

Manuscript Details

Manuscript number	NURSINGSIMULATION_2017_186_R1
Title	Snapshots of simulation
Article type	Full Length Article

Abstract

Innovations in simulation in nursing and health care continue to be developed as creative and committed educators respond to challenges of providing pedagogically sound, engaging and effective learning experiences for large student cohorts. Time-pressed educators may find it difficult to network with others working in simulation-based learning, and thus, it is useful to provide summaries or snapshots to provide a brief overview of activities in various countries using simulation in a variety of ways. The purpose of this paper is to profile a diverse range of innovative, cost-effective, and tested simulation approaches that have been implemented in healthcare programs by nursing educators from a range of countries to spark creativity. Each strategy was designed to address contemporary and critical practice issues. They facilitate immersion in authentic clinical scenarios, increase students' awareness of cues in the environment that may compromise health and safety, and prepare students for cultural or clinical realities that they may not routinely encounter because of the inherent restrictions associated with clinical placements.

Keywords nursing; role play; simulation; video; healthcare; innovation.

Taxonomy Nursing Education, Nursing Competence, Nursing

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Submission Files Included in this PDF

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Highlights new.doc [Highlights]

Title page NEW.docx [Title Page (with Author Details)]

revised manuscript for Clinical simulation in nursing 3 clean.docx [Manuscript (without Author Details)]

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3 **Highlights**
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5 Simulation is a well-accepted learning strategy that can be substituted for some clinical hours
6 and/or experiences.
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9 Used around the globe, simulation can present learners with authentic practice issues and
10 prepare them for clinical realities.
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12 A diverse range of innovative, cost-effective, and tested simulation approaches is presented to
13 spark creativity among readers.
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4 **1 Snapshots of simulation: Innovative strategies used by international educators to**
5 **2 enhance simulation learning experiences for healthcare students**
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10 **4 Word count:** 3152 (without abstract, keywords and references)
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135 **Snapshots of simulation**

136 **Abstract**

137 Innovations in simulation in nursing and health care continue to be developed as creative and
138 committed educators respond to challenges of providing pedagogically sound, engaging and
139 effective learning experiences for large student cohorts. Time-pressed educators may find it
140 difficult to network with others working in simulation-based learning, and thus, it is useful to
141 provide summaries or snapshots to provide a brief overview of activities in various countries
142 using simulation in a variety of ways.

143 The purpose of this paper is to profile a diverse range of innovative, cost-effective, and tested
144 simulation approaches that have been implemented in healthcare programs by nursing
145 educators from a range of countries to spark creativity. Each strategy was designed to address
146 contemporary and critical practice issues. They facilitate immersion in authentic clinical
147 scenarios, increase students' awareness of cues in the environment that may compromise health
148 and safety, and prepare students for cultural or clinical realities that they may not routinely
149 encounter because of the inherent restrictions associated with clinical placements.

150

151 **Keywords:** nursing, role play, simulation, video, healthcare, innovation

152 **Key point statements**

153 Time-pressed educators may find it difficult to keep up with innovations in clinical simulation
154 around the world.

155 A series of short case studies, or snapshots of innovative and international simulation
156 approaches are presented to stimulate creativity.

1 Introduction

2 A recent US longitudinal study suggested that up to 50% of clinical placements can be safely
3 substituted with simulated experiences (Hayden et al., 2014). This is good news for
4 universities who are challenged by the ongoing issue of inadequate numbers of clinical
5 placements. Yet, although simulation has become an almost ubiquitous learning approach in
6 healthcare education, multiple challenges remain, such as trained and available staff,
7 sufficient equipment and simulation facilities, and the time required to develop authentic,
8 high quality clinically relevant simulation scenarios. Further, while innovative and cost-
9 effective simulations have been developed, they are not always shared for the benefit of the
10 broader simulation community.

11 This paper reports on diverse simulation approaches that are internationally relevant in
12 nursing education; they include: humanising manikin-based simulations, learning to provide
13 accurate and succinct clinical handovers, inter-professional collaboration, communicating
14 with children, home-based nursing, the lived experience of disability, and environmental
15 health and safety assessments.

