Preparing Student Nurses for the Future of Wound Management: Telemedicine in a Simulated Learning Environment

ABSTRACT

BACKGROUND: The Danish Society for Wound Healing advocates for the use of telemedicine in chronic wound management. It is crucial that student nurses are prepared for the technological demands of the future so that they will be competent to manage chronic wounds.

AIM: The aim of this project was to integrate the concept of telemedicine for wound care into a simulation-based class for undergraduate student nurses and to evaluate their experiences with this integrated learning method.

METHODS: Five medium-fidelity mannequins were used in a simulated learning environment consisting of a simulated laboratory and a simulated wound clinic. A primitive electronic platform was used to allow the students to experience the benefits and challenges of telemedicine in wound care. At the end of the course, the students were asked to evaluate the course based on their experiences with telemedicine and simulation.

FINDING: Students found the concept of telemedicine relevant and enjoyable, and the challenges and benefits of telemedicine clearly emerged in the simulated learning environment.

CONCLUSION: Based on student evaluations and the need to prepare students for "real-life" telemedicine for wound management, the simulated learning environment seems to be a constructive didactic method. The simulated learning environment should also be tested with postgraduate nurses with less experience in telemedicine.

INTRODUCTION

The government of Denmark has initiated targeted telemedicine trials for routine care to evaluate the efficacy of telemedicine in clinical practice. The goal in the near future is for 80% of municipalities to offer telemedical wound assessment to 40% of relevant patients[1]. This initiative is supported by the Danish Society for Wound Healing, which aims to facilitate the use of telemedicine throughout Denmark[2]. Surveys taken in Denmark indicate that patients and healthcare staff have positive attitudes towards telemedicine, even though staff face challenges related to the technology. It has been shown that staff experience difficulty with the technology related to telemedicine, thus preparing staff to use this technology is important[3]. This supports the need to prepare nursing students to use this technology and suggests that it is important to integrate elements of telemedicine early during general training and during wound management training. The aim of this project was to integrate the concept of telemedicine for wound care into a simulation-based class for undergraduate student nurses and to evaluate their experiences.

Since 2013, undergraduate student nurses have taken a simulation-based course in chronic wound management[4], but telemedicine was excluded from the student learning outcomes. Although increased knowledge of wound healing does not automatically lead to changes in clinical practice[5], studies have shown that simulations improve learning outcomes, increase critical reflection, improve patient safety, and enhance practical skills[6-9]. Simulation has been used to educate healthcare staff for decades[10] and has been defined as "A dynamic process involving the creation of a hypothetical opportunity that incorporates an authentic representation of reality, facilitates active student engagement, and integrates the complexities of practical and theoretical learning with the opportunity for repetition, feedback and reflection[11]. Simulations include a variety of options, such as anatomical models, task train-

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ers, role plays, games, standardised patients, and low- to high-fidelity mannequins[10]. In a recent review, Topping et al. states that for integration of simulation in a teaching environment to be successful, provision of a simulation environment in itself is not enough, rather, a multi-skilled educator is also required[12].

TELEMEDICINE

Telemedicine is defined as "The use of electronic information and communication technologies to provide and support healthcare when distance separates the participants[13].

Telemedicine is an efficient method for chronic wound management. The expected gains include shorter healing times, increased skills for local nurses, increased patient satisfaction, and reduced travel time[2].

In 2010, Ekeland et al., concluded that gains from telemedicine are not uniformly substantiated from the literature[14]. In addition, Zarchi et al. claimed that as of 2014 there has been no convincing evidence to support the clinical efficacy of telemedicine in wound management. Nevertheless, Zarchi et al. showed that providing wound management advice through telemedicine was associated with increased healing when compared to conventional practice[15].

Because understanding and evaluating telemedicine is complex, further research is necessary. The MAST (Model for ASsesment of Telemedicine application) model may be a useful tool to determine whether telemedicine should be implemented[16]. As described in the joint document "eHealth in Wound Care – from conception to implementation", wound care is a complex process that requires preparation and careful planning[17].

