Osaamista
ja oivallusta
tulevaisuuden
tekemiseen

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Recognizing and Preventing ICU Delirium in Intensive Care

A Descriptive Literature Review

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ICU delirium is a poorly known life-threatening condition unless diagnosed and treated early. ICU delirium risks factors are known however, it remains misdiagnosed or underdiagnosed. The purpose of this thesis is to identify factors affecting recognition of ICU delirium and the available preventive interventions in intensive care unit. The aim is to produce knowledge that could be used in developing and improving ICU delirium management in intensive care.

Thesis topic was done as part of HUS (Helsingin ja Uudenmaan Sairaanhoitopiiri) neuro centre and Metropolia UAS collaboration. The COVID-19 pandemic caused intensive care units overly capacitated with patients in need of intensive care. This made the implementation of ICU delirium assessment and preventive measures almost unachievable due to lack of additional resources.

The data of recognition of ICU delirium and the preventive measures was collected from the following reliable sources; CINAHL, Medline and Medic. With the use of key terms, initial search result were 5,352 articles of which ten articles were utilised. Inductive content analysis was used to analyse the results that answered research questions; How is ICU delirium recognized by nurses in intensive care unit? and How could the ICU delirium be prevented?

Result of the study states that nurses have poor knowledge and perception of ICU delirium and there is a need for additional training. Nurses were familiar with ICU delirium assessment tools and existing non-pharmacological interventions. Nurses with long work experience have attitude that influence their adherence to the ICU delirium guidelines, by relying on their personal judgement instead of using assessment tools. Moreover, several ICU delirium preventive interventions were revealed.
Hospital management should provide nurses with further education on ICU delirium to improve the quality of patient care and enhance the competence of nurses. With ICU delirium being fatal it is a matter of patient safety and getting the right treatment at the right time.

Keywords	Delirium, intensive care unit (ICU), critical care, intervention, treatment, nursing

Tekijät Otsikko Sivumäärä Aika	Irene Pakarinen & Minna Eklund Tehohoito-deliriumin tunnistaminen ja ennalta ehkäisy tehohoidossa 29 sivua + 2 liitettä 25.03.2022
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Tehohoito-delirium on huonosti tunnettu hengenvaarallinen tila, ellei sitä diagnosoida ja hoideta aikaisessa vaiheessa. Riskitekijät tiedetään, mutta se on edelleen väärin- tai alidiagnosoitu. Tämän opinnäytetyön tarkoituksena oli kuvata tehohoito-deliriumin tunnistamiseen vaikuttavia tekijöitä sekä tehohoitoyksikössä käytettäviä ennaltaehkäiseviä toimenpiteitä. Tämän opinnäytetyön tavoitteena on tuottaa tietoa, jota voitaisiin käyttää tehohoito-deliriumin hoidon kehittämisessä. Tietoon sisältyy tilan tunnistamiseen vaikuttavia tekijöitä ja käytettävissä olevia ennaltaehkäiseviä toimenpiteitä.

Opinnäytetyö tehtiin osana HUS (Helsingin ja Uudenmaan Sairaanhoitopiiri) Neurokeskuksen ja Metropolia UAS yhteistyötä. COVID-19-pandemia kuormitti tehohoitoyksiköitä, jotka olivat ylityöllistettyjä tehohoitoa tarvitsevien potilaiden kanssa. Tämän seurauksena tehohoito-deliriumin arviointi ja ennaltaehkäisevien toimenpiteiden toteuttaminen oli haastavaa puutteellisen lisäresurssin vuoksi.

Data tehohoito-deliriumin tunnistamisesta ja ennaltaehkäiseviä toimenpiteistä kerättiin seuraavista lähteistä; CINAHL, Medline ja Medic. Alkuperäinen hakutulos oli 5, 352 artikkelia, joista opinnäytetyöhön hyödynnettiin kymmenen artikkelia. Analysoinnissa käytettiin induktiivista sisältöanalyysiä, jonka tulokset vastasivat tutkimuskysymyksiin; Miten sairaanhoitajat tunnistavat tehohoito-deliriumin tehohoitoyksikössä? ja Miten tehohoito-delirium voidaan ehkäistä?
Tutkimuksen tuloksista ilmenee sairaanhoitajilla olevan puutteellista tietoa tehohoito-deliriumista, sekä lisäkoulutuksen tarvetta. Sairaanhoitajien, joilla on pitkä työkokemus, asenne johti siihen, että he luottivat tehohoitopotilaiden hoidossa omaan arvioonsa ja harkintaansa arviointityökalujen käytön sijaan. Myös useita tehohoito-deliriumia ehkäiseviä interventioita tuli ilmi tutkimuksessa.

Sairaalajohdon tulisi tarjota sairaanhoitajille jatkokoulutusta tehohoito-deliriumista hoidon laadun parantamiseksi ja sairaanhoitajien osaamisen kehittämiseksi. Tehohoito-deliriumin ollessa vakavimmillaan kuolemaan johtava tila, lisätutkimuksia tarvitaan potilasturvallisuuden sekä oikeanlaisen että oikea-aikaisen hoidon turvaamiseksi.

Avainsanat	Delirium, Teho-osasto, Tehohoito, Interventio, Hoitomenetelmä, Sairaanhoito

1 Introduction

ICU delirium is common and underdiagnosed condition among intensive care patients. It is a serious medical condition during hospitalization that commonly manifest an acute brain dysfunction, therefore early identification of risk factors associated to ICU delirium is very essential to facilitate prevention and management strategies of delirium (Hughes, Pandharipande & Ely 2020:13,39). ICU delirium refers to a sudden state of confusion and brain failure, which can be caused by various organs and diseases. It is caused by a disturbance in the functioning of the central nervous system, a wide range of diseases, fluid balance disorders, post-surgery conditions, poisonings, medications as well as alcohol and other intoxicants or their sudden cessation can be underlying the condition. In the state of confusion, a person's level of consciousness, attention span and attention are impaired. In addition, delirium is characterized by developing in a short period of time, from a few hours to one day. (Huttunen 2018.) ICU delirium is linked to poor outcomes of intensive care unit patients, caused prolonged hospital stays and increased in the cost of healthcare.

Previous studies showed ICU nurses having lack of competence in recognition and identification of ICU delirium which were linked to nurses having lack of education. The purpose of this thesis is to identify factors affecting recognition of ICU delirium and the available preventive interventions in intensive care unit. The aim is to produce knowledge that could be used in developing and improving ICU delirium management in intensive care. Additionally, the event of covid 19 pandemic, has been affecting the health care system due to large number of covid patients and the increased need for ventilatory care. Due to pandemic, there was an increased use of drugs, increased mortality rate, and an increased in the over-all cost of patient care. (Kotfis et al. 2020: 4-5; Pun et al. 2021: 246-247.) In this circumstance, nurse’s understanding and expertise of ICU delirium improves patient’s ICU outcome and will enhance the effectivity of treatment and rehabilitation. Thesis was done as part of HUS neuro centre and Metropolia UAS collaboration.

