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Research article

Undergraduate nursing students' learning experiences of a telehealth clinical practice program during the COVID-19 pandemic: A qualitative study

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ABSTRACT

Background: Against the backdrop of the COVID-19 pandemic, nurse education institutions are required to create innovative and diverse educational methods to ensure the continued learning of undergraduate nursing students. We developed a telehealth clinical practice program to address this challenge.

Objectives: We explored the students' learning experiences of our telehealth clinical practice program by qualitatively analyzing student reports.

Methods: The participants were fourth-year undergraduate students who had taken the telehealth clinical practice program at Hiroshima University. Data were collected as reports from the participants during clinical practice and analyzed using thematic analysis.

Results: Of the 59 students who completed the practical training, 26 agreed to participate in the study (consent rate: 44.1%). Sixteen themes emerged from the analysis as the students' learning experiences, and were classified into four thematic categories: (1) recognition of continued self-improvement required to become a nurse and development of a sense of ethics, (2) improvement of knowledge and practical skills in chronic care nursing, (3) acquisition of telehealth skills, and (4) learning through modeling and teamwork, and improvement of self-efficacy. Interacting with persons through telehealth provided an opportunity to learn directly about persons' lives and their experiences of illness, and helped participants develop a sense of responsibility and ethical nursing.

Conclusions: Our study findings indicate that undergraduate nursing students perceived that their attitude, knowledge and skill acquisition improved through this program. We believe that telehealth can have a place as a teaching strategy and this telehealth clinical practice program can be further enhanced the learning effects by combining it with face-to-face training and multidisciplinary education in the future.

1. Introduction

The coronavirus disease 2019 (COVID-19) that was identified in Wuhan, China in late 2019 (Lu et al., 2020) has become a global pandemic threat. In Japan, the first person was diagnosed in January 2020 (Furuse et al., 2020).

The World Health Organization promotes basic infection control measures (World Health Organization, 2021), and the Japanese government called on its citizens to implement measures to restrict the spread of COVID-19. During severe infection periods, citizens were requested to engage in social distancing and refrain from leaving their homes, except for essential workers such as medical care workers, police, and supermarket staff. Similarly, nurse education institutions were locked down and hospitals could not take on students for nursing clinical practice programs. Accordingly, nurse education institutions were required to create innovative and diverse educational methods to ensure students' continued learning.

In undergraduate nurse education, students need to acquire the knowledge, skills, and attitudes required to form the foundations of their identity as a nurse (Al-Moteri, 2020; Fukuda, 2018). Attitudes include empathy for the person, respecting the person's rights, and maintaining professional responsibility, and autonomy. The students' attitudes facilitate their acquisition and development of knowledge and skills (Fukuda, 2018). Clinical practice aims to integrate health and nursing
knowledge, improve nursing practice and communication skills, and develop a sense of ethical practice. To ensure quality education of students during the pandemic, the authors at Hiroshima University constructed a new fully remote learning method using information and communication technology (ICT).

To achieve the learning objectives of clinical practice, the following issues were considered: First, it would be difficult to facilitate the development of face-to-face practical skills. Therefore, we introduced the telehealth strategies, which we developed for persons with chronic conditions (Moriyama et al., 2009; Fukuoka et al., 2019; Mizukawa et al., 2019; Kazawa et al., 2020). Telehealth is a healthcare service using telecommunication technology such as ICT and telephone (Glinkowski et al., 2013), which includes assessment, provision of education, information and consultation, care coordination and monitoring (College of Nurses of Ontario, 2020).

Second, clinical practice involves interacting with persons to learn about caring, nursing ethics, and effective communication (Nicholls et al., 2018) and deepen understanding of health assessment and persons' subjective experiences of illness. It is difficult to achieve all objectives only from clinical practice using video, a paper/pencil case study (scenario), or high fidelity simulation. We believed that telehealth with actual patients would be the most appropriate method to address these issues. Telehealth also helps the students to visually assess the person's life and intervene educationally with the entire family as one care unit. Third, the health issues of community-living outpatients have become more complex and diverse in recent years with advances in medical care and an aging population (Billings and Halstead, 2019). Specifically, some persons face difficulties in managing multiple comorbidities and activities of daily living. Therefore, nurses need to acquire clinical reasoning skills, and we thought it would be significant for the students to learn clinical reasoning by remote observing and modeling the faculty members' good practice (such as advanced practice nurses). Hence, we developed the telehealth clinical practice program for undergraduate nursing students.

