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Teaching and Learning in the Biosciences: the development of an educational programme to assist student nurses in their assessment and management of patients with wounds.

Catherine Redmond, Carmel Davies, Deirdre Cornally, Marianne Fegan and Margaret O'Toole

Abstract

Aims

The aim of this project was to develop an educational package for undergraduate student nurses that would provide them with the theoretical knowledge and practical skills to care for a patient with a wound.

Background

Internationally there is concern over the adequacy of preparation of undergraduate nurses for the clinical skill of wound care. Deficits have also been identified in the underpinning biological sciences needed for this skill. Expectations associated with wound management have altered significantly in the last two decades with decision making around wound care coming under the scope of practice of nurses. The treatment and care options for patients with wounds must be based on a sound knowledge of how wounds are formed and healed. If nurses do not have the evidence-based knowledge, it can affect wound healing adversely leading to increased patient suffering, pain and delayed healing. From an organisational perspective, delayed healing will increase the cost of care.

Design

This project utilised constructivism learning theory to provide a framework for the development of a wound care educational package for undergraduate Irish nurses in their penultimate year of training.

Methods

Collaboration was formed with key stake holders. Pertinent curriculum content was mapped. Learning strategies to suit the incoming student learning styles

were incorporated into newly developed theoretical content and practical skill sessions.

Conclusion

The developed educational programme will assist student nurses in their care of patients with wounds.

Relevance to clinical practice

This paper provides a model that can be followed to develop small units of study to keep abreast of changes in healthcare delivery and the changing scope of practice of nurses. It also contributes to the debate on the teaching and learning of biosciences as it highlights the depth of biological knowledge required as a basis for good evidence based nursing care.

Keywords:

Wound management, nursing, education, clinical skill, biological knowledge

Summary Box

What does this paper contribute to the wider global clinical community?

- This paper outlines a model that can be used as a guide to develop short educational units into a curriculum to meet rapidly changing health and policy needs.
- This paper highlights the depth of biological sciences required by student nurses if they are to provide evidence based wound care.

Teaching and Learning in the Biosciences: the development of an educational programme to assist student nurses in their assessment and management of patients with wounds.

Aims

The primary aim of this project was to develop an educational package for undergraduate student nurses taking a 4 year Honours degree that would provide them with both the theoretical knowledge and practical skills to care for a patient with a wound.

Background

Clinical skills acquisition is a fundamental component of nursing education and a lack of clinical skills competency can compromise patient care and safety. Internationally, concern has been expressed about the adequacy of clinical skills education in contemporary nursing curricula (Farrand *et al.* 2006, Hilton & Pollard 2005). Wound care education in particular, in undergraduate nurse training is often considered as too limited with deficits identified in underpinning biological sciences knowledge and inadequate preparation for the skill of wound care (Cowan 2009, Ylonen *et al.* 2014). Wound management within clinical practice has undergone significant change in the past two decades with decision making around wound care becoming part of the nurses` scope of practice (Stephen-Haynes 2013). Additionally care delivery is becoming more complex and health and social policy is moving away from hospital care towards primary care (Department & Health 2009c). These differences in care delivery need to be understood for knowledge and skills to be applied appropriately. However, the teaching of wound management has not fully taken cognisance of these elements (Madsen & Reid-Searl 2007).

Wound healing is a highly complex biological process composed of interdependent and overlapping stages. It is important that nurses have a comprehensive understanding of the physiological processes involved in order to support and care for their patients appropriately. An understanding of the physiology of normal wound healing makes it possible to recognise the abnormal. Recognition of the stages of healing allows for the selection of

appropriate dressings. A plethora of dressings exist for the non-healing wound from products to debride tissue, accelerate healing, provide moisture, rebalance the wound bed to those that reduce bacterial burden. Nurses need to be aware of the biological mechanism of action of these products and the evidence base supporting their effectiveness. Furthermore, an understanding of the requirements of each stage of the healing process means that appropriate resources such as nutrition can be given to the patient. Finally, research and evidence underpinning effective wound prevention and maintenance of skin integrity must be incorporated into wound education for nurses (Ousey et al. 2013).