2 Background

2.1 ICU Delirium

ICU delirium is a serious medical condition during hospitalization that commonly manifest an acute brain dysfunction (Hughes et al. 2020: 13,39). It is referred to as a sudden state of confusion and brain failure, caused by a disturbance in the functioning of the central nervous system, resulting from a wide range of diseases (Huttunen 2018). Most often, ICU delirium manifests itself on the second or third day of intensive care and takes about three days (Koivula & Peltomaa 2017). During postoperative condition, delirium occurs in 15% to 53% among older adults, from which 70% to 87% happens in the ICU (APA 2013: 600).

Symptoms of ICU delirium may include confusion, voice and auditory hallucinations, problems in concentration and a diverse sleep rhythm. Aside from the patient being disoriented, the speech can also be confusing and unclear. A confused patient is incapable to focus, he may as well misinterpret the environment leading to exhibit illusion, hallucination, delusion, and fear that would also cause agitation. The intensity of the symptoms can vary during the same day, and a person may be almost asymptomatic in between. Furthermore, the function of the patient's autonomic nervous system is accelerated, as a result the patient sweats and heartbeat increase, blood pressure and temperature are elevated, and the pupil of the eyes dilates. (Huttunen 2018.)

2.2 ICU Delirium Subtypes

ICU Delirium is divided into three clinical subtypes and are categorized according to the level of alertness and psychomotor activity. The clinical classification includes hyperactive delirium, hypoactive delirium, and mixed subtype. Patient with hyperactive delirium, are described to be agitated, combative and disoriented which often, cause them to be at risk for injury. Due to disruptive behaviour and danger, patients suffering hyperactive delirium are the one’s received the most clinical focus in intensive care unit. The hypoactive delirium on the other hand, is often called silent delirium which occurs in more than fifty per-cent of hospitalized patients. Patients with this type of delirium, do not exhibit disruptive behaviour causing it to be undiagnosed and underestimated unless they are screened and actively monitored by validated clinical instruments. Mixed type delir-

ium is described to be fluctuating in nature. In some cases, patients experiencing hyperactive delirium were given sedatives to calm down. After which, patients emerged from sedation to hypoactive state. Quantifying the frequency of this delirium subtype is quite challenging due to rapid changes of the symptoms. (Hughes et al. 2020: 4-6; Sole, Klein, Mosely, Makic & Morata 2021:74.) However, in conditions where patients are delirious and agitated, ICU delirium is also often referred to as ICU psychosis or sundowner syndrome (Urden, Stacy & Lough 2020:76).

2.3 Risk factors and Assessment of ICU Delirium

Pathophysiological mechanism causing the development and progression of delirium is unknown (Sole et al. 2021:75). Factors predisposing to delirium includes high age, weakened general condition, earlier brain damage, medication, substance use, and impairment of vision and hearing. Other conditions such as fluid balance disorders, post-surgery conditions, poisonings, medications as well as alcohol and other intoxicants or their sudden cessation can also be an underlying cause of the condition. (Huttunen 2018.) List of the ICU delirium risk factors presented in Table 2. Previous studies revealed other contributing factors such as lack of knowledge and familiarization of ICU delirium which put patients at risk for developing the condition. Having insufficient knowledge led to lack of sensitization on the care of older patients that are known to be more vulnerable to ICU delirium. Insufficient patient guidance and inappropriate assessment of ICU delirium was exhibited. By the absence of patient's routine such as using their familiar items in the ICU, excessive lights and noise affecting patient's sleep, triggers the development of ICU delirium. Nurse's perception of family's involvement in patient care was poor, leaving them with insufficient communication. (Faustino, Chaves Pedreira, Seixas de Freitas, de Oliveira Silva, & Bezerra do Amaral 2016:680-683.) The insufficient knowledge of ICU delirium was influenced by the non-availability of guidelines in the intensive care unit (Christensen 2016:13).

Unanticipated event of COVID-19 caused burden to the overall healthcare system specifically in the intensive care unit. Nearly 90% of the COVID-19 patients admitted to ICU requires mechanical ventilation and the use of sedating drugs had increased. The condition in hospitals hardest hit by the virus, was so serious that flexible approached was needed to manage the situation. The implementation of the ABCDEF bundle is almost unfeasible as workforces and resources were getting drained. For vulnerable patients,

social distancing and quarantine exposed them even more to develop ICU delirium especially older adults with limited or no support from care givers. (Kotfis et al. 202: 2-3.)

Despite the unknown pathophysiological cause of ICU delirium, there are existing validated instruments available and used for assessment. Two of the most frequently used are the Intensive Care Delirium Screening Checklist (ICDSC) and Confusion Assessment Method for ICU (CAM-ICU). ICDSC is an eight-item screening checklist which is based on the criteria of the Diagnostic and Statistical Manual of Mental Disorder (DSM). The ICDSC checklist presented in Table 3. The CAM-ICU is a serial assessment tool which is designed for use by bedside medical personnel. (Sole et al. 2021:75.) To diagnose ICU delirium, medical staff should exclude life threatening conditions that require immediate treatment, such as metabolic disorders, intracranial haemorrhage, infections, and hypoxia (Koivula & Peltomaa 2017). However, despite of the existing assessment tools, nurse's competence in the intensive care unit were still insufficient in identifying ICU delirium. According to Elliot (2014: 333-337), 44% of the 76 intensive care unit personnel who responded to the survey had never received training on ICU delirium. Indeed 33% of medical staff used their own judgement when assessing the patient. As a result, delirium prolongs and significantly delays the patient's recovery process. Delirium is also poorly identified because of using several names such as encephalopathy, ICU psychosis, altered mental status, and catatonia. (Spiegelberg, Song, Pun, Webb & Boehm 2020: 34.)

Table 2. List of ICU delirium risk factors (Koivula & Peltomaa 2017).

