

Impact of COVID-19 on Clinical Training in Undergraduate Nursing Students: A Scoping Review

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Purpose: This scoping review aims to explore the challenges encountered by undergraduate nursing students during the COVID-19 pandemic and the strategies employed to address these challenges in the context of clinical teaching. **Methods:** A systematic search was conducted across electronic databases, including PubMed, Embase, CINAHL, and the Cochrane Library. A total of twenty-nine studies were included. Data extraction and synthesis were performed to identify key issues faced by nursing students and the strategies implemented by educators and institutions. **Results:** The analysis of this study revealed several significant issues encountered by undergraduate nursing students during the pandemic, including limited interaction and communication, changes in healthcare practices, emotional and psychological impact, and limited supervision and support. To address these challenges, various strategies were employed, such as telehealth, simulation, case studies, virtual tours, online forums, and video lectures. These strategies aimed to provide alternative avenues for clinical learning and foster critical thinking and decision-making skills. **Conclusion:** This scoping review highlights the critical issues faced by undergraduate nursing students during the COVID-19 pandemic and the diverse strategies implemented to mitigate these challenges. The findings underscore the importance of adapting clinical teaching methodologies to ensure educational continuity during times of disruption. The identified strategies provide valuable insights for nursing educators and institutions seeking innovative approaches to enhance clinical teaching. Future research should focus on evaluating the long-term outcomes and effectiveness of these strategies while exploring additional innovative approaches to optimize nursing education during times of crisis.

Key Words: COVID-19; Nursing students; Clinical practicum; SARS-CoV-2; Nursing education

INTRODUCTION

The coronavirus disease 2019 (COVID-19) is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). World Health Organization (WHO) declared it a 'Pandemic' in March 2020. Since COVID-19 first occurred in patients with pneumonia in Wuhan, China, it has infected more than 223 million people globally and all countries are facing severe socioeconomic consequences due to the COVID-19 pandemic [1]. COVID-19 continuously influences on the health and well-being of people and communities worldwide. The COVID-19 pandemic

has had a profound impact on global healthcare systems, requiring significant adaptations in the delivery of care [2]. This novel infectious disease has necessitated changes in clinical practice, healthcare policies, and education.

The pandemic has presented unique challenges for undergraduate nursing students, who are in the process of acquiring essential clinical skills and experiences [3]. Clinical practice forms a fundamental component of nursing education, providing students with hands-on learning opportunities, exposure to real-world healthcare settings, and the chance to develop clinical judgment and critical thinking skills. However, the pandemic has disrupted

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these traditional clinical learning experiences. The COVID-19 pandemic has led to numerous modifications in health-care settings, including limitations on student involvement in direct patient care, reduced clinical placement opportunities, and altered educational formats such as virtual simulations and online learning [3,4]. These changes have had far-reaching implications for undergraduate nursing students, affecting their ability to gain practical experience, develop clinical competence, and transition smoothly into professional nursing roles [5].

Scoping reviews offer a comprehensive overview of existing literature on a particular topic. It allows researchers to map the breadth and depth of the available evidence. In the context of this study, the scoping review aims to systematically assess the effects of the COVID-19 pandemic on the clinical practice experiences of undergraduate nursing students. By examining the impact of the COVID-19 pandemic on undergraduate nursing students' clinical practice, this research study allows for the identification of challenges and obstacles faced by students in adapting to the new clinical learning environment. In addition, it enables nursing educators and policymakers to develop targeted interventions and support mechanisms to address these challenges effectively.

This study examined the impact of the COVID-19 pandemic on undergraduate nursing students' clinical practice. Specific aims were 1) to assess the effects of the COVID-19 pandemic on the clinical practice experiences of undergraduate nursing students to identify the challenges faced by nursing students in adapting to the changes in clinical practice during the pandemic and 2) to explore the strategies employed by nursing programs to mitigate the impact of the pandemic on clinical education.

METHODS

The scoping review was structured according to the Joanna Briggs Institute's Review Manual on scoping reviews [6] and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines [7,8]. Research questions are:

- What are the issues encountered by nursing students related to clinical practice during the COVID-19 pandemic?
- What strategies have been implemented in clinical teaching for undergraduate nursing students during the pandemic?

