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Clinical practice in ICU contributes better learning results to nursing students and newly graduated nurses

A Literature Review

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Abstract

Background
Recently, because of the full disclosure of quality nursing care in intensive care unit (ICU), some undergraduate nursing programmes offer nursing students the opportunity of clinical practice in ICU. But the outcomes are uneven and students have very different experiences of their practice. Therefore, how to ensure the students to bring safety nursing care and at the same time to achieve efficient learning results has always been a good question.

Task and objective
The aim of this study was to collect the clinical experience of students in ICU. The purpose of this literature review was to offer information to develop mentoring nursing students who are going to participate their clinical practice in the intensive care unit. The research question was: what is the experience of nursing students in ICU.

Implementation method
A comprehensive literature review was conducted, and published peer-reviewed articles were selected as reliable sources, including the latest valuable research that students participated in critical nursing care in hospitals during the COVID-19 epidemic. Classical content analysis was used to summarize the results, Hawker checklist was applied for critical appraisal.

Conclusions
This study demonstrated four main themes on students' ICU experience: Discouraging challenges, rewarding achievements, professional identify and inner struggling. To take into consideration based on the main four themes may contributes to students' learning results in ICU.

Keywords

Clinical practice experience, ICU, critical care, nursing students, newly graduated nursing students, graduating nursing students.

Miscellaneous

No existing or potential conflict of interest relevant to this article was reported.

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1   Introduction

The intensive care unit (ICU) is an important medical environment, which mainly treats critically ill patients. Various high-tech equipment provides continuous support when monitoring extremely weak patients or suffering from complex situation of various diseases that affect life safety (Marshall et al. 2016; Salem 2021). The patients can be critically ill or post-operation monitored patients. Sometimes the results do not go according to the plan, but we always hope that the recovery is becoming better.

The nurse group is the largest among employees in a medical environment. For nurses, working in the intensive care unit is a challenging job. Nurses in the intensive care unit work on patients with evidence-based nursing skills is undoubtedly the ability to bring reliable and trustworthy nursing results (Sim et al. 2021). Sim also mentioned, critical thinking and deal with problem properly are also tests, which requires a lot of continuous self-learning throughout the career. Nurses' work in ICU faces difficulties like organizing work, being responsibility for their clinical performance, collaborating with other staffs (Baumberger-Henry, 2012). Under the joint action of various pressures resulted from work, many nurses in ICU are planning to leave their posts. In the study of Chegini et al. (2019), the proportion of nurses in ICU who have the idea of leaving their jobs even exceeds 60%, and more than 80% of nurses feel the tremendous pressure of work.

Working in an Intensive care unit is different, quite a few nursing students are willing to go and explore. The importance of nursing students' internship in ICU has always been emphasized, and its advantage lies in expanding students' knowledge by learning complex treatments and nursing interventions (Nursel 2016). O' Kane (2011) found that going to study in the intensive care unit was considered to curtail the impact from the true critical environment on the new nurses and students. So, it is no doubt meant to experience in ICU for nursing students in their profession.

There are both positive and negative attitudes towards practice in the intensive care unit, but they appreciate practicing chance (Sim, et al. 2021; Lakanmaa et al. 2015).

Heather et al. (2018) found that after experiencing various clinical situations in the early stage, the new members of ICU have successfully adapted to the work. After that, students could change their roles smoothly, and even take the initiative to control the turning over (Heather et al. 2018). However, there are more negative worries. Despite the knowledge and ability, the predictable stress and anxiety are great drag between students and their workplaces. For instance, nursing students felt scared in clinical practice (Vatnansever & Akanse 2016). The nursing students worried about making mistakes when caring for frail patients because often the slightest mistake could be fatal (González-García et al 2020). They worry about the countless life-support and testing devices that dazzle them and leave them clueless about whether they can operate them properly, in strange surroundings (Sim, et al. 2021; Vatansever & Akansel 2016). Students were afraid they couldn't keep up with their mentors as it is sometimes a race against time to save a life in an emergency rescue (Williams & Palmer 2013). Finally, students became exhausted when they are confronted with the physical and mental challenges (Swinny & Brady 2010).

At present, although most ICU indicate that only students who are studying in the later stage are accepted for clinical practice, there is no clear standard for what kind of abilities nursing students should have before joining ICU. However, students' knowledge and ability level are uneven, their preparation before entering the intensive care unit is mostly based on their study habits. The aim of this study was to collect the clinical experience of students in ICU. The purpose of this literature review was to offer information to develop mentoring nursing students who are going to participate their clinical practice in ICU.

2 Clinical practice in ICU

2.1 The meaning of ICU experience to nursing students

According to Williams and Palmer (2014), participating in clinical practice in ICU is precious experience for nursing students, because the quick pace and alert environment brings plenty of learning opportunities, it enhanced students' skills by acquiring profession knowledge, good communication and ability of collaboration. Swinny &

Brady (2010) expressed the ICU or critical care environment is meaningful to nursing students in their professional study process, as it cultivates students a competence of taking care of the critically ill patient that with multi-diseases in one. Therefore, no matter from the familiarity with the medical environment and integration, or from professional and technical point of view, the benefits of this practice in the intensive care unit are remarkable.

2.2 Demand of ICU and nurses increases during COVID-19 pandemic

Globally, until the date of 19 November 2021, there have been 255,324,963 confirmed cases of COVID-19, including 5,127,696 deaths, reported to WHO (WHO 2021). The demand of ICU beds increases to high since the pandemic of COVID-19. The important role of ICU which assembled higher demand of beds, professionals' collaboration among nurses and bunch of other related medical staff, as a whole unit (Hill 2020). In the same study, the ratio of nursing-patient in ICU nationally England decreased visually, due to coping with the fast raised pandemic situation from March 2020. Besides, the ratio of critical care consultant and patient in ICU is influenced too, as it dropped by 50% comparing to the instructed number.

There are huge number ICU beds are needed in the United States according to the COVID-19 predicted fast increasing cases globally (Goic et al. 2021). To deal with the situation, a frequently updated (every two weeks) forecasting model was illustrated which indicates predicted demanding beds from ICUs (Goic et al. 2021). Some certain hospitals must temporally change other departments and wards into ICUs due to sudden raising critical cases, and nursing students were called to participate in (Casafont et al. 2021). The European center for disease prevention and control (ECDC 2021) observes daily hospitalised patients, but they even can't count all globally due to the massive pressure of the tremendous numbers that change rapidly. A trend graph showing current hospitalized patient with COVID-19 is presented as Figure 1.