METHODS

Prior to the evaluated course students had been studying 25 weeks. On average, 20 students attended, and to enhance student learning, three facilitators were present. The learning content was based on the curriculum[18] and the specific learning outcomes of the module[19]. Box 1 lists the expected learning outcomes.

The course consisted of six lessons covering chronic wound management and took place in a traditional classroom, a simulated wound clinic, and in our simulation laboratory. We used five medium-fidelity "Nursing Anne" mannequins from Laerdal that had artificial wounds made of wax or latex. The wounds were painted to mimic different types of chronic wounds (Picture 1). Besides simulation-based learning, the course also included elements of a "flipped classroom", which is a method that requires

BOX 1: LEARNING OUTCOMES
- Ability to explain the physiological processes that occur during wound healing
- Ability to identify risk factors
- Ability to describe and assess the type of chronic wound
- Ability to assess and argue for the choice of dressing
- Ability to use telemedicine

students to obtain instruction online prior to attending class so that students and teachers may work together constructively during class[20]. We presented some of the lectures on wound care theory as online videos, and students were required to watch these and other online videos and read relevant parts of the curriculum as preparation for class. It was crucial that students prepared in advance to have practice time during class.

Wound assessment was performed in teams of three or four students. An overview of the pedagogical design is shown in (Fig. 1). One member of each group (five groups total) represented the wound clinic, which was located away from the simulation laboratory. The groups in the simulation laboratory removed the bandages from the mannequins, took pictures of the wounds (Picture 2), and uploaded the pictures to an electronic platform (Fig. 1 steps 3, 4). The students that represented the wound clinic received the pictures and were allowed to discuss their picture with their fellow students. Next, each student in the wound clinic made a plan based on the elements in Box 2.
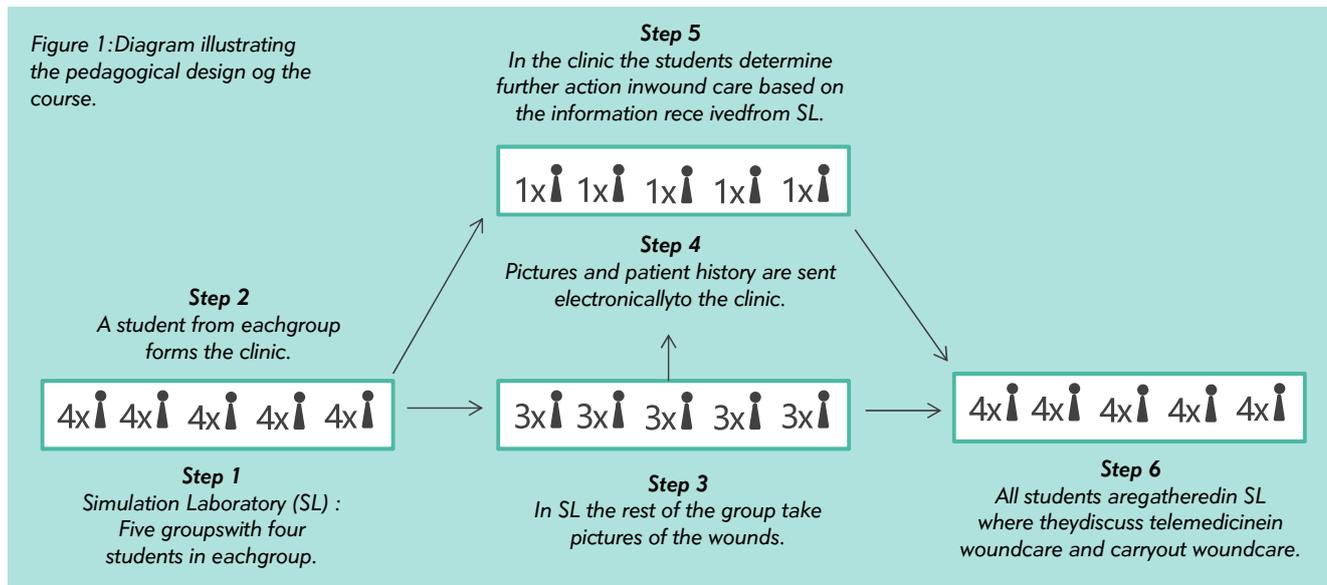
BOX 2: ELEMENTS TO REFLECT UPON
- Identify factors related to the patient's risk of developing a wound based on the patient's history
- Determine whether critical information is missing
- Focus on the picture of the wound and collect data
- Evaluate the wound bed, edges, and periwound skin
- Describe a management plan with the patient based on the Triangle of Wound Assessment