1. Search Strategy and Eligibility Criteria

A literature search was performed in May 2023. The following databases were used: PubMed, Embase, CINAHL, and the Cochrane Library. A combination of medical subject headings (MeSH) and free text terms were used. Boolean operators OR and AND were used for comprehensive searching. The words used to search relevant articles included "Students, Nursing"[Mesh] OR "nurs* undergraduate" AND "clinical training" AND "COVID-19." The example search strategies for the PubMed database is illustrated in Supplementary File. The inclusion criteria were as follows: 1) quantitative research and quantitative data from mixed-method primary studies; 2) studies published from January 2020 to April 2023; 3) studies describing clinical training; 4) studies conducted during the COVID-19 pandemic; and 5) English language publications. The exclusion criteria were as follows: 1) The majority of the study subjects were not undergraduate nursing students; and 2) articles in which only the abstract was available.

2. Data Extraction, Classification, and Analysis

Search results from each database were merged using EndNote 20 (EndNote™, Clarivate™, Philadelphia, USA) to ensure a comprehensive collection of relevant studies. Subsequently, duplicate studies were removed to avoid redundancy. The investigator then proceeded with a two-step screening process. Initially, the studies were screened at the title and abstract level to assess their relevance and alignment with the research objectives and eligibility criteria. The remaining studies were then subjected to a thorough review of their full texts. The review process employed for this scoping review was not be linear but iterative, which ensures that all potentially relevant studies were considered.

Once the studies were included in the research, data extraction was carried out systematically. Relevant information, such as the year of publication, country of origin, aims of the study, sample size, study design, outcomes measured, and key findings, was extracted from each included study. This data extraction process aimed to capture essential details and enable a comprehensive understanding of the characteristics and findings of the reviewed studies. Following data extraction, the characteristics of the included studies were summarized to provide an overview of their key attributes. Additionally, the outcomes measured and key findings from each study were extracted and documented. This review process ensures a

comprehensive analysis of the selected studies. As the review involved the analysis of previously published literature, it did not require formal ethical approval.

The number of the records retrieved from the data was 266 and duplicates were removed. The flow diagram of study identification and selection process is illustrated in Figure 1. The total number of selected studies was twenty-nine.

RESULTS

In terms of the characteristics of the articles included in the scoping review, twelve articles (41.4%) were published in 2022. Seven (24.1%) were published in Korea, followed by the US (4, 13.8%), and Hong Kong (3, 10.3%). Most frequently used research design was cross-sectional study (62.1%). The whole summary of extraction is summarized in a Table 1. The issues that undergraduate nursing students encountered regarding clinical practice during the COVID-19 pandemic were illustrated in Table 2. The issues were: Fear and anxiety, limited interaction and communication, changes in healthcare practices, emotional

and psychological impact, limited supervision and support, lack of personal protective equipment, disrupted clinical placements, uncertainty and lack of preparedness, ethical dilemmas, and reduced opportunities for hands-on learning. The strategies to manage the issues were illustrated in Table 3. They are telehealth, simulation, case studies, virtual tours, online forums, and video lectures.

DISCUSSION

This study explored the effects of the COVID-19 pandemic on the clinical practice experiences of undergraduate nursing students and identified the challenges faced by students in adapting to the changes in clinical practice. Additionally, the strategies employed by nursing programs to alleviate the impact of the pandemic on clinical education were examined. The COVID-19 pandemic has significantly disturbed the clinical practice experiences of undergraduate nursing students worldwide. The restrictions on in-person clinical placements, reduced patient interaction, and altered learning environments have posed substantial challenges for students. These disturbances

