

Assessing the use of simulated wounds in nurse education

In the past, nursing students only had access to classroom theory to develop their wound care knowledge. In the project detailed here, simulated wounds were developed to teach nursing students at the University of Salford about tissue viability management, as part of a Vice Chancellor's funded project. The aim was to design a collection of simulated wounds that accurately replicated the features of actual wounds, including realistic wound beds, periwound areas and exudate. While being overseen by clinicians, nursing students were tasked with developing essential skills and competencies using these models. This project was evaluated through regular feedback from the perspective of both lecturers and students.



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INTRODUCTION

According to Dugdall and Watson^[1], nurses with training in tissue viability, as well as link nurses or those who have achieved a higher-level academic qualification, have the potential to achieve positive outcomes for wound care patients. However, despite this Beeckman and Duprez^[2] suggest that inadequate wound management is still prevalent, often due to misunderstandings around the implementation of tissue viability guidelines and policies.

Educational consistency

In 2006, the NMC^[3] reviewed the fitness for practice of newly qualified nurses at registration. Detailed competencies were then added to the Standards for Proficiency Outcomes^[4] as issues were raised about consistency in relation to programme content and outcomes, as well as the ability of newly qualified nurses to 'perform essential skills safely and effectively'. Wound management was considered one of these essential skills. Although the NMC's Essential Skills Clusters^[5] addressed wound management education at pre-registration level through structured clinical assessments of practice, Beldon^[6] argues that the drivers to develop qualified nurses' wound care knowledge remained

dependent on local policies, agendas and training.

However, tissue viability practices are now high on the Good to Great agenda^[7], with targets set through High Impact Actions^[8], Outcome Measures^[9], the Commissioning for Quality and Innovation payment framework^[10] and information requirements from the Patients Association^[11], Care Quality Commission and National Patient Safety Agency for England^[12].

Trusts and organisations are now compelled to ensure there is an evidence base to underpin nursing practice in wound care.

Classroom learning versus simulation

Although clinical skills training is frequently used at the author's centre to underpin classroom theory in pre-registration nurse programmes^[13], the content of the tissue viability module was purely theoretical. According to NHS Education for Scotland^[14], clinical skills are defined as 'any action performed by staff involved in direct care of patients, which impacts on clinical outcomes in a measurable way', and include:

- Cognitive or 'thinking' skills, such as clinical reasoning and decision-making
- Non-technical skills such as team work

References

1. Dugdall H, Watson R. What is the relationship between nurses' attitudes to evidence-based practice and the selection of wound care procedures? *J Clin Nurs* 2009; 18(10): 1442-50
2. Beeckman D, Duprez V. The journey to evidence-based practice? *Br J Nurs* 2011; 20(15): 3
3. NMC. Supporting Direct Care Through Simulated Practice Learning in the Pre-registration Nursing Programme. 2007; (NMC Circular 36/2007). Available at: http://www.nmc-uk.org/Documents/Circulars/2007circulars/NMCCircular36_2007.pdf (Accessed 24th January 2012)
4. NMC. Requirements for Pre-registration Nurse Programmes. 2004; NMC, London
5. NMC. Essential Skills Clusters (ESCs) for Pre-registration Nursing Programmes Annex 2 to NMC Circular 07/2007. 2007; NMC, London

and communication

- **Technical skills, such as clinical examination and invasive procedures.**

However, it is widely acknowledged that decision-making skills seldom develop in the classroom setting^[15] and Benner^[16] recognises that it is only when theory is applied to practice that students learn to deliver care safely.

Despite this, many post-registration courses, study days and conferences remain heavily theoretical. A Cochrane Systematic review^[17] found that a mix of didactic and interactive education was more effective than either method alone.

Therefore, it is now recognised that simulated environments can help lecturers construct interactive patient situations that provide students with skills training as well as linking theory to practice^[18]. The benefits of simulated learning include:

- **Critical thinking**
- **Confidence**
- **Decision making**
- **Skills development**^[19].