Acute disease	Infection Sepsis, encephalitis, meningitis Acute Respiratory Failure Syndrome (ARDS) Hypoxia Multiorgan Disorder (MOF) Drug or narcotic intoxication Metabolic disorders Hypoglycaemia, electrolyte disorders Cerebral circulation disorder
Other diseases	Other Diseases Basic diseases For example, heart or kidney failure, diabetes, hypertension Past Disorder of Cognitive Functions Memory Disease Impaired hearing or vision

	Neurological disease for example, seizures, cerebral circulation disorder Abundant alcohol use Nicotine addiction
Treatment or Environmental Factors	Use of Sedatives and Opioid Immobilization (resting bandages) Respiratory apparatus therapy Parenteral nutrition Lack of sleep or sleep problems Malnutrition Anemia Restless environment

Table 3. Intensive Care Delirium Screening Checklist ICDSC (Koivula & Peltomaa 2017).

Abnormal consciousness	If the patient has awakened or he overreacts to ordinary stimuli
Attention	Difficulties follow conversation or instructions, or the patient is sensitively disturbed by external stimuli.
Disorientation	Incapable of correctly determining time or place or identifying persons
Hallucination	Sensory Delusion (sees visions or hears non-existent voices)
Agitation	Restlessness or hypoactivity
Speech	Inappropriate or confusing speech or mood
Sleep rhythm	Sleeps less than 4 hours a night or wakes up densely (although the environment is calm) or sleeps throughout the day
Variation in symptoms	Change in any of the above, for example, is instantaneously oriented and in the next moment confused

2.4 Treatment of ICU Delirium

ICU delirium can be managed both with pharmacological and non-pharmacological interventions. Non-Pharmacological interventions include stabilizing the patient's sleep rhythm. Early mobilization and rehabilitation of the patient contributes to the healing process. Reorientating the patient by informing the reason of the medical procedure and repetitive reminder of their location. Providing the patient with the option of using familiar

objects or personal aids, creates a safe environment to cope with delirium induced confusion. Especially in neurological and neurosurgical patients, nonpharmacological methods were preferable than sedatives. Medical staff need to be able to monitor the patient's neurological status constantly. (Koivula & Peltomaa (2017.) Early intensive care intervention such as ABCDEF bundle should be used to optimize patient's recovery. Each letter of this preventive bundle constitutes evidenced based interventions in preventing and managing ICU delirium. Letter A of the bundle stands for assess, prevent, and manage pain. Letter B is used to represent both spontaneous awakening (SAT) and breathing trials (SBT). Letter C represents the choice of analgesia and sedation. Letter D represents delirium, assess, prevent, and manage. Letter E was assigned for early mobility and exercises. Letter F was added to represent family's contribution as well as empowerment in the care of patient with ICU delirium. The use of ABCDEF bundle as preventive intervention, is effective, beneficial, and coordinate multidisciplinary approach in the care of the ICU patient. (Marra, Ely, Pandharipande & Patel 2017: 225, 234.)

Educating nurses and other intensive care unit personnel, was another intervention supported by previous studies. Educational intervention had raised awareness and update the knowledge of the ICU medical personnel. Monitoring ICU patients and implementation of preventive intervention were enhanced. Thru education, the quality of care had improved. ICU nurses had critically reflected in their work and the care they provided for the patients. Family's involvement in patient care, such as reorientation and cognitive stimulation was upheld, instead of pharmacological intervention and physical restraint to control the condition. (Faustino at al. 2016:680-683.) Thus, family's involvement in the patient's care plan should always be considered (Torres Contreras et al. 2021:2; Smithburger, Korenoski, Kane-Gill, & Alexander 2017: 51). Positive attitude of ICU nurses had a great contribution to the recognition, assessment, and management of ICU delirium. Being the primary and direct care provider, nurses were in a good position to lead the interprofessional collaboration regarding patient care in intensive care unit. (Oosterhouse et al. 2016: 389.)

During an episode of ICU delirium, pharmacological intervention involves drug therapy as prescribed by doctor. Typical drugs for ICU delirium treatment includes haloperidol and antipsychotics. Benzodiazepines should be avoided in treating ICU delirium, as they may cause confusion. However, for alcohol delirium and withdrawal symptoms, benzodiazepines are used as treatment. (Koivula & Peltomaa 2017.)

3 Key Terms

To better facilitate and support the understanding of ICU delirium, important terms were identified. These terms were utilized during database search and throughout the study. The key terms included were delirium, critical care, intensive care unit (ICU), nursing, treatment, and intervention.

Delirium was described as any disturbance in attention and awareness accompanied by changes in baseline cognition which is not related or caused by any existing or evolving neurocognitive disorder (APA 2013: 599).

Critical care was referred as an intensive care given to highly dependent or critically ill patients (NICE 2021). While the National Health Service, described *intensive care unit* as hospital ward specially designed to provide treatment and monitoring of critically ill patients (NHS 2019).

The American Nurses Association, defined *nursing* as a heart and mind, possessing fundamental respect for human dignity, and the ability to identify patient's needs. Nursing includes rigorous core learning, critical-thinking and application of scientific based knowledge in caring for the patient. (ANA 2021.)

Treatment was defined as a medical care given to a patient for the illness or condition that needs medical attention (Lexico 2021a). Whereas *intervention*, was referred to as an action taken to address the need to improve medical condition (Lexico 2021b).

4 Purpose, aims and study questions

The purpose of this thesis is to identify factors affecting recognition of ICU delirium and the available preventive interventions in intensive care unit. The aim is to produce knowledge that could be used in developing and improving ICU delirium management in intensive care. The knowledge gained from the thesis can be used by ICU nurses and nursing students.

This study was conducted to answer the following study questions:

1. How is ICU delirium recognized by nurses in intensive care unit?

2. How could the ICU delirium be prevented?

5 Methodology and methods

5.1 Methodology

Research is a systematic, rigorous, and critical investigation. It should aim to answer questions about nursing phenomena and a researcher should follow scientific processes in conducting research (LoBiondo-Wood & Haber 2018: 6-9). It is a form of systematic inquiry that uses disciplined methods for answering questions or solving problems that aim to develop, gain, and utilize the knowledge beneficial to many. Conducting nursing research, engaged with disciplined studies and continuously develop evidence that support and benefit nursing practice and its clients. Consequently, it enhanced the understanding and helped nurses to understand, adopt and conform to evidence-based practices. (Polit & Beck 2022:2.) Methodology in research, refers to the systematic study of the research process. It concerns the general guidelines for conducting research and consider the science and philosophy behind research methods. (Thomas 2021:29.) It is a way of solving research problem systematically that researchers need to know and design (Kothari 2004:8). In conducting nursing research, diverse methodologies were applied due to its wide scope; therefore, qualitative, quantitative, or mixed methods (both qualitative and quantitative) can be used. (Kyngäs, Mikkonen & Kääriäinen 2020: 3,5,32.) This thesis applied qualitative methodology to produce a descriptive literature review that identify factors affecting the identification of ICU delirium and the preventive interventions being used in the Intensive Care Unit (ICU).

