

The use of simulation to address the acute care skills deficit in pre-registration nursing students: A clinical skill perspective

Lesley J. Nickless*

School of Health and Social Care, Bournemouth University, England, United Kingdom

ARTICLE INFO

Article history:
Accepted 4 September 2010

Keywords:
Nursing students
Acute care
Clinical skills
Nurse education

ABSTRACT

The increase in patient acuity in primary and secondary settings is continuing, with a corresponding increase in the need for technological competence in these areas. Evidence, however, both nationally and internationally, suggests that these expectations are not being met. This paper offers a review of the literature on acute care, with a specific focus on pre-registration nursing students and the development of acute care skills. Three themes are discussed: factors contributing to the acute care skills deficit, the knowledge and skills required to work in acute care and strategies used to support the acquisition of acute care skills. In response to the review, and based upon the evidence-based solutions identified, the clinical skills team at Bournemouth University designed and developed two teaching sessions, using simulation and role play to support the acquisition of acute care skills in pre-registration students. Student evaluations identify that their knowledge, competence and confidence in this area have increased following the teaching sessions, although caution remains regarding transferability of these skills into the practice environment.

© 2010 Elsevier Ltd. All rights reserved.

Introduction

Nine years ago a review of adult critical care services in the United Kingdom led to a recommendation that healthcare provision should focus “on the level of care that individual patients need, regardless of location” (DoH, 2000, p. 9). The nursing role was specifically highlighted, recommending that nurses caring for these patients should possess the knowledge and skills to meet their needs. Unfortunately, according to the literature, whilst acutely ill patients are indeed being nursed outside of high dependency areas, the care they are receiving often remains sub-optimal (NICE, 2007).

Background

As part of a programme of clinical skills expansion within the School of Health and Social Care at Bournemouth University (BU), year three adult branch-nursing students were surveyed to identify which particular nursing skills they felt they lacked confidence in. Results identified that the students perceived that in particular they lacked the necessary skills to care for acutely ill patients. Although evidence suggests that it is not uncommon for student nurses to lack confidence in their overall skills competency, from the student

perspective this deficit was a ‘real problem’, creating a high level of anxiety. The survey outcome initiated a review of the literature in order to identify if this problem was occurring elsewhere and if so, to identify possible causes and evidence-based solutions to address the problem. This paper will examine the findings from the review and describe how, in response to these results, the skills team at BU implemented and evaluated two acute care skills sessions.

Literature review

The primary focus of the review not only centred upon pre-registration and newly qualified nursing staff but also included both United Kingdom (UK) and International perspectives. Three themes emerged during appraisal: factors contributing to the acute care skills deficit, the knowledge and skills required in acute care areas and the strategies used to support acquisition of acute care skills.

Factors contributing to the acute care skills deficit

It is a fact that the number of acutely ill patients requiring care in primary and secondary care environments is rising and this trend is set to continue (DoH, 2000). This phenomenon is linked to shorter in-patient stays, increasing levels of patient dependency and the decreasing capacity of traditional critical and high dependency environments to cope with these demands (Walker, 2001; Adam,

* Tel.: +44 1202 963789.

E-mail address: lnickless@bournemouth.ac.uk.

2004; Hoban, 2004; Higginson et al., 2004; Wood et al., 2004; Mole and McLafferty, 2004). The problem is not, however, limited to the UK and appears to be occurring universally, notably the United States (US) (Menzel et al., 1998; King et al., 2003; Feingold et al., 2004; Sigsby and Yarandi, 2004; Gross and Anderson, 2004), Finland (Aari et al., 2004), Israel (Greenberger et al., 2005), Australia (Boxer and Kluge, 2000), Canada (Robertson, 2000) and Ireland (Mcfetridge and Deeny, 2004).

The review of critical care services in the UK concluded that care of acutely ill patients should be based upon need, not environment, and healthcare staff should possess knowledge and skills to provide this care (DoH, 2000). The National Institute for Health and Clinical Excellence (NICE) echoed these findings, highlighting that sub-optimal assessment often led to delayed treatment and fatalities (NICE, 2007). It was recommended that all qualified nurses should have achieved training in critical care skills by the year 2004, with pre-registration programmes ensuring that students acquire the skills to assess acutely ill patients (DoH, 2001).