Simulated patient scenarios also allow students to integrate skills from different domains of learning and receive immediate feedback^[20].

It is important to explore the possibility of providing learning activities that incorporate simulated wounds and which are designed to meet the outcomes of educational modules. This will assist in bridging the theory/practice gap and help to develop students' confidence in performing wound care skills.

SIMULATED WOUNDS

There are many companies manufacturing simulated wounds and some schools of nursing make their own, some of which are placed on actors or student nurses involved in the clinical simulation.

They are usually made of rubber and are mostly classified as low fidelity simulators because although they are useful for skills training they are not as anatomically realistic as medium or high-fidelity simulators or as able to mimic diverse physical parameters^[21]. Low fidelity simulated wounds also require added moulage (the art of applying and making up mock injuries for the purposes of training by clinicians) to assist in the 'suspension of disbelief'^[22].

SALFORD SIMULATED WOUNDS PROJECT

The wound models made for the University of Salford project are considered medium fidelity, meaning they realistically depict wounds seen in clinical practice and promote realistic responses from students^[21].

Compared with low fidelity models, these wounds contain greater detail in relation to:

- **Anatomical size**
- **Physiology: when viewed by students the wounds make sense in relation to the causative factors of skin breakdown, for example, a model designed to resemble a pressure ulcer caused by shear and pressure will look like a real ulcer as it will have the typical 'teardrop' shape and an undermined cavity**
- **Tissue: granulation tissue, for example, will be red and look granular, slough will be yellow and stringy and necrotic tissue will be able to be debrided**
[Fig 1]
- **Skin: the simulated wound can be blended to the actor's skin so it is more convincing — students will be unable to tell where the real skin begins**
- **Feel: the simulated wounds are made with silicone and replicate the sensation of real wounds.**

Extra blood, exudate and slough are regularly added to the wounds for effect and can be absorbed into any dressings that are applied.

Project development

The development of six large simulated chronic wounds and 12 smaller wounds were funded solely from monies awarded from a Vice Chancellor Scholarship within the university.

The simulated wounds were designed by special effects and make-up artist, Davy Jones, and lecturer in adult nursing, Melanie Stephens. The wounds were sculpted and moulded to replicate the chronic and acute wounds seen in clinical practice. Jones manufactured resin moulds, which could then be used on real people.

From the resin moulds Jones then produced the wounds as gel-filled silicone appliances. Along with his team, Jones hand painted all the models, making sure he had

References

- Beldon P. Is wound management training in primary care good enough? *Br J Comm Nurs*. 2010; 15(9): 29
- DoH. NHS 2010–2015: From Good to Great. Preventative, People-centred, Productive. 2009a; DoH, London
- NHS Institute for Innovation and Improvement. High Impact Actions for Nursing and Midwifery. Available at: http://www.institute.nhs.uk/building_capability/hia_supporting_info/your_skin_matters.html. 2009; (accessed 8 November, 2011)
- DoH. Quality and Outcomes Framework. 2009b; DoH, London
- DoH. Using the Commissioning for Quality and Innovation (CQUIN) payment framework. 2008a; DoH, London
- The Patients Association. Meaningful and comparable information: Tissue Viability Nursing Services and Pressure Ulcers. 2010; The Patients Association, Middlesex



Figure 1. Debridement of a simulated pressure ulcer wound.

regular discussions with Stephens about how the wounds would look and feel. The chronic wound models produced included:

- **Buttocks with multiple pressure ulcers of varying depth, category and healing**
- **A fungating breast wound**
- **A dehiscid abdominal wound with stoma**
- **A necrotic heel ulcer**
- **A dehiscid cardiac wound**
- **A leg ulcer.**

The 12 smaller models included incision wounds, ulcers, healing wounds and small burns.

All the models were based on factual patient case studies. This was so the students could experience the wounds as they were observed in practice and also learn about real 'back-stories' and patient outcomes.

The simulated wounds were used to augment the theoretical content of a tissue viability module. The introduction of the models provoked debate around the assessment and management of each case.

