

Bachelor nursing students' perceptions of a blended-learning unit on leg ulcers during the COVID-19 pandemic

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ABSTRACT

Aim

To face teaching challenges during COVID-19, a new three-step blended learning pedagogical scenario for leg ulcers was developed combining e-learning, theoretical seminars and workshops. The aim of this survey is to explore students' perceptions of the three-step learning unit presented during the COVID-19 pandemic.

Method

An online anonymous survey comprising five Likert scale questions and two open-ended questions was sent to the 151 participating nursing students. Quantitative data were analysed with descriptive statistics, and qualitative data were addressed using thematic analysis.

Results

A total of 68 students participated in this survey. The students reported that the newly developed three-step unit promoted their learning. The allocated time for the e-learning was, for 20 (29%) students, insufficient. The qualitative data demonstrated the benefits of studying in small groups and using e-learning as well as following a structured learning

program. Workshops led by clinical nurse specialists and the use of adapted wound care materials were reported as essential.

Conclusion

Students appreciate this three-step blended-learning unit. Small groups led by clinical specialists promote a positive learning environment. Further research is needed to evaluate the effectiveness of this approach.

Authors' contributions

All authors were responsible and accountable for all parts of this project and participated in the data analyses. More specifically, PB started the development of this project. PB and CMT developed and designed the e-learning. LuC, CG and PB developed the workshops. LaCa and SP provided feedback and significant input on the project and workshops. PB and CMT analysed quantitative data, and PB, GG and SP analysed qualitative data. PB, SP and GG contributed to writing the manuscript; all authors revised the manuscript and gave their approval of the final version to be published.

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INTRODUCTION

Leg ulcers (LUs) are part of chronic wounds that occur on the lower leg or foot and require more than 6 weeks to heal.¹ They are the most frequent type of chronic wound²⁻⁴, and their aetiology is mostly vascular and associated with venous insufficiency (70%), arterial perfusion (5%) or of mixed aetiology (15%).¹ In the United Kingdom (UK), between 2017 and 2021, their numbers increased by 101% for venous leg ulcers (VLUs), by 325% for mixed leg ulcers (MLUs) and by 244% for arterial leg ulcers (ALUs).² Meanwhile, the number of unspecified aetiologies of LUs decreased by 14%.² Persons with LUs are treated mainly by nurses at home⁵, requiring two to four nursing visits or dressing changes per week.² Managing LUs is complex, requiring specialist knowledge and skills. Healthcare providers must accept the variety in best practices because up to 14 clinical practice guidelines exist for VLUs alone.⁶ However, a literature review of 16 studies⁷ showed not only a lack of knowledge among nurses on VLU clinical-assessment skills, including the finding of pedal pulses, but also a lack of knowledge on VLU pathophysiology and wound healing in general. When assessing a VLU patient, nurses did not provide sufficient attention to the patient's medical history, leg/wound appearance or symptoms⁸, or discuss and address patients' concerns.⁹ Choosing and applying wound dressings or compression therapy adequately without specific training are challenging for nurses and requires specific theory and knowledge to perform.¹⁰ Woo and Sears¹¹ also described a lack of knowledge in providing appropriate and consistent treatments for persons with MLU in a sample of 436 wound care clinicians, of whom 68.8% were nurses. Friman et al.¹² suggested that general practitioners also have insufficient knowledge to manage LUs efficiently in primary healthcare settings. It is important that nurses improve their skills and knowledge to offer the best wound care for persons living with an LU. Protz et al.¹³ developed a course combining face-to-face teaching with a practical unit for an intervention group to develop nurses' skills for applying compression therapy. Their results suggest not only that a single training session could improve

skills for applying compression therapy, but also that this practice must be repeated to ensure adequate pressure with compression devices. A recent online e-VLU programme based on best practice recommendations¹⁴ could also improve certified nurses' perceived knowledge.

Regarding the need for repetition, and to ensure that most nurses are trained in wound care, nurses must acquire skills and knowledge during their general nursing education. Therefore, the chair of tissue viability and wound care at the HES-SO University of Applied Sciences and Arts decided to develop a new blended learning unit for LUs that included e-learning, seminars and workshops for the school's second-year Bachelor of Science in Nursing students.