However, these targets do not appear to have been met. According to Walker (2001), Adam (2004), Hoban (2004) and Higginson et al. (2004), inadequate staffing levels, poor skill mix and increasing workloads have prohibited the release of key trained staff for education and training, resulting in an acute care skills deficit. This deficit, they argue, has impacted upon the quality of learning experienced by student nurses in practice, with poor role modelling, insufficient teaching and supervision in the practice area cited as major problems.

Lack of experience and opportunity to practice in acute care settings are a further factor, which Walker (2001), Mole and McLafferty (2004), Scholes et al. (2004) and Greenberger et al. (2005) suggest, contributes to this deficiency in acute care skills. They argue that poorly organised placements, inadequate time spent within them and increasing cohort numbers further compound the problem. Table 1 highlights the factors outlined above.

There is widespread agreement within the literature that several factors contribute to the ongoing acute care skills deficit in pre-registration nursing students. Nonetheless, the ongoing rise in patient acuity equates with an increase in the technological innovations used to care for them. It follows therefore, that all nursing staff working in these areas will require the necessary knowledge and skills to meet their needs. However, clarification of these skills remains ambiguous.

The knowledge and skills required to work in acute care environments

Wood et al. (2004) explored the education and training needs of both inexperienced and experienced healthcare professionals caring for acutely ill patients. Focus groups ($n = 25$) from a range of inexperienced, experienced and expert clinicians working in acute/critical care settings within five hospitals in the UK were used to identify a comprehensive list of knowledge and skills required for

the management of the acutely ill. Their recommendations included a blend of experience in acute areas combined with theoretical modules and practice.

Similarly, two studies outside of the UK attempted to identify the acute care skills required by newly qualified nurses (Boxer and Kluge, 2000; Greenberger et al., 2005). Both found that fundamental skills, such as feeding, were used frequently but acute care skills, such as airway management, although vital, were not performed as often or as competently as required. Although the sample in the Boxer and Kluge (2000) study was relatively small ($n = 132$) in comparison to the Greenberger et al. (2005) study ($n = 256$), both highlighted similar skills to those identified by Wood et al. (2004), suggesting that certain skills may indeed be required universally. Table 2 provides a list of the commonly agreed skills identified within the literature.

Aari et al. (2004) surveyed 130 graduating nurse students in Finland to identify the knowledge and skills they required for working in intensive care. Whilst their paper failed to identify the specific skills required, they did discover that those with previous intensive care experience scored higher knowledge scores, suggesting that exposure to specific acute care environments increases knowledge acquisition, as identified earlier. They too highlight the need for a blended approach to learning incorporating both practical experience and theory.

In the US, King et al. (2003) attempted to identify the competencies required by newly qualified nurses working in acute care. They sought perspectives from 332 nurses, nurse administrators and faculty, working in acute care agencies in Tennessee. From a list of 24 competencies, each group had a different perspective in terms of importance. Why these competencies were chosen was not clear, raising questions of how well they represented the needs of practice. In addition, only one skill was included (administration of intravenous medication) and the newly qualified nurses rated this skill as more important than the other competencies. This may however, reflect the higher value often placed upon skills acquisition by newly qualified nurses.

It is interesting to note that whilst the UK places such credence to the acquisition of competency in pre-registration nursing education (NMC, 2004), only one study was found relating to student nurses in the UK. Perhaps a collaborative approach, as used by Wood et al. (2004), would assist in the development of nationally or internationally agreed core competencies skills, which could then be integrated into the pre-registration curricula, ensuring that a uniform approach to education is adopted.

Strategies to support the acquisition of acute care skills

There is extensive agreement that achievement of competency in acute care requires the integration of acute/critical care

Table 1

Factors contributing to the acute care skills deficit.

1. Increasing numbers of acutely ill patients/clients
2. Lack of acute care placements
3. Larger student cohorts
4. Insufficient time spent in acute placements
5. Lack of learning opportunities
6. Insufficient staff/lack of training
7. Lack of supervision and or experience

Adapted from: Walker, 2001; Adam, 2004; Hoban, 2004; Higginson et al., 2004; Wood et al., 2004; Mole and McLafferty, 2004; Scholes et al., 2004; Greenberger et al., 2005.

Table 2

The knowledge and skills required to work in acute care.