Project examples

Simulation of a fungating breast wound

The simulation of a fungating breast wound was based on a patient referred to the tissue viability services by a local group of pharmacists who had noticed her regularly buying large rolls of gamgee.

This type of wound was chosen so that students could learn that healing is not always the objective of wound management — the goals for this particular patient included the absorption of exudate and the reduction of odour and bulk as the patient preferred to wear T-shirts in the summer instead of polo neck jumpers and a coat.

The simulation needed to replicate the visual appearance of a fungating wound, but also have both breasts present. Therefore, when constructing the wound, Jones needed to sculpt on a real woman and then build up the fungating area to replicate the original wound [Fig 2].

Simulation of a pressure ulcer

A necrotic pressure ulcer on the heel of a foot was based upon a patient who had undergone a hemiarthroplasty. This enabled students to explore pressure ulcer

References

12. Guy H. Now is the time for tissue viability. 2011; *Br J Nurs* 20(11): 30
13. Rennie I. Exploring approaches to clinical skills development in nursing education. 2009; *Nurs Times* 105(3): 20–22
14. NHS Education for Scotland (2007) Partnerships for Care. Taking Forward the Scottish Clinical Skills Strategy. NES, Edinburgh
15. Gallagher AG, Ritter ME, Champion H, Higgins G, Moses G, Smith DC, Satava RM. Virtual reality simulation for the operating room: proficiency based training as a paradigm shift in surgical skills training. 2005; *Ann Surg* 241(2): 364–72
16. Benner P. From Novice to Expert: Excellence and Power in Clinical Nursing Practice. 1984; Addison-Wesley, California
17. Forsetlund L, Bjorn dal A, Rashidin A, Jamtvedt G, O'Brien MA, Wolf F, Davis D, Odgaard-Jensen J, Oxmon AD. Continuing Education Meetings and Workshops: Effects on Professional Practice and Healthcare Outcomes. 2009; Available online at: <http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD003030.pub2/abstract;jsessionid=ACBE98E30D293C1470DB775551050E19.d02t02> (accessed 20 January, 2012)

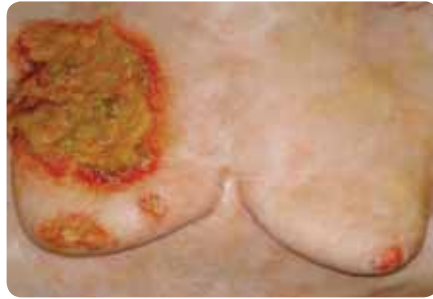


Figure 2 (left). Simulation of a fungating wound after debridement
Figure 3 (right). Necrotic pressure ulcer on the heel of the foot.

References

18. Wolfgram LJB, O'Leary-Quinn A (2011) Integrating simulation innovatively: evidence in teaching nursing education. *Clin Sim Nurs* Available at: <http://www.sciencedirect.com/science/article/pii/S1876139910001660> (accessed 26, July 2011)
19. Nehring WM, Ellis WE, Lashley FR. Human patient simulators in nursing education: An overview. *Simulation and Gaming*. 2001; 32(2): 194–204
20. Kneebone R, Kidd J, Nestel D, Asvall S, Paraskeva P, Darzi, A. An innovative model for teaching and learning clinical procedures. 2002; *Medical Educ* 36: 628–34
21. Lapkin S, Levett-Jones T, Bellchambers H, Fernandez R. Effectiveness of patient simulation manikins in teaching clinical reasoning skills to undergraduate nursing students: a systematic review. 2010; *Clin Sim Nurs* 6: 207–222
22. Kreger NE. Five fast fixes. 2009; *Clin Sim Nurs* 5: e85
23. Moule P, Wilford A, Sales R, Haycock L, Lockyer, L. *Can the use of Simulation Support Pre-registration Nursing Students in Familiarising Themselves with Clinical Skills before Consolidating them in Practice?* Faculty of Health and Social Care. 2006; University of the West of England (UWE), Bristol

development, wound assessment and removal of necrotic tissue. The simulated necrosis was designed to be separate from the ulcerated heel [Fig 3]. Jones added layers of simulated sloughy tissue to the wound bed and then placed the necrotic tissue on top.