This scenario considers prior developed knowledge and skills on wound care during the bachelor curriculum. For example, before this unit, students took courses on wound healing/characteristics, prevention and management of pressure ulcers, the management of diabetic foot ulcers or providing dressings for malignant fungating wounds. Moreover, they finished a specific course on research and evidence-based practices (EBP).

Due to the COVID-19 pandemic, the unit included the challenge of restrictive teaching conditions, which allowed only face-to-face teaching for small groups. Therefore, we developed a new blended learning unit that challenged our usual use of blended learning units by combining e-learning content with a theoretical aspect using sources of evidence and practice in small groups. According to teaching quality criteria, it was important to analyse students' feedback on this new unit. Our survey aimed to explore students' perceptions of this three-step learning unit during the COVID-19 pandemic.

METHOD

Description of the three-step unit

The three steps of the pedagogical scenario for the second-year students are outlined below.

First, all students completed an e-learning unit focusing on LU physiopathology, assessment and recommendations for best practices. This unit was based on a literature review and included the latest evidence. Articulate Storyline® was used to design an interactive unit to support learning. It included quizzes for students to assess themselves, videos to explain how

to apply compression therapy and pictures to improve the clinical descriptions.

Second, to improve evidence-based practices and increase the understanding of LU assessment protocols, clinical nurse specialists conducted a 2 to 4-hour workshop that was split into two parts. The first was a 2-hour theoretical section, during which students appraised and discussed a 'clinical situation' with tutors using the knowledge from the e-learning unit and research papers focusing on patient assessment. During the second part of the workshop, the students conducted a clinical assessment on high-fidelity artificial legs, clarified the aetiology and selected and applied adequate dressing on synthetic legs or feet.

Third, the students attended a second 4-hour workshop on LU management and compression therapy. During its theoretical section, clinical nurse specialists provided the students with a clinical situation and sources of evidence with which to discuss the aim and challenges of, adherence to and risks associated with compression therapy. Then, in the practical portion of the workshop, students applied short stretch bandages, including padding, to their peers' limbs. The clinical nurse specialists gave insights and guidance on how to apply compression stockings or short-stretch bandages. To conclude the workshop and illustrate the variety in compression therapy, the clinical nurse specialists applied a two-layer cohesive short-stretch bandage, adjustable wrap compression or Unna boots to student volunteers. To experience how it feels to wear compression bandages and the effects of compression therapy on daily life, students were invited to wear them until the evening. Figure 1 illustrates the three-step scenario, including the aim of each sequence and the literature used during the workshops.

To guarantee a good and COVID-19-adapted learning environment for each workshop, all 151 students were allocated into 36 to 40 groups of four to five students. A clinical nurse specialist with a minimum education level of a Certificate in Advanced Studies in Wound Care tutored each group. To ensure parity among the groups, a tutorial was provided to all of the clinical nurse specialists before the workshop, in which the learning outcomes of the theoretical and practical sections were disclosed and the points to discuss from the provided research articles or clinical cases were highlighted. However, according to their specialisation, all clinical nurses

were invited to bring their clinical expertise into the workshop. A 15-minute introduction prior to each workshop allowed all clinical nurse specialists to ask for clarifications and improved organisation among the groups. In addition, a lecturer specialising in wound care and a professor of tissue viability provided support to all groups. In total, 16 clinical nurse specialists were involved in the workshops.

Because English was not the students' first language, all of the research articles were provided online prior to the workshop, to ensure fair and adequate preparation. In addition, to encourage students to prepare well for the workshops, they were concluded with a continuous summative assessment.

