

## Fresh simulation options in critical care nursing education

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Many forms of simulation, as a teaching strategy, have been used successfully over the last few decades. Some of the advantages thereof in health sciences education are that it is a learner-centered training modality that presents with no risks to patients and allows for facilitated repetition of learning until all students have achieved the required level of proficiency.<sup>1</sup> Simulation may reduce time spent by students in clinical areas to master the necessary skills and it is therefore perceived as an efficient use of limited resources. Utilising the Clinical Skills Centre (CSC) for teaching of procedures may therefore facilitate the reduction in time allocated to the clinical areas.

Critical care (CC)-trained nurses are expected to have the expertise to perform a variety of practical procedures on patients, but even more importantly, they should be able to integrate information about a patient in order to provide holistic and effective care. The practical component of the CC nursing programme at the specific university consists of two parts: the completion of practical procedures and case presentations. Some of the challenges associated with the teaching and assessment of these two components are important and will be discussed in this article.

### Background/ literature

The practical procedures are activities that are performed on a daily basis by registered nurses caring for critically ill patients. Although these practical procedures consist of a cognitive, psychomotor and affective component, they amount to a set of rules for a list of actions, and therefore pose the risk of fragmenting the patient's care instead of providing holistic care. Performing the practical procedures correctly contributes to better and safer nursing care of the critically ill patient, but it does not allow the development of insight and critical thinking skills that are required of CC nursing students by the end of the programme.

In order to do case presentations students need to master the skills of integration and critical thinking, which is at a higher cognitive level than simply performing the individual practical procedures. CC nursing students require an integrative type of thinking about physiology, pathophysiology and treatment to be able to grasp the nursing care priorities of a critically ill patient.<sup>2</sup> The students have opportunities during the programme to be supervised by a CC nursing tutor in the clinical area. This time should ideally be spent on discussing the critically ill patients and their environments. These structured supervised clinical opportunities are of marked importance. Tutors aim to spend at least one hour per week with individual students and during this time students have the opportunity to ask questions and discuss patients with the CC nursing tutor or practise the practical procedures required by the programme. The ineffective use of these clinical contact times is often a problem. During these teaching sessions, the students tend to focus on completing the individual practical procedures and neglect to do case presentations. The result of this is often CC-trained registered nurses who do not possess the skills to integrate knowledge, think critically and manage patients appropriately.

The use of simulation in a CSC to teach, learn and assess the individual practical procedures allows the CC nursing tutors to use the time

in the clinical areas to assist the students in the development of their integrative and critical thinking skills.

The questions addressed in this study were the following:

- Which practical procedures are suitable to be taught with simulation?
- How do students and CC tutors perceive the use of simulation?
- How do students spend the allocated teaching time at the bedside with the CC nursing tutors?

### Methods

#### Ethics

Permission was received from the Research Ethics Committee for this study and written consent was obtained from all participants. All participants agreed to take part in the study and they remained anonymous throughout.

#### Research design

A descriptive case study design was used to examine a single nursing department and its CC nursing programme. The aim of the case study was to determine if simulation could be used to teach, learn and assess the practical procedures required in a CC nursing programme.

#### Population and sample

The study population was all the postgraduate CC nursing students registered at a specific university as well as the CC nursing tutors involved in the clinical education of this group of students during 2007. All students ( $N=15$ ) and tutors ( $N=5$ ) volunteered to be part of the study so no samples were drawn.

#### Methods and procedures

Qualitative and quantitative data were used for this study. The qualitative data were generated through semi-structured group interviews as well as questionnaires consisting of open-ended questions. The quantitative data were obtained through a questionnaire making use of a five-point Likert-type scale as well as by analysing students' clinical logbooks. The interviews were conducted by the researcher, who was the manager of the Clinical Skills Centre. In the first semi-structured group interview (with the CC tutors in the programme) consensus was reached about which of the 12 practical procedures required for the programme were most suitable to be taught and assessed in simulation in the CSC. By the end of the academic year a follow-up semi-structured group interview was held with the same nursing tutors to gather data on how they had experienced the use of simulation as part of the programme.

A questionnaire was used to gather both qualitative and quantitative data from the CC nursing students at the end of the programme. The researcher administered the questionnaire but remained uninvolved. A questionnaire used by Freeth and Fry<sup>3</sup> served as a basis for the question-

naire. The questions mainly focused on themes that emerged as being important from the literature review.

Two students randomly selected from the participant group were used to pilot the questionnaire in order to identify errors and ambiguous questions. The questionnaires completed by these two students were excluded from the participant group.

Finally, the clinical logbooks of the students were analysed to gather numeric data on how the teaching time at the bedside was spent. Clinical logbooks of students from 2006 (who did not have the benefit of the simulated teaching sessions) as well as 2007 (the students who were exposed to simulation sessions) were analysed to see whether any observable differences existed.