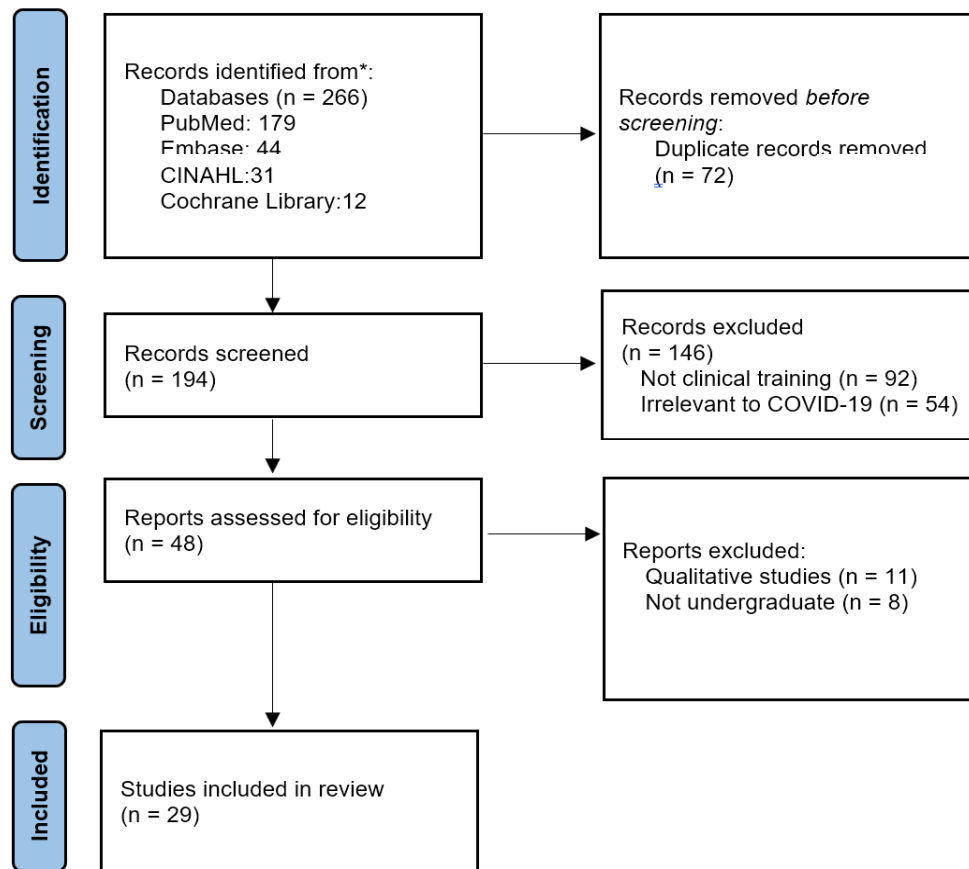


Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for flow diagram for Scoping review.

Table 1. Summary of Extraction

#	Author(s)	Year	Country of origin	Aims	Sample size	Study design	Outcomes measured	Key findings
1	A Belén Subirón-Valera et al.	2022	Spain	To determine the degree of psychological distress and fear of COVID-19 in undergraduate student nurses who were about to begin their clinical placements during the academic year 2020~2021	100	Cross-sectional study	- Fear of COVID-19 Scale - Depression Anxiety Stress Scales	Student nurses who lived with their relatives experienced higher levels of stress due to the perceived risk of transmission, but were less fearful of loss of work and income. Anxiety was associated with not knowing their upcoming placement location.
2	B Banstola et al.	2021	Nepal	To find out the prevalence of anxiety among nursing students during clinical placement in the pandemic of COVID-19 2021.1.20.-2.2.	144	Descriptive cross-sectional study	- Demographic, clinical, and COVID-19 related questionnaires - Beck Anxiety Inventory - Brief-COPE	All the nursing students 144 (100.0%) having clinical placement had anxiety. Among them, 117 (81.3%) had mild anxiety and 27 (18.8%) had moderate level of anxiety. Religion was the most commonly used to cope. Acceptances, seeking informational and emotional support were the highly used approach coping strategies.
3	B Salameh et al.	2020	Palestine	To critically evaluate the effect of using a complex case with HFS on knowledge and clinical judgment related to MV for ARDS among nursing students	151 (4th yr)	Quasi-experimental, 2~group pretest/posttest study	The Lasater Clinical Judgment Rubric - Clinical Judgment - Clinical knowledge	Significantly improved clinical judgment and knowledge in the intervention group.
4	C Kane et al.	2022	England	To explore the psychological experience of a small cohort of nursing and midwifery students who had been deployed to work in the NHS during the COVID-19 pandemic.	53 (3rd yr)	Survey (response rate of 22.0%)	- The Maslach Burnout Inventory (MBI-HSS)	Students found the experience of being deployed into clinical practice during a major public health emergency a valuable and unique experience that strengthened their resilience. Students reported a significant level of personal obligation to opt-in to deployment. Working within clinical areas caused heightened anxiety and uncertainty, which was alleviated by managerial support.
5	D Ulenaers et al.	2021	Belgium	To study nursing students' experiences during clinical placement during the COVID-19 pandemic 2020.4.20.-2020.6.5.	665 (all years)	Cross-sectional survey (response rate of 17.5%)	- Demographics and work environment - Perception of infection risk - Self-efficacy in COVID-19 related competencies - Support and communication during clinical placements - Resilience.	Clinical placement planning was disrupted for some students due to the pandemic, with site changes for 36.1% and multiple changes for 9.2% of students. 54.7% of students could continue their placements as planned. Students felt most confident in recognizing patients with oxygen deprivation and administering oxygen, but less confident in managing the psychological impact of isolation and observing/monitoring ventilated patients. A majority of students (77.4%) felt they could discuss concerns with their clinical placement supervisor, while 5.3% felt unsupported. 52.6% of students found the COVID-19 situation enriching to their training, while 19.9% considered it limiting. Limited time and attention from preceptors hindered the attainment of certain competences. Students had fewer chances to practice technical nursing skills, especially in nursing homes.