5.2 Descriptive Literature review

Literature review is logical and comprehensive representation of the established knowledge on a certain phenomenon and serving different purposes in accordance with the nature of inquiry (Machi & McEvoy 2016:5). Literature review is also used in identifying the strengths and weaknesses of the existing knowledge through analysing, critically evaluating, and synthesising (Dingwall & Staniland 2021: 56-57; Hart 2018:3). According to Kankkunen & Vehviläinen-Julkunen (2017: 91-92), literature review is conducted on both quantitative and qualitative studies with the purpose to identify a research problem, research question or hypothesis. In quantitative research, its contribution is significant because existing literature is used as metrics of research results. When conducting a

review, there may be an ambivalence of the findings thereby, it is necessary to be critical whether research has been conducted from different perspectives and whether it is possible to obtain adequate information.

Descriptive literature review, provide a detailed and concise summary of previous studies together with the research methods, results, and evaluations of the cited studies (Jaidka, Khoo & Jin-Cheon 2013: 304,319). The aim of the descriptive literature review is to describe and understand a certain phenomenon and identify significant relationship between factors as well as to present an empirical basis for valid argument (Hart, 2018: 67; Kyngäs et al. 2020:3-4). Hence, this method was chosen in making this thesis. By opting to descriptive literature review, being subjective and bias was avoided due to ethically, logically, and clearly outlined methodology used. (Fink 2014:12; Coughlan, Cronin & Ryan 2013: 14-16,118).

5.3 Data collection and selection

Data used for this thesis was selected and extracted by searching, reviewing, and analysing, published research articles from CINAHL Complete, Medline and Medic data bases. Selected articles were about ICU delirium, recognition, assessment, and ICU delirium treatment. In addition to database search, manual searching was executed to support the understanding and to acquire additional knowledge of ICU delirium. Available clinical textbooks and e-books from Metropolia University of Applied Sciences library were also utilized. The free dictionary online, Lexico was as well used in defining some of the key terms.

Cumulated Index to Nursing and Allied Health Literature (CINAHL) is an index of authoritative and quality source of information and literature. It has a wide range of relevant materials, journals and publication including nursing, biomedicine, healthcare, and other allied health disciplines in English and other selected languages. (EBSCO 2021.) As Polit & Beck (2022: 93-94) claims, CINAHL is an important database for nurses, as it covers references of thousands of nursing and allied health books, journals, and dissertations. Together with MEDLINE, these two electronic databases were especially useful for nurses. Medline is the premier bibliographic database of the National Library of Medicine's (NLM) containing more than 28 million different references to journal articles. It focused on biomedicine and had the records indexed with the NLM Subject Heading (MeSH) as one of its distinctive characteristics (NIH 2021.) Medic is a science database

produced by the University of Helsinki Library containing medical science articles, books, dissertations, theses, and reports from research institutes. The data base contains more than 120,000 references published each year starting from 1978 (Medic 2021).

Articles were extracted from databases using the key terms delirium, critical care, intensive care unit (ICU), nursing, treatment, and intervention. Boolean techniques and operators “AND” and “OR” were used during the search. Key term combinations were composed of “delirium AND ICU OR critical care, intensive care AND nursing” and “delirium AND ICU OR critical care, intensive care AND/OR nurs* AND treatment.” Limiters were also applied to further narrow down search results which includes full text, peer reviewed, English language, abstract available and year of publication from 2016-2021. Aside from the limiters mentioned above, there are additional inclusion and exclusion criteria for selecting the articles such as: ICU delirium, articles that answered the study questions, research articles, good quality articles and from good quality journals. Excluded articles were not related to the topic, were not answering the study questions, articles of paediatric patients and not adult patients, not research articles and articles older than 2016. After which, the abstract of the chosen articles were read. Based on the result from reading the abstracts, 20 articles were chosen to read in full text. Selected articles were from primary sources, written by the researcher. (Coughlan et al. 2013:78). Result of the database search expressed in Table 1 attached in the appendix.

The process of data selection is presented though Prisma diagram in Figure 1. By utilizing key terms and Boolean technique, initial search yielded 5352 articles. To reduce the amount of search result, limiters were applied, which were peer reviewed, English language, publication year of 2016-2021, full text, and abstract availability. The search result yielded 452 articles and excluded 4900 other articles which were not corresponding to the applied limiters. After applying the limiters on the search process, articles were then selected by title which further reduced the number of articles into 83, while 369 other articles were excluded. The title of the selected articles was relevant to recognition of ICU delirium and preventive interventions in intensive care units. Further screening continued by reading the abstract of each article. This process further reduced the number of articles into 43 articles and excluded 40 other articles. The selection criteria for abstract were those articles that answered or was of relevance to the study questions. Lastly 40 selected articles were read in full and further evaluated with the relevance and relationship to the study questions. By this evaluating process, number of articles was further reduced, yielding 20 articles, and excluded 23 other articles. Excluded articles

were not directly answering the study questions or had no relevance. The 20 selected articles were arranged in a table according to the author and year of publication, journal name where the article was published, title of the article, methods and methodology used, participants in the study, and main outcomes.

The quality of the 20 selected articles were appraised by using Joanna Briggs Institute (JBI) checklist. According to Joanna Briggs Institute JBI (2017), when conducting a systematic review, it is important to ensure the quality of the articles referenced. Using JBI quality criterion, ensured that the articles selected for the thesis were of good quality. In the criterion, there are eleven questions. By answering the implementation of each criterion rated on a scale: Yes (Y), No (N), Unclear (?), Not applicable (NA). Quality evaluation of the articles were based on the number of Yes answers. Thereafter, quality of the Journal as a source, was evaluated through publication forum (JuFo). The Publication Forum (JuFo) is a classification of publication channels produced by the Finnish scientific community, which supports research quality assessment. It is a web-based credibility site where journals are rated by scale 0 to 3, the higher the number the higher is the journal's credibility for a specific year. Articles selected for the thesis were of level 1 and 2 (Julkaisufoorumi 2021.) After the evaluations only 10 articles were finally selected to be used for the thesis.