In research reports of nurse education programs, in the field of acute care nursing, teaching on clinical reasoning and basic nursing skills has previously been conducted using high fidelity simulation, virtual reality systems, and a paper/pencil case study (scenario) (Lavoie et al., 2017; Murata and Fukuda, 2020; Shin et al., 2015). In recent years, there have been many reports on education using objective clinical competency examinations, which have been shown to be effective in integrating knowledge and skills, and fostering communication skills and attitudes (Lynga et al., 2019; Saunders et al., 2019). However, there are no reports of undergraduate nursing students learning telehealth strategies for persons with chronic conditions.

This study aimed to explore undergraduate nursing students' learning experiences of a telehealth clinical practice program conducted from May to July 2020 by qualitatively analyzing student reports. Based on the results of this study, we attempted to determine whether student experiences were positive and whether telehealth has a place as a teaching strategy in the future.

2. Construction of our clinical practice program

2.1. Learning objectives of the program

Fig. 1 shows the learning objectives of the telehealth clinical practice program developed by Hiroshima University. The learning objectives are as follows: to understand the person with a chronic condition and his/her family holistically based on the disease and management process; to identify patient issues through the assessment process, and to learn a series of telehealth strategies.

The structure of the program was based on Bloom et al.'s taxonomy of educational objectives (Bloom et al., 1971), the Japan Council of Colleges' nursing core competencies, graduation goals for the nursing bachelor's degree (Japan Association of Nursing Programs Universities, 2018), and previous research (Kazawa et al., 2015). The general framework was outlined as the development of attitudes and the

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**Fig. 1. Learning objectives of the clinical practice program.**

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acquisition of knowledge and skills.

2.2. Contents of the program

The duration of the program was 2 weeks.
To enhance students’ readiness, we built the learning content in stages as follows (Fig. 2):

Week 1: Basic skill development of telehealth for students

- Individual work: Using e-learning, the students learned the necessary elements for telehealth based on the structure illustrated in Fig. 1. E-learning provides knowledge about chronic conditions and telehealth process for persons with chronic conditions (Kazawa et al., 2015). It shows how the expert nurses in telehealth develop clinical reasoning and interventions. Through this work, students will be able to trace the expert nurses’ clinical reasoning process as role models and review e-learning repeatedly on their own.

- Role-play: The students worked as groups to develop nursing care plans using a paper/pencil case study scenarios of persons with chronic conditions, and role-played with faculty members remotely. The students also learned the feelings and experiences of persons and their families, therapeutic communication, and telehealth skills.

Week 2 (Appendix 1): Application of the developed telehealth skills to persons with chronic conditions: Students conducted three one-hour interactions with persons with chronic conditions

- Procedure: First, the students assessed the persons’ health beliefs, personality traits, disease management, lifestyle, family, and environment, and conducted remote physical examinations. After identifying factors that hinder appropriate self-management of the person, the students provided behavioral change support and educational interventions on disease-specific self-management to help persons manage their health problems.

- Software used in this study: In this study, Microsoft Teams and Skype were used for communication between students, and between faculty members and students. Tablet devices (iPads) were used for telehealth with the patients because of their operation simplicity.

3. Methods

We followed the Standards for Reporting Qualitative Research (SRQR) recommendations (O’Brien et al., 2014).

3.1. Participants and recruitment

The participants were fourth-year undergraduate students (final year) who were in the clinical practice program at Hiroshima University and consented to participate in this study. The purpose and content of the study were explained to the participants in writing and through pre-recorded explanatory video from the author on Microsoft Teams.

3.2. Data collection and analysis

After completion of the clinical practice program, we collected reports from participants who had consented to join the study. Participants’ reports were loaded into MAXQDA (version 2020, VERBI Software) for data management and facilitating analysis. The data were analyzed using thematic analysis (Braun and Clarke, 2006; Kiger and Varpio, 2020). We generated initial codes relevant to the acquisition of knowledge and skills of telehealth based on content and meaning using all data. Themes were developed from the codes with codes separated, combined, and refined to form overarching themes. Repeated analyses and discussions were conducted with faculty nurses who hold advanced practice certificates in chronic care nursing to ensure the truthfulness of the results.

3.3. Ethical considerations

The participants were informed of the following in writing via a pre-recorded video on Microsoft Teams: the purpose of the study, guaranteed anonymity, freedom to participate in the study, assurance that the students’ academic achievement would not be affected by their participation or nonparticipation, and the likelihood of the study results being published. To ensure students were not pressured into participating in this study, the participants provided written consent via email to the faculty managing their personal information of this study, who was not involved in our practice program. This study was approved by the Ethical Review Committee for Epidemiological Research at Hiroshima University.