## Data analysis

The qualitative information of the group interviews was transcribed and analysed by the researcher. Field notes that were taken during the focus-group interviews were also used to ensure that none of the discussion points were missed. Content analysis was used in the analysis of the data. The text was broken down into units for analysis and then coded and categorised according to events and ideas. The categories identified were put together to see which different themes emerged.

The quantitative data from the questionnaire as well as the data from the clinical logbooks were captured in MS Word and descriptive measures such as averages and tables were used for analysis.

## Results

### Discussion-group interviews with the tutors

The CC nursing tutors involved in the programme reached consensus that 10 of the 12 practical procedures would be appropriate to be taught and assessed in simulation in the CSC (Table I).

**Table I. Results of the consensus discussion group interview**

Procedures suitable to be taught and assessed in simulation	Procedures NOT suitable to be taught and assessed in simulation
<ul style="list-style-type: none"> <li>Assess an abnormal blood gas</li> <li>Assess a chest X-ray</li> <li>Assess a 12-lead ECG</li> <li>Administer IV medication</li> <li>Perform open ET suctioning</li> <li>Extubate a patient</li> <li>Maintain epidural analgesia</li> <li>Maintain haemodynamic monitoring</li> <li>Care of patient with a ventricular drain</li> <li>Care of a patient post-temporary pacemaker insertion</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of neurological status</li> <li>Care of a ventilated patient</li> </ul>

The two procedures that were identified as not being suitable for assessment in simulation both require the presence of a patient to ensure that the students understand and interpret these procedures adequately.

The themes of the focus-group interview at the end of the academic year with the tutors on how they had experienced the use of simulation are reflected in Table II and explained in the discussion section.

**Table II. Themes identified from the group interview with the tutors concerning their experiences of the use of simulation**

Positive feedback about the simulation sessions	Issues that needed to be improved
<ul style="list-style-type: none"> <li>It worked pretty well</li> <li>Students with little practical experience prior to the course benefited most from the sessions</li> <li>Procedures were taught consistently</li> <li>Assessment was fair, consistent and uniform</li> <li>The students' practical procedures were all completed in time</li> <li>Clinical contact sessions were far more productive than in the past</li> </ul>	<ul style="list-style-type: none"> <li>Due to the sessions in the CSC some of the students canceled their appointments with the CC tutors in the clinical areas</li> <li>Some students had difficulty in performing the procedures in the clinical areas although they have been found competent in the CSC</li> <li>Teaching at the bedside needed to be revisited and structured</li> <li>The lack of equipment in the CSC made some of the clinical scenarios unrealistic</li> </ul>

### Student questionnaire (N=15)

In general the students valued the simulation sessions. Table III is a summary of the perception and attitudes towards the teaching and learning in simulation in the CSC.

### Analysis of the clinical logbooks

A comparative analysis of the 2006 and 2007 student logbooks was completed in order to investigate how the clinical contact sessions with the CC nursing tutor were spent. These data revealed that more time was spent at the bedside doing discussions or presentations of patients in 2007 than in 2006. There was also a decrease in the number of isolated practical procedures performed at the bedside during 2007, compared with 2006. This could well have been because of the fact that students had the opportunity to practise and complete most of their practical procedures in simulation in the CSC and that they could therefore spend more time at the bedside discussing their patients holistically with their CC nursing tutors.

## Discussion

Most of the reviewed studies found in the literature on the use of simulation discuss this in terms of undergraduate nursing and medical programmes. The results of this study, however, reveal that the practical procedures of a postgraduate CC nursing programme can also be effectively taught through simulation. Below is a brief discussion of how the students and CC nursing tutors perceived the use of simulation in the CSC.

**Table III. Results of the student questionnaire**

Attitudes and perceptions	Percentage of agreement with statements
• They could repeat practical procedures in the CSC without causing harm to their patients	100%
• The sessions in the CSC assisted them in the process of integrating theory and practice	100%
• It added value to have the assistance and feedback of a CC nurse tutor while practising the procedures in the CSC	100%
• Practice in the CSC was realistic enough to ensure the transfer of learning to the clinical area	92%
• The learning opportunity in the CSC helped to make them more confident and competent to perform these same procedures on real patients	92%
• Learning in groups and from peers was meaningful and enjoyable	75%
• The manikins in the CSC were sufficiently realistic to help with the development of their clinical skills	75%
• Students enjoyed the sessions in the CSC and learned from them	100%

## Curriculum integration

The CC tutors indicated that they thought simulation was a consistent way to teach the practical procedures. Neary<sup>4</sup> points out that the use of simulation enables clinical skills to be clearly defined as learning outcomes for each part of the programme and that it can help to bridge the gap between theory and practice by offering opportunities for learning in a risk-free, low-anxiety environment. Relying only on the clinical placement can mean that the development of clinical skills is *ad hoc* and dependent on what a particular unit has to offer. In a simulated environment students can be encouraged to discuss the situation and establish links between theory and practice.