Table 1. Summary of Extraction (Continued)

#	Author(s)	Year	Country of origin	Aims	Sample size	Study design	Outcomes measured	Key findings
6	EA Hassan et al.	2022	Egypt	To evaluate the effects of simulation-based flipped classroom (SBFC) on nursing students' acquisition of CPR skills.	326 (4th semester)	A two-parallel prospective, single-centre, simulation-based, randomized, controlled trial	- The simulation experience satisfaction scale - CPR checklist	The SBFC group had a significantly better satisfaction with the simulation experience than the traditional simulation (TS) group ($p=.03$). As regards the mean score of the CPR checklist after simulation, the SBFC group had a significantly higher score than TS group ($p=.01$).
7	EJ Kim et al.	2023	Korea	To identify and compare nursing students' achievement emotions associated with clinical practicums and alternative learning during the COVID-19 pandemic.	236 (3rd, 4th yr)	Cross-sectional, descriptive study	- The Korean version of the class-related AEQ	Higher achievement emotions were associated with clinical practicums than with alternative learning (e-learning, patient simulations, skills laboratories).
8	E Musallam et al.	2021	USA	To explore the impacts of COVID 19 on the students' perceptions of readiness for practice and their preparation for the NCLEX exam and initial clinical practice.	26 (senior BSN students)	Cross-sectional descriptive design	-The Casey-Fink Readiness for Practice Survey -- Clinical confidence and readiness for practice	Students reported substantial impacts of COVID-19 on their clinical experiences, their ability to practice skills and procedures, their preparations for NCLEX exam, and their nursing career.
9	HGN Yazici et al.	2022	Turkey	This study examines senior nursing students' fear and anxiety levels regarding clinical practices during the COVID-19 pandemic.	124 (senior)	Cross-sectional study	- The 21 – question Beck Anxiety Inventory - The 7 – question Fear of COVID – 19 Scale	The participants' mean Fear of COVID – 19 Scale score was 20.0 ± 7.7 (medium level). Their mean Beck Anxiety Inventory score was 14.2 ± 15.4 (mild anxiety). A positive relationship was found between fear of COVID – 19 and anxiety
10	HK Son	2020	Korea	To evaluate the effectiveness of simulation problem-based learning (S-PBL)	78 (3rd yr)	Quasi-experimental control group pretest-posttest design	- Learning Attitude Measuring Scale - Metacognition - The California Critical Thinking Disposition Inventory (CCTDI)	The pre-post difference in learning attitude and critical thinking increased significantly ($p < .01$) in the experimental group
11	H Lee et al.	2022	Korea	This study developed a VR simulation program for mechanical ventilation care and evaluated its effects.	60 (4th yr)	Non-equivalent control group and non-synchronized pretest-posttest design	- Knowledge of mechanical ventilation nursing - Self-efficacy - Clinical reasoning capacity - The Flow Short Scale-- learning immersion - The Numeral Rating Scale (NRS)--learning satisfaction	The VR stimulation program had a positive effect on their self-efficacy, clinical reasoning capacity, and learning satisfaction.
12	I Basso et al.	2022	Italy	To explore whether and to what extent the third-year undergraduate nursing students perceived that their readiness for practice was impacted by changes to clinical placement and classroom learning implemented in response to the COVID-19 pandemic. 2020.6.	126 (3rd yr)	Cross-sectional study (response rate 55.3%)	- The Casey-Fink Readiness for Practice tool - Impact (a 5~point Likert scale (none, minimal, moderate, major, and severe))	Overall, 84 (66.7%) perceived that COVID-19 safety measures had a moderate to severe impact on their readiness for practice. Despite important advances in technology-based educational activities, clinical placement remains the best educational strategy to allow nursing students to feel prepared to work effectively during a pandemic.
13	J Du et al.	2023	China	To evaluate the fully online flipped classroom's effects during the pandemic.	103 (3rd yr)	Comparative descriptive study with historical control design	- Final examinations	The fully online flipped classroom method was fairly effective during the pandemic. The passing rate in 2020 reached 92.0%, and the passing rate in 2019 was 96.0% ($p=.60$).