1. Assessment and management of airway (airway and tracheostomy care, suctioning)
2. Assessment and management of breathing (rate; depth; oxygen saturations, oxygen therapy)
3. Assessment and management of cardiovascular function (arterial and central venous blood pressure, pulse, blood pressure, ECG interpretation, hydration status)
4. Assessment of disability and neurological status (glasgow coma scale, blood glucose monitoring)
5. Assessment of exposure (pain assessment, blood loss, wounds, external changes)
6. Assessment and interpretation of investigations (blood results)

Adapted from: Boxer and Kluge, 2000; King et al., 2003; Wood et al., 2004; Greenberger et al., 2005.

components into the pre-registration curricula (Menzel et al., 1998; Walker, 2001; Wood et al., 2004; Aari et al., 2004; Mcfettridge and Deeny, 2004; Mole and McLafferty, 2004; Sigsby and Yarandi, 2004; Holmes, 2004; Collins et al., 2006). This viewpoint is endorsed by Scholes et al. (2004), who evaluated the outcomes of both Making a Difference (DoH, 1999) and Fitness for Practice (UKCC, 1999) reforms, by looking at 16 Universities and Hospital Trusts in the UK. They agreed that preparation for acute/critical care was insufficient and recommended that a fifth adult branch, focusing on these areas, should be added to existing pre-registration nursing curricula.

Nonetheless, although many agree that participation in these environments is essential, conflicting views exist on where this experience should occur. Whilst Walker (2001), Menzel et al. (1998), Gross and Anderson (2004) and Holmes (2004) propose that critical care environments provide rich learning experiences, others (Hoban, 2004; Higginson et al., 2004; Aari et al., 2004), caution that these are too stressful for student nurses and a range of alternative acute care settings would be more appropriate.

Sigsby and Yarandi (2004) hypothesised that a peri-operative elective would increase acute care knowledge and skills when compared to a general medical/surgical elective. They followed 280 randomly assigned nursing students throughout a three-year programme. The experimental group ($n = 97$) followed a peri-operative elective and the control group ($n = 183$) a medical/surgical elective. Although they acknowledge that external factors over this period may have influenced the outcome, the hypothesis was accepted, confirming the overall opinion that specific placement experience is essential for the development of these skills.

An alternative strategy was proposed by Mcfettridge and Deeny (2004), who hypothesised that the use of case studies during a pre-registration critical care placement would support a holistic approach to caring as well as acquisition of technical competence. Although the findings support their initial hypothesis, the impact upon achievement of technical competence, is noticeably lacking. Nevertheless, there may be some value in the use of case studies when used in conjunction with alternative strategies and appropriate placement experience.

The use of simulation as a strategy to support the development of acute care skills has also been investigated. Ker et al. (2003) and Mole and McLafferty (2004) both used a simulated acute care ward environment, which they proposed would assist in the development of clinical, management and organisational skills. Ker et al. (2003) evaluated the effects on 151 nursing and medical students and found deficits in their clinical competence. They agreed that the environment was conducive to learning skills safely but the evaluation did not highlight to what extent this was achieved. Mole and McLafferty (2004) sampled 123 third-year adult branch student nurses and although the researchers suggest their findings support the use of these strategies, only 52% of the students agreed that the environment enhanced their clinical skills, raising questions regarding the justification of such a resource intensive strategy.

Mannequins present an alternative use of simulation and are widely endorsed in the literature. Proponents suggest that high-fidelity mannequins, which are acknowledged as expensive and resource intensive, offer opportunity to practice acute care skills in realistic, risk-free environments, achieving a level of expertise and safety prior to application on patients (Feingold et al., 2004; Alinier et al., 2004; Henneman and Cunningham, 2005).

Three nursing studies evaluated the use of simulation mannequins in acute care environments. Henneman and Cunningham (2005) used simulation as part of a critical care course and found that although the students valued the experience the process was costly and labour-intensive. Unfortunately, the evaluation failed to highlight the effect of the process on skills efficacy, as predicted.

Feingold et al. (2004) surveyed students ($n = 65$) and faculty members ($n = 4$) perceptions regarding the use of high-fidelity mannequins to simulate acute care scenarios. They hypothesised that clinical simulation would be an adequate test of clinical competence, which could be transferred in practice. Whilst faculty and the majority of students perceived the mannequins as a realistic and valuable support to the development of clinical skills prior to practice, the hypothesis of transferability was not accepted; a key issue in much of the literature, suggesting further research is required in this area.