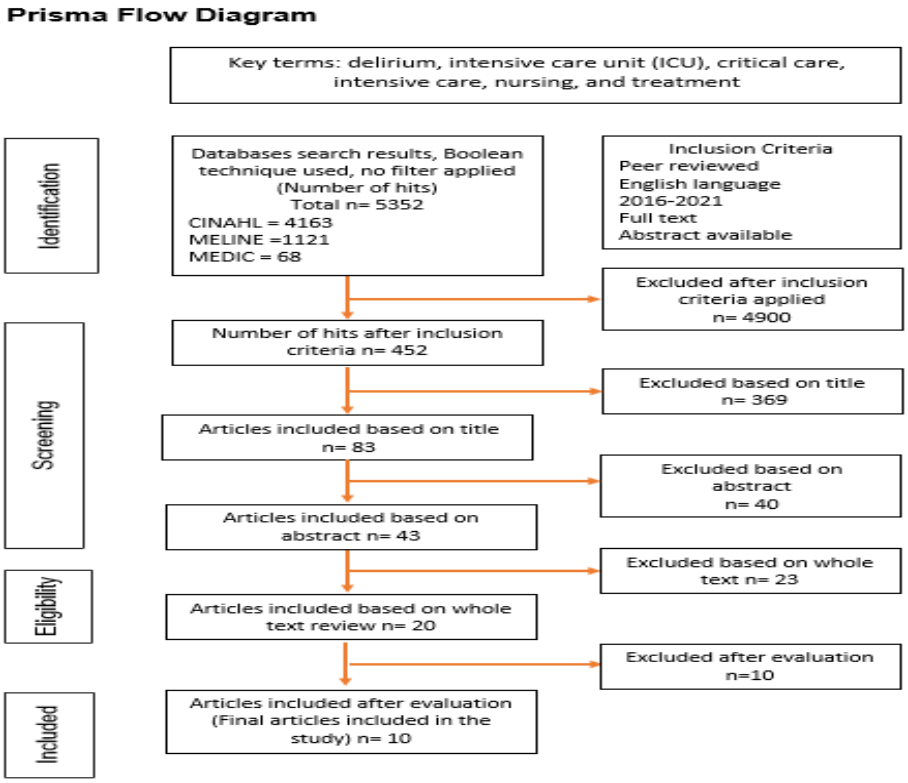

Figure 1. Prisma Diagram

5.4 Data analysis

To generate result from the collected data, various analysis methods can be used. In qualitative research, content analysis method is commonly used. This refers to the approach applied in extracting, organizing and synthesizing data from written materials (Polit & Beck 2022: 380). In nursing research, content analysis is well suited to be use in analysing multifaceted and sensitive phenomena. Content analysis provide evidence for sensitive topics where only qualitative approach is applicable. Furthermore, content analysis method enables the researcher to describe research phenomena objectively and systematically at theoretical level. There are two approaches used in content analysis method namely inductive content analysis and deductive content analysis method. Inductive content analysis method is applied when there is none or fragmented previous studies made on a phenomenon while deductive content analysis approach is used to assess or compare a previous theory (Elo & Kyngäs 2008: 5,9,13-14.) Inductive analysis method aimed to produce abstracts of the raw data with a summary of the main category, concepts, and themes as well as providing the indication of the potential theoretical relationship. (Kyngäs et al. 2020:14). In analysing the collected data, this thesis utilized inductive content analysis method. Data was then collected from reliable databases and analysed using data reduction, followed by grouping and concept formation in relation to the study questions.

Collected data from the 10 articles were laid out in a six-column table, assigned with corresponding titles. First column was assigned to the article name. Second column was the meaning unit which showed the result of study made on the specific article. Third column was the code assigned for the study results of the corresponding article. Fourth column was for the subcategory which was derived from the given code of the previous column, resulting to seventeen subcategories generated. Fifth column was assigned for the generic category derived from the subcategory of the previous column and a total of thirteen generic categories generated. Sixth column was assigned for the main category which were the study questions. Collected data supports the study questions at this point. The result of the analysis was further presented and explored during discussion with validity and ethical consideration together with the implication for clinical practice, conclusion, and recommendation (Coughlan et al. 2013:78).

Type of Article I= Intervention R= Risk	Meaning Unit	Coding	Sub Category	Generic Category	Main Category
17. Risk Awareness of Delirium by ICU nurses	*"ICU nurses hold moderate to low levels of knowledge and lack of adequate clinical experience to handle delirium."*	Nurses lack of knowledge of interventions and experience	Lack of Competence	Lack of education	What factors affects recognition of ICU delirium for adult patients?

Figure 2. Content analysis table

6 Results

6.1 Summary of data

The 10 research articles in this literature review answer thesis study questions How is ICU delirium recognized by nurses in intensive care unit? How could the ICU delirium be prevented? To improve readability, the results are divided into two paragraphs. In paragraph 6.2 presents the result found to answer the study question: How is ICU delirium recognized by nurses in intensive care unit? Whereas paragraph 6.3 presents the results to study question: How could the ICU delirium be prevented?

The 10 research articles included in this descriptive literature review were conducted in six different countries. Five studies were from United states of America and other five studies were conducted only one per country. USA (Blevins & DeGennaro 2018, Balasanova & Park 2021, Grami & Smith 2017, Bounds et al.,2016, Smith C. et al. 2019), China (Chen et al. 2019), Netherlands (Wassenaar et al. 2018), Iran (Khan et al. 2020), Brazil (Eberle et al. 2019), Palestine (Asmar et al. 2021). Eight of the studies reviewed was quantitative (Blevins & DeGennaro 2018, Chen et al.2019, Smith & Grami 2017, Khan et al. 2020, Bounds et al.,2016, Smith C. et al. 2019, Asmar I et al. 2021, Wassenaar et al. 2018), one study was qualitative (Eberle et al. 2019) and one was mixed methods (Balasanova & Park 2021). In studies with nurses as subjects the sample size varied between twelve to 91 nurses. Research articles where the sample size formed of patients the sample size was between 52 and 447 (Figure 3.)

During the data analysis, the data was classified into a table. There were two tables: Interventions and Risk factors. In the Intervention table, Sub Category had thirteen components: Cognitive exercises implemented among ICU patients, Competent nursing skills, Decreased number of patients who are tied to an ventilator, Enhancing nursing competence, ICU patients are being mobilized, Improved daily RASS score, Improved

delirium outcomes, Increased number of non-delirious patients, Nurses willingness to learn, Patients level of activity is increased, Patient's preference, Post operative screening for delirium risk factors and Patients family. Generic Category included seven components: Bundle interventions for ICU delirium, Cognitive stimulation, educating nurses, Music is a good intervention, Nurses attitude, Patient mobilization, Patient re-orientation, Screening for interleukin 6 serum level, Importance of family or relatives. In the Main Category nine articles answered the study question: How could the ICU delirium be prevented?