4. Results

Of the 59 students who completed the program, 26 agreed to
participate in the study (consent rate: 44.1%), all of whom were female.

Sixteen themes emerged from the analysis and were classified into four thematic categories (Table 1). (1) Recognition of continued self-improvement to become a nurse and the development of a sense of ethics facilitated (2) improvement of knowledge and practical skills in chronic care nursing, (3) acquisition of telehealth skills, and (4) learning through modeling and teamwork, and improvement of self-efficacy.

4.1. Recognition of continued improvement to become a nurse and development of a sense of ethics

The participants learned the basics of telehealth and communication through e-learning and textbooks, and then faced the challenge of applying them to individual interventions in role-play and telehealth. At the same time, they recognized the importance of clinical reasoning to support peoples’ behavioral modification and the necessity of communication skills to build relationships, which enabled them to “clarify their own issues in chronic care nursing and communication.”

For the participants, persons’ behavioral change through their intervention increased their sense of responsibility to be involved as a nurse. Through role-play and telehealth, the participants developed understanding of the persons’ experience of illness. For example, one person with a chronic condition felt lonely because the people around her did not fully understand the physical and mental pain associated with her illness. Other persons lost their social roles due to the effects of illness, treatment, and retirement. This learning led to the “development of a sense of responsibility and ethics to be a nurse.”

I felt it was difficult to explain the correct knowledge and information with evidence using therapeutic communication based on the patient’s response. As a nurse, I felt that these skills were also very important.

Table 1
Themes emerged in the present study.

| Theme category                                      | Theme                                                                 |
|-----------------------------------------------------|----------------------------------------------------------------------|
| Recognition of continued self-improvement required to become a nurse and development of a sense of ethics | Clarification of personal issues in chronic care nursing and communication |
| Improvement of knowledge and practical skills in chronic care nursing | Development of a sense of responsibility and ethics to become a nurse |
|                                                     | Understanding of persons with chronic diseases and nursing care          |
|                                                     | Understanding the necessity of family assessment and intervention      |
|                                                     | Acquisition of structured medical consultation techniques based on clinical reasoning |
|                                                     | Learning to identify the problems that interfere with appropriate patient’s self-management |
|                                                     | Consideration of intervention strategies based on the persons’ values, personality, illness, and living situation |
|                                                     | Structuring nursing process based on priorities for intervention       |
|                                                     | Understanding of multidisciplinary collaboration and the use of social resources for continuous support |
|                                                     | Acquisition of skills to support behavior change using theories and models |
|                                                     | Improvement of communication skills to build relationships with patients |
| Acquisition of telehealth skills                    | Consideration of intervention strategies based on the persons’ actual lives and environment |
|                                                     | Acquisition of telehealth assessment skills                           |
|                                                     | Improvement of telehealth intervention skills                         |
| Learning through modeling and teamwork, and improvement of self-efficacy | Learning through modeling                                           |
|                                                     | Improvement of self-efficacy through leadership and membership and learning |

For the participants, developing these attitudes facilitated the acquisition of their knowledge and skills.

4.2. Improvement of knowledge and practical skills in chronic care nursing

The participants deepened their “understanding of persons with chronic diseases and nursing care” through the program. In addition, role-playing as a family member of a person with a chronic condition and interacting with the family led to the “understanding the necessity of family assessment and intervention” based on the family as a care unit.

Through the preparation and presentation of role-playing, I was able to think about things from the standpoint of the patients and their families, such as how to motivate the patient and how to communicate in an easy-to-understand manner.

With regard to telehealth, the faculty members provided basic information such as gender, age, and the diagnosed disease in advance, and the participants prepared for the consultation by referring to clinical guidelines. Through actual interaction, they “acquired structural medical consultation based on clinical reasoning.” By integrating the comprehensive information extracted, they “learned to identify the problems that interfere with appropriate patient self-management.”

Because I was able to hear directly from the patients about their current medical history, diet, mental health, etc., in their own words rather than a summary, I was able to gain a deeper understanding of the background of their illnesses and personalities than in previous practice training.

To limit the burden on persons with chronic conditions, the student online intervention was set to three one-hour sessions. The participants “considered intervention strategies based on the patient’s values, personality, disease, and living conditions,” and “structured nursing process based on the priority of intervention.” In addition, through patient intervention and adjustment of the treatment environment, the participants recognized that they had gained an “understanding of multidisciplinary collaboration and the use of social resources for continuous support,” “acquired behavior change support techniques using theories and models,” and “improved their communication skills for building relationships with patients.”