Good wound care is important because every wound is at risk of bacterial contamination, which inhibits the healing process and prevents wound closure. Non-healing wounds impact on mortality risk, patient function and quality of life (Rich & McLachlan 2003). The prevalence of chronic wounds is strongly related to increasing age and changing demographics in Europe indicate that the number of people with chronic wounds is likely to increase substantially in the future (Vanderwee *et al.* 2007). The resource impact on health-care providers is equally important with Posnett *et al.* (2009) estimating the prevalence in Europe to be 0.37% with an approximate cost to the UK alone of £2.3-£3.1 billion per year. Approximately 1.5% of the Irish population are affected by a wound at any one point in time, a high percentage of these being chronic ulcers (Gottrup 2004). This has major implications for both wound practice and education.

Design

This is a discursive paper outlining the process utilised by one Irish university to develop a wound care educational package for undergraduate nurses in their penultimate year (Year 3) of training. Since knowledge and decision-making skills are recognised as essential professional competencies for nurses (NMBI 2002), it is imperative that nurse educators design educational experiences that address these learning needs. The constructivism learning theory provided a framework for this development (Kala *et al.* 2010). This theory emphasises the construction of new knowledge by the learner with the focus firmly on student-centeredness and active learning. Interaction in learning is deemed a necessary and fundamental process for knowledge acquisition and development of both

cognitive and physical skills and thus is suitable for our purpose (Young & Maxwell 2007). Constructivism learning theory encourages learners to build their own body of knowledge based on individual experience and to apply this knowledge directly to their environment. The focus is on learning rather than teaching, keeping the learner central in the social process. This implies that the educator takes on the role of facilitator while the student is active. The facilitator's role includes enhancing active learning, facilitating meaningful social interaction and creating quality learning materials. He/she may give instructional guidelines, direct attention to learning the essential relationships, provide worked examples, negotiate or argue against points or add to evolving ideas and offer alternative perspectives while solving authentic tasks (Woo & Reeves 2007).

Methods

The first step in the process involved gathering a team of experts that were key stake holders in the area of wound care.

Formation of a development team:

As a first step collaboration with the tissue viability nurses (TVNs) in the University's partner hospitals was sought. These are expert nurses in wound management and as such are relevant stakeholders. They have a key role in wound care education in clinical practice and act as a support and resource for pre- and post registration nurses. To prepare competent and confident practitioners clinical and academic staff need to have a clear, common vision (Fletcher 2007). By working together we can utilise our combined strengths to accomplish our aims. A number of academic nursing staff with an interest in wound care and clinical skills education also committed to collaborating and facilitating this project. These included two nurse physiologists and a nurse psychologist. It is important for lecturers to be passionate about their teaching as this promotes the development of a positive learning environment and lends itself to rewarding and successful learning experiences for students (Spurr *et al.* 2010).

A third group of education providers - a number of commercial companies dealing with wound care products – were also contacted. These companies

traditionally demonstrate use of various products and devices to students on nursing and midwifery programmes. While some are uneasy with this alliance (Castledine 2006), it can serve a useful purpose when appropriately structured and delivered. Commercial companies are bound by their codes of conduct and their educational material is of high quality. This education is also free of charge and is delivered by experts in the product.

Content Mapping:

The next phase involved content mapping. All content previously delivered to students pertaining to wound care and skin integrity was reviewed. Areas identified included: skin care, nutrition, pressure relief, pain management, safe moving and handling, asepsis and infection control and basic dressing techniques. This content is delivered in Year 1 or 2 of the curricula. Learning objectives for this content were clarified and formed a basis for the newly developed and higher level objectives and content proposed for Year 3. This mapping of the content across the curriculum contributes to more transparency (Armarego & Roy 2013) and allowed the team to ensure that the skills and knowledge required to be competent in wound care were moving from a fundamental to a more complex level and were applied within various contexts throughout the programme. It also allowed us to ascertain the gaps in taught theory.

