

## EXPERIENCE EXCHANGE

# The creation of a simulated rural hospital nursing unit for the purpose of conducting research

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## Abstract

While the use of simulation is gaining popularity as an educational and training method, little is known about its utility in supporting field research activities. To address this gap, the physical, psychological, and conceptual dimensions of a full-scale simulated multi-bed rural nursing unit that became the 'field' for a rural nursing practice study is presented. The advantages of using simulation in this manner are that it: 1) allows processes to unfold in a controlled but natural fashion; 2) supports the exploration of complex phenomena; 3) and provides comparable data sets for analysis. Items to consider prior to using a simulation environment are also discussed.

## Key words

Rural nursing, Rural nurses, Simulation

## 1 Introduction

For a variety of reasons, nursing education programs have increasingly turned to simulation to provide clinical learning opportunities for nursing students<sup>[1,2]</sup>. The term *simulate* is defined as "to look or act like" [Webster's Dictionary]. As a result, simulation requires carefully planned and orchestrated educational processes designed to imitate the workplace or a clinical environment<sup>[3]</sup>. A review of the nursing education literature quickly reveals that simulation in undergraduate nursing programs is used to teach content, refine skills, and assess competence<sup>[5,6]</sup>. It is also used to assist with orientation programs post-licensure as well as continuing education and certification courses, and staff development<sup>[7]</sup>.

A review of the literature pertaining to simulation and nursing research reveals that most studies use simulation as an educational tool<sup>[8-10]</sup> for the purposes of improving safety and levels of self-efficacy<sup>[11]</sup>, and to assess the function of clinical practitioners and systems<sup>[12]</sup>.

While it is clear that simulation has a duality in that it is a method of education and training as well as an investigational tool<sup>[12]</sup>, creating a full-scale simulated environment in nursing research where all of the elements of a situation that are perceptible to research participants are recreated<sup>[13]</sup> is in its infancy. To help start the dialogue on the applicability and feasibility of using simulated environments for nursing field studies, using Paige and Morin's<sup>[14]</sup> simulation framework, this paper describes the physical, psychological and conceptual dimensions of a full-scale simulated multi-bed rural nursing unit that became the 'field' for a rural nursing practice study. The paper will conclude with a discussion pertaining

to the advantages of using a simulated environment in this manner along with items for consideration prior to embarking on such a project.

## 2 Setting the context for rural nursing practice

Rural nursing practice is situated within the context of providing care to patients of all ages with a wide variety of health concerns <sup>[4, 15]</sup>. The complexity of care required by some patients in rural hospital settings is similar to nursing care normally provided by registered nurses (RNs) in critical care settings <sup>[16]</sup>. This more advanced level of practice may be required at a moment's notice and without onsite medical or auxiliary support. As a result of the complex nature of rural hospital nursing practice, one of the primary skills required by RNs working in this setting is the ability to develop sound clinical reasoning and decision making skills that take into consideration multiple and competing patient concerns.

## 3 The study design and method

To capture how RNs solve problems they encounter during a typical shift, a broad-ranging, robust and highly focused research approach was required. Thus, the approach had to attend to not only the contextual and dynamic nature of rural hospital nursing practice but as well, had to provide the researchers with a degree of control of specific elements that were of particular interest to the research study. Consequently, for this study, recreating a full-scale fully simulated rural hospital nursing unit and standardized 30 minute clinical scenario provided the melding of a more controlled approach to content within a sufficiently natural context. Further description of the research method and findings are published elsewhere.

## 4 Creating a rural nursing unit full-scale simulation environment

A full-scale simulation is a constructed natural environment where all relevant elements of the clinical environment and situation that are perceptible to study participants are recreated <sup>[13]</sup>. In order to recreate such an environment, an existing simulation laboratory of approximately 200 square meters in the researchers' university was transformed into a fully functioning nursing unit. The unit included eight patient beds separated by curtains, two supply carts along the walls, a mobile medication cart, and a nursing desk (a table with a telephone and two-way radio, and a book case with patient charts) in the center of the room (see Figure 1). An adjoining room with a crash cart, cardiac monitor, and stretcher functioned as the Emergency Room. A second adjoining room functioned as a storage room. The control room housed the simulation computer from where the Simulation Coordinator monitored pre-designed programs for two high fidelity mannequins. The debriefing room was located down the hallway from the simulation laboratory. There were no recording devices in the simulated environment. Rather, to engage in participant observation, one of the researchers was physically present in the simulated environment and recorded their observations during the unfolding of a clinical scenario.

To further replicate the rural hospital nursing practice environment, close attention was given to the fidelity, that is, the degree to which the simulation replicated reality. This was done by attending to its' physical, psychological, and conceptual dimensions <sup>[13]</sup>.