The Triangle of Wound Assessment is a tool for the evaluation of the wound bed, wound edges, and periwound skin. Furthermore, this model is holistic and assesses factors that are unique to each patient, such as comorbidities, infection, pain, and how the wound affects daily life[21].

The students that are with the patients in the simulation laboratory also reflect on the elements listed in Box 2. After completing step five of the pedagogical design shown in Figure 1, the students in the wound clinic meet with their group members in the simulation laboratory and discuss the following questions:

Figure 1: Diagram illustrating the pedagogical design og the course.

Step 1
Simulation Laboratory (SL) : Five groups with four students in each group.

Step 2
A student from each group forms the clinic.

Step 3
In SL the rest of the group take pictures of the wounds.

Step 4
Pictures and patient history are sent electronically to the clinic.

Step 5
In the clinic the students determine further action in wound care based on the information rece ived from SL.

Step 6
All students are gathered in SL where they discuss telemedicine in wound care and carry out wound care.

1. Which advantages of telemedicine can you identify?

2. Which downsides of telemedicine can you identify?

3. How was your experience working with telemedicine?

In order to identify the potential shortcomings of telemedicine in a structured and holistic manner, we encouraged students to reflect on these questions while considering the domains covered by the MAST-model, which include patient perspectives, organisational constraints, sociocultural aspects, and ethical aspects[16].

For example, when determining if a patient is suited for treatment by telemedicine, the age and overall health of the patient must be considered; some frail, elderly patients with numerous comorbidities may not be eligible for telemedicine and may benefit more from traditional consultations. This level of reflection should enable students to understand that telemedicine is more than just technology. In fact, a recent study by Rasmussen et al. emphasised the need for further investigations to identify groups of patients that may not be suited for telemedical care[22].

After discussing the questions, students cleansed and dressed the wounds (Picture 3).

At the end of the course, students completed a short questionnaire, which was developed to allow students to evaluate whether the course experiences satisfied the learning outcomes of the course. Students ranked 1) practical skills training for cleansing and dressing wounds and 2) a learning strategy that combined telemedicine and simulation using a five-point scale that included "very good," "good," "appropriate," "could be better", or "poor".

RESULTS

70% of the students evaluated the overall skills training positively with scores ranging from "very good" to "appro-

Picture 1.
Nursing Anne equipped with chronic wound made of latex.

Picture 2.
Student nurses removing dressing from pressure ulcer.

Picture 3.
Student nurses cleans the wound.

priate." The remaining 30% of the students thought that the exercise "could be better". 39% of the students evaluated the telemedicine component positively with scores ranging from "very good" to "appropriate," whereas the remaining 61% of the students expressed that it "could be better". Although 61% of the students thought that the exercise could be better, the evaluations also showed that students found simulation to be a suitable method for integrating telemedicine. When asked whether the learning outcomes related to telemedicine and if chronic wounds were met with the simulation-based method, the students responded positively.