Educational Package destination:

It was felt that the proposed new package would best fit in Year 3 of the programmes. The theory to be learned is complex but at this stage of training, students have a foundation level of knowledge of the physiology, psychology and social concepts needed. Students have also had exposure to mostly acute wound care in various contexts from, for example, observation and participation in the care of patients with surgical wounds to patients with skin tears and abrasions.

It was also decided that the wound care package would be placed as a unit on an existing module on biopsychosocial care delivered to all Year 3 nursing students. This module uses the biopsychosocial model to guide the teaching and learning of a variety of chronic conditions. Engel (1977) developed this holistic model as an alternative to the biomedical model of care in existence at that

time. Its intention is for clinicians to attend simultaneously to the biological, psychological and social dimensions of an illness. It advocates a listening to the narrative biology and emotions of the person suffering as well as maintaining a focus on their disease (Borrell-Carrio et al. 2004). For nurses guided by this model, both the subjective experience of the patient and the objective biomedical data require equal attention. Therefore it is both a philosophy of clinical care and a practical clinical guide. While the need for a firm grounding in biological sciences is clear when assessing and managing patients with wounds, empirical evidence is increasing for the necessity of an equally firm knowledge base in psychology and sociology. Studies have reported relationships between psychological stress and delayed wound healing (Solowiej *et al.* 2010, Walburn *et al.* 2009). As wound pain is a major contributor to psychological stress, education on the assessment and management of pain should be a key priority in wound education (Richardson 2012). Social factors have also the potential to impact on wound healing. Chronic wounds frequently cause loss of mobility, social isolation and depression. Social support is thought to reduce illness by directly influencing variables such as the perception of control, well-being and coping responses (Brown 2008). This module therefore seemed a very suitable destination for the proposed theoretical wound content as its philosophy captured all the essential components of good wound care.

Assessment of learning styles:

It is also essential to ensure that the teaching strategies developed would be suited to the student's preferred learning styles. A number of studies have identified that if the teaching strategies and learning styles are congruent then students feel more motivated and responsible and achieve the learning outcomes set (Bostrom & Hallin 2013, Hallin 2014). Learning style theories and models assume that all may learn, though in different ways and at different levels. Some focus on aspects such as talents, sensory modalities, cognitive and/or learning and thinking processes. The Visual, Aural, Read-write and Kinesthetic (VARK) questionnaire focuses on the different ways in which learners take in and give out information (Fleming 2001). This inventory measures four sensory perceptual preferences: visual (V), aural (A), read/write (R) and kinaesthetic (K). Auditory learners prefer hearing material and verbal instructions related to practical examples while visual learners enjoy

observation, graphics, images and videos. Kinaesthetic learners prefer hands-on-learning and learn best through practical sessions, case studies or computer simulations. The VARK deals with only one dimension of the preferences that make up a person's learning style, that of perception, and it does not provide information on environmental, emotional or sociological preferences. As lecturers have little control over many of these other variables (e.g. light, sound level, time of day, food intake etc) it was felt that the VARK tool was sufficient for our purpose.

Students registering to the module were encouraged to complete an on-line VARK questionnaire in advance and to submit their results to the module coordinator. The response rate for the survey for incoming students was 44% (n = 61) from a potential 160 students. Results indicated that the majority (80.7%) of the participants were quadmodal, with a blend of all four sensory modes (VARK). This high multimodal profile implies that these students are flexible and adaptable and are open to learning using a variety of methods. A strategy of using multiple media for teaching these students would ensure that all student learning modes would be captured. The survey also showed that individual preferences scores were 73.7% K, 33.3% V, 31.6% A and 19.3% R. The very high % score for kinaesthetic styles among our prospective students indicates that they would like a practical, hands-on component to their teaching and learning experience and would enjoy demonstrations, interactive simulations and role plays. Aural and visual scores were also popular, showing that many students would also appreciate traditional lectures and tutorials that mainly involve speech and hearing. The low score for read-write indicates the need for more than simple print materials to achieve the best learning outcomes.