Alinier et al. (2004) also used high-fidelity mannequins to simulate an intensive care environment, comparing the competency of two groups of year three nursing students. The students were randomly selected into an experimental group ($n = 29$), using simulation and a control group ($n = 38$) receiving traditional teaching methods. When tested, the experimental group fared significantly higher than the control group (13.43%) compared with 6.76% ($p < 0.05$), supporting the argument for the use of simulation.

The above studies have all used high-fidelity mannequins to support the acquisition of acute care skills with Alinier et al. (2004) and Feingold et al. (2004) in particular highlighting the value that students' place upon simulation as a learning strategy. However, simulation is represented in any activity that reflects reality (McCallum, 2006), and as such could be achieved through medium or low fidelity mannequins and role play activities. This was achieved in a study by Baillie and Curzio (2009), who found that both confidence and clinical ability were enhanced through the use of simulation. However, in this study the findings were arrived at with the use of low fidelity mannequins and role play coupled with theory.

Summary

The responsibility to create a change in practice depends upon practitioners and educators adopting evidence-based solutions. In this case the literature has identified a range of evidence-based strategies to support the acquisition of acute care skills (See Table 3). Although high-fidelity mannequins are supported in some studies, their cost may prohibit their use in some educational environments. In these areas, medium to low fidelity mannequins may provide an alternative but valuable learning resource and indeed be fit for purpose (Baillie and Curzio, 2009). Simulation, in other forms such as case studies (Mcfettridge and Deeny, 2004) and role play (Baillie and Curzio, 2009), has also been reported as positive strategies to enhance the learning environment. Ultimately, combining a variety of simulation strategies with theoretical input appears to provide an evidence-based solution of the acute care skills deficit in pre-registration student nurses (Aari et al., 2004; Wood et al., 2004; Baillie and Curzio, 2009).

Although a range of learning and teaching strategies are utilised within the skills laboratories at BU, simulation and role play are

Table 3

Strategies to support the development of acute care knowledge and skills.

- | |
|--|
| 1. Exposure to a range of supported acute care placements |
| 2. Exposure to comprehensive programmes of learning, focusing on acute care knowledge and skills |
| 3. The use of case studies to support learning |
| 4. The use of simulation to develop technological competence in acute care skills |

Adapted from: Menzel et al., 1998; Walker, 2001; Ker et al., 2003; Alinier et al., 2004; Gross and Anderson, 2004; Holmes, 2004; Hoban, 2004; Higginson et al., 2004; Wood et al., 2004; Aari et al., 2004; Feingold et al., 2004; Mcfettridge and Deeny, 2004; Mole and McLafferty, 2004; Sigsby and Yarandi, 2004; Scholes et al., 2004; Henneman and Cunningham, 2005; Collins et al., 2006.

Table 4
Evaluation questions.

1. The session was well structured
2. The session related theory to practice
3. The session was relevant to clinical practice
4. The skills taught have increased my confidence
5. The content of the session was appropriate to my stage of learning
6. There was enough time to practice the skills during the session
7. The tutor shared their enthusiasm about the topic with us
8. The tutor offered support and guidance throughout the session

used most commonly. Nevertheless, whilst it should be noted that the skills team at BU recognised that simulation will never replace the experiential learning that occurs in supported placements (Joy and Nickless, 2008), they are also aware that this vital experience may not always be as available or as effective as anticipated. Therefore, based upon the findings from the review, the team developed two skill sessions, using simulation and role play and focusing on pre and post-operative care (year two nursing students) and specific acute care skills (year three students). The purpose of the sessions was twofold, firstly, to support the acquisition of acute care skills and secondly, to address the problem identified by the students and highlighted within the literature.

The simulation sessions

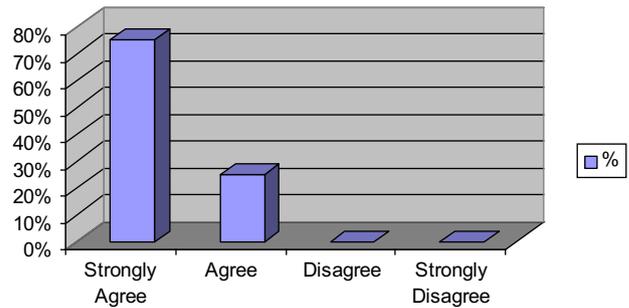
Participants

Approximately 200 year two adult branch students complete the pre and post-operative skills session each year, complemented by experience in acute care placements. The number of year three adult branch students is slightly less (approximately 150) and these students also experience critical care placements.