The second table Sub-Category had four items: Lack of competence, Lack of continues education and training, Poor MD response to RN concern, Patient's family is uncooperative. These would fall in Generic category as Lack of education, Poor interprofessional collaboration, Importance of family or relative and Nurse's attitude. These findings were from two studies and answered the study question: How is ICU delirium recognized by nurses in intensive care unit? (Figure 3.)

Journal/Source Name	Methods	Year of Publication	Study Location
American Journal of Critical Care *(7 articles)* Critical Care Nursing Quarterly *(2 articles)* Revista da Escola de Enfermagem da USP *(1 article)*	Qualitative - *1 articles* Quantitative - *8 articles* Mixed Method - *1 article*	2016 *(1 article)* 2017 *(1 article)* 2018 *(2 articles)* 2019 *(3 articles)* 2020 *(1 article)* 2021 *(2 articles)*	USA *(5 articles)* China *(1 article)* Netherlands *(1 article)* Iran *(1 article)* Brazil *(1 article)* Palestine *(1 article)*

Main Category	Generic Category	Sub-Category
•What are the preventive interventions of ICU delirium for adult patients? •(9 Articles)	•Bundle Interventions for ICU Delirium •Cognitive Stimulation •Educating nurses •Music is a good intervention •Nurses Attitude •Patient Mobilization •Patient Re-orientation •Screening for interleukin 6 level •Importance of family or relative	•Cognitive exercises implemented among ICU patients •Competent nursing skills •Decreased number of patients receiving mechanical ventilator •Enhancing Nursing Competence •ICU patients are being mobilized •Improved daily RASS score •Improved delirium Outcomes •Increased number of non-delirious patients •Nurses Willingness to learn •Patient's Level of activity is increased •Patient's Preference •Post operative screening for delirium risk factors •Patient's Family Support

Main Category	Generic Category	Sub-Category
•What factors affects recognition of ICU delirium for adult patients? •(2 Articles)	•Lack of education •Poor Interprofessional Collaboration • Importance of family or relative • Nurse Attitude	•Lack of Competence •Lack of continues education and training •Poor MD response to RN concern •Patient's Family being uncooperative

Figure 3. General findings

6.2 Barriers in identifying ICU delirium

This chapter explained what kind of factors affects the recognition of ICU delirium. According to Asmar et al. (2021:264-266) nurse's level of knowledge on ICU delirium is poor. Nurses have insufficient evidence-based knowledge. According to Balasanova and Park (2021:281) nurse's attitude towards their own competence has an impact on their nursing job. According to a claim posed to nurses, 80% advocated that using a standardized tool would increase nurse's ability to detect delirium. However, some nurses had responded affirmatively to proposition that no tool is better than a nurse's own clinical judgement. In this study it has been confirmed that nurses have a misknowledge and additional education is needed.

Only 11% of nurses involved in this study considered delirium to be serious and a condition that should be treated, in addition only one nurse knew the most common type is hyperactive delirium. 40.9% of nurses involved in the study had more than 10 years of work experience (Asmar, et al. 2021:264-266.) In Balasanova and Park`s (2021:280-281) study, it was found that 85% of nurses believe that the confidence in nursing would increase if they received additional training. Nurses have voiced interest in further education. In the study 70% of nurses are confident in their skills in identifying ICU delirium. However, the highest knowledge score is in nurses who have been employed less than a year and the lowest level of knowledge in nurses with work experience from eleven to fifteen years. 90% of nurses have a misknowledge that delirium can be identified by observing their patient's agitation. According to Eberle, Santos, Macedo and Martins (2019:1246) the right kind of medication, removing invasive devices, nutrition and hydration were not mentioned by nurses as non-pharmacological preventive intervention. Researchers thought it to be because these are usually physician-prescribed treatments and therefore they are not thought to be a part of nurse's job. In addition to lack of education and knowledge deficiencies Balasanova and Park`s (2021:280-281) study, 42% of nurses have raised that communication among the rest of the medical team as the biggest challenge. Nurses felt cooperation should be improved to enhance quality of patient care.

6.3 Preventive Interventions for ICU delirium

In this paragraph is written results of research interventions that have positive results in the prevention of ICU delirium. ABCDE bundle designed for ICU care has been perceived

as an effective method to prevent ICU delirium. According to Bounds et al. (2016:541-542) delirium prevalence and duration decreased by 38% after ABCD bundle was implemented in routine care. The number of patients with ICU delirium decreased by 15% and the number of patients with median days of ICU delirium fell from 3.8 to 1.72. In addition, there was a noticeable increase in ventilated patients ICU delirium free stays. Before implementing ABCDE bundle in ventilated patient's non-delirium stays were only 31%. After implementation, the number increased to 69%. According to Smith and Grami (2017:21-24) the use of Delirium Prevention Bundle reduced ICU delirium up to 78%. The control group was assessed twice a day for 30 days, which in total was 1533 observations. DPB includes five actions of sedation cessation, pain management, sensory stimulation, early mobilization, and sleep promotion. The study has highlighted the fact that if intensive care continues for more than 3 days, the patient's risk of developing delirium is tripled. The use of physical restraints raises the possibility of delirium by 2.82 times. In the light of these result, it can be noted that using DPB components, the chance of delirium decreases. Khan et al. (2020:34-37) have studied the importance of music in ICU to prevent delirium. Patients have been played music or audio books through noise cancelling headphones via mp3 player. Intervention had been administered for one hour, 2 times a day, for seven days. Patients were divided into three groups, the first group had patients to whom music was played, considered commonly sedative (60-80 bpm). In the second group, patients had chosen their music themselves, and in the third, audiobooks were played for patients. The number of patients who listened to calm music from these three groups had the most coma free days. Based on the CAM-ICU measurement among ICU delirium sufferers, the severity rate was milder in this group. Patients would have rather listened to music of their own choice. The agitation-sedation scale, heart rate and diastolic blood pressure was higher in this group where music was pre-selected. The study also finds that the group who played calm music were treated less with Haloperidol, opioids, Propofol, and Quetiapine. As an additional finding it was identified that patients had lower anxiety and pain score when listening to music. Therefore, music can act as an ICU delirium inhibiting intervention.

In the case of patients undergoing major surgeries such as coronary artery bypass graft (CABG), changes in the interleukin 6 (IL-6) level postoperatively exhibits relationship to developing ICU delirium. After CABG operation, patients in the cardiac ICU unit were monitored for the IL-6 level after six, twelve and eighteen hours respectively. Delirious patients show high level of IL-6 on the 18^{th} after hours of surgical operation. The study

revealed the importance of screening IL-6 in relevance to managing ICU delirium (Chen et al. 2019: 462-470.)