Table 1. Summary of Extraction (Continued)

#	Author(s)	Year	Country of origin	Aims	Sample size	Study design	Outcomes measured	Key findings
14	J Lee et al.	2022	Korea	To verify the effects of simulation problem-based learning on nursing students' communication skills, communication attitudes, and team efficacy.	93 (3rd yr)	Non-equivalent control group pretest-posttest design	- The Korean version of the Health Communication Assessment Tool (K-HCAT)--communication skills -the Communication Skills Attitude Scale (CSAS)--communication attitudes - Team efficacy	The simulation problem-based learning in clinical practice is recommended to improve communication attitudes for nursing students. Communication skill (NS), communication attitude ($p=.020$ in experimental group), team efficacy ($p=.073$)
15	J Roldán-Merino et al.	2022	Spain	To evaluate the psychological impact on nursing students at the end of period of confinement during the first wave of the COVID-19 outbreak.	203 (all yr)	Cross-sectional study	- The Spanish version of the WHO-5 Well-Being Index (WHO-5) - The Generalized Anxiety disorder-7 scale (GAD-7)	The levels of anxiety due to the COVID-19 pandemic in nursing students have been high, and levels of psychological well-being have been low.
16	JTC Fung et al.	2021	Hong Kong	To evaluate the effect of a virtual simulation education programme with debriefing in undergraduate nursing students.	188 (the final yr [5th yr])	One-group pretest and posttest design	- The Clinical Competence Questionnaire (CCQ) - The Clinical Learning Environment Comparison Survey (CLECS) - The overall student satisfaction	Perceived clinical competence of Chinese nursing students has significant improvements by using virtual simulation combining a debriefing model during the COVID-19 period. Scores in communication and critical thinking were significantly lower in the simulated environment but significantly higher in the nursing process compared with the traditional environment.
17	K Angasu et al.	2021	Ethiopia	To determine the status of achievement of clinical learning outcomes and associated factors among midwifery and nursing students of Jimma University, Ethiopia.	147 midwifery and nursing students (3rd, 4th yr)	Cross-sectional study (March 25 to 30, 2021)	- Questionnaire contains four sections: socio-demographic characteristics; practice of COVID-19 preventive measures; perceived impact of COVID-19 on clinical practice; achievement of clinical learning outcomes	Less than half of midwifery and nursing students of Jimma University had achieved their clinical learning outcomes.
18	K Angasu et al.	2021	Ethiopia	To assess COVID-19's negative impacts on clinical learning, and proposed compensation mechanisms among midwifery and nursing undergraduate students of Jimma University.	147 midwifery and nursing students (3rd, 4th yr)	Cross-sectional study (March 25 to 30, 2021)	- Questionnaire contains three sections: socio-demographic characteristics; COVID-19's negative impacts on clinical learning; proposed compensation mechanisms for ending long-term COVID-19 negative impacts on clinical learning	High proportion of the study participants perceived that they suffered high COVID-19 negative impacts on their clinical training. The proposed compensation mechanisms include: intensively using teacher-facilitated skill demonstration laboratory, case scenarios, clinical teaching videos, and using pre and post clinical conferences.
19	KY Ho et al.	2022	Hong Kong	We evaluated the effectiveness of the placement by assessing students' knowledge, attitudes and practices regarding smoking cessation and tobacco control.	61 (3rd yr; mental health nursing)	One-group pretest-posttest design	- Knowledge, attitudes and practices regarding smoking cessation and tobacco control	Incorporating the service-learning model in existing community-based services can provide additional venues for nursing students to practice.
20	L Gibson-Young et al.	2023	USA	To explore the effect of an innovative educational approach aimed at teaching pediatric content.	93 (junior)	Mixed-method study Cross-sectional approach with a six-item survey	- Comfort level, preparedness (for children, family)	Statistically significant increase in students' perceived comfort level, preparedness for children, and preparedness for family.

Table 1. Summary of Extraction (Continued)