Session content

The pre and post-operative sessions incorporate simulated practice and role play supported by medium fidelity mannequins. Case study scenarios, based upon hypothetical patients admitted for surgical procedures, are used to stimulate student activity. The students work in small groups and are expected to plan the pre and post-operative care for their particular patient. Information supplied from the scenarios is used to predict potential complications and the students are asked to provide rationales for why these problems may occur and which actions could reduce the risks. Medium fidelity mannequins are used to simulate activities such as haemodynamic monitoring, nasogastric aspiration and changing drains. A period of feedback and de-briefing ensures that each

The session related theory to practice



Graph 2.

student understands the rational and evidence base for the care planning and actions taken.

The acute care skills session focuses more specifically on skills to assess, monitor and measure the physiological condition of acutely ill patients. These include the management of central venous lines, the measurement of central venous pressure and the insertion and management of nasogastric tubes. The session is supported by the use of a variety of medium and low fidelity simulation mannequins and equipment, which in the case of central venous pressure is advanced enough to replicate the fall of water in a water manometer and the oscillation that occurs thereafter.

Both sessions are supported by updates, carried out by the skills team, on basic life support which in years two and three incorporate the skills required for assessment of the deteriorating patient; airway; breathing; circulation; disability and exposure (ABCDE).

Evaluation method

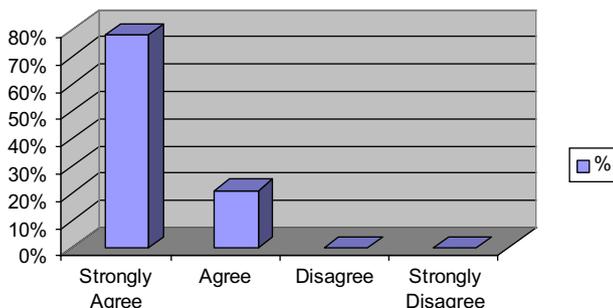
The simulated sessions are evaluated using anonymous, session specific quantitative/qualitative questionnaires developed by the skills team. Eight statements are utilised to explore the simulated experience from the student perspective, using a 4-category Likert type scale (See Table 4). Qualitative commentary is also allowed for.

Findings and discussion

Graphs 1–8 depict the responses from 143 year three students who recently experienced the acute care session. The evaluations clearly demonstrate the high level of satisfaction noted by the students:

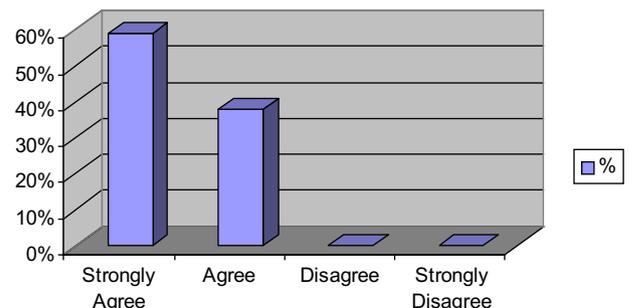
“ I believe that it is essential to be taught acute skills and procedures, especially when we are nearly qualified”

The session was relevant to practice



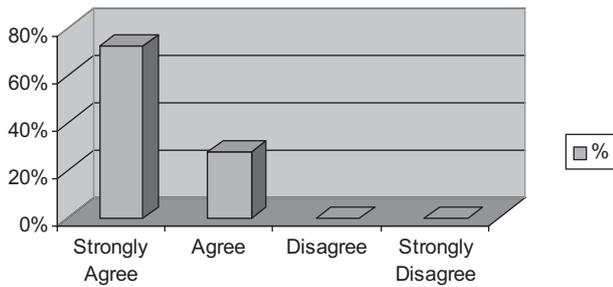
Graph 1.