Figure 1. Current hospitalized COVID-19 patients (ECDC)
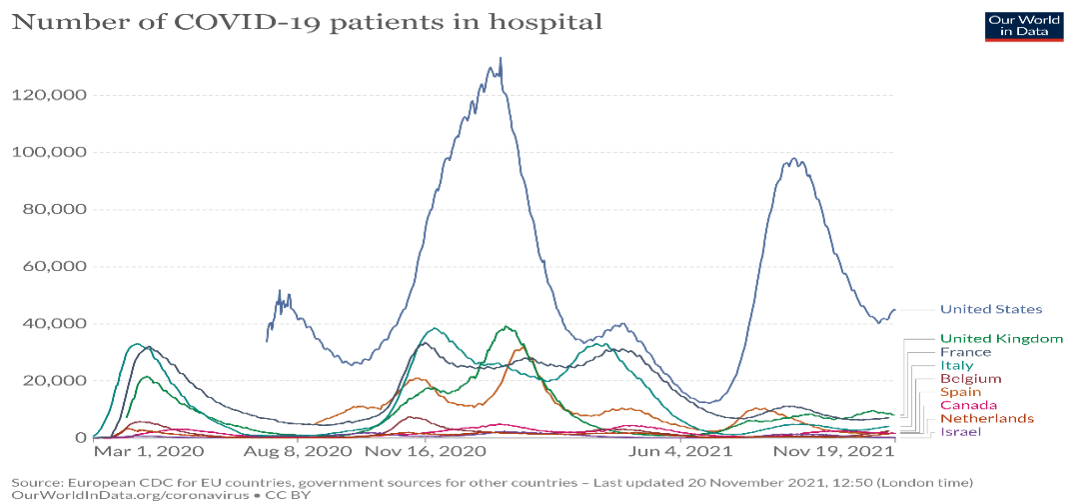
2.3 Mentors' feedbacks in ICU

It's been proved that the clinical mentors and practice organization can help students with the prescribed anxiety and worries a lot (Williams & Palmer 2013). However, student are not the only people who are worried about implementing the clinical practice in an intensive care unit. The mentors are, too. In the study of Swinny & Brady (2010), it is a challenge for students' mentors to instruct a student while performing frequent procedures to critical illness clients. Baumberger-Henry (2012) collected disappointment from the clinical places in ICU. They found the nursing students were insufficient confidence and difficulty to fixed well in the tough ICU environment, or else they were not ready to up to the professional skill standards, that made the situation even more difficult for mentors. O 'Kane (2011) indicated that student mentors can be stressful, even exhausted as there was not enough time to irrigate the students with plenty of knowledge when they were dealing with a heavy workload in ICU.

3 Aim, purpose and research questions

The aim of this study was to collect the clinical experience of students in ICU. The purpose of this literature review was to offer information to develop nursing students' mentoring and clinical practice in ICU. The research question was: what is the experience of nursing students in ICU.

4 Methodology

4.1 Literature review

Edoardo & Alan (2014) explained that a literature review has developed into an increasingly important means to identify, summarize and evaluate data. They also introduced a literature review is a method of analyzing critically published knowledge through a large number of articles that analyze the data by summarizing, classifying, and comparing past studies or literature reviews. Edoardo and Alan (2014) condensed the characteristics of most scientific journals, and the published articles cited in a literature review must be reviewed by peers, the literature included in a literature review can be a combination of research reports of current data and theoretical literature focusing on a definition. All the included articles need to be assessed carefully during analyzing (Edoardo & Alan 2014). The systemic literature review and its conduct were introduced in Table 1.

Table 1**.** A systematic literature review and its conduct (Edoardo & Alan 2014)

A systematic literature review and its conduct
1. Clearly articulated objectives and questions to be addressed.
2. Inclusion and exclusion criteria, stipulated a priori (in the protocol), that determine the eligibility of studies.
3. A comprehensive search to identify all relevant studies.
4. Appraisal of the quality of included studies, assessment of the validity of their results, and reporting of any exclusions based on quality.
5. Analysis of data extracted from the included research.
6. Presentation and synthesis of the findings extracted.
7. Transparent reporting of the methodology and methods used to conduct the review.

This literature review is based on many qualitative designed studies, which can be consulted from journals, professional articles in critical care with nursing experience, and professional databases of health and social studies. The articles used for data collection and analysis are collected from CINAHL (Ebsco) and PubMed. Key words implemented as (nursing students OR undergraduate nursing students OR graduating

nursing students) AND (clinical practicing experience OR study experience OR clinical internship) AND (intensive care unit OR ICU OR critical care). The inclusion process is completed by following the PICOS framework instruction. Assessing steps were illustrated by the papers' themes relate to research question, primary research articles under peer reviewed, reported in English, publication date from year 2011 to current days with full text retrieved by students from JAMK. The PICOS framework assessment process has been shown in Table 2.

Table 2. PICOS framework

PICOS FRAMEWORK	
Population (participants)	Undergraduate nursing students
Phenomena of Interest	Undergraduate nursing students' experience of
Context	Participating in clinical practice in ICU
Types of studies	Primary research articles, published in English, under peer reviewed, published from 2011 to date, full text available for students from JAMK

The article data search was done by author. The Prisma flow diagraph was applied to search papers, a total number of 1024 were obtained from PubMed and CINAHL databases. Then, after deleting the duplicates, there are 994 records left. By filtering peer-reviewed, published English and full-text articles, 131 records left. Then, after assessing original research and publication time, 49 records were excluded from the result, 82 left because they were either not original studies or published in a year beyond the range of 2011-2021. Based on the remaining 82 articles, 77 records were excluded because their topics did not answer the research question. At last, 5 articles were chosen to be studied as the data research, 2 more articles were searched manually by the author by reviewing the five chosen resources and their relative sources. The document search criteria are shown in Table 3 below.