#	Author(s)	Year	Country of origin	Aims	Sample size	Study design	Outcomes measured	Key findings
21	M Adewuyi et al.	2022	USA	To synthesize evidence on the effect of clinical experiential learning approaches on pre-licensure nursing students' competence in dementia care and to identify associated challenges.	17 retrieved articles	Systematic review		The evidence could inform curriculum development, teaching methods, experiential learning experiences and clinical placements of pre-licensure nursing students with regards to dementia care. Face-to-face (in person), virtual and simulated experiential learning approaches increased pre-licensure nursing students' dementia care knowledge. The face-to-face experiential learning approach that provides physical contact with people living with dementia and clinical staff had more impact on their skills and attitudes.
22	MK Song et al.	2023	Korea	To examine nursing students' experiences of alternative and nonstandard practicum methods used during the COVID-19 pandemic	239 (3rd yr)	Online surveys	- Faculty-Student Interaction Scale - Satisfaction with Clinical Practice scale - Korean version of the Nursing Students' Anxiety with Clinical Decision-Making Scale (NA-CDM)	Satisfaction with clinical practicums was associated with students' anxiety with clinical decision-making. The amount of time spent in attending alternative clinical practice methods was positively associated with nursing students' anxiety with clinical decision-making
23	M Kells et al.	2023	USA	To examine the affective state (anxiety, depression), life satisfaction, stress and worry, media consumption and perceptions of pursuing a career in nursing amidst the COVID-19 pandemic.	161 (4th yr)	Cross-sectional study	- The Patient Health Questionnaire-9 (PHQ-9) - The General Anxiety Disorder-7 (GAD-7)	Mean stress score was 56.6 (range 0-100), 55.6% of respondents felt unsettled about the future, and 68.2% reported feeling overwhelmed. 18.7% of students reported moderate to severe anxiety, 19.8% reported moderate to severe depression and 54.4% reported that COVID-19 influenced their interest in nursing.
24	MSY Hung et al.	2023	Hong Kong	To examine Hong Kong general nursing students' mental health and quality of life during the COVID-19 pandemic.	380 (all year)	Online survey	- The Fear of COVID-19 scale (FCV-19S) - The Depression Anxiety Stress Scale short version (DASS21) - The WHO Quality of Life-BREF (WHOQOL-BREF)	Hong Kong nursing students, especially those who attended clinical practicum during the pandemic, experienced substantial emotional and quality of life implications.
25	RS Eweida et al.	2020	Egypt	To explore the mental strain and changes in the psychological health hub of intern-nursing students at pediatric and medical-surgical units amid the ambience of COVID-19 Pandemic	150 (intern-nursing students)	Cross-sectional descriptive study	- Middle east respiratory syndrome COVID-19 (MERS-CoV) staff questionnaire - General Health Questionnaire (GHQ-12)	Students felt nervous, scared and angry due to increased workload during COVID-19 outbreak. Student's the most stressful factors were related to possibility of getting COVID-19 infection and transmitting it to their families. Most of the students felt under strain, worthless, and depressed during COVID-19 outbreak. COVID-19 pandemic was identified as a great source of mental strain among intern-nursing students at pediatric and medical-surgical units and it had a negative impact on their psychological health.
26	SY Yang	2022	Korea	To examine the effects of a neonatal resuscitation gamification program using immersive virtual reality based on Keller's ARCS model.	83 (nursing students) (29 VR group; 29 simulation group; 28 control group)	Non-randomized controlled simulation study with a pretest-posttest design	- Neonatal resuscitation nursing knowledge - Problem-solving ability - Clinical reasoning ability - Self-confidence in performing neonatal resuscitation - Degree of anxiety - Learning motivation	Neonatal resuscitation knowledge and learning motivation were significantly higher in the virtual reality and simulation groups than in the control group, whereas problem-solving ability and self-confidence were significantly higher in the virtual reality group than in the simulation and control groups. Anxiety was significantly lower in the simulation group than in the virtual reality and control groups.

Table 1. Summary of Extraction (Continued)

#	Author(s)	Year	Country of origin	Aims	Sample size	Study design	Outcomes measured	Key findings
27	SY Yang et al.	2022	Korea	To investigate the neonatal intensive care unit (NICU) clinical practicum status during the COVID-19 pandemic and the need for extended reality (XR)-based training for neonatal care.	132 (4th yr)	Cross-sectional design	<ul style="list-style-type: none"> - Neonatal nursing performance - High-risk neonatal nursing performance - NICU training needs - NICU training experience - Neonatal and family handoff training needs 	Nearly all the students stated that XR-based neonatal nursing training programs were needed. The top five topics reported for training needs were phototherapy, body temperature maintenance, infection prevention, oxygen therapy, and infusion therapy. The top five categories with the greatest gap between need and experience were gavage tube feeding, oxygen therapy, fluid therapy, attachment promotion, and incubator management.
28	T Kochuvilayil et al.	2021	Australia	To compare knowledge, anxiety, academic concerns and preventative behaviors between undergraduate nursing students in Australia and India during the COVID-19 pandemic.	212 (all yr)	Cross-sectional study using an online survey (99 Australian, 113 Indian students)	<ul style="list-style-type: none"> - Knowledge and source of information about COVID-19 - Anxiety and coping strategies - Concerns about the altered study environment - Preventative behaviors 	Greater number of Indian students indicated having sufficient knowledge of COVID-19, getting information about COVID-19 from social media and being concerned about 'attending clinical placement'. Australian students reported significantly higher levels of anxiety, difficulty sleeping, concentrating and eating. Greater number of Australian students indicated that they would go to the University if they needed to meet with other students, had to access the library or had a group assignment.
29	V. Duprez et al.	2021	Belgium	To explore the relation between internship experiences during a pandemic and student nurses' commitment or intent-to-leave the nursing program.	1,079 (all yr)	Cross-sectional study (2020.4.~5.)	<ul style="list-style-type: none"> - Organizational Commitment Questionnaire--commitment to study nursing - Students' intent to leave nursing education - Basic Psychological Need Satisfaction and Frustration Scale (BPNSFS)--Need-supportive and need-thwarting internship experiences - Motivation for internship 	<p>Students reported high levels of study commitment, and an overall low intention-to-leave.</p> <p>Structural internship characteristics (i.e., planning, and setting) were not associated with student's commitment or intention-to-leave nursing education.</p> <p>Need-supportive internship experiences were positively associated with commitment. Need-supportive internship experiences relates, both directly and indirectly, to study commitment via internship motivation.</p>