16 Humanising manikin-based simulations

17 A common challenge when using manikins is humanising manikins which are often perceived
18 as lifeless and unresponsive (Barry et al. 2012). To address this issue, educators converted
19 paper-based case studies into authentic online vignettes as preparation for manikin-based
20 simulations. The approach has advantages: they engage multiple senses while telling an
21 unfolding, realistic story (Verleur, Hevelman & Verhagen, 2011), they encourage imagination,
22 reflection, problem-solving, (Moorman, 2015), and they can be stopped and replayed, which
23 is useful for reflection and for students whose first language is not English (McConville & Lane,
24 2006).

25 The online vignettes, developed from the team's clinical experience, which portrayed people
26 from a range of diverse backgrounds and social histories who were dealing with various health
27 challenges. Rather than simply reading a case study, this approach allowed learners to assess
28 the client by observing and listening, to notice differences, idiosyncrasies, cultural

29 vulnerabilities, and unique responses to care. The vignettes also allowed learners to consider
30 and reflect on the professional behaviours portrayed by the nurses. After viewing the
31 vignettes, students participated in a simulation where the manikins portrayed the same
32 persona, had the same 'back-story' and wore the same clothes as the people portrayed in the
33 videos.

34 An evaluation of the simulations identified that this approach humanised the manikins.
35 Students reported that they felt more connected and invested in caring for the manikin, were
36 more emotionally engaged with the unfolding storyline, and more aware of judgemental
37 attitudes and biases (Power et al. 2016).

38 **Safe and effective communication during handovers**

39 Internationally, communication failures are identified as the primary cause of adverse patient
40 outcomes, including safety incidents, ineffective teamwork, fragmented care, and
41 unsatisfactory healthcare experiences (Baron, 2014). To improve collaborative
42 communication during patient handover, the Simulated Practice Activity (SPA) was created.
43 The experience was designed to occur at the end of a communication course and involved
44 nursing students, service users/consumers, and service/clinical partners, such as practising
45 nurses. All stakeholders were first prepared for the encounter in a pre-briefing session. Then,
46 in groups of 3 students, took on the role of evaluator, mentor, or novice student. The student
47 was asked to assess a client, played by a consumer, using the service partner's hospital
48 admission form. The student then provided a handover to the service partner. The activity
49 concluded with a guided reflection session where all stakeholders provided constructive
50 critiques about the handover and areas for improvement. Although resource intensive, this
51 authentic simulation provided students with much needed practice in communicating with
52 clients and colleagues.

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54 **Night duty, fatigue and the need for information**

55 Another issue affecting nurses globally, and yet something that many students may not
56 understand fully because of restricted placement times, is the ravages of shift work. Han et al

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121 57 (2014) recently showed that fatigue from shift work can hinder work performance and
122 58 threaten both nurse and patient safety. Therefore, a simulation was designed so that
123 59 students would be exposed to a series of video-recordings of bedside handovers from tired
124 60 night shift colleagues, and asked to discern from this inadequate handover the
125 61 comprehensive medical and nursing needs of the client. The range of client issues simulated
126 62 included dementia, asthma, post-operative bowel resection and the repair of a fractured neck
127 63 of femur. Following the simulation, students reflected on the experience and wrote an essay
128 64 that focused on patient handover, clinical reasoning and professional practice. Although, in
129 65 some respects, this was a challenging experience, it did simulate the kind of situations many
130 66 students were likely to encounter as graduates, and it raised their awareness of the
131 67 responsibility that nurses have in ensuring that all required information is handed over safely,
132 68 even if the circumstances are time-pressed and difficult.

142 69 **Interprofessional communication and collaboration**

143 70 Nursing students across the world tend to spend the majority of their study time in uni-
144 71 professional groups and as a result, rarely get an opportunity to learn about the disciplines,
145 72 world views, and unique practices of other professional groups. This approach does not
146 73 prepare healthcare graduates with the requisite skills to collaborate and communicate
147 74 effectively with all members of the inter-professional team (Thistlewaite & Nesbit, 2007). To
148 75 address this concern, an inter-professional extracurricular, immersive simulation was
149 76 designed for nursing and paramedic students that aimed to explore a client's healthcare
150 77 journey from the perspective of the client, rather than the discipline.