Table 3. The literature search process
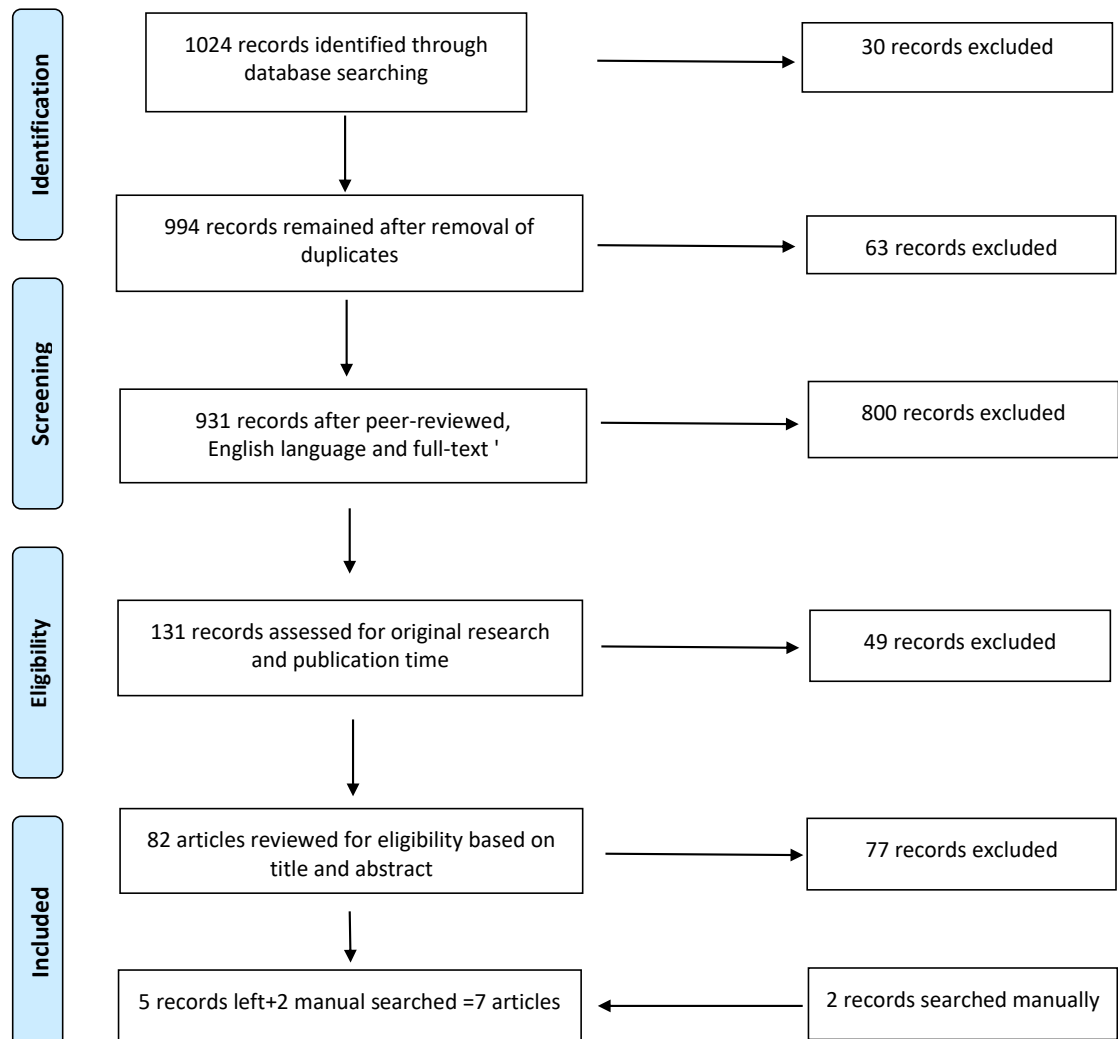
4.2 Studies included in the research

Seven articles conducted globally were used in this study, they are presented as summaries in appendix 2, the excluded data criteria presents as Table 4. Among the seven resources, two of the studies were conducted in Spain (González-García, Lana, Zurrón-Madera, Valcárcel-Álvarez, Fernández-Feito 2020; Casafont, Fabrellasb, Riveraa, Oliv´e-Ferrerb, Querol, Venturas, Prats, Cuzco, Frías, P´erez-Ortega, Zabalegui 2021). Two were conducted in the United States (DeGrande, Liu, Greene, Stankus 2018; Edwards, Mintz-Binder, Jones 2019). One was conducted in South Korea (Sim, Bae & Kim 2021). One was studied in Turkey (Vatansever & Akansel 2016). And one conducted in Macau China (Ng & Sun 2013).

Table 4. The excluded data

| Excluded data |
| --- |
| Literature reviews |
| Not full-text available |
| Medical students experience in ICU |
| Nursing student mentors' experience in ICU |
| Studied on specific disease care experience |
| Clinical experience out of critical care environment |
| Students perceive preparedness, readiness going to ICU |
| Simulation educating out of real ICU environment support |

These seven projects were designed with qualitative research. By the meantime, Ng & Sun (2013) and González-García, Lana, Zurrón-Madera, Valcárcel-Álvarez, Fernández-Feito (2020) used similar methods as self-administration questionnaire and documentary analysis to analyse data; Vatansever & Akansel (2016) made a descriptive exploration design; Edwards, Mintz-Binder, Jones (2019) applied thematic analysis; Three out of seven used phenomenology analysis methods (Degrade, Liu, Greene & Stankus 2018; Sim, Bae & Kim 2021; Casafont, Fabrellas, Rivera, Oliv´e-Ferrer, Querol, Ventures, Prats, Cuzco, Fr í as, p ´ erez-Ortega, Zabalegui 2021).

One of the studies conducted to reflect journaling related to an unexpected crisis as it unfolded through the eyes of nursing students (Edwards, Mintz-Binder, Jones, 2019). Three of the studies conducted to explore students' perceptions about their study in ICU (Vatansever & Akansel. 2016; Casafont, Fabrellas, Rivera, Oliv´e-Ferrer, Querol, Venturas, Prats, Cuzco, Frías, P´erez-Ortega, Zabalegui 2021; Ng & Sun 2013). One of the studies conducted to comprehend more with students' preparedness and readiness joining environment of ICU (DeGrande, Liu, Greene & Stankus 2018). One study focused on conducting methods to gain students study output in clinical education (Sim, Bae & Kim. 2021). One of study identified if there are differences experience based on female and male students practiced in ICU (González-García, Lana, Zurrón-Madera, Valcárcel-Álvarez, Fernández-Feito 2020).

4.3   Data analysis

Based on the 17 kinds of data analysis technologies (Leech & Onwuegbuzie 2007; Onwuegbuizie 2008) for literature analysis, the author applied classical content analysis method. Firstly, in the process of documenting, the author read through all the selected articles to make an overview of the research methods, and study process. Secondly, by paying attention to the results part, carefully reading each "units" and dividing them into smaller independent parts (n = 34). Then author documented the similar experience with their initial codes into columns in same colors as sub-themes (n = 9). At last, the reviewer compared sub-themes and clustered them (n=4) inductively. The four themes are described as: discouraging challenges, rewarding achievements, professional identity, and inner struggling. One of the themes' merging process is presented in Table 5.