### 4.1 Physical dimension

The physical dimension of simulation encompasses equipment and environmental attributes <sup>[14]</sup>. By attending to the characteristics of rural hospital nursing practice where RNs need to develop an awareness of and ability to manage the dynamic needs of multiple patients, the environment included seven in-hospital patients who required varying types and levels of nursing care. To this end, one bed held a newborn in an isolette with overhead bilirubin lights and the six

remaining beds held adult patients. One bed in the unit remained empty. High physical attributes included the use of two computerized full-body mannequins. These mannequins were pre-programmed to emit retching and crying sounds as well as palpable pulses, audible breath sounds, and fluctuations in blood pressure. As part of their orientation to the simulated environment, the Simulation Center coordinator explained the functionality of each mannequin to the participants.

Beyond the props discussed above, other props that are normally part of nursing units such as bedside tables, oxygen tubing, a clock and basins were included. To ensure familiarity with the call bell system, intravenous pumps, telephone, medication administration cart and the two-way radio, all of the research participants received an orientation to the simulated environment that included how each piece of equipment worked. Props intended to enhance the realism of the rural environment included patient charts and Kardex for each of the seven patients on the unit and a tape-recorded shift change report.

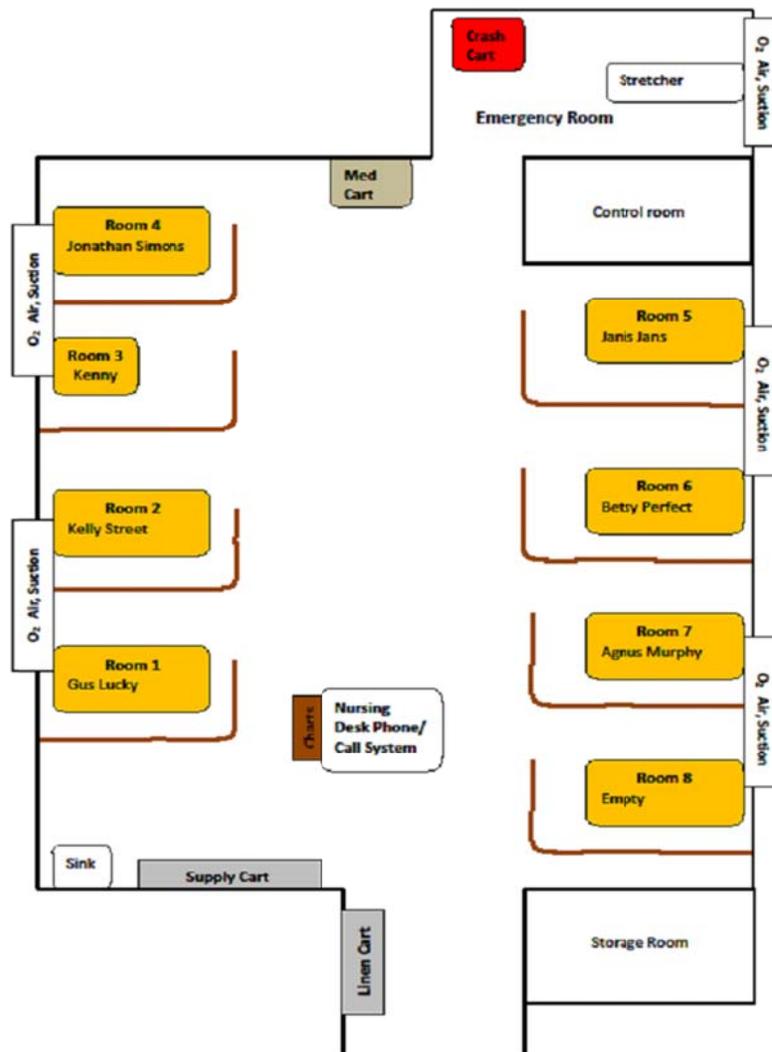


Figure 1. Floor plan

## 4.2 Psychological dimension

The psychological dimension is the participant's engagement in and experience with the simulation that includes task and functional attributes<sup>[14]</sup>. Task attributes are the extent to which events within the simulation reflect real life situations.

A task attribute considered central to and reflective of rural hospital nursing practice was the timeframe within which the simulation took place. Given that there are typically fewer nurses, minimal ancillary staff, and on-call physicians are frequently out of the hospital while ‘on shift’, that is, after 1700hs, the simulation was deliberately set during evening shift (2100-2130h).