The skills taught have increased my confidence



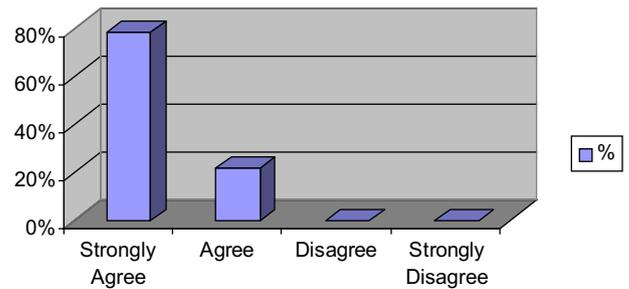
Graph 3.

The content of the session was appropriate to my stage of learning



Graph 4.

The tutor offered support and guidance throughout the session



Graph 6.

“Definitely helped reduce fear/anxiety of caring for a patient with a Central Line and Nasogastric tube”

This point is noted by Steen and Costello (2008) who highlighted the important role of skills laboratories within their acute care course and is echoed by Baillie and Curzio (2009) who believe that safe simulated environments support successful learning and preparation for practice.

It is also significant that the students overwhelmingly agreed that the session is relevant to and related theory to practice (Graphs 1 and 2):

“It gives us a chance to ‘question and answer’ about relevant practical issues and a chance to interact with the theoretical explanations”

These findings may reflect the fact that the sessions at BU integrate theory and practice elements unlike many skills laboratories which focus on psychomotor skills development only. The value of using a combination of learning strategies linked to theoretical components is highlighted several times in the literature (Aari et al., 2004; Wood et al., 2004; Baillie and Curzio, 2009).

The students also valued the support offered to them during the session and this is reflected in Graphs 5–8:

“The tutor taught at a level and pace easy to understand and follow”

“Well presented session with good interaction”

This support, guidance and enthusiasm may stem from the fact that the facilitators are dedicated members of the skills team with ongoing and extensive practice experience in acute care, as well as enthusiasm for the topic. This point is raised by Steen and Costello

(2008), who consider that a positive regard for facilitators encourages student satisfaction.

Although the majority found that the content of the session was appropriate to their stage of learning (Graph 4), it should be noted that although the students undertake a critical care placement in their third year this may occur before or after the skills session and several students commented on this:

“More useful before critical care placement”

“Could have been more beneficial earlier in the year”

This feedback has resulted in a reconfiguration of the timetables to provide the sessions, where possible, prior to their critical care placements.

An interesting finding is demonstrated in Graph 3. It is notable that fewer students strongly agreed that the session increased their confidence. One student commented that:

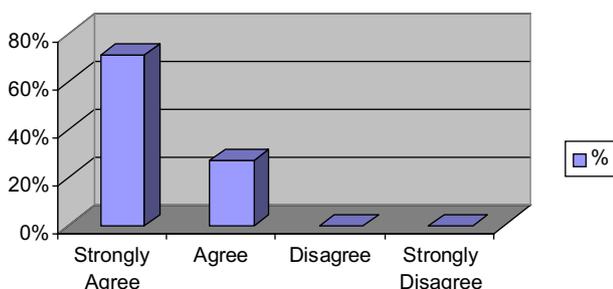
“I feel the session may have decreased my confidence as it has made me realise that I have a large gap of clinical skills knowledge!!!”

However, an alternative viewpoint is also offered:

“I feel that my knowledge of CV lines and NG tubes has been increased. I now feel more capable with carrying out these techniques”

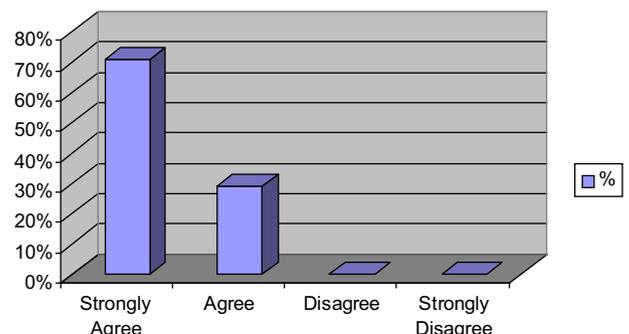
This issue of confidence is well documented in the literature and although previous studies have identified that simulation has helped prepare students for practice, the percentage of students responding positively remains inconsistent. In the study by Feingold et al. (2004) only 47% of student felt that simulation

There was enough time to practice the skills during the session



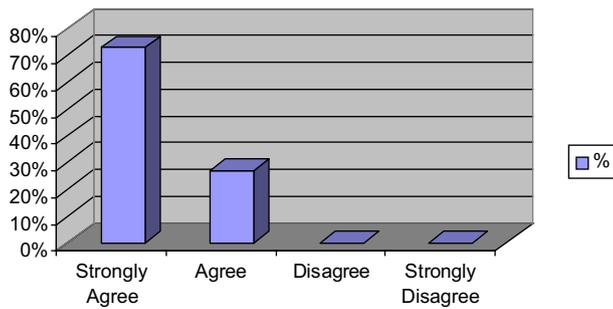
Graph 5.