In addition, the students stated that the course offered insight into wound management and that they liked practicing skills in an authentic environment.
However, they pointed out that time was limited and that they wished for the course to be extended. They also commented that the electronic platform did not support the ability to send descriptions and pictures of the wound along with patient history; the students who worked in the wound clinic found this to be a challenging limitation.

One of the expected learning outcomes was the ability of students to use and reflect on telemedicine. During course discussions, students were able to highlight the advantages and disadvantages of telemedicine, and this can be interpreted as an indicator of the ability to reflect on telemedicine.

DISCUSSION

Because studies have shown that students prefer simulation-based learning to traditional classroom learning[23,24] and because motivation is crucial to learning, we maintained simulation as the foundation of the course. In addition, providing meaningful content in an authentic environment enhances learning outcomes[25] and simulation can be a way to bridge the gap between theory and practice[26].

Students evaluated their learning outcomes, and 77% of the students evaluated the learning outcome related to cleansing and dressing the wound positively, whereas only 39% evaluated the learning outcome related to telemedicine positively. This may be due to the fact that students are familiar with the mannequins and the simulation laboratory, whereas the concept of telemedicine is new to them. As expected, students stated that they would like to spend more time in the simulation laboratory, and based on their evaluations, they recognise the need for practical skill competencies within the field of chronic wound management. At this time, expanding the course is not possible. But, there will be a new nursing curriculum in 2016[27], and we may have the opportunity to emphasise the need to incorporate technology into chronic wound management courses.

One of our concerns prior to the development of this course was the use of a primitive electronic platform as the medium for telemedicine. We selected this electronic platform because our students were familiar with it and could easily navigate it, but as described above, we also need to consider whether students can receive detailed wound descriptions when they 'work' in the clinic. Sixty-one percent of the students evaluated the telemedicine component of the course as "could be better". Student comments revealed that the poor evaluation was based on a desire for more time and the inability of the platform to facilitate communication between the wound clinic and the simulation laboratory. In the future, we may accommodate this criticism by purchasing a realistic and authentic teaching module from the Danish organisation PlejeNet[28] that would align with simulation as the chosen pedagogical strategy. In tandem with clinical practice, we familiarise our students with EPJ, a platform for electronic patient journals, and students are expected to work with this platform during clinical practice and in the simulation laboratory. We have observed that nurses in clinical practice successfully navigate and use this platform. Thus, we believe that students can become proficient with PlejeNet when it is incorporated into an appropriate simulated learning environment.

FUTURE DEMANDS

When simulation is the chosen didactic strategy, the environment must be authentic to enhance learning outcomes[24]. In the future, caring for patients will be more complex and will involve technology. Tasks that hospital nurses perform will also extend to nurses employed in municipalities[29], and this must be considered when designing courses. In our current simulation, students meet patients that were admitted to the hospital, but in our future simulations, we would like our students to meet patients in their own home. Nurses employed in municipalities must be able to make autonomous decisions and must be familiar with technology. In the future, we would like to invite an outpatient nurse to participate in simulated training to give our students first-hand insight into the challenges present in home care.

The need to maintain wound management and technology in the nursing curriculum is based on the future roles of nurses and the expected increase in the number of people living with a chronic wound. Madsbjerg et al. and Dowsett emphasise using a holistic approach for wound management in which the "active patient" is taken into consideration[21,30]. This approach can be difficult to incorporate into a learning environment. In our course, three facilitators were present to take on the roles of the patient in only three out of five patient cases. Thus, to some degree, students were given the opportunity to consider and

reflect on patient experience, compliance, and resources in addition to practical skills.

Our reflections and the student evaluations support our assumption that introducing telemedicine in a teaching environment through simulation is appropriate. We need to improve the electronic platform to allow for communication and wound descriptions. The possibility of implementing a suitable platform in the next course will be explored. We believe that implementation of a suitable platform will prepare students for future demands in the nursing profession. We are also convinced that the concepts of telemedicine and simulation are suitable for postgraduate education. ■

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