151 78 The simulations involved the sudden onset of chest pain and an epileptic seizure. All students
152 79 were briefed together and then each discipline facilitator conducted a discipline-specific
153 80 briefing to ensure students were familiar with the equipment and environment. The
154 81 simulation began with the client's experience of health deterioration. It was followed by
155 82 paramedic students responding to an emergency call, attending, treating and transporting
156 83 the client, whilst being observed by the other nursing and paramedic students. The client was
157 84 transported to a simulated emergency department, where the nursing students received a
158 85 handover, assessed the client, and managed their care, whilst being observed by the other
159 86 paramedic and nursing students.

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180 87 Reflective debriefing occurred following the activity, and explored professional role identities,
181
182 88 effectiveness of inter-professional communication, and the health care journey from the
183
184 89 client's perspective. Evaluation revealed that students found the activity relevant, exciting
185
186 90 and raised awareness of differing professional world views and approaches to critical thinking
187
188 91 and clinical decision making.

189 190 92 **Learning the art of communicating with children**

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192
193 93 The challenge of communicating effectively with sick and injured children arises. Unlike
194
195 94 adults, children may lack experience and the cognitive capacity to fully understand the
196
197 95 meaning of illness, diagnoses and treatment. Similarly, they may not have the psychological
198
199 96 and social abilities yet to compose and contain emotions such as fear, distress or frustration
200
201 97 (Bjorklund & Causey, 2017).

202
203 98 A simulation was designed, incorporating the use of a silicone procedural puppet. The aim
204
205 99 was to prepare students for undertaking vital signs with paediatric clients. The puppet was
206
207 100 custom-designed and included a movable face, an injectable abdomen, catheterisable
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209 101 genitalia, patent nares for naso-gastric insertion, intravenous access via the arm, and a porta-
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211 102 cath for injections (See Figure 1). One puppet can be used for around 25 students, and costs
212
213 104 fluid can be extracted or delivered, for example, simulating urination or being able to insert
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215 105 fluid into the portacath. The puppet can simulate sternal recession and abdominal breathing.
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217 106 It has a cartoonish appearance with larger head, engaging eyes, and smaller body to make the
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219 107 puppet friendly and appealing. Lastly, the puppet was made of silicone for ease of cleaning
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221 108 and to address infection control issues identified in previous studies when using cloth puppets
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223 109 in the clinical environment (Author et al. 2014).

224 110 {Insert Figure 1 about here}

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226
227 111 A specific pedagogy has been developed and published on the use of puppets for health
228
229 112 professional learning. This approach requires the educator to transform the puppet into a
230
231 113 little person with a story and history relevant to the learning experience. The narrative then
232
233 114 becomes the platform for learning and teaching and the educator guides and facilitates the

115 learning through the character puppet (Author et al. 2017). Evaluation has shown that
 116 learning in this way, students do not experience the detachment that has been reported to
 117 commonly occur when students learn solely on manikins (Dean et al. 2017). Yet, importantly,
 118 students learn how to simultaneously interact compassionately and even playfully, whilst
 119 implementing a nursing procedure effectively.

120 **Case-managing in a person's home**

121 In many countries across the world, home-based nursing is just as prevalent as hospital-based
 122 care, and students need practice to learn about the unique and challenging nature of working
 123 in a person's home, where access to clinical supervision and resources are limited (Savarese,
 124 2016). Students need to be familiarised with and oriented to this new environment because,
 125 unlike in a hospital setting, students and nurses are guests in someone's home and
 126 surrounding community, and this requires a different dynamic for communication and
 127 interventions. Skills in environmental and psychosocial assessment and provision of safety
 128 require development (Unwin & Tatum, 2011).