Knowledge is considered part of competence. Eberle et al. (2019:1242-1248) Research has noted that knowledge and the presence of loved ones play vital role in the prevention of ICU delirium. Nurses' knowledge had been measured by asking questions in four categories; what delirium means, non-pharmacological methods of treatment, what are the hindrance for using non-pharmacological means, and why they are difficult to use. Nurses have up-to-date knowledge and know how to treat delirium. They have been able to list several non-pharmacological means. The most important is the competence and implementation of early recognition and preventive measures. A key role in avoiding delirium is the activation of the patient with passive or active muscle use. Smith, Grami, Haseeb and Ababio (2019:388) had activated patients once a day with the help of exercise physiologists. Patients were supported to move both passively using auxiliary devices and actively using their own muscle strength. 97% of patients benefited from the exercises and their activity levels remained the same or improved. Wassenaar et al. (2018:127-129) exposed patients to cognitive activities. The study involved patients with symptoms of delirium as well as patients without symptoms. According to the study, cognitive activation is a useful method to reduce symptoms, as well as the incidence of ICU delirium.

Educating nurses produced beneficial results in increasing knowledge of ICU delirium and assessment tools. Blevins and DeGennaro (2018:272-276) study found that nurses attended to fifteen lessons of ICU delirium and knowledge baseline was tested. In the knowledge section, nurses did well when asked about alcohol delirium or the connection of sedation and delirium. Only 62% of nurses knew that MMSE is not the best tool for detecting ICU delirium. Identifying risk factors such as diabetes, hip fracture, male sex, obesity, and dementia was not well known. The number of nurses who answered the dementia question correctly before intervention was only 32% and after intervention the figure was 82%. Overall, baseline for correctly given responses was 76% and 80% after intervention. Delirium knowledge questions answered correctly before additional training 89% which rose to 97% with the help of education. For assessment tools, the data remained unchanged at 81%.

7 Discussion

7.1 Ethics and validity

Ethics is a fundamental part of research and cannot be neglected. It is a set of principles, morals, and values that everyone conducting any research or study must adhere to. This thesis considered and conformed with the responsible conduct of research all the time during the entire process of conducting the study. The selected articles were from recognized and reliable databases and used information from primary sources. This is to ensure that used data was from the results of researched facts and studies conducted by the authors of original research. The authors of the source articles were also professionals and specialized in their own field. (Coughlan et al. 2013:78; Parahoo 2014: 131; TENK 2012.) Gaining more knowledge and better familiarization with the study topic and study questions were done by referring to available books and other references from Metropolia University of Applied Sciences library. The articles used for the thesis were in English, as well as the study questions, therefore there is no need of any translations. Information used for data analysis was based on the actual study results presented in the sourced articles. This thesis sought not to cause any harm to anyone and only aimed to produce useful knowledge for nurses and medical personnel. Literature review method was used in making this thesis. There was no need to acquire permit to conduct research and no questionnaires or interviews were made in any form. The Metropolia University of Applied Sciences Guidelines for Written Assignments was followed in writing the thesis. Researchers and authors of the sourced articles for this thesis were acknowledged and respected by proper referencing. To check the reliability, thesis was submitted to Turnitin application for checking the level of plagiarism (ARENE 2020; ETENE 2012.) By first familiarizing and defining ICU delirium and exploring additional information from reliable scientific based sources, it had supported authors knowledge and conception of the topic. Thus, influencing and improved the validity of the thesis (Fink 2014: 106-107).

During the planning stage, study topic and questions were carefully identified. Selecting of the articles for the study were based on the relevance to the topic and study questions. Data analysis and results were summarized directly from the information presented by the authors of the source articles, without changing or altering the meaning of the text. Proper referencing was followed, and results were supported with figures and tables for better understanding (Galvin & Holloway 2016 :304; Kyngäs et al. 2020: 19-20, 45-47). Furthermore, publication forum JuFo was used to evaluate the credibility of the journals

that published the articles. Joanna Briggs Institute checklist was utilized to evaluate for the quality of the articles used. Existing studies regarding ICU delirium recognition and preventive measures in the intensive care unit were examined. Articles with the mentioned topics were collected and evaluated to facilitate the purpose and aim of this thesis. Collected data was relevant to the topic and study questions. Utilisable articles were executed between years; 2016- 2021 and were from primary sources.

7.2 Discussion of the results

The purpose of this study was to identify factors that affects recognition of ICU delirium and the available preventive intervention used in intensive care unit. From the result, the study yielded two main categories consisting of factors that affects recognition of ICU delirium, and preventive intervention. Factors affecting recognition of ICU delirium were the lack of education among ICU nurses, nurse's attitude, poor interprofessional collaboration in the ICU and family or relatives of patient who were reluctant or uncooperative (Asmar et al. 2021; Balasanova & Park 2021; Smith & Grami 2017). While preventive interventions were composed of, ABDCDE bundle, cognitive stimulation, educating nurses, music, nurse's attitude, patient mobilization, patient reorientation, screening of interleukin 6 (IL-6) serum level and the involvement of family or relative in patient's care (Balasanova & Park 2021; Blevins & DeGennaro 2018; Bounds et al. 2016; Chen et al. 2019; Eberle et al. 2019; Khan et al. 2020; Smith & Grami 2017; Smith. et al. 2019; Wassenaar et al. 2018).

Nurse's attitude and patient's family involvement in nursing care affects recognition of ICU delirium and influenced the implementation and effectivity of preventive interventions. Adhering to the use of validated tools for ICU delirium assessment, enhanced the accuracy of clinical assessment whereas, nurses using personal judgement may cause misdiagnosis. (Balasanova & Park 2021:281-282.) Acknowledging the need of further education regarding ICU delirium, motivates nurses to seek for evidenced based knowledge. In return, this will increase nurse's competence and will warrant positive ICU outcome on patient. The importance of education and enhancing nurse's competence on ICU delirium is also supported by the previous study (Faustino at al. 2016).

Results of this study revealed various available preventive intervention for ICU delirium. Implementation of ABCDE bundle had significantly reduced the occurrence and duration of ICU delirium (Bounds et al. 2016: 541; Smith & Grami 2017: 24). Patient mobilization,

cognitive stimulation and patient reorientation were components of ABCDE bundle (Smith et al. 2019; Wassenaar et al. 2018; Eberly et al. 2019). ABCDE bundle was also suggested by Marra et al. (2017: 225-243), with the addition of letter “F” to represent family and empowerment.