have not only impacted the acquisition of essential clinical skills but have also affected the psychosocial well-being and confidence of nursing students. In addition, several challenges identified that were faced by nursing students during the pandemic. These challenges include Fear and anxiety, Limited interaction and communication. Changes in healthcare practices, Emotional and psychological impact, Limited supervision and support, Lack of personal protective equipment (PPE), Disrupted clinical placements, Uncertainty and lack of preparedness, Ethical dilemmas, and Reduced opportunities for hands-on learning. Recognizing and addressing these challenges is crucial to ensure the overall well-being and education of nursing students. The pandemic has led to restrictions on in-person clinical placements, limiting the opportunities for nursing students to directly engage with patients, healthcare professionals, and various healthcare settings. This reduction in

hands-on learning experiences may result in a decreased ability to practice and refine essential clinical skills, such as physical assessments, medication administration, and patient care procedures.

Nursing programs have implemented various strategies to alleviate the impact of the pandemic on clinical education. The findings of this review provided an overview of the strategies implemented in clinical teaching for undergraduate nursing students during the pandemic. The findings revealed a range of innovative approaches, including the use of telehealth for remote patient consultations, virtual simulations for skill development, case studies for clinical reasoning, virtual tours for contextual understanding, online forums for collaborative learning, and pre-recorded video lectures for self-paced learning. These strategies have demonstrated their potential to adapt and ensure continuity in nursing education during chal-

Table 2. Issues Encountered by Nursing Students related to Clinical Practice during the COVID-19 Pandemic

Issues	Description	Articles
Fear and anxiety	Nursing students experienced heightened levels of fear and anxiety due to the perceived risk of contracting and transmitting COVID-19 during their clinical placements.	5, 8, 12, 15, 18, 22, 25
Limited interaction and communication	Nursing students faced challenges in interacting and communicating with patients and healthcare professionals due to the use of PPE, social distancing measures, and increased workload on healthcare teams.	2, 6, 10, 17, 20, 23, 26
Changes in healthcare practices	Nursing students had to adapt to changes in healthcare practices and protocols implemented during the pandemic, such as infection control measures, virtual patient interactions, and remote learning.	3, 6, 9, 12, 19, 23, 27
Emotional and psychological impact	The pandemic had a significant emotional and psychological impact on nursing students. They reported increased stress, burnout, and concerns about their own well-being and that of their families.	5, 8, 12, 15, 18, 22, 25
Limited supervision and support	Some nursing students reported limited supervision and support from preceptors and clinical staff during their placements, which hindered their learning experience and professional development.	7, 10, 13, 16, 20, 24
Lack of personal protective equipment (PPE)	Some nursing students reported a shortage or inadequate supply of PPE, which increased their concerns about their safety and risk of infection.	4, 9, 14, 19, 24, 28
Disrupted clinical placements	The pandemic disrupted the planning and scheduling of clinical placements for nursing students. Some students had their placements canceled or postponed, leading to delays in their learning and clinical experience.	1, 7, 13, 16, 21, 27
Uncertainty and lack of preparedness	Nursing students expressed concerns about the uncertainty surrounding the pandemic and felt inadequately prepared to handle the challenges posed by the evolving situation.	5, 8, 14, 18, 22
Ethical dilemmas	Nursing students faced ethical dilemmas related to resource allocation, patient prioritization, and balancing their duty to provide care with the need to protect their own health and safety.	7, 11, 15, 21, 25
Reduced opportunities for hands-on learning	Due to the pandemic, nursing students had limited opportunities for hands-on learning and practical skills development, which are crucial for their training and professional development.	3, 11

Table 3. Strategies Implemented in Clinical Teaching for Undergraduate Nursing Students during the COVID-19 Pandemic

Strategies	Description	Articles
Telehealth	Use of remote technology for patient consultations	4, 8, 12, 16, 22
Simulation	Virtual simulations to replicate clinical settings	2, 5, 7, 9, 13, 17
Case studies	Analyzing and discussing patient cases	1, 6, 10, 14, 19
Virtual tours	Online tours of healthcare facilities	3, 11, 18, 21, 23
Online forums	Discussion platforms for collaborative learning	15, 20, 24, 27
Video lectures	Pre-recorded lectures for self-paced learning	25, 26, 28, 29

lenging times.

