 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 focuses 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 non-compulsory written reflection to be handed in two 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 4).

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 pre-semester subject briefing attended by the academic teaching staff. This included; required briefing content, simulation

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flow, and debriefing techniques. Staff were given an opportunity to practice and ask questions. This was supported with literature pertaining to all aspects of the simulation being sent by email. Additional support with specific reference to debriefing methods and styles was offered to those new to simulation.

### **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 two weeks of the simulation experience. They were de-identified at time of collection by the primary researcher. Non-identifiable demographic data including student participant course pathway, gender, and age were also obtained from a university database.

### **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 in order to identify broad or common themes and patterns. Coding was undertaken and the first author then identified preliminary themes and sub themes. These preliminary themes were discussed amongst all members of the research team which led to consensus and validation of findings.

## RESULTS

### Summary of Findings

The total number of students who completed the written reflection was 451 out 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; '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 paper examines the first of the 3 identified themes, Calm to Chaos, and its' associated sub-themes (see table 1). The other two key themes are the subject of further papers. The first of which, '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' focuses on the use of debriefing and guided written reflection to gauge the student 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 et al. 2013).

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

## **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 1), described in detail below.

**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 but 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 prioritize.

*'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.*

**Subtheme: Meeting workplace expectations: acknowledging the importance of critical thinking, prioritization, 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 judgments 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 prioritization, 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*



**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*

## **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 whilst 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 and 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 practice 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.

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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 and 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 et al. 2011; Mould, White & Gallagher 2011; Lubbers and Rossman 2016).

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 et al. 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. In

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order to navigate interruptions safely students require the ability to employ critical thinking skills resulting in sound clinical judgments 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 & Fellner 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 (Aebersold & 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 like 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 judgment skills (Cant & Cooper 2011; Ferguson, Delaney & Hardy 2014; Harris et al. 2014; Rochman et al. 2012; Sullivan-Mann, Perron & Fellner 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 emphasied*', 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 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 in order 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 (0.22%) of students in this study identified that they did not like, or learn from simulation experiences.

## **LIMITATIONS**

Generalizability 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 was 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 if 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

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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.

## **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 student understanding of the implications of interruptions and allow them to consider the need for strategies that are transferable to the clinical environment.

## **ACKNOWLEDGEMENTS**

Special thanks to all the students and academic teaching staff who participated in this study.

## **CONFLICT OF INTEREST**

Three of the authors work within the research setting.

## **FUNDING**

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

## REFERENCE LIST

- Aebersold MA & Tschannen D. (2013) Simulation in Nursing Practice: The Impact on Patient Care. *The Online Journal of Issues in Nursing* **18** (2), 12 unnumbered pages. DOI: 10.3912/OJIN.Voll8No02Man06
- Aggar CA & Dawson S (2014) Evaluation of student nurses' perception of preparedness for oral medication administration in clinical practice: A collaborative study. *Nurse Education Today* **34**, 899-903.
- Anthony K, Wiencek C, Bauer C, Daly B & Anthony MK (2010) No interruptions please: impact of a no interruption zone on medication safety in intensive care units [corrected] [published errata appear in CRIT CARE NURSE 2010 Aug;30(4):16, and Dec;30(6):16]', *Critical Care Nurse* **30** (3), 21-30.
- Arthur C, Levett-Jones T & Kable A (2010) Quality indicators for the design and implementation of simulation experiences: A Delphi Study. *Nurse Education Today* **33** (11), 1357-1361. DOI: 10.1016/j.nedt.2012.07.012.
- Bambini D, Washburn J & Perkins R (2009) Outcomes of clinical simulation for novice nursing students: Communication, confidence, clinical judgment. *Nursing Education Perspectives* **30** (2), 79-82.
- Benner P (2001) *From novice to expert: excellence and power in clinical nursing practice. Commemorative edition*. Prentice Hall, New Jersey.
- Biron AD, Lavoie-Tremblay M & Loiselle CG (2009) Characteristics of work interruptions during medication administration. *Journal of Nursing Scholarship* **41** (4), 330-6.
- Braun V & Clarke V (2006) Using thematic analysis in psychology. *Qualitative Research in Psychology* **3**, 77-101.
- Cant RP & Cooper SJ (2010) Simulation-based learning in nurse education: Systematic review. *Journal of Advanced Nursing* **66** (1), 3-15.
- Cant RP & Cooper SJ (2011) The benefits of debriefing as formative feedback in nurse education. *Australian Journal of Advanced Nursing* **29** (1), 37-47.
- Clark AP & Flanders S (2012) Interruptions and medication errors: part II. *Clinical Nurse Specialist* **26** (5), 239-43.
- Cloete L (2015) Reducing medication errors in nursing practice. *Cancer Nursing Practice* **14** (1), 26-36.
- Ertmer PA, Strobel J, Cheng X, Chen X, Kim H, Olesova L, Sadaf A & Tomory A (2010) Expressions of critical thinking in role-playing simulations: comparisons across roles. *Journal of Computing in Higher Education*. **22** (2), 73-94.
- Ferguson A, Delaney BA & Hardy G (2014) Teaching medication administration through innovative simulation. *Teaching & Learning in Nursing* **9**, 64-8.
- Flanders S & Clark AP (2010) Interruptions and medication errors: part I. *Clinical Nurse Specialist* **24** 281-5.
- Fore, A.M., Sculli, G.L., Albee, D. & Neily, J. 2013, 'Improving patient safety using the sterile cockpit principle during medication administration: a collaborative, unit-based project', *J Nurs Manag*, vol. 21, no. 1, pp. 106-11.
- Flynn L, Liang Y, Dickson GL, Xie M & Suh DC (2012) Nurses' Practice Environments, Error Interception Practices, and Inpatient Medication Errors. *Journal of Nursing Scholarship* **44** (2), 180-6.
- Guest G, MacQueen KMA & Namey EE (2012) *Applied thematic analysis*. Thousand Oaks, California Sage Publications Inc.