The session was well structured



Graph 7.

The tutor shared their enthusiasm about the topic with us



Graph 8.

experience had increased their confidence, a similar result to the BU evaluation. However, Baillie and Curzio (2009) found that 89% of their students identified that their confidence had been enhanced through simulation. It should also be noted that the Baillie and Curzio study included a selection of acute care skills within their programme. An overriding factor arising from these findings is that it has enhanced our determination to ensure the students practise as much as possible in a stress free environment. It has also emphasised the need for more simulation practice which several students requested:

“Really useful – feel that more of these would have been beneficial throughout our training”
 “This sort of session should be given more often over the course”

Conclusions

Three themes emerged during the review of the literature, the factors contributing to the acute care skills deficit in pre-registration student nurses, the knowledge and skills required in acute care areas and the strategies used to support acquisition of acute care skills.

The review clearly identified several factors that contribute to the lack of acute care skills possessed by both pre-registration and newly qualified nurses, and occurring both here in the UK and other countries. There is also widespread agreement that these factors seriously impact upon the quality of nurse education, the development of nurses who are fit for practice and purpose and the implications to patient care. The review also highlighted the need for a more robust and collective identification of key skills required by staff working with acutely ill patients.

Although a range of evidence-based strategies are offered in the literature, simulation, in a variety of formats, is widely endorsed, especially when used in combination with alternative strategies such as case studies and role play. It is clear that supporting student learning in acute care skills will possibly require a combination of these strategies, in addition to supportive placement opportunities.

The NMC has recently endorsed this issue of simulated practice by inviting educational providers to allocate a percentage of practice hours to simulated environments (NMC, 2007). Our response at BU has been to increase both hours and skills sessions, which we in turn hope will increase student's confidence and competency.

The two skill sessions offered at BU remain very popular and will continue to be refined in light of evaluation feedback. However, although evaluations are vital elements of curriculum monitoring and quality control and in this instance have been very positive, it

should be remembered that development of skills within a simulated environment does not necessarily ensure transferability into the practice environment, as found by Feingold et al. (2004). They do however, provide an invaluable method of preparing students, which complements the work-based learning occurring in practice. Simulated practice may also negate some of the problems identified in the review which contribute to the acute care skills deficit in pre-registration and newly qualified nurses.