Data collection

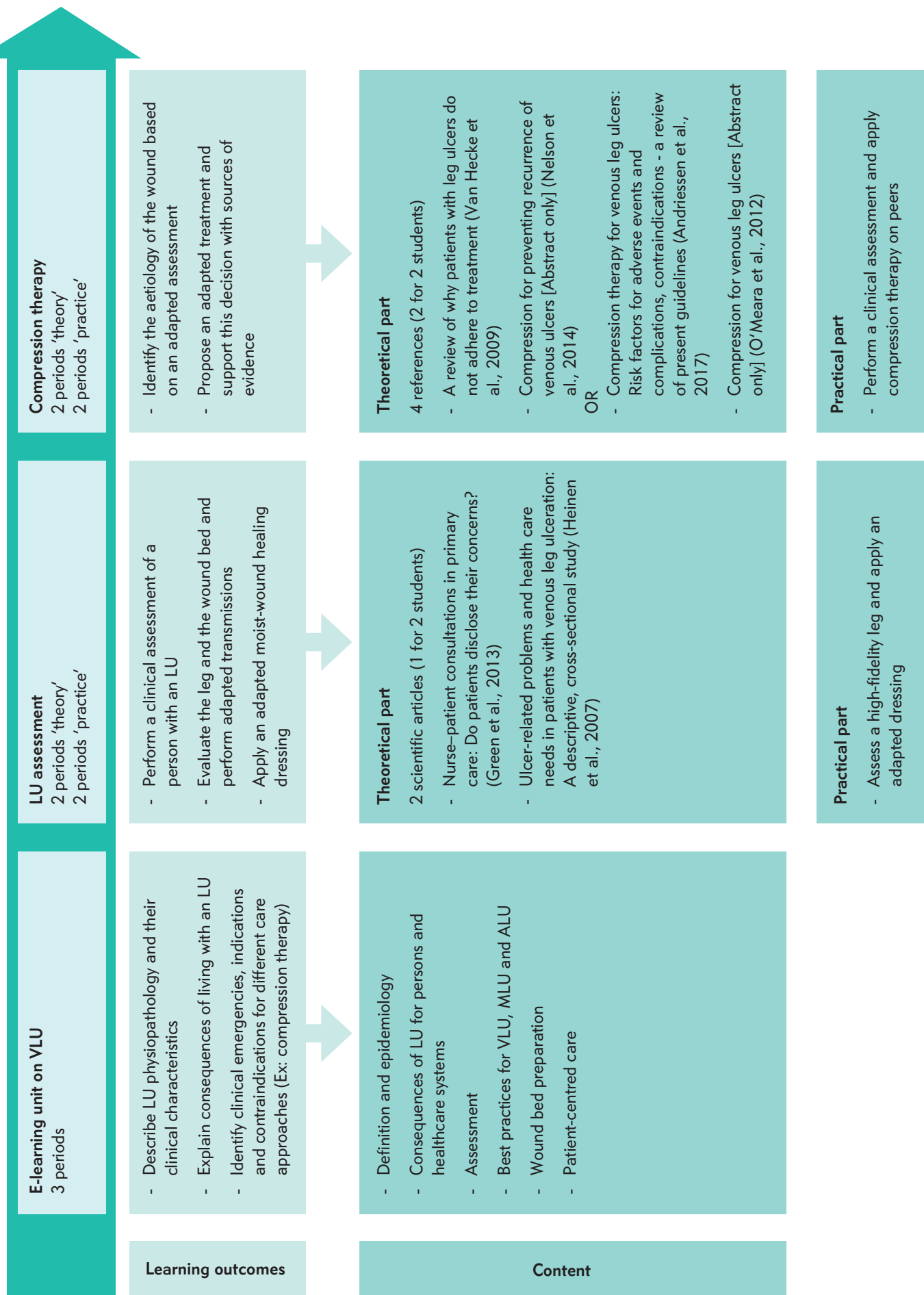
After completing the three-step learning programme, and after the students' summative evaluation, an online survey was conducted with second-year students in the Bachelor of Nursing programme from a French-speaking University of Applied Sciences and Arts. The survey method was chosen because it is a simple way to collect extensive data in a short period. Furthermore, it is anonymous, cost-effective and easy to complete.¹⁵ Research-based literature and the usual questions for student feedback from the university were used to develop the questionnaire to explore students' perceptions of the three-step learning unit.

The questionnaire contained questions using a four-point Likert scale (1 = 'totally disagree' to 4 = 'totally agree' and 'no opinion') that focussed on the timeframe available for e-learning, the importance of this content for their future practice, the clarity of the study aims and proposed modalities. No personally identifying questions were asked. The questionnaire concluded with open-ended questions asking the students to give feedback with which to improve the learning unit.