The implications of the issues encountered by nursing students during the pandemic were significant. The transition from in-person to virtual clinical experiences posed challenges such as limited patient interaction [9-15], re-

duced hands-on learning opportunities [16,17], and decreased access to healthcare facilities [16,18-20]. These issues impacted students' confidence, competence, and overall clinical readiness. Furthermore, the lack of face-to-face interactions with faculty and peers affected social support

and collaboration, which are crucial aspects of nursing education [21-24]. Addressing these challenges is essential to ensure the quality of education and prepare nursing students for future practice.

In response to the issues encountered, the identified strategies offer valuable nursing implications. Telehealth provides an opportunity for nursing students to develop skills in remote patient care, which is becoming increasingly relevant in healthcare practice [25-28]. Virtual simulations offer a safe environment for practicing procedures and decision-making [18,29]. Case studies bridge the gap between theory and practice, promoting critical thinking and clinical reasoning [30-32]. Virtual tours of healthcare facilities enhance contextual understanding and workflow comprehension [32,33]. Online forums foster collaboration, knowledge exchange, and peer support [20,34]. Pre-recorded video lectures provide flexibility and accessibility to educational content [35-37]. These strategies can be incorporated into nursing curricula to address the challenges faced by students during the pandemic and beyond.

The significance of the study findings lies in their contribution to the field of nursing education during a global crisis. The identified strategies provide valuable insights for educators, policymakers, and institutions seeking to adapt clinical teaching to challenging circumstances. The findings showcase the potential of technology and innovative approaches in maintaining educational continuity, fostering student engagement, and promoting skill development. By highlighting successful strategies, this study contributes to the growing body of knowledge on effective approaches to nursing education in times of disruption.

While the findings shed light on the strategies implemented during the pandemic, there are limitations to consider. The analysis was based on a limited number of records and may not represent the full spectrum of strategies employed globally. Publication bias may have influenced the results, as only published records were included. Additionally, the implementation and effectiveness of these strategies can vary depending on the resources and infrastructure available to different institutions. Future research should explore the long-term effects and outcomes of these strategies and investigate additional innovative approaches to further enhance clinical teaching in nursing education.

CONCLUSION

This scoping review systematically examined the effects of the COVID-19 pandemic on the clinical practice experiences of undergraduate nursing students. Through the

analysis of the reviewed studies, it is evident that the pandemic has had a profound impact on nursing education, posing numerous challenges for students and necessitating significant adaptations by nursing programs. The restrictions on in-person clinical placements, reduced patient interactions, and altered learning environments have disrupted the acquisition of essential clinical skills and have had psychological and emotional implications for nursing students. To alleviate these challenges, nursing programs have implemented various strategies, including telehealth experiences, simulation-based learning, virtual clinical simulations, remote supervision and mentoring, and online platforms for collaborative learning. These adaptations aim to provide alternative avenues for students to develop clinical skills and maintain engagement with the nursing profession. Future research should focus on evaluating the long-term outcomes and effectiveness of these strategies while exploring additional innovative approaches to enhance clinical teaching in nursing education.

CONFLICTS OF INTEREST

The author declared no conflict of interest.

AUTHORSHIP

Study conception and design acquisition - SH; Data collection - HS; Analysis and interpretation of the data - SH; Drafting and critical revision of the manuscript - SH.

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Appendix. Search strategies

PubMed

1. "Students, Nursing" [Mesh]
 2. "Education, Nursing" [Mesh]
 3. nurs* undergraduate
 4. pre-licensure nurse*
 5. pre-registration nurse*
 6. 1 or 2 or 3 or 4 or 5
 7. "Clinical Clerkship" [Mesh]
 8. "clinical teaching"
 9. "clinical learning"
 10. "clinical training"
 11. "clinical rotation"
 12. "clinical placement"
 13. "clinical practice"
 14. 7 or 8 or 9 or 10 or 11 or 12 or 13
 15. 6 and 14
 16. "SARS-CoV-2" [Mesh]
 17. coronavirus
 18. SARS2
 19. 2019~nCoV
 20. COVID-19
 21. "severe acute respiratory syndrome coronavirus 2"
 22. "novel coronavirus"
 23. 16 or 17 or 18 or 19 or 20 or 21 or 22
 24. 15 and 23
 25. Filters: Publication date from 2019/01/01 to current; Language: English
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