Table 5. The merging process of theme: Discouraging challenges
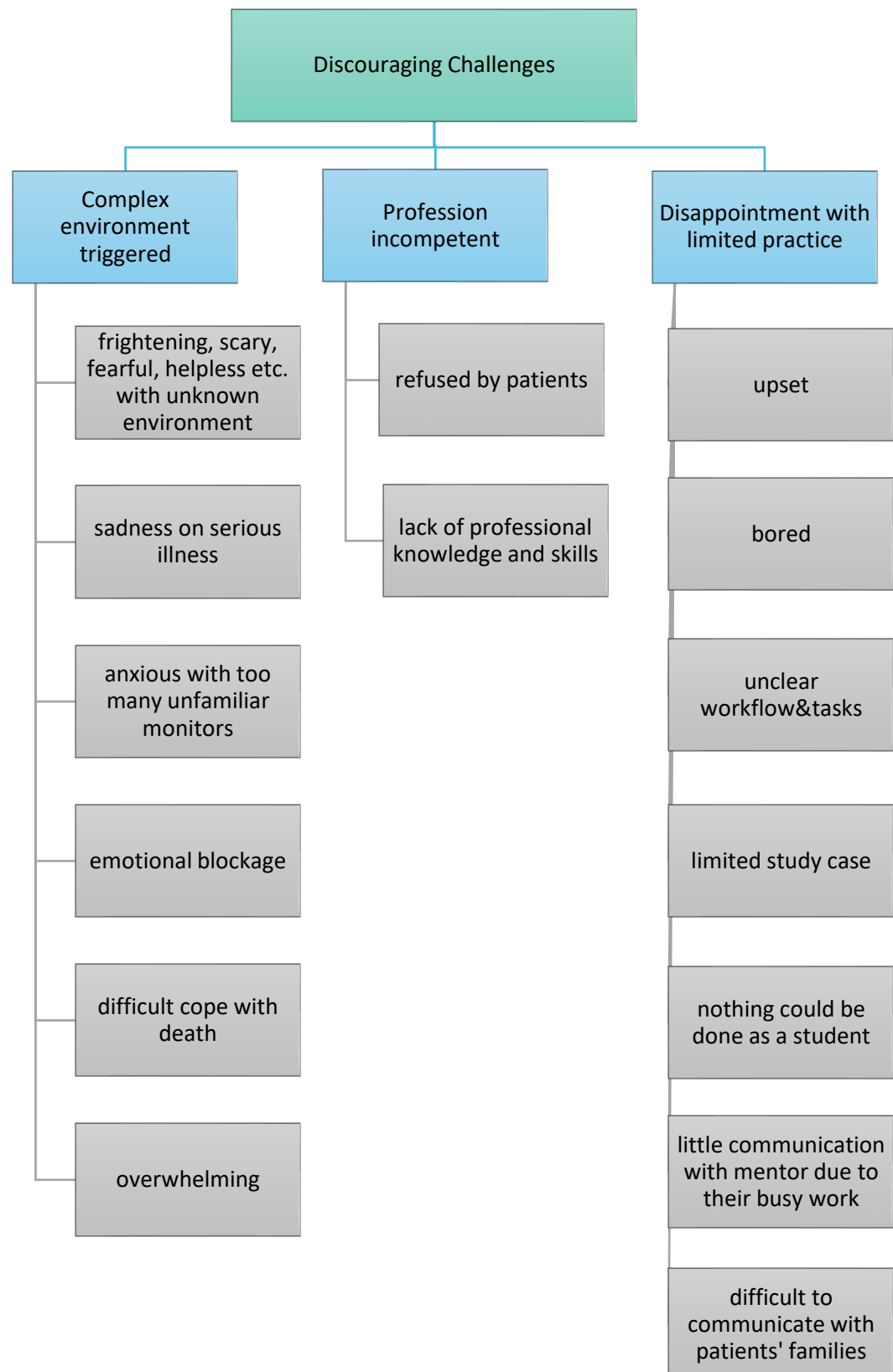
5   Results

Results from analyzing data of the literatures, four main themes of nursing students' experience in ICU were summed up in: discouraging challenges, rewarding achievements, professional identify and inner struggling, as presented as Table 6. The whole analyzing process is presented in Appendix 3.

Table 6. The main experience and sub-themes according to qualitative data
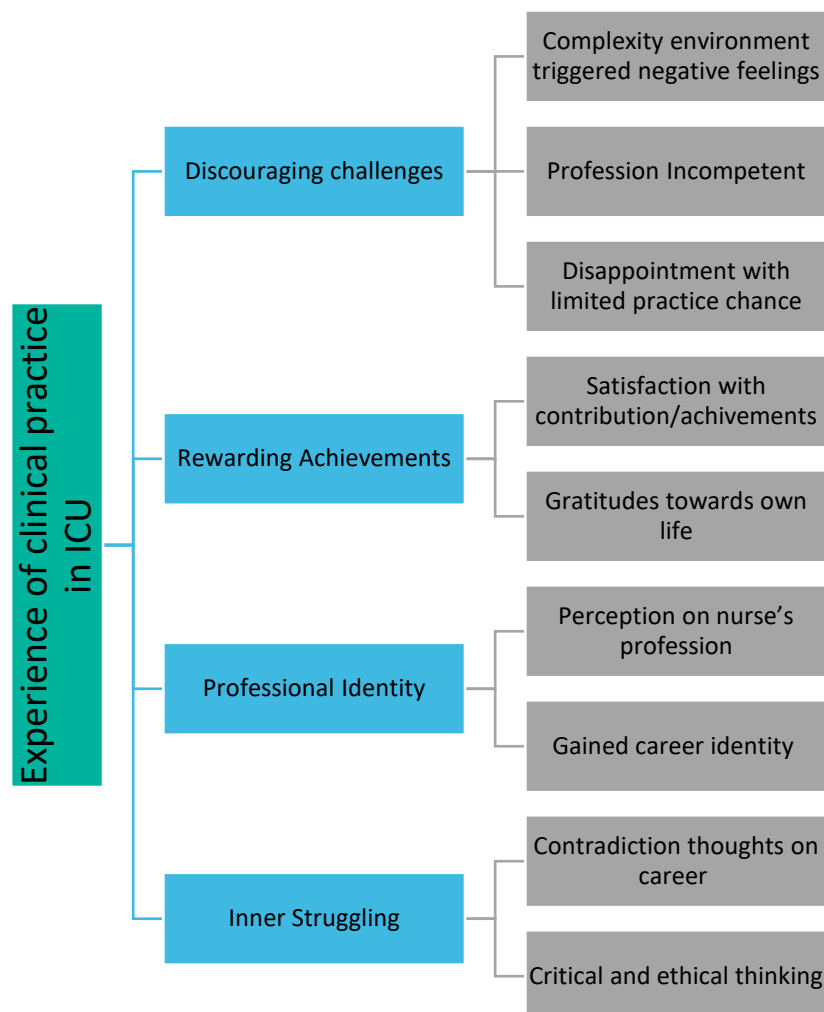
5.1   Discouraging challenges