Data analysis

The quantitative data were analysed using descriptive statistics (percentages, means and standard deviations [SDs]) with Excel®.¹⁶ The answer 'no opinion' was treated as missing data in the descriptive statistics. The comments section was analysed independently by PB, GG and SP using thematic analysis¹⁷ with an inductive approach. First, we familiarised ourselves with the data, generated initial codes and identified themes. Second, the codes and themes were compared, and discrepancies in code or theme

Figure 1 : Modality, learning outcomes and content of the three-step unit



names were resolved with a discussion to provide rich and meaningful themes. The data first were analysed using paper and pencil; then, codes and themes were imported into MAXQDA.¹⁸

Ethics

According to the Human Research Ordinance¹⁹ and the Federal Act on Data Protection²⁰, no health-related data or personal data were collected. Therefore, no ethical approval or informed consent was required for this study. Furthermore, all the data were collected anonymously, and no links were possible between the respondents and their feedback.

RESULTS

Of the 151 students registered in the module, 149 participated in the first workshop and 148 in the second workshop. Of these, 68 (45%) participated in the survey. The overall student feedback was positive. All students ($n = 68$) reported that the expected level of the e-learning content was consistent with their level of training and that the three-step unit supported their learning process.

The use of research papers during the workshops was positive ($M = 3.29$; $SD = 0.65$), but 7% ($n = 5$) specified that the research papers did not contribute to their learning process. The time attributed for following the e-learning was rated positively, with a mean score of 3.01 ($SD = 0.92$). However, 20 students (29%) indicated having insufficient time to prepare for the e-learning. Table 1 provides an overview of the results.

Five themes emerged from the comment section: (1) learning in small groups, (2) using e-learning, (3) following a structured learning programme, (4) using pedagogical materials and (5) workshops led by clinical nurse specialists. The authors translated the students' comments verbatim, illustrating the following themes from French into English.

1. Learning in small groups

All of the students mentioned that it was a privilege to learn in small groups, which they considered to promote a better understanding of the content, and it allowed them to ask questions, debate and improve their theoretical and practical knowledge and skills, even if they were shy. Additionally, the clinical nurse specialists had more time for each student.

Two students wrote:

"The various debates and discussions were nourished by each member of the group because we were few in number, and this allowed even the most discreet people to express themselves."

"Having only four students in workshops promoted my learning. For once, I can say thank you to COVID-19."

A few students noted that the group size facilitated them being more autonomous and allowed them to participate and help each other easily during discussions.

2. Using e-learning

Students reported that the e-learning unit was well-structured, attractive and a good preparation for the workshops. They felt that the content was complete. Additionally, they appreciated the illustrations with videos and pictures. One student wrote:

"The e-learning was clear and very intuitive. The presence of photos/videos helped with understanding."

Students suggested that our university develop clinical videos and provide more time to prepare for the e-learning segments. They faced difficulties taking notes during the e-learning session, which made it difficult to maintain the planned timeframe. Students advised adding the e-learning course in Portable Document Format (PDF), to save learning time. This is illustrated in the following quote:

"An additional PDF would have allowed me to study in the allocated time. Without a PDF, the note-taking time doubled."

3. Following a structured learning programme

The combination of e-learning, seminars and workshops was well appreciated. Students described the workshop preparation via e-learning as beneficial for their participation during the workshops. The continuous evaluation ensured their preparation and helped them to go in depth with the material. Two students explained:

Table 1: Quantitative results of the survey

Item	Not agree at all N (%)	Rather disagree N (%)	Rather agree N (%)	Totally agree N (%)	No opinion N (%)	Mean (SD)
The required time for preparing the e-learning is consistent with the available time.	4 (5.9)	16 (23.5)	23 (33.8)	25 (36.8)	0 (0)	3.01 (0.92)
The expected level through e-learning is consistent with my level of training.	0 (0)	0 (0)	13 (19.1)	55 (80.9)	0 (0)	3.81 (0.40)
E-learning prepare me appropriately for workshops.	1 (1.5)	0 (0)	16 (23.5)	51 (75)	0 (0)	3.72 (0.54)
The use of research articles during the workshops promotes my learning.	1 (1.5)	4 (5.9)	36 (52.9)	25 (36.8)	2 (2.9)	3.29 (0.65)
The combination of e-learning, theoretical seminars and workshops promotes my learning.	0 (0)	0 (0)	14 (20.6)	54 (79.4)	0 (0)	3.79 (0.41)
I am satisfied with the proposed modalities (distance lessons, articles and practical workshops).	0 (0)	0 (0)	24 (35.3)	44 (64.7)	0 (0)	3.65 (0.48)
The teaching material (high fidelity legs, bandages, bands ...) promotes my learning.	0 (0)	0 (0)	9 (13.2)	57 (83.8)	2 (2.9)	3.86 (0.35)
The content will be useful for my future practice.	0 (0)	0 (0)	2 (2.9)	65 (95.6)	1 (1.5)	3.97 (0.17)
The learning outcomes of the teaching units are clear.	0 (0)	0 (0)	12 (17.6)	55 (80.9)	1 (1.5)	3.82 (0.39)
The content taught in the wound and wound healing unit has been adapted to the learning objectives.	0 (0)	0 (0)	9 (13.2)	58 (85.3)	1 (1.5)	3.87 (0.34)
Not agree at all = 1 ; Rather disagree = 2 ; Rather agree = 3 ; Totally agree = 4. No opinion = Not applicable.						

“Preparing for the workshops allows more participation and deepening.”

“Because every workshop is assessed, it pushes us to learn and therefore helps us to integrate the knowledge.”

Students explained that the theoretical portion was valuable to them and could help to improve their practical skills. The similarity between the received information during the e-learning seminars and the workshops was also helpful. This structured three-step learning programme allowed them to link theory and practice using a reflective approach. One student highlighted:

“The division of the workshops into a theoretical and a practical part allowed us, on the one hand, to develop our reasoning through theory and research articles, and, on the other hand, to develop practical skills, which is just as essential for our future practice.”

Another student reported:

“With this unit, I made links with my traineeship, and I could see what should be right in practice. I remember my mistakes, and thanks to the research articles, I can clearly present the best practices.”

Even though students had the chance to practice, some wanted more time to exercise LU assessment and to apply compression therapy. They suggested minimising the time for discussing scientific articles. One student explained:

“Maybe more practical time and less research articles... the aim is to have as most as possible practical skills. It is not necessarily interesting wasting time on research articles.”

4. Using pedagogical materials

The pedagogical materials used comprised high-fidelity wound models, compression therapy devices and research papers.

Using high-fidelity wound care models during workshops improved students' learning and understanding of LUs. These models helped them to assess the wounds more easily and enhanced their clinical observations. One student wrote:

“I found it very interesting to have a false leg available because it helped me to visualise different wounds that can occur from venous or arterial insufficiency.”

In addition to the wound models, photographs of wounds were used to illustrate the clinical problem. The student feedback showed that the photos used did not help them to assess the wound and/or leg properly. One student explained:

“For me, the photos used during the workshops were a big negative point. They were often not taken properly and did not allow us to assess the extent of the entire wound area.”

Students were able to practice applying compression bandages, which was much appreciated. After the workshop, they were asked to wear the bandages until the evening and report how the bandages affected their daily living. One student said:

“Having the opportunity to go home with the compression bandages and to perform our activities of daily living with them allows future caregivers to picture themselves as patients. This allows us to perceive their feelings and therefore allows us to better understand the situations.”

Another student commented:

“Wearing compression bandages allowed me to put myself in the patient's place and to understand the importance of a good relationship and communication with him/her to have his/her compliance.”

Using articles during the workshops was a positive point for some students, who described it as a good exercise for improving their English comprehension and their understanding of evidence-based practices. However, others would have preferred shorter workshops on LU and training on other clinical practices. Two students stated:

“Reading research articles in class is a plus—it brings an approach to the EBP and the bachelor's degree.”

“I found the part with the research articles unhelpful. I would have preferred to have a shorter lab for this topic because everything was clear. Also, I

would have preferred to practice care, such as the mobilisation of the blade.”