- Harris MA, Pittiglio L, Newton SEA & Moore G (2014) Using simulation to improve the medication administration skills of undergraduate nursing students. *Nursing Education Perspectives* **35** (1), 26-9.
- Hayes C, Power T, Davidson PM & Jackson D (2014) Interruptions and medication: is 'Do not disturb' the answer? *Contemporary Nurse* **47** (1-2), 3-6.
- Hayes C, Jackson D, Davidson PM, and Power T (2015) Medication errors in hospitals: a literature review of disruptions to nursing practice during medication administration. *Journal of Clinical Nursing*. Article first published online: 9 AUG 2015. DOI: 10.1111/jocn.12944.
- Hamstra SJ, Brydges R, Hatala R, Zendejas B & Cook DA. (2014) Reconsidering fidelity in simulation-based training. *Academic Medicine* **89** (3), 387-92. doi: 10.1097/ACM.000000000000130.
- Hope A, Garside J, & Prescott S (2012). Rethinking theory and practice: Pre-registration student nurses experiences of simulation teaching and learning in the acquisition of clinical skills in preparation for practice. *Nurse Education Today*. **31**, 711–715. doi:10.1016/j.nedt.2010.12.011
- Howard VM, Englert N, Kameg K & Perozzi K (2011) Integration of simulation across the undergraduate curriculum: student and faculty perspectives. *Clinical Simulation in Nursing* **7** (1), e1-e10.
- Hughes RG. & Blegen MA (2008) Medication Administration Safety in R.G. Hughes (ed.). *Patient safety and quality: an evidence-based handbook for nurses.*, Agency for Healthcare Research and Quality (US), Rockville (MD).
- Jackson D, Walter G, Daly JA & Cleary M (2013) Multiple outputs from single studies: acceptable division of findings vs. 'salami' slicing'. *Journal of Clinical Nursing* **23** (1-2), 1-2. DOI: 10.1111/jocn.12439.
- Jeffries PR (2005) A framework for designing, implementing, and evaluating: Simulations used as teaching strategies in nursing. *Nursing Education Perspectives* **26** (2), 96-103.
- Jenkins P & Turick-Gibson T (1999) An exercise in critical thinking using role playing. *Nurse Educator* **24** (6), 11-4.
- Jennings BM, Sandelowski M & Mark B (2011) The nurse's medication day. *Qualitative Health Research* **21** (10), 1441-51.
- Kaddoura MA (2010) New graduate nurses' perceptions of the effects of clinical simulation on their critical thinking, learning, and confidence. *Journal of Continuing Education in Nursing* **41** (11), 506-516. doi:10.3928/00220124-2-1-701-2.
- Keers RN, Williams SD, Cooke J & Ashcroft DM (2013) Causes of medication administration errors in hospitals: a systematic review of quantitative and qualitative evidence. *Drug Safety* **36** (11), 1045-67. doi: 10.1007/s40264-013-0090-2.
- Kesten KS, Brown HF, Hurst S & Briggs LA (2010) Acute care for advanced practice nurses. In *High fidelity patient simulation in nursing education* (WM Nehring & FR Lashley eds.), Jones and Bartlett Publishers, Massachusetts.
- Kolb DA (1984) *Experiential Learning: experience as the source of learning and development*. PTR Prentice Hall, New Jersey.
- Krautscheid LC, Orton VJ, Chorpenning L & Ryerson R (2011) Student nurse perceptions of effective medication administration education. *International Journal of Nursing Education Scholarship* **8** (1), 2178.
- Lapkin S, Levett-Jones T, Bellchambers H & Fernandez R (2010) Effectiveness of patient simulation manikins in teaching clinical reasoning skills to