## Different learning and teaching methods

### Small-group teaching and learning

Another positive comment in this study was that the small-group teaching allowed focused discussion in a non-threatening environment. In a 'real' health care setting, learning is in a sense a by-product of care. The clinical needs of the patients must always take priority over the educational needs of the learner. Simulation, however, deliberately places the learners' needs at the centre of attention and provides the opportunity to create conditions of best practice for teaching.<sup>1</sup>

### Self-directed learning

Students are increasingly being encouraged to take responsibility for their own learning and to develop skills for becoming lifelong learners. The CSC provides them with the opportunity to maintain their skills in periods between clinical placements and 'revise' them prior to clinical assessments.<sup>5</sup>

## Feedback

All the students indicated that they valued the assistance and feedback while practising the practical procedures with a CC nursing tutor in the CSC. This confirms that feedback on performance is a crucial component of the learning processes associated with simulation. Nicol and Glen<sup>5</sup> explain that provided that there is an adequate level of supervision, mistakes can be used to provide valuable feedback opportunities for the whole group.

## The additional use of DVDs

The students indicated in the questionnaire that there is a need for additional teaching and learning material to be available in the CSC, e.g. DVDs. Treadwell and Grobler's<sup>6</sup> study about medical students' perceptions of learning in simulation, recommend the following with regard to the use of videos in the CSC:

- Videos should not take the place of live practical demonstrations.
- Videos are only appropriate if students watch them before an actual live demonstration.
- One should show videos that are relevant to the South African context.

## Controlled and safe environment

Simulation is a learner-centered modality that presents no risk to patients and facilitates the repetition of particular aspects of tuition. This aspect was greatly valued by the students and they indicated that they welcomed the fact that they could repeat practical procedures in the CSC without causing harm to their patients. Because the environment is safe, learners have the opportunity to fail and can then learn from their mistakes.<sup>7</sup>

## The transfer of learning

The problem of transferring the learning in the CSC to the clinical area is always a challenging issue that one has to be aware of. According to Kneebone<sup>1</sup> procedural interventions are often directed towards task-based training, whereas clinical practice is artificially broken down into component skills. These are practised and assessed in skills laboratories, isolated from the clinical reality that they are intended to reflect. The assumption that such learning is directly transferable to a clinical context often goes untested. There is a danger that the task-based simulation may become divorced from the wider context of actual clinical practice. Unfortunately in the case of the data gathered from this study it was not possible to measure whether students had the ability to perform better in more complex skills expected of them.

## Utilisation of teaching time at the bedside

The CC nursing tutors indicated that the CSC sessions were of particular benefit to the academically weaker students. Because their practical procedures had been completed timeously in simulation, these students, when taught in the clinical areas could proceed to performing case presentations with their CC nursing tutors rather than doing individual practical procedures.

## Conclusions

The aim of the study was to investigate whether simulation was suitable to be used to teach and assess the practical procedures required in a CC nursing programme as well as how it was perceived by the students and the tutors. The information obtained from the study indicated that the students and tutors were largely in agreement that simulation was valuable and can be used in a CC nursing programme. The study also revealed that

the way students spent their time in the clinical areas have changed due to the use of simulation opportunities. Although this study has shown the benefits of teaching in simulation, it is advisable that each skill should be individually assessed for advantages and disadvantages of teaching in simulation before a general recommendation can be made.

**Limitations:** This study was done at one University with one group of Critical Care nursing students. Further studies amongst similar groups are needed to assess the generalisability of this study.

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## References

1. Kneebone R. Evaluating clinical simulation for learning procedural skills: A theory based approach. *Academic Medicine* 2005;80(6):549-552.
2. Rauen CA. Simulation as a teaching strategy for nursing education and orientation in cardiac surgery. *Critical Care Nurse* 2004;June:46-51.
3. Freeth D, Fry H. Nursing students' and tutors' perceptions of learning and teaching in a clinical skills centre. *Nurse Education Today* 2005;25:272-282.
4. Neary M. Project 2000 students' survival kit: a return to the practical room. *Nurse Education Today* 1997;17:46-52.
5. Nicol N, Glen S. Clinical skills in nursing. The return of the practical room. LTD, London: Macmillan, 1999.
6. Treadwell I, Grobler S. Students' perceptions on skills training in simulation. *Medical Teacher* 2001;23(5):476-482.
7. Kneebone R. Simulation in surgical training: educational issues and practical implications. *Medical Education* 2003;37:267-277.