Another central task attribute pertained to capturing the notion of having competing priorities as a result of providing nursing care to a diverse group of patients. To this end, the simulated environment included patients ranging in age and experiencing chronic to more acute, unstable health problems: Gus Lucky, a long-term care patient in a persistent vegetative state; a newborn with hyperbilirubemia; Kelley Street, a palliative care patient; Jonathan Simon, a newly diagnosed Type 1 diabetic; Janis Jan recovering from a bowel resection post-op day three; and Betsy Perfect and Agnus Murphy. Both of these patients were waiting placement in a local long-term care facility. Furthermore, since it is not unusual for rural hospital RNs to provide care to individuals who call for healthcare advice, two in-coming telephone calls were incorporated into the simulation. The first call was from a mother inquiring about a skin rash her toddler had recently developed. The second call was from a young woman who thought she might be in labour. Given that rural hospital RNs are also expected to provide nursing care in emergent and/or critical situations <sup>[16]</sup>, the simulation included a six year old child presenting in Emergency suffering from a severe earache. Finally, a call from Emergency personnel completed the simulation. Having these additional patient care situations within the simulation helped to capture the notion of ‘we’re it’ <sup>[18]</sup>.

The functional attributes are the realistic responses of the learner or more accurately in this situation, the research participants <sup>[14]</sup>. In this full-scale simulation, the research participants had the opportunity to interact with three volunteer amateur actors. These actors moved in and out of the simulation at specific times. So that their responses were realistic <sup>[8]</sup>, four rehearsals were organized with the actors where they received instructions regarding potential responses to the research participants. The selection criteria for the actors included experience with rural nursing practice and their familiarity with the roles and the simulated learning environment (two actors were nurse educators). An actor who did not have nursing or medical knowledge played the mother and ‘sister-in-law’ roles.

### 4.3 Conceptual dimension

The conceptual dimension is where information offered to the participant is interpretable as representing a theoretical concept <sup>[14]</sup>. Being able to recognize levels of acuity among the patients provided the research participants with the opportunity to engage in and demonstrate their knowledge of theoretical concepts. For example, one of the high fidelity mannequins was pre-programmed to display signs of diabetic ketoacidosis and responded according to the nursing interventions offered by the participant.

## 5 Advantages of using full-scale simulation in field research

There are several advantages to using full-scale simulation in field research. To begin with, simulation provides researchers with the opportunity to blend control and naturalism by controlling content but not process <sup>[8]</sup>. In fact, simulated environments such as the one described allows the researcher control over events which is often time is not possible or ethical in ‘real life’ field studies.

Another advantage to using full-scale simulation is that the content of clinical problems presented to the participants can be carefully tailored to include elements that are of particular interest to the research study. Thus, simulation provides a means of controlling certain factors thereby facilitating the exploration of complex phenomena <sup>[8]</sup>.

Full scale simulated environments also allow for control over time and events neither of which are possible to control in field studies. Thus, simulated environments generate directly comparable data sets for analysis which strengthen the

significance and meaning of research findings<sup>[9]</sup>. Findings that are context-relevant add in understanding and improving clinical performance and outcomes<sup>[9, 12]</sup>.

In this particular study, using a simulated environment allowed the researchers to build-in cues thereby allowing the participants to access tacit aspects of their knowledge. These participants demonstrated new and complex ways of reasoning.

## 6 Items for consideration

The process leading up to data generation for research purposes using full-scale simulated environments can be time and labor intensive. Thus, researchers need to carefully consider the following items.

First, research team development must include pedagogical understanding of simulation as well as competency with the technical resources so that they can be proficient and effective simulation facilitators<sup>[19]</sup>.

Second, when using actors to enhance and support the psychological dimension of fidelity there is a potential for poor acting that can diminish the credibility and reliability of the simulated environment. Costs associated with hiring professional actors and/or providing formal training needs to be considered.

Third, use of a full-scale simulation environment might be restricted to using existing simulation laboratories in post-secondary institutions. Consequently, priority booking and use of the simulation laboratory space may be given to students and educational programs. This could result in a delay in the generation of data.

Fourth, there may be costs associated with hiring the Simulation Coordinator to run high fidelity mannequin programs as well as using material resources like dressing change kits. Thus, use of human and material resources needs to be considered.

Last, while useful for exploring complex phenomenon, simulations like the one used in this study, generally present only a brief segment of the phenomenon resulting in incomplete answers to the research questions being generated. Consequently, continued research endeavors are required.

## 7 Conclusion

Simulation is unique in that it has an unusual duality. It is a method of education and training and can also be used in research endeavors. While there are considerations that need to be taken into account prior to creating a simulated environment like the one described in this paper, full-scale simulation also has significant potential in becoming an invaluable research tool in the exploration of complex concepts germane to nursing practice.

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