Complexity environment triggered negative feelings. By reviewing all the articles, the various negative feelings prevailed over the other clinical practice experience in critical medical environment (González-García et al. 2020). Students explained anxious as some of the patients were "terminally ill" (Casafont et al. 2021). Scary, worry,

concern, the question of "what if …" swept in when peers got infected with Ebola virus disease (Edwards et al. 2019), or been recruited to work with COVID-19 (Casafont et al. 2021). Variety equipment, monitors ringing around patients which made students confusing and stressing (Vatansever & Akansel 2016; DeGrade et al. 2018; Sim, Bae & Kim 2021), from exhausted working overload, disappointment witnessing death to finally got anxiety (Vatansever & Akansel 2016; Casafont et al. 2021). In the interviews designed by Vatansever & Akansel (2016), someone felt sorry to the sever ill patients as they are suffering so much pain or unconsciousness. Students could tell the loneness of the isolated patients that lead to tough on mind, much sadness, even anger happened when realizing own incapable (Casafont et al. 2021). A significant point from the study of González-García et al. (2020) showed there's no difference in front of this intensive emotion, the negative emotions happened to both female and male nursing students. Except for the nervous come straitly from environment, students practiced in neonatal intensive care unit told they were afraid of making mistakes too, as that might bring high risks of fatal influence to baby patients (Sim et al. 2021). Lack of trustful friends to pour out blocked emotion after someone passed away caused students' overwhelming (DeGrande et al. 2021).

Profession incompetent. As a newcomer in ICU, unexperienced nursing students met theory-practice gap, they found that the real clinical care is absolutely another thing than school (DeGrade et al 2018; Sim et al. 2021). In the study of Ng & Sun (2013), disappointment was reported by students when they were rejected to provide care by patient, due to lacked professional attitude. Ng stated a contradiction between providing help and doubting own professional happened to the former student. Sim et al. (2021) pointed students realized own deficiency of profession knowledge and skills after seeing the nurse working in NICU. Sim also put forward that the students faced difficulties while communicating with patients' family members. A good deal of treating and operating reminded students that they know little things (Vatansever & Akansel 2016). González-García et al. (2020) mentioned that not only the knowledge learned at school is required, but also the students accepted there are much more to learn in clinical environment like ICU. Examples from that study includes many characteristics from different dimensions, like working attitude, responsibility, good sense of teamwork, self-motivation, accept own mistakes, keep calm at work, etc.

Disappointed with limited practice. Beyond the challenge on students' insufficiency knowledge, to be mentored in an immature way influenced students' experience negatively too. For instance, in the study of Casafont et al. (2021), students experienced unwell-organized mentoring in a sudden pandemic, when they had to "combine" clinical practice and work together. Casafont noticed almost all students found they had unclear guideline, unclear role, and unclear tasks during working/practicing as healthcare aids (HAs) in hospital in COVID-19 pandemic, because of the updating protocols and unavailable reliable sources. Some students in that study frankly spoke that they even didn't know the meaning of being there. Sim et al. (2021) reported a few nursing students felt bored, upset with limited practice chance because they were allowed to do nothing as a student in NICU, those students told if skills performing are limited, at least someone would be able to explain. What worse was they were left alone many of the times as their mentors were too busy to explain anything, it was difficult to "disturb" the busy nurses. Those students also wished someone can introduce them much about machines in NICU and the applied medicine.

5.2   Rewarding achievements

Satisfaction with own achievements and contribution. This is another highlighted major experience of nursing students in clinical practice. A student recalled strong thankfulness and trust from patient's family (Ng & Sun 2013), as family member of a patient was calming him/her to recover peacefully in ICU because they were sure the nursing team was helping fully. Besides, in study of DeGrade et al. (2018), students reported being welcomed by the working team significantly strengthened their spirit to grow braver. They explained as while working with a warm team, the difficult negative emotions are released in an easier way. As time went by, students learned to monitor pain, spent more time with patients, communication skills improved, the complexity environment became quieter and calmer than beginning (González-García et al. 2020). The quickly gained knowledge and skills cheered up students. González-García et al. also presented someone female students figured out that attitude is more above than skills, the good attitude of working gained their confidence of work as a good nurse. The love and support from the family and friends were also valuable

gifts to the nursing students. While seeing own child joining the fight with pandemic, some family showed their tolerance, love, and respect (Casafont et al. 2021).

Gratitude towards own life was a surprise award to some nursing students. Sim et al. (2021) studied the students who participated in NICU spent long time looking at lovely kids, they received the joyful from babies and understood deeper the role of parents. Those students experienced the toilsome long way raising up a baby, thus they couldn't help feeling gratitude to own parents. Except for thankful to families, student reflected on own lives that everything might come the next minute, life is short and anything happened can lead to unchangeable damage (González-García et al. 2020). One student expressed that the practice was "a turning point" in the life as the work remined her/him that everyone has the probability being administered into ICU someday, by this mean, another thing that she/he realized was the significance of psychological support to patients (Vatansever & Akansel 2016).

5.3   Professional identify

Perception on nurses' profession was clearly learned by students, during the positive motion reflected in practicing. Some students grasped the meaning of own role in front of a patient and the responsibility to take (Ng & Sun 2013; Vatansever & Akansel 2016; DeGrade et al. 2018; González-García et al. 2020; Sim et al. 2021). They grasped the difficulty of the nursing work in ICU even though the nurse-patient ratio is low to 1:1, as most of the patient were high dependency which exacerbated the workload, thus students couldn't keep up with the work pace. Some of them expressed the experience showed her/him "the stressful site of nursing profession" (Vatansever & Akansel 2016). Good samples of nurses impressed students. For example, the importance of psychological support was highlighted observing nurses called patients' names rather than bed numbers, respected everyone, lead an opened and positive talk, strict infection control, etc. (Vatansever & Akansel 2016; Sim et al. 2021). Someone felt like "flat-footed" in front of different situations (Sim et al. 2021). Students realised that to continuously study and searching knowledge are demanded to benefit nursing profession, as plenty of theory knowledge and performance need to be learned (Vatansever & Akansel 2016; DeGrade et al. 2018; Sim et al. 2021). The

peers helping each other anytime rather than sitting only with own patients, that made student feel about very warmly nurse working culture in ICU (González-García et al. 2020). DeGrade et al. (2018) reported new graduated students gave feedback it would be better to adjust the characteristic when working as a nurse in ICU. They meant the features like to be brave instead of being shy and keep humble might efficiently reduce mistakes and ensure nursing quality, the character of not able to ask for help working in ICU lead to back out.