Information about the patient’s condition, disease management, and available social resources should be provided at the appropriate time. It is also necessary to reduce the burden on the family by explaining that they do not have to bear the burden alone, and by combining social resources as needed.

4.3. Acquisition of telehealth skills

The telehealth clinical practice led the participants to “consider intervention measures based on the persons’ actual lives and environment” while examining the persons’ beliefs, knowledge, abilities to self-manage, their family and environments. For example, the persons with chronic conditions took measures such as disinfection, placement of dialysis products, and use of daily necessities such as hangers and hooks, to enable them to change dialysis fluid smoothly while paying attention to infection prevention. From these observations, the participants learned the person’s self-management ingenuity, which was not included in standard patient education methods described in textbooks.
It was confirmed that peritoneal dialysis and infection prevention measures such as cleaning, hand washing, and disinfection of catheter outlets were being implemented.

In addition, the participants “acquired telehealth assessment skills” through tablet devices, including assessment of self-measured blood pressure and pulse rates, symptoms, and visual and hearing disorders such as asking whether the person can read a newspaper and communicate easily with the participants. They devised communication methods such as adjusting the color and font size of educating materials according to the characteristics of the person’s disability and paying attention to the pace and tone of voice and facial expressions. Furthermore, the participants “learned telehealth intervention skills,” such as calculating exercise and nutritional requirements together via a tablet device and using digital pamphlets for education.

As home care is currently recommended in Japan, opportunities for online nursing care are expected to increase in the future. This practice was a valuable experience for me.

4.4. Learning through modeling and teamwork, and improvement of self-efficacy

Throughout the program, participants were able to “learn skills through modeling” such as assessment, intervention, and communication by watching and imitating the faculty members, team members (paired students), and e-learning materials.

Through team discussions and advice from faculty members, I learned the importance of listening to the patient’s thoughts, communicating, and providing guidance that reflects their feelings.

As a result of reflecting on the process of their practice and recognizing the learning experiences, the participants “improved their self-efficacy through leadership, membership, and learning.”

Since I was able to provide nursing care with the greatest awareness of the patient’s background, thoughts, and sense of value, I experienced my own growth, and it gave me confidence.

5. Discussion

5.1. Students’ learning experiences in the telehealth clinical practice program

Our program is the first telehealth clinical practice program for undergraduate students in Japan. This study outlined undergraduate nursing students’ learning experiences of this program, implemented during the spread of COVID-19, by qualitatively analyzing student reports. Four themes were developed: recognition of continued self-improvement to become a nurse and development of a sense of ethics, improvement of knowledge and practical skills in chronic care nursing, acquisition of telehealth skills, and learning skills and teamwork and improvement of self-efficacy.

Ensuring accessibility, convenience, and flexibility is important in remote learning, as it is more difficult for faculty to follow up with students in a timely manner than in face-to-face learning (Wu et al., 2018). We believe that the use of e-learning in this program was beneficial as it did not limit the students’ study place and time but promoted their independent self-learning. In addition, during the telehealth practice, the students were able to understand the patients’ lifestyles, home environments, and family relationships. This was a valuable experience for the students to identify problems that hinder patients’ appropriate self-management and provide education that is feasible and sustainable for patients.

5.2. Facilitating learning through realistic interactions with patients with chronic diseases

Nursing interventions for persons with chronic conditions in this program were conducted using tablet devices. Through these interactions, participants perceived “recognition of continued self-improvement to be a nurse and fostering a sense of ethics,” and “learning through modeling and teamwork, and improvement of self-efficacy.” The changes in patients’ cognition, behavior, and feedback may have triggered the students to reflect on their nursing interventions and recognize the need for self-improvement (Tashiro et al., 2013).

In the COVID-19 pandemic, undergraduate nursing students were unable to attend university and had to change their mode of communication, which placed a large stress load (Galleo-Gomez et al., 2020). We tried, to the greatest possible extent, to build relationships among the students and between the faculty members and students using Microsoft Teams to communicate in small teams or one-on-one. In the student-faculty relationship, regular and careful reflection, and sharing of the status of goal achievements were conducted. The faculty members’ attentive support may have mitigated the students’ stress and contributed to their proactive and continuous learning.