References

- Aari, R., Ritmala-Castren, M., Leino-Kilpi, H., Suominen, T., 2004. Biological and physiological knowledge and skills of graduating Finnish nursing students to practice in intensive care. *Nurse Education Today* 24 (4), 293–300.
- Adam, S., 2004. Plugging the gap – critical care skills are the current universal commodity. *Nursing in Critical Care* 9 (5), 195–198.
- Alinier, G., Hunt, W.B., Gordon, R., 2004. Determining the value of simulation in nurse education: study design and initial results. *Nurse Education in Practice* 4 (3), 200–207.
- Baillie, L., Curzio, J., 2009. Students' and facilitators perceptions of simulation in practice learning. *Nurse Education in Practice* 19 (5), 297–306.
- Boxer, E., Kluge, B., 2000. Essential clinical skills for beginning registered nurses. *Nurse Education Today* 20, 327–335.
- Collins, T.J., Price, A.M., Angrave, P.D., 2006. Pre-registration education: making a difference to critical care? *Nursing in Critical Care* 11 (1), 52–57.
- Department of Health, 1999. Making a Difference: Strengthening the Nursing, Midwifery and Health Visiting Contribution to Health and Healthcare. The Stationary Office, London.
- Department of Health, 2000. Comprehensive Critical Care: A Review of Adult Critical Care Services. DoH, London.
- Department of Health, 2001. The Nursing Contribution to the Provision of Comprehensive Critical Care for Adults: A Strategic Programme of Action. DoH, London.
- Feingold, C.E., Calaluce, M., Kallen, M.A., 2004. Computerized patient model and simulated clinical experiences: evaluation with baccalaureate nursing students. *Journal of Nursing Education* 43 (4), 156–163.
- Greenberger, H., Reches, H., Riba, S., 2005. Do new graduates of registered nursing programmes in Israel perceive themselves as technically competent? *The Journal of Continuing Education in Nursing* 36 (3), 133–140.
- Gross, C., Anderson, C., 2004. Critical care practicum: an essential component in baccalaureate programs. *Nurse Educator* 29 (5), 199–202.
- Henneman, E.A., Cunningham, H., 2005. Using clinical simulation to teach patient safety in an acute/critical care nursing course. *Nurse Educator* 30 (4), 172–177.
- Higginson, R., Lewis, C., De, D., Jones, B., 2004. The need for critical care nurse education at preregistration level. *British Journal of Nursing* 13 (22), 1326–1328.
- Hoban, V., 2004. Critical care. *Nursing Times* 100 (45), 20–22.
- Holmes, S.P., 2004. Implementing a perioperative nursing elective in a baccalaureate curriculum. *AORN Journal* 80 (5), 902–910.
- Joy, R., Nickless, L.J., 2008. Revolutionising assessment in a clinical skills environment – a global approach: The recorded assessment. *Nurse Education in Practice* 8, 352–358.
- Ker, J., Mole, L., Bradley, P., 2003. Early introduction to interprofessional learning: a simulated ward environment. *Medical Education* 37, 248–255.
- King, M.S., Smith, P.L., Glenn, L.L., 2003. Entry-level competencies needed by BSNs in acute health care agencies in Tennessee in the next 10 years. *Journal of Nursing Education* 42 (4), 179–181.
- McCallum, J., 2006. The debate in favour of using simulation education in pre-registration adult nursing. *Nurse Education Today* 27 (8), 825–831.
- Mcfetridge, B., Deeny, P., 2004. The use of case studies as a learning method during pre-registration critical care placements. *Nurse Education in Practice* 4 (3), 208–215.
- Menzel, L.K., Katz, S.M., Menting, S.A., Donovan Laack, K., 1998. Providing a critical care experience for undergraduate nursing students. *Critical Care Nurse* 18 (5), 47–53.
- Mole, L.J., McLafferty, H.R., 2004. Evaluating a simulated ward exercise for third year student nurses. *Nurse Education in Practice* 4 (2), 91–99.
- National Institute for Health and Clinical Excellence (NICE), 2007. Acutely ill patients in hospital: recognition of and response to acute illness in adults in hospital. Available from: <http://www.nice.org.uk/nicemedia/pdf/CG50QuickRefGuide.pdf> (Accessed 15.03.09).
- Nursing and Midwifery Council, 2004. Standards of Proficiency for Pre-registration Nursing Education. NMC, London.
- Nursing and Midwifery Council, 2007. Supporting direct care through simulated practice learning in the pre-registration nursing programme. NMC Circular 36/2007.
- Robertson, K.A., 2000. Clinical major option: a model for implementing critical care nursing into baccalaureate preparation. *Dynamics* 11 (3), 22–24.
- Scholes, J., Freeman, M., Gray, M., Wallis, B., Robinson, D., Matthews-Smith, G., Miller, C., 2004. Evaluation of Nurse Education Partnership: Final Report. Available from:

- http://www.brighton.ac.uk/snm/research/cnmr/projects/pedagogy/partnerships_report.pdf (accessed 20.3.09).
- Sigsby, L.M., Yarandi, H.N., 2004. A knowledge comparison of nursing students in perioperative versus other rotations. *AORN Journal* 80 (4), 699–707.
- Steen, C.D., Costello, J., 2008. Teaching pre-registration student nurses to assess acutely ill patients: an evaluation of an acute illness management programme. *Nurse Education in Practice* 8, 343–351.
- United Kingdom Central Council for Nursing, Midwifery and Health Visiting (UKCC), 1999. *Fitness for Practice: The UKCC Commission for Nursing and Midwifery Education*. UKCC, London.
- Walker, W., 2001. Comprehensive critical care education is critical to success. *Intensive and Critical Care Nursing* 17, 237–241.
- Wood, I., Douglas, J., Priest, H., 2004. Education and training for acute care delivery: a needs analysis. *Nursing in Critical Care* 9 (4), 159–166.