Gained career identify. Student practiced in NICU evaluated the work is meaningful, as the nursing procedures to the babies covers both professional medical techniques and life support skills, like monitoring vital signs, pacifying babies, even changing diapers, by touching the soft babies, a strong attachment was established, and they wanted to protect and be responsible on the babies strongly (Sim et al. 2021). In the research of Edwards et al. (2019), nursing students found they had made quite a choice joining the just right field while seeing the peer nurses were so bravely get ready fight with Ebola virus pandemic. They explained they were not afraid of sacrifice themselves when needed to stand out in a sudden clinical crisis, because by saving lives they would make themselves a part of something bigger, sublimation their lives as meaningful. Students who observed nurses working as both good and bad samples, made them to reflect own career (Vatansever & Akansel 2016). They also asked themselves which technique works better while communicating with patients? What kind of interventions open the patients more? And then those reflections drew a clearly picture on the students as what kind of nurse to be or not to be, in the future. Students who participated in COVID-19 patients' nursing care shared that she/he was proud of her/himself as a helpful nurse in the pandemic, and only a few people could have the chance to start their nursing career with such a global medical situation (Casafont et al. 2021).

5.4   Inner struggling

There were **contradiction thoughts on career** came to students' mind after experiencing in specific critical care environment. E.g., NICU, there were susceptions from students as they wondered whether the knowledge learned from NICU are useful in

other wards. A few students thought it might not a good idea to go to NICU for first job after graduating, because they were afraid that they would know no other skills if they changed to another ward (Sim et al. 2021). Besides, students experienced ambivalent thoughts, they would like to be there but also scares to be there, they were struggling between being proud of helping the patients and holding much fearful in front of uncertainties (Casafont et al. 2021). Ng & Sun (2013) reported students felt it seemed not right to experiment on patients, but they had no other way to grow to be a real nurse. There were conflict thoughts among the students in a same group too, as a few of them felt exciting to have potential chance caring a Ebola virus patient, but the classmate who supposed to care a real patient felt fearful, he even got jealous from the other student. (Edwards et al. 2020)

Being in the critical environment stimulated students' **ethical thoughts.** For instance, two of the students were impressed that some patient was restrained and given much sedation the whole day due to preventing catheter withdraw (Ng & Sun 2013), visiting isolated COVID-19 patients were rejected as needed to control the cross-infection strictly (Casafont et al. 2021). The protocols made students feel inhumane, but they had to accept it as nursing plans are made according to demand order, especially facing the situation of a patient whose life is in danger. Another phenomenon was students' family and friends worried a lot when their loved ones need to be exposed in contagious disease, pandemics as a medical staff. Some family members "deeply concerned" told the student that they hope she/he not to go to clinics with (potential) Ebola, as they didn't want own child to die if unluckily got infected (Edwards et al. 2019). Some students felt struggle when they believed in the school and hospital protocols with personal preventing in a pandemic, but their family still hoped their kids may change the career path to another contagious disease unrelated department (Edwards et al. 2019).

Critical thinking. There were not always positive samples showed to students in clinical environment. Some students found a few nurses didn't respect patients' privacy, judged their values upon own thoughts, critical thinking was established that they had an idea of what is wrong and what can be done by themselves in the future.

Comparing to some registered nurse who only followed the "to do list", students had clear mind of recognizing the good care and bad ones. Even the samples in clinical environment didn't show well what kind of behaviors as a nurse should have. The students made own decision with nursing interaction like performing hygiene to make patient feel more comfort, even though it didn't have to be according to registered nurse. They were clear about what kind of nurses to be or not to be in the future career (González-García et al. 2020). Students in study of Sim et al. (2021) pointed they were not enough space for nurses to perform caring in the ward, and they sensed it had negative affection on nursing quality. They further explained the narrow space might reduce working habits which confuse working result, e.g. fail to recognize difference on babies' cry.

6 Discussion

6.1 Discussion of results

This study reviewed seven articles to collect nursing students' clinical experience in the intensive care unit. The four main themes were carried out as a summarization: discouraging challenges, rewarding achievements, professional identify and inner struggling, they are presented as Figure 2. Among the first part discouraging challenges, the result of complexity environment triggered negative feelings remain as the stem experience in the research before, which includes fearful, scary, anxiety, stressful, etc. The commonly happened lack of profession incompetent reflected directly to the studies by Halcomb et al. (2011) and Salem (2021) that the students' profession knowledge didn't match their own perception of competence and readiness going to practice in ICU. Then that points back to the findings in this study: there are theory-practice gaps (Sim et al. 2021) among students which leads to a reality shock (DeGrande el al. 2018) in the later study.

Figure 2. The four main themes of nursing students' experience
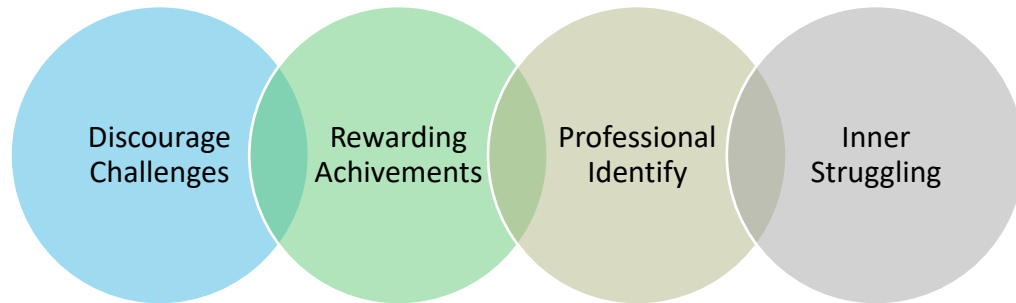
The result of rewarding achievements and the professional identify relate to each other a lot. In one hand, being exposed to real critical care environment broaden students' sight of view in their career (Sim et al. 2021). Students felt strong willingness of proud of themselves with all the interventions applied to patients, then the positive feedback from patient encouraged more to the students with harder working on the knowledge and skills. During this process, the strong career identify was established gradually. And yes, this study verified the research before that it's valuable chance for nursing students to participate in a nursing place like ICU, plenty of knowledges and skills are gained quickly. Looking back to the current situation of lacking nurses in ICU; reported by Halcomb et al. (2011) students expressed to be exposed into ICU for more than one week is significant increase the competence in ICU, and the probability of seeking for a work in such a place. They just echo each other.

A tricky situation here is whether it's good or safe to let student implement nursing care? Salem (2021) pointed out that deficiency knowledge nurse may lead to fatal mistakes on innocent patients. DeGrande et al. (2018) reported the new nurses in ICU had near-miss situations. Also, in the study of Sim et al. (2021) and Vatansever & Akansel (2016) many students shared their boring and disappointment without allowing to handle any professional interventions. But the true learning outcome revealed that even a tiny role student involved brought them strong willing of devote themselves into this career which strengthen the professional identify (Vatansever &

Akansel 2016). Surprisingly, there was a student reflected that to her, learning by watching is one of the best good things in ICU as that deepened her understanding the knowledge from textbook, which idea stranded out of others. Thus, a dilemma arises between ensuring medical safety and the good education outcomes. All those conflicts alert us that there's not always a common phenomenon can be concluded in front of various individuals, the one thousand Hamlets story lies everywhere.