129 Home visiting is one way that students case manage clients in one program's Population
 130 Health Nursing (PHN) course. In a simulation of home-visiting, students participated in groups
 131 of two in four different home situations. Prior to the experience, students prepared by
 132 reading about interviewing (Frankel & Stein, 1999), therapeutic strategies to meet and
 133 intervene with clients in their homes (Unwin & Tatum, 2011), and guides for specific
 134 assessments, such as risk for suicide and child/older adult abuse. A home setting was
 135 established in the simulation centre, and standardised patients were used to enhance the
 136 realism. These four scenarios presented students with health, social, and environmental
 137 challenges: (1) a new mom/newborn visit; (2) an older adult female who was frequently
 138 calling emergency services for non-emergencies; (3) a recently widowed male who was
 139 discharged from the hospital to home, following an exacerbation of heart failure; and (4) a
 140 middle-aged Type I diabetic woman, who could not afford her medications and testing
 141 materials. Other professional healthcare students partnered with nursing students in
 142 simulated and actual home visits.

143 Although the simulations focused on individual clients, the debriefing widened the lens to
 144 consider populations experiencing similar issues and community resources. Evaluation has
 145 shown that students gained a new appreciation for the importance of environmental and
 146 population-based issues that impact upon health-outcomes and confidence in conveying a
 147 respectful stance to support client autonomy.

148 **Learning clinical skills peer to peer**

149 A challenge for large schools of nursing globally is the sheer number of students that need to
 150 learn effectively in settings where time and resources are tight. Building on the idea that
 151 learning can be effective even when students are observing and critiquing, rather than
 152 directly acting – a term Spouse (1998) describes as *legitimate peripheral participation*, a
 153 simulation experience was designed to harness and potentiate the impact of peer learning.

154 Rather than the nursing educator directing activities, their role was restricted to facilitate peer
 155 interaction. Students took responsibility for actively learning from each other through peer
 156 observation, critical review and feedback discussion (Stone, Cooper & Cant, 2013).

157 Groups of up to 30 students working in teams of four to five worked through four different
 158 client scenarios. The scenarios were approximately 15-minute duration and took place in a
 159 simulated ward with six SimMan manikins, that could simulate human physiological functions
 160 when manipulated by a handheld SimPad system.

161 The SimPads were programmed so that each of the scenarios allowed a number of pathways
 162 or stage tabs that varied in complexity. The person controlling the device chose a stage tab,
 163 according to the student’s clinical reasoning process upon encountering the clinical issue.
 164 Each stage tab had pre-set human physiological functions, for example, the manikin might
 165 deteriorate, die, or recover depending on the decisions made by the student. The student’s
 166 actions and decisions could also be recorded and timed in the SimPad program. Standard
 167 recording activities in each SimPad scenario were listed on the right-hand side of screen and
 168 included: hand hygiene, introduces self, effectively communicates, gains consent, comfort
 169 measures, reassures client, ISBAR handover framework, documents, team communication

170 and correct medication administration. The left-hand side of the screen predicted care
171 activities pertaining to that particular stage of scenario were listed.

172 Each scenario required four student roles: one person to operate the SimPad[®] device, one to
173 play a doctor, one to provide the client's voice and one to play the nurse. On completion of
174 each scenario the group debriefed with each other, asking: 1) What did you do well? 2) What
175 did you not do not so well? and, 3) What would you do differently next time? Evaluation has
176 shown that students found the peer learning to be as effective, and challenging as the
177 educator-led simulation experiences.

178 **Taking an empathic stance towards illness and disability**

179 Thanks to advances in health-care, more people world-wide are surviving serious injuries and
180 illnesses, yet this also means that many people are living long lives with disabilities that range
181 from physical to emotional (Vos et al., 2015). This requires that nurses move beyond the
182 medical model, towards the psycho-socio-cultural and spiritual so that they can support
183 clients and communities in ways that are functionally useful, but also emotionally empathic
184 and uplifting. In preparing for this shift in practice, students need to learn how to listen
185 empathically, and communicate to clients that they are trying to understand and work with
186 their unique needs and experiences (Anderson, Ford & Thorpe, 2011).