5. Workshops led by clinical nurse specialists

Students highly appreciated being taught by clinical nurse specialists. They highlighted the nurse specialists' learning approaches and the time they took to provide clear explanations.

“It was a pleasure to follow this workshop. They (clinical nurse specialists) were very competent and objective, but also ‘human’.”

Even though some students emphasised some inconsistencies among the clinical nurse specialists, the workshop was highly appreciated. One student reported:

“According to the clinical nurse specialist who led the workshop, the information differs, and therefore, we can have contradictory information on the same technical abilities ...”

DISCUSSION

The aim of this survey was to explore students' perceptions of a three-step learning unit delivered during the COVID-19 pandemic. Our results demonstrate that the students greatly appreciated learning in small groups. These results align with those of a scoping review by Dionne et al.²¹, who showed the importance of students contributing equally to the group. In line with Dionne et al.'s findings, we observed that small groups seem to promote discussions and help students to understand the subject better, so learning in small groups is a positive experience. For these groups to be successful, however, students must be engaged, open and supportive during their interactions. In our three-step unit, the continuous assessment of the students ensured good preparation for the workshops and a climate of support among peers, which supported their learning in small groups.

Students appreciated our e-learning efforts. According to Coyne et al.²², the use of videos can effectively improve students' clinical skills by providing opportunities to visualise the activity and to link theory to practice. Our survey highlights the importance of using videos specifically developed by our university, rather than industry-developed videos. To improve the flexibility and autonomy of students' learning, our e-learning content was

always available. In alignment with our results, the evidence also describes the time-consuming aspects of e-learning.^{23,24}

The effectiveness of e-learning on its own has been discussed elsewhere²⁵, but blended learning designs seem to show superior learning outcomes.^{26,27} The use of a flipped classroom blended learning design enhances rich exchanges during face-to-face seminars and workshops between teachers and well-prepared students, resulting in active learning.^{24,28} The students' global satisfaction with the learning unit was high. In their meta-analysis, Li et al.²⁷ reported the global positive impact of blended learning on knowledge, satisfaction and skills. We could expect that this scenario benefited the students.

During the three-step unit, students had the opportunity to apply compression bandages. In a recent randomised controlled trial with 55 nurses, Protz et al.¹³ demonstrated the importance of holding a specific compression therapy workshop. Through practice, nurses acquired better competences to apply compression devices. These results decreased non-significantly over the three-month observation period. Relating to the authors' conclusions, we could expect our students' skills to have improved during the workshops, but regular refresher sessions must be planned.

The development of the three-step learning unit was challenging because up to 40 groups received the same content from 16 clinical nurse specialists. Only a few students stated that they had received differing information from the different clinical nurse specialists or the e-learning. This probably reflects the variety reported in LU guidelines⁶ or in clinical practices, as illustrated by the variety of dressings used in clinical practice.²

Limitations and further development

This study did not include evaluating students' knowledge and skills or formally evaluating the efficacy of the applied compression therapy. Some students' feedback was not explicitly about this learning unit. Nevertheless, our results provide interesting feedback and perspectives with which to enhance the three-step learning unit. The survey results acknowledge the importance of future e-learning development. For example, we will replace photographs of actual wounds with high-quality photos and focus on students' note-taking during their e-learning session.

The use of research articles will be maintained, which will give us the opportunity to implement an evidence-based approach during workshops for the Bachelor of Science in Nursing programme. Finally, our data will support the development of other learning units in our university.

CONCLUSION

Our development of a three-step unit could promote learning among second-year bachelor's students. Teaching in small groups of four to six students enhanced learning and was adapted to the restrictive COVID-19 pandemic conditions. Further research is needed to evaluate the students' skills, knowledge and the costs of this three-step pedagogical learning unit.

Implications for nursing education

- A flipped classroom using blended learning enhances active learning.

- Students appreciate small-group learning.

Implications for research

- Further studies could investigate the effectiveness of blended learning on knowledge and skills over time.

KEY MESSAGES

- A well-designed blended learning unit for nursing students on leg ulcers goes along with positive student feedback.
- Small groups improve interactivity, learning and student satisfaction.
- Using sources of evidence during workshops illustrates their usefulness for clinical practice. ■

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