In addition, participating in clinical practice has brought challenges to both nursing students and their tutors in the intensive care unit. The phenomenon like being left alone by the mentors, not enough communication/explanations from the mentors (Sim et al. 2021) and unclear working instructions (Casafont et al. 2021) calling the author to reflect the often-overlooked group-clinical mentors. As mentors expressed their business and lack of time teaching to students in the work (Catherine E O 'Kane 2011). The further study of working out a standard mentoring content might be recommended as that standardize the teaching process from the practice place sight of view which guarantees the mentoring time and quality which bring average learning outcome and reduces the students' struggling.

During this study, a new discovery by González-García and others (2020) calculated the different experience happened to female and male students in ICU. They found that there was a significant difference between the experience reported by male and female nursing students in the learning process, that is, women thought that improving the comfort of basic nursing was more important than skills; However, men pay more attention to "specific knowledge" and affirmed the importance of teamwork, and in similar clinical environments, they have a strong willingness to seek jobs in the later period. This discovery reminds us not to stick to superficial phenomena all the time, but to emphasize these two aspects in clinical education. Teaching students according to their aptitude may bring surprises.

6.2 Ethical considerations, validity and reliability strength and limitation

Review articles are searched from published journals and opened to readers for academic research, there are no potential ethical issues included. Meanwhile, the ideas from each of the articles were cited carefully in both in-text and from the References section (JAMK project reporting instruction 2014). To ensure evidence-based research, a critical appraisal is a process of systematically and carefully evaluating research to judge their value, relevance, and credibility under specific circumstances (Burls 2009). The chosen articles in this study are peer-reviewed original research, the author applied Hawker check list to assess the papers by following the criteria: Abstract and title, introduction and aims, method and data, sampling, data analysis, ethics and bias, results, transferability or generalizability, implications, and usefulness: how important are these findings to policy and practice? (Hawker et al. 2002). The assess result expressed in numbers were based on the degree of conformity with the evaluation criteria of Hawker from 1 to 4: Good=4, fair=3, poor=2, very poor=1 (Hawker et al. 2002). The assessed scores of the articles are in the range from 34-36.

The author believes that these articles are worth studying, because these studies observed the experiences of nursing students based on different cultures and environments. At the same time, this research is valuable, because the selected literature was published in different countries around the world, so the bias against specific regions might be small. In addition, the selected articles were cited 1-29 times, and a considerable number of them were published in 2018-2021, which improved the reliability to a certain extent. In addition, based on the results of the original article, the data were analyzed and summarized. As the author is a novice in research methods, the data analysis has gone through several times (the same results have been obtained) to ensure that the summary is objective. It is very meaningful to sum up the experience of nursing students comprehensively, hoping to play a very good role in supporting the international nursing projects in Finland.

There are limitations in doing this study. By looking at the articles from CINAHL and Pub-Med provided free of charge to JAMK students, the availability of full-text articles reduces the numbers of articles being commented. At the same time, the language published in English was one of the filters used by the author, which might also cut out some good articles. As a junior researcher, the performed searching process might not be complete, so a manual search method was implemented to support it.

6.3   Conclusion and recommendation

The conclusions and recommendations in a literature review should be based on the research results (Endoardo & Alan 2014). At the same time, they mentioned the suggestion is put forward under the consideration of whether there is a clear and accurate summary of results: an instruction on further studying with data support. What has been done? In the study of Eliza-beth & Chris (2013), some resultful support from both the academic side and the clinical department can improve the students' internship experience and parallel study outcomes, through the efforts from both schooling and clinical places. This is a very good idea, that is, transferability. Research by Angelo et al. (2021) found being exposed to high-fidelity simulation of intensive care enhances students' ability of implementing theory to clinical environment, and cheers students' confidence facing critical illness patients.

Further research recommendation. In view of the existing problem of "theory-practice gap", it is suggested that nursing students should be given some knowledge or guidance to support their learning, which can be used as a "bridge" to connect the gap between theory and clinical practice in the fast-paced intensive care environment. In the research of Salem (2021), some similar suggestions were given, such as developing projects to improve the tutor's ability or providing partners for newly graduated intensive care unit nurses. It's been approved as a good try and might be more efficient if optimized more. For instance, based on this study, the cognitive differences between male nurses and female nurses on nursing profession should be considered, which requires that the "bridge" cover all the needs of future nurses. To

add some friendly reminds of coming intense emotion which may drive students anxious, but teel students to relax because there's always a team standing behind and supporting them; In addition, many of the mentioned fearful anxious about unknown environment happened before joining ICU (Sim et al. 2021); Thus, the pictures of ICU environment can be introduced in advance to nursing students for a preview of the plot, in order to reduce the intense emotion caused by the critical and complicated clinical environment. It is considered as an advisable forward-looking step, which can be easily copied and implemented in different cultures and environments.

In addition to research issues, the author also consulted some related articles on research issues. For instance, the readiness and preparedness of nursing students going to practice in ICU by Salem 2021. Salem reported an interesting and important correlation, that is, students who work during the education process are less capable of clinical knowledge than those who didn't work. However, it did not mention whether the works were related to nursing professions. Therefore, another further research topic may focus on whether does nursing students' working experience (in their profession) in the process of education affects the educational results, if so, how?

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Appendices

Appendix 1. Critical Appraisal of the articles (Hawker et al. 2002)

	Author	1 Abstract and title	2 Introduction and aims	3 Method and data	4 Sampling	5 Data analysis	6 Ethics and bias	7 Results	8 Transferability or generalizability	9 Implications and usefulness	Total score
1	Sim, Bae & Kim 2021	4	4	4	4	4	4	4	4	3	35
2	Casafont, Fabrellas, Rivera, Oliv´e-Ferrer, Querol, Venturas, Prats, Cuzco, Frías, P´erez-Ortega, Zabalegui 2021	4	4	4	4	4	3	4	4	4	35
3	González-García, Lana, Zurrón-Madera, Valcárcel-Álvarez, & Fernández-Feito 2020	4	3	4	4	4	4	4	4	4	35
4	Edwards, Mintz-Binder, Jones, 2019	4	4	4	4	4	3	4	4	4	35
5	DeGrande, Liu, Greene & Stankus 2018	4	4	4	4	4	4	4	4	4	36
6	Vatansever & Akansel 2016	4	4	4	4	3	3	4	4	4	34
7	Ng & Sun 2013	4	4	4	4	4	2	4	4	4	34