187 Although empathy is integral to practice, many health professionals have a limited
188 understanding of the experiences, needs, and preferences of people with disabilities and
189 clients continue to perceive discrimination from nurses and others (Flickinger et al. 2016).

190 To enhance students' empathy towards people with a disability, an immersive simulation
191 experience was devised. Participants were allocated the role of either a person with an
192 Acquired Brain Injury (ABI) or a rehabilitation nurse. The simulated clients wore hemiparesis
193 suits that replicated the experience an ABI, and they were provided with the following
194 information:

195 *You have recently been transferred to a rehabilitation unit after being in an acute care*
196 *hospital for three months. You have an acquired brain injury as a result of being involved*

197 *in a car accident three months ago. You have difficulty talking, difficulty swallowing,*
 198 *blindness over half of your field of vision and paralysis to one side of the body.*

199 The students allocated the role of a rehabilitation nurse were given the following instructions:

200 *You have been allocated the care of a recently admitted patient with an ABI. Their long*
 201 *term prognosis is uncertain, but your goal is to help them become as independent, self-*
 202 *caring, and confident as possible. You will need to help the patient dress, take them for*
 203 *a walk, and help them pour and drink a glass of thickened juice.*

204 Evaluation demonstrated that students' empathy levels improved and students' stigmatising
 205 beliefs were challenges and replaced. When the students assumed the role of the patient
 206 during the simulation they gained new understanding of the personal experience of ABI.

207 **Game-based simulation learning**

208 The digital revolution is not only changing the way health-care and education are delivered,
 209 but it is transforming the very nature of social interaction, including the ways students learn
 210 (Mawhirter & Garafalo, 2016). The use of gaming technology, where a player solves a puzzle,
 211 advances to higher levels or wins rewards engages learners, building their interest in the
 212 subject matter, and personal self-efficacy (Sung, Hwang & Yen, 2015).

213 A game-based simulation was designed to teach nursing students environmental health and
 214 safety assessment. In this game, learners were introduced to clients who live in a variety of
 215 contexts, including a cottage, long term care, community park and supermarket car-park.
 216 Immersed in a 3D virtual environment, learners' curiosity and sense of adventure were
 217 sparked as they entered and moved around dwellings, opened doors, switched on lights and
 218 assessed for potential and actual hazards. Over a hundred different hazards were randomly
 219 generated each time the learner entered a level in the game. Using drop down boxes, they
 220 identified and categorised hazards and selected interventions that contain, minimise and
 221 eliminate health and safety risks. This promoted learners' critical thinking and clinical
 222 reasoning skills and offered a practical opportunity to apply theoretical concepts and practice
 223 undertaking skills that are not often available to them in clinical environments. At the
 224 completion of the game, detailed analytics and individual feedback provided learners with
 225 information about the number of hazards found, correctly categorised and managed.

226 Evaluation has shown that students improved their detection and management of health risks
227 and that the game technology is accessible, cost effective and engaging.

228 **Summary**

229 Over the last decade, the use of simulation has matured, and educators are increasingly
230 utilising creative and pragmatic solutions to address contemporary practice and educational
231 issues. As has been detailed in this paper, simulation learning can introduce students to
232 technical as well as non-technical skills required for competent nursing practice. The paper
233 described strategies from the United Kingdom, Australia, and the US to enhance realism
234 within simulation to foster learner engagement – audio-visual enhancement of case studies,
235 child-like puppets, and body suits that simulate the restricted movements experienced by a
236 client with acquired brain injury are examples. The paper also described activities to build
237 confidence and accuracy in the processes of client assessment, clinical handover and
238 collaborative communication. Because nursing and health care are increasingly taking place
239 beyond hospital borders it is imperative that students learn to use a wider lens in their
240 assessment of clients, families and communities – beyond physiology. The paper explored
241 home-based simulation and a game to promote awareness of environmental hazards. In
242 providing this series of snapshots from across the world, it is hoped that educators
243 everywhere will be inspired to incorporate and adapt these activities to continually improve
244 the quality of simulation learning experiences and to build collaborative networks to
245 capitalize on others' learning.

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Figure 2: Silicone Procedural Puppet