These results informed the development team of a need to develop both a theoretical component to the educational wound care package, using a variety of teaching strategies and of a clear need for a practical and interactive component. Accordingly the educational package was developed in two main stages.

Stage 1: development of the theoretical component.

Two lectures on the general physiology of wound healing and the pathophysiology of chronic wounds were developed. These lectures will use high

quality graphics to illustrate e.g. stages of healing, signs of infection etc. It is planned to have frequent defined stop periods throughout the lectures, where students will work with their neighbours to answer problems set. Worksheets were produced for these self-directed learning exercises. An example includes the student producing a concept map of intrinsic and extrinsic factors that may influence various stages of wound healing. Worksheets with short excerpts of case histories and pictures of wounds will allow students to attempt to integrate their knowledge and to discuss and examine the cases with their peers. Suitable video clips to supplement the lecture content were sourced and embedded into the unit. Streamed video has been shown to support and contribute to student learning (McNulty *et al.* 2009). The emphasis is on increasing opportunities for independent learning.

Three lectures focusing on the assessment and management of chronic wounds of various aetiologies will follow. Again, this content will be highly visual and clinically focussed and frequent question and answer periods will be facilitated. The various classes of wound care products and their biological mechanism of action will be discussed. Students groups will then be given different products and asked to research using their smart phones/laptops how their product works, and then to feed this back to the class as a whole. These sessions will be facilitated by an academic, a tissue viability nurse and a company representative, acting as resources in the room. The use of video in class has been shown to facilitate `narrative visualisation` and can lead to a better description by the teacher and enhanced visualisation, recognition and identification by students (Flood & Robinia 2014). However a search of internet sources to support these sessions did not come up with many suitable video clips. In particular we found a scarcity of on-line resources around the techniques of wound assessment: e.g. around wound measurement, measurement of exudate volume, application of products to various wounds, etc. This lack has prompted the team to consider developing our own video resources as a future project.

A demonstration of both the use of negative pressure dressings and profore dressings will be delivered. This will be captured on a big screen so all students can clearly see the skills. These demonstrations will be digitally recorded and made available for student viewing throughout the module. Perceived

advantages of on-line lecture provision include improved flexibility, equity of access and ease of engagement (Kendal *et al.* 2015). The psychosocial aspects of caring for a patient with a wound will be facilitated by our nurse psychologist team member. These sessions will be reflective in nature, drawing on the experiences of students, discussing and developing ideas that emerge. A number of case studies have been sourced exploring patients' psychosocial experiences of living with a wound which will promote debate. Fostering reflection `before action', `during action' and 'after action' is seen as a welcome addition to a blended approach to learning (Littlejohn & Pegler 2007).

Stage 1b: development of the practical component.

It was also decided, based on the learning styles of our students, to incorporate a wound care workshop into the unit. The clinical skills laboratory will be used as it provides an environment that is safe for students to practise and consolidate skills used in practice. It also allows facilitators and students to manage the simulation to meet individual learning needs, halting activity to offer feedback, discuss theory and articulate tacit knowledge (Bland *et al.* 2011).

The large class size of 160 students will be broken down into 18 students per lab with 6 students per facilitator rotating around three cases. All members of the team will take on this role of facilitation. The 1.5hr lab session aims to reiterate and reinforce the theory received and provide a practical overview of chronic wound management. Specifically, students will verbalise their holistic assessment of each simulated patient case and of each wound. Students will discuss and defend care options with the support of their facilitator. At this stage of their training (Year 3), these students will have observed, performed and been deemed competent in the practice of the psychomotor skill of uncomplicated acute wound cleaning and dressing. This workshop will supplement this training, sharpening their assessment and clinical decision-making skills to include chronic nonhealing wound case scenarios and deepening their cognitive and affective competencies.