Appendix 2. Summary of reviewed articles

Authors, (Year), Country	Article Title	Purpose and Aims of the Study	Research Methods or Instrument	Sample (*n*)	Main Results	Critical Appraisal (Hawker et. al 2002)
Sim, Bae & Kim 2021. (South Korea)	South Korean nursing students' experiences of clinical practice in the new-born nursery and neonatal intensive care unit: A phenomenological study.	To understand nursing students' clinical experiences in newborn nurseries and neonatal intensive care units and to provide basic data for the establishment of strategies to promote effective clinical education.	A qualitative research design using Colaizzi's phenomenological analysis method to obtain an in-depth understanding of the research phenomenon and to describe nursing students' clinical experiences.	15 participants were in their junior or senior year and had completed and experienced clinical practice in both the newborn nursery and NICU.	Expectations for and anxiety about clinical practice. Acquisition of a wide range of knowledge regarding neonatal nursing. Challenges faced in clinical practice. Experiencing interpersonal changes.	35
Casafont, Fabrellasb, Riveraa, Oliv´e-Ferrerb, Querol, Venturas, Prats, Cuzco, Frías, P´erez-Ortega, Zabalegui 2021. (Spain)	Experiences of nursing students as healthcare aid during the COVID-19 pandemic in Spain: A phenomenological research study.	To explore and understand the experience of nursing students' roles as healthcare aid in responding to the COVID-19 crisis.	A qualitative phenomenology design was used to explore undergraduate nursing students' perceptions of their experiences during the COVID-19 outbreak.	A purposive sample of 10 fourth year students contracted as HAs was recruited.	Learning, ambivalent emotions and adaptation were classified at a personal level; teamwork, patient communication, and unclear care processes were categorized under hospital structure; and coping mechanisms were part of external factors.	35

González-García, Lana, Zurrón-Madera, Valcárcel-Álvarez, & Fernández-Feito 2020. (Spain)	Nursing Students' Experiences of Clinical Practices in Emergency and Intensive Care Units.	To explore the experience of final year nursing students during their clinical placement in emergency and intensive care units and to identify whether differences exist between female and male students.	A qualitative study using documentary analysis of RLJs written by nursing students in their senior year during their clinical practices.	15 female students, 13male students.	Both male and female students experienced intense emotions, improved their learning in complex environments and acquired attitudes linked to the humanization of care. But the other experience was different between female and male students.	34
Edwards, Mintz-Binder, Jones 2019. (United States)	When a clinical crisis strikes: Lessons learned from the reflective writings of nursing students.	To reflect journaling related to an unexpected crisis as it unfolded through the eyes of nursing students.	The students' unedited experiences were captured through the technique of reflective journaling and written comments were analysed using qualitative design with thematic analysis.	10 students joined the hospital for their clinical rotations.	Identified as an array of emotions, nursing as a calling, and personal protection.	35

DeGrande, Liu, Greene & Stankus 2018. (United States)	The experiences of new graduate nurses hired and retained in adult intensive care units.	To explore the experiences of nurses who were hired into adult intensive care as a new graduate and survived their transition from novice to competent.	The study used the qualitative hermeneutic phenomenology research approach.	11 Participants were recruited across Texas via purposive and snowball sampling.	Themes as confidence and uncertainty, gaining experiences and forever learning, difficult and stressful, courage and assertiveness, and the team and support persons. (Only the experience at the beginning of graduate were collected according to the research question)	36
Vatansever & Akansel 2016. (Turkey)	Intensive Care Unit Experience of Nursing Students during their Clinical Placements: A Qualitative Study	The aim of this study is to determine nursing students' ICU experiences and expose how these experiences influence them.	A qualitative content analysis was done.	18 students from February to May 2011 in ICU units of a University Hospital.	Perceptions about ICU environment and patients. Thoughts about being an ICU nurse. Comprehension of communication and empathy with ICU patient. Contribution of patient caring activities in learning.	34

Hou Tek Ng; Ho Ian Sun, 2013. (Macau China)	Experiences that affect development of professionalism of nursing students during clinical practicum in critical care unit (ICU & CCU)	To investigate the critical incidents experienced by nursing students during clinical practicum in critical care unit (ICU&CCU) and the influence of those critical incidents.	A qualitative study was conducted on questionnaire with two open-end questions was given to nursing students just after they finished their clinical practicum in the intensive care unit.	47 nursing students' ICU clinical practice experience in their final year of bachelor's degree programme.	The incidents of patient care provided by themselves influence their professionalism in three themes: realizing the meaning of nursing, promoting professional identity, and struggling.	34

Appendix 3. The theme merging process of literature review

Initial codes	Sub-themes	Themes
-Frightening, scary, fearful, helpless with the unknown -Sadness for serious illness -Anxious with too many monitors -Emotional blockage -Difficult cope with death -Overwhelming -Dehumanized interaction like rest	Complexity of critical environment triggered feelings	Discouraging challenges
-Received negative feedback from patients -Lack of enough knowledge and skills	Profession Incompetent	
-Upset, bored with limited practice chances -Unclear workflow, tasks -Not many cases to study -Nothing could be done as a student -Own mentor was busying with work, not teaching much -Difficult to communicate with critical illness patients and families	Disappointment with limited practice chance	

-Received thankfulness from patients -Gained successful experiences, make contributions in teamwork -Felt very welcomed from nursing team -Positive supports from own family -Knowledge and skills improved quickly -Reflected on own life and family relation, based on clinical observing -Moral development, interpersonal maturity	Satisfaction with contribution and achievements Gratitude towards own life	Rewarding achievements
-Nurses are very responsible to patients -Very good work attitude, showing love and humanity to the patient -Quick work pace, e.g. decision making and problem solving -Teamwork is significant in working -Comparing to students, registered nurses work quite calmly and proficiency -Realising meaning of nursing -Forever learning is demanded as always something new happens to critical environment -Too much and wide knowledge need to be learned -Workload is heavy -Never be shy is compulsory to achieve better teamwork -Initiated caring idea were stopped, but critical thinking was established as "to be or not to be"	Perception on clinical nurse's profession Gained career identify	Profession Identify
-Maybe not a good path to be as first job later -Suspect if learned knowledge are useful in other wards -Family and friends worry when students were exposed in contagious environment -Poor working environment, e.g., deficiency space, monitors, etc. -Sad to keep patient restrict but had to do so -Trust school and hospital when joining pandemic, but feel sorry to family for making them worry -Being refused by patients but need to adjust own attitude of learning -Critical thinking if work instruction were proper	Contradiction thoughts on career Critical, ethical thinking	Inner Struggling