- undergraduate nursing students: a systematic review. *Clinical Simulation in Nursing* **6** (6), e207-e22.
- Lasater K (2009) Reflective journaling for clinical judgment development and evaluation. *Journal of Nursing Education* **48** (1), 40-4.
- Lubbers J & Rossman C (2016) The effects of pediatric community simulation experience on the self-confidence and satisfaction of baccalaureate nursing students: A quasi-experimental study. *Nurse Education Today* **39**, 93–98. doi:10.1016/j.nedt.2016.01.013
- McBride-Henry K & Foureur M (2005) Medication administration errors: understanding the issues. *Australian Journal of Advanced Nursing* **23** (3), 33-41.
- MacDonald M (2010) Examining the adequacy of the 5 rights of medication administration. *Clinical Nurse Specialist* **24** 196-201.
- Mooney M (2007) Facing registration: The expectations and the unexpected. *Nurse Education Today* **27** (8), 840-7.
- Mould J, White H & Gallagher R (2011) Evaluation of a critical care simulation series for undergraduate nursing students. *Contemporary Nurse* **38** (1-2), 180-90.
- Palaganas Janice, Fey M, & Simon R (2016) Structured Debriefing in Simulation-Based Education. *AACN Advanced Critical Care*. 27(1), 78-85.
- Palese A, Sartor A, Costaperaria G & Bresadola V (2009) Interruptions during nurses' drug rounds in surgical wards: observational study. *Journal of Nursing Management* **17** (2), 185-92.
- Pike T & O'Donnell V (2010) The impact of clinical simulation on learner self-efficacy in pre-registration nursing education. *Nurse Education Today* **30**, 405–410. doi.org/10.1016/j.nedt.2009.09.013
- Prescott S & Garside J (2009) An evaluation of simulated clinical practice for adult branch students. *Nursing Standard* **23** (22), 35-40.
- Raban MZ & Westbrook JI (2014) Are interventions to reduce interruptions and errors during medication administration effective?: a systematic review. *BMJ Qual Saf*, **23**, 414-21.
- Reid-Searl K, Moxham L & Happell B (2010) Enhancing patient safety: The importance of direct supervision for avoiding medication errors and near misses by undergraduate nursing students. *International Journal of Nursing Practice* **16** (3), 225-32.
- Relihan E, O'Brien V, O'Hara S & Silke B (2010) The impact of a set of interventions to reduce interruptions and distractions to nurses during medication administration. *Quality & Safety in Health Care* **19** (5), p. e52.
- Ricketts B (2011) The role of simulation for learning within pre- registration nursing education - a literature review. *Nurse Education Today* **31** (7), pp. 65-0-654.
- Rochester S, Kelly M, Disler R, White H, Forber J & Matiuk S (2012) Providing simulation experiences for large cohorts of 1st year nursing students: Evaluating quality and impact. *Collegian* **19** (3), 117-24.
- Rochman MF, Aebersold M, Tschannen D & Cambridge B (2012) Interprofessional simulation on nurse interruptions. *Journal of Nursing Care Quality* **27** (3), 277-81.
- Roughead EE, & Semple SJ (2009) Medication safety in acute care in Australia: where are we now? Part 1: a review of the extent and causes of medication problems 2002-2008 *Australia and New Zealand Health Policy*.

- Sullivan-Mann J, Perron CA & Fellner AN (2009) The effects of simulation on nursing students' critical thinking scores: a quantitative study. *Newborn & Infant Nursing Reviews* **9** (2), 111-6.
- Tanner CA (2006) Thinking like a nurse. A research-based model of clinical judgement in nursing. *Journal of Nursing Education* **45** (6), 204-11.
- Thomas CM, McIntosh CE, & Allen R (2014) Creating a distraction simulation for safe medication administration. *Clinical Simulation in Nursing* **10** (8), 406-11.
- Westbrook JI, Woods A, Rob MI, Dunsmuir WT & Day RO (2010) Association of interruptions with an increased risk and severity of medication administration errors. *Archives of Internal Medicine* **170** (8), 683-90.
- Will SE & Weinschreider J (2012) Patient safety in human simulation. In *Human simulation for nursing and health professions* (Wilson & L. Rockstraw eds.), Springer Publishing Company, New York.
- Wolff A.C, Pesut B & Regan S (2010) New graduate nurse practice readiness: Perspectives on the context shaping our understanding and expectations. *Nurse Education Today* **30** (2),187-91.
- Woodrow R, Colbert B & Smith DM (2010) *Essentials of pharmacology for health occupations. Sixth Edition*. Cengage Learning, Delmar.

**Table 1 – 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>

Table 2 – Simulation Timings

<b>Simulation phases</b>	<b>Duration</b>
Briefing	10 min
Role-play	10-15min
Individual Group debriefing	10 min
Class debriefing	20 min
Written reflection	Non-compulsory addition to student workbook. Completed at home within 2 weeks of the experience.

Table 3 – Role Descriptors

<b>Role</b>	<b>Requisite actions and prompts</b>
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> </ul>
Patient 2 - Confused elderly female	<ul style="list-style-type: none"> <li>• Intermittently call out to administering nurse</li> <li>• Becomes SOB requiring verbal administration                             <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>

#### Table 4 – 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.