5.3. Supporting students’ learning of clinical reasoning process and their collaboration

Undergraduate nursing students are encouraged to learn evidence-based and problem-based clinical reasoning processes (Djulbegovic and Guyatt, 2017; Ryan, 2016). Additionally, in clinical practice, individual appropriate clinical reasoning is crucial, but it is also essential to improve collaborative skills as a healthcare team to provide patient-centered care (Wosinski et al., 2018). Although this program was limited to collaboration with nurses only, the faculty facilitated the students to learn clinical reasoning and collaborate to provide care to persons with chronic conditions, and most of the students recognized this learning experience. However, some students struggled to communicate and collaborate remotely, and the faculty members engaged these students individually and in groups. In the future, it is necessary to consider environments and methods that allow students to communicate more comfortably, and to develop a multidisciplinary practice program.

5.4. Possibility of ICT utilization and telehealth practice in nurse education

In Japan, most of the nursing clinical practice programs at medical facilities were suspended during the COVID-19 pandemic. We constructed and conducted the telehealth clinical practice program that would maximize the benefits of ICT. However, there are some aspects that nursing students can only learn through face-to-face practice. It would be desirable to combine face-to-face practice and ICT-based practice after categorizing the learning that can only be obtained through face-to-face practice and topics that can be further understood or efficiently learned using ICT. It has been reported that some undergraduate nursing students are not familiar with the usage of internet technology to retrieve health-related information (Terkes et al., 2019). Although there were only a few students who were not proficient at using ICT in this program, the skill of using internet technology to locate health-related information is essential to enable evidence-based practice. An environment and support may also be needed to help the students develop this skill.

With an aging population and the recent promotion of home healthcare, telehealth is becoming crucial for the effective use of limited health resources. For this reason, we believe that incorporating telehealth practice into undergraduate nurse education and expanding the range of nursing activities are future challenges.

This study has some limitations. It is possible that participants were naturally highly motivated for the clinical practice training therefore
were more positive in their attitude towards telehealth. The target of analysis was only the students’ reports (subjective evaluation), and although the faculty members evaluated the students’ performance, it was difficult to comprehensively evaluate their knowledge, skills, and attitudes in detail remotely. In future, it would be desirable to combine ICT with face-to-face evaluation. We believe that the desired learning methods of this clinical practice program can be further enhanced with face-to-face training and evaluation methods and multidisciplinary collaboration in the future.

6. Conclusions
With the prolonged COVID-19 pandemic, nurse education institutions have been motivated to create innovative educational methods. Our study clarified that undergraduate nursing students perceived that their attitude, knowledge and skill acquisition to become a nurse improved through the telehealth clinical practice program. Findings from this study can be considered by nurse educators to increase opportunities to understand students’ experiences with telehealth education and design clinical practice program that incorporates telehealth. Future educational development and research are needed to enhance the learning effects of the telehealth clinical practice program by combining it with face-to-face training and multidisciplinary education.

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Declaration of competing interest
The authors declare no conflict of interest.

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CRediT authorship contribution statement
Kana Kazawa and Michiko Moriyama were involved conceptualization. Kana Kazawa, Chie Teramoto, Ayako Azechi, Hiroki Satake and Michiko Moriyama were involved in analysis and manuscript writing. All authors read and approved the final manuscript.

Appendix A. Supplementary data
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References
Al-Moteri, M., 2020. Entrustable professional activities in nursing: a concept analysis. Int. J. Nurs. Sci. 7 (3), 277–284. https://doi.org/10.1016/j.ijnss.2020.06.009.
Billings, D., Halstead, J., 2019. Teaching in Nursing, 6th ed. Elsevier Saunders, St Louis, Bloom, B.S., Hastings, J.T., Madonna, O.F., 1971. Handbook on Formative and Summative Evaluation of Student Learning. McGraw-Hill Book Company, New York.
Braun, V., Clarke, V., 2006. Using thematic analysis in psychology. Qual. Res. Psychol. 3 (2), 77–101. https://doi.org/10.1177/1478088706069030.
College of Nurses of Ontario, 2020. Telepractice: practice guideline. College of Nurses of Ontario, Toronto. https://www.cno.org/globalassets/docs/prac/41041_telephone.pdf.
Djulbegovic, B., Guyatt, G.H., 2017. Progress in evidence-based medicine: a quarter century on. Lancet 390 (10092), 415–423. https://doi.org/10.1016/S0140-6736(16)31592-6.
Fukuda, M., 2018. Nursing competency: definition, structure and development. Yonago Acta Med. 61, 001–007. https://doi.org/10.31610/ym.2018.03.001.