Simulation of a dehisced abdomen with a stoma site

A dehisced abdomen with a stoma site was based upon a patient who had infected diverticulitis and had undergone an urgent hemicolectomy and stoma formation. The wound had dehisced post-surgery and was healing by secondary intention.

The rationale for including this wound was for students to explore the management of a heavily exuding wound that was further compounded by a stoma site. It also provided the opportunity to consider the patient's goal of going home without experiencing wound leakage [Fig 4].

Simulation of a leg ulcer

A simulated leg ulcer was designed [Fig 5] so that it could be stuck to the leg of an actor. The aim was to assist students in developing knowledge and assessment skills around venous leg ulcer management. The ulcer and surrounding skin needed to display signs of venous hypertension as well as an ulcerated wound bed with moderate exudate.

Outcomes

At the end of the 16-week programme, the students' responses were collated using a Likert scale. They were asked:

- Whether using the simulated wounds aided learning?
- What was the usefulness of the simulated wounds to their practice?
- For any other comments students wanted to make about the wounds.

From the 16 students who provided feedback, it was found that:

- All strongly agreed that the wounds helped their learning
- All strongly agreed that they found the wounds useful to their practice.

General comments included:

- 'I found the practical session most useful'
- 'The wounds related so well to our place of work'
- 'Practical demonstrations using the wound care model were really beneficial'
- 'The opportunity to discuss the problems associated with the wounds, whilst they were in front of you, and then to develop familiarity with wound assessment and management, aided my learning.'

The lecturer found that the simulated wounds enabled greater discussion of tissue viability practice and that students could better relate to the wounds seen in practice. It also helped them to deal better with the complexities of assessment, management and treatment.

DISCUSSION

The NMC^[3] strongly supports the use of



Figure 4. Dehisced abdomen with a stoma site.



Figure 5. Simulated leg ulcer.

simulation as an opportunity for nurses to rehearse and consolidate skills prior to practice. Case studies using simulated wounds have highlighted that they can increase students' confidence, skills and decision-making capabilities [23].

The government's quality agenda and outcome measures are aimed at reducing wound care expenditure in trusts, while at the same time providing increased safety and effectiveness of care [9]. Wound care simulation enables students to gain knowledge and understanding in a safe environment.

Vicarious learning, where knowledge is gained by observing the consequences of others' actions, such as in Vygotsky's

Zone of Proximal Development, appears to be undervalued [24]. Daniels implies that learners' knowledge and skills development is reduced when they have to independently solve problems, rather than having the input of more capable peers.

Therefore, if the lecturer 'scaffolds' the learning experience with academic support and peer learning, students' knowledge, skills and problem-solving abilities increase.

By using simulated models, the University of Salford project enabled students to discuss their practice in a safe environment and learn from each other.

Although this method may not take into account students' learning style, ability or current levels of knowledge, according to Grundy [25] learning in this way can achieve the same outcomes as pre-registration nursing programmes.

Although this project is limited by the small number of self-reported student evaluations, the feedback was unequivocal in demonstrating that the simulated wounds aided students' learning experience.

A systematic review on the effectiveness of simulation in teaching clinical reasoning skills to undergraduates [21] suggests that although the evidence is inconclusive, knowledge and skills acquisition is significantly improved. This project provides a call for future research and work in this field.

CONCLUSION

The purpose of this project was to develop a set of simulated wounds that were more realistic and life-like than those previously available, therefore, enhancing the learning experience for nursing students.

Although this project only included a small number of evaluations, it highlights that wound simulation can offer educators in the field of tissue viability an effective way to prepare clinicians for the types of wounds that they will see on real patients.

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References

- Daniels H. *An Introduction to Vygotsky*. 1996; Routledge, London
- Grundy L. Pathways to fitness for practice: national vocational qualifications as a foundation of competence in nurse education. 2001; *Nurse Educ Today* 21: 260–65