The workshop material will be focused so that it is relevant to incidences that may arise in various health settings: in the adult, mental health or paediatric arenas. This allows facilitators involved to be more responsive to the learning needs of the students. It also allows students to share their experiences and to

learn from their peers (Kieran & O`Neill 2009). It is important to acknowledge the variety of previous experience of the student and to implement a problem-solving approach to the session. A number of familiar clinical health scenarios were developed. `Patient' cards containing a feasible history and presentation were produced with the intention that one student from each small group would simulate the patient. The remaining members of the group will assess the patient and the wound. Facilitators will be provided with prompt cues for stages of the process, in case the students became "stuck" during their assessment or forget to assess a critical area. When the `wound` is undressed, a high quality image of, for example, a venous leg ulcer, will be revealed. Students will articulate their full assessment, thus strengthening their communication skills and will interact as a group to manage the case given to them. Gibbons *et al* (2002) suggest that this creation of realistic examples enhances clinical learning.

Practice of skills such as wound measurement on the images and mannequins and the documentation of care will be undertaken. Students must also chose, with rationale, from a trolley containing a variety of dressings which dressing would be most suitable for that wound at that time. The facilitator will demonstrate the application of this dressing to a mannequin with the embedded wound type. Also, supplemental to each case will be a sample of images of other similar wounds: e.g. where students identify wound bed tissue types, grades of ulcers, or characteristics, or identify an image as venous as opposed to an arterial ulcer etc. It is hoped that these will engender curiosity and dialogue among the students and will be fun.

To provide an analysis of this educational package, a combination of content, process and outcome evaluations will be conducted. To this end a pretest-post-test on-line quiz was developed, covering both theoretical and practice issues. An extra question on the post-test quiz is an open ended question and asks for student feedback on the lectures and workshop. This will provide immediate feedback, very close to the experience, which can be very useful (Kirkpatrick & Kirkpatrick 2006). Interviews with all stake holders (including a focus group of students) regarding process issues will be conducted retrospectively. Appropriate modifications will be made based on feedback received. This process will contribute to the content validity of the education package.

Conclusion

This study describes the process involved in the development of a blend of educational activities for student nurses that would provide them with both the theoretical knowledge and practical skills to care for a patient with a wound. Based on a constructivist approach to learning, resources developed focused on active student involvement.

While the management of wounds is complex nurses need to have a comprehensive understanding of the underlying physiology and pathology. They need to understand the stages of wound healing, how wound physiology interacts with various products and techniques, and how clients respond to wounds and wound products in order to make appropriate decisions about wound management (WUWHS 2008). Nurse lecturers need to ensure that their students are adequately prepared to take on the task of wound management as practicing clinicians.

Relevance to clinical practice

This study describes the process undertaken in one Irish university to develop a wound care educational package for undergraduate nurses in their penultimate year (Year 3) of training. This process will be of interest to nurse educators and practitioners alike globally. The need for a revision or an addition to student education is frequently first identified by clinical staff. This study provides a model that can be followed to develop and implement small units of study to keep abreast of changes in healthcare delivery and policy and the changing scope of practice of nurses. Whilst this paper is focussed on an educational package for wound care, equally the process can translate into a unit on care of patients with any condition or clinical issue. The study will also contribute to the debate on the teaching and learning of biosciences as it highlights the depth of biological knowledge required as a basis for good evidence-based nursing care. Traditionally bioscience is thought of as being the most difficult subject for nursing students to grasp. We present here a variety of learning strategies that are suitable for use with biosciences material and that will aid in the achievement of a positive learning environment and successful attainment of learning outcomes.

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