Smith and Grami (2017: 24), researched how patient’s family influenced the assessment of ICU delirium and the effectivity of cognitive stimulation on patients that uses personal aids and devices. Due to reluctance and cooperativeness of the patient’s family to leave personal items for patient’s use in intensive care, nurses recourse to use aids that were available in the unit which are often not many or sometimes none. This condition caused difficulty in the assessment ICU delirium and cognitive stimulation on patients. Conversely, family has positive contribution in reorientation as well as in cognitive stimulation of ICU patients (Eberle et al. 2019:1245; Wassenaar et al. 2018: 130). ICU nurses could choose activities that suited the condition of the patient. More than the ease of implementing simple cognitive exercises, it will also initiate and encourage family’s participation. Family’s contribution in the care of ICU patients was also acknowledged in the previous studies (Faustino et al. 2016: 680-683; Smithburger et al. 2017: 51). Letter “F” in the ABCDEF bundle also represent family and empowerment. Incorporating family in patient care increased their understanding of the patient’s care and made them feel involved and respected. (Marra et al. 2017.) According to the study, relatives did not want to leave the patient's familiar belongings on the ward, due to fear of losing them. Familiar loved ones have a positive effect on patients which, could equally affect the onset of ICU delirium. COVID-19 pandemic has negatively impacted the presence of loved ones in hospitals due to the restrictions of close contact. Negative consequences of these restrictions are interpretable in future studies and statistics.

Aside from the ABCDE bundle, further education, and training of ICU nurses regarding ICU delirium is essential and considered an effective component of preventive intervention. Nurses should have continuous update of evidence-based practices (Blevins & DeGennaro 2018: 276-277; Eberle et al. 2019:1244-1247.) Nurses work experience does not warrant their expertise. Despite having long time work experience ICU nurses remain unfamiliar with the risk factors associated with ICU delirium and the appropriate use of assessment tools. (Blevins & DeGennaro 2018: 276-277). Despite the knowledge and awareness of ICU delirium, nurses were still unable to identify all the ICU delirium subtypes and the physiologic dysfunctions as a risks factor. ICU delirium was also not de-

scribed by exact terminologies as well as challenges in implementing preventive interventions. (Eberle et al. 2019:1244-1247.) The effect of further education and training of nurses agreed with the previous study conducted by Faustino at al. (2016). Thru further education and training, the knowledge of ICU delirium can be uniformly distributed among health care professionals and will further reinforce their perception of the condition. Interprofessional collaboration will also be enhanced, leading to a better quality of patient care.

Assessment and overall care of ICU delirium does not solely rely on nurses, which emphasized the importance of interprofessional collaboration in intensive care unit. Poor collaboration oftentimes results to doctor's poor response to nurse's concerns regarding patients care plan and patient's being under medicated. Sometimes, even medical doctors have inadequate training and familiarization of ICU delirium. (Balasanova & Park 2021:282-284). In the previous study, nurses identified that interprofessional collaboration enables them to work together effectively in assessing and managing ICU delirium (Oosterhouse et al. (2016:387-389).

Reducing ICU delirium thru music was found to be feasible for the patient in the intensive care and may as well contribute to the decrease of ICU delirium (Khan et al. 2020: e37). Previous study has reported that music therapy had a significant effect in reducing anxiety and stress on patients in intensive care, as well as lowering the level of pain (Umbrello et al. 2019: 890, 894).

Another preventive intervention for ICU is screening the interleukin 6 (IL-6) serum level. Interleukins are cytokines that can affect the function of the immune system (Hinkle, & Cheever 2018: 354). Elevated serum level of cytokines indicates a systematic response to inflammation after surgery. Among other cytokines, IL-6 which is produced at the inflammation site, was considered potential predictor of ICU delirium on patients that have undergone coronary artery bypass graft (CABG). Post operatively, patient that have undergone CABG exhibits higher IL-6 serum level at 18^{th} hour. (Chen et al. 2019: 463-468.)

The result of this study also revealed that ICU delirium management is not uniformly standardized anywhere. It is worth noting how nurses have poor knowledge and perceptions of ICU delirium and were not adhering to the use of validated tools for the assessment (Asmar et al. 2021 265-267; Balasanova & Park 2021: 28). Asmar et al. (2021), claimed the non-existence of ICU delirium guidelines and protocols. Lack of widely used

guidelines can interfere in the safety of ICU patient and cause poor ICU outcomes. This needs to be taken seriously with corresponding action. The unavailability of ICU delirium guidelines was also discussed in the study conducted by Christensen (2016:13).

7.3 Conclusions and recommendations

Intensive care unit nurses need to increase their level of competence in recognition, prevention, and management of ICU delirium. Further education will provide nurses and other medical personnel with more knowledge and better understanding of the condition. Continuous update of clinical knowledge will also enhance the quality of care and ensure patient safety. Work experience does not guarantee nursing expertise (Balasanova & Park`s 2021:280-281). Clinical approach should be evidence-based practice and not based on nurse's personal judgement. However, ICU management has a role in nurse's unfamiliarity of ICU delirium and non-existence of guidelines and protocols (Asmar, et al. 2021:267). There is a need to standardize ICU delirium management worldwide. Evidently, even the WHO (World Health Organization) has no information on their webpage about ICU delirium, considering that Covid-19 pandemic had seriously affected intensive care units. Interprofessional collaboration and institutional support needs to be enhanced to as well create a healthy and safe work environment.

The knowledge gained from this thesis can benefit ICU nurses to further improve identification and management of ICU delirium. The event of ICU delirium is a serious condition and can even be fatal. It is a condition that put the patient's safety at risk, therefore need to be research further. Additional research is recommended to identify more factors affecting nurse's recognition of ICU delirium.

7.4 Professional Growth

The knowledge gained from the entire process of making this thesis was very essential and beneficial, highlighting the importance of research work, ethical consideration, and critical thinking. As a nurse it is necessary to know where to acquire reliable and scientific based knowledge. By doing so, we can evaluate the credibility and validity of the information that we grasp. Patient care is a multidisciplinary approach. Being a nurse who is in directly in charge of the patient care, it is beneficial to prepare ourselves with the right skills and adequate scientific based knowledge to perform our job. The process of making this thesis, made us familiar with ICU delirium, recognition, and assessment as well

as preventive measures. We have understood the seriousness of the condition and the importance of early recognition and interventions. We have learned the consequential result of ICU delirium if not treated. The knowledge gained from this thesis is useful in developing and improving ICU delirium management in intensive care. We realized the influenced of nurses' attitude and nursing skills in managing the condition. This realization made us contemplate and do self-evaluation how we can contribute to improve the quality of patient care and safety. Furthermore, we were able to understand the importance of interprofessional collaboration on patients care to achieve positive ICU delirium outcome.

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Database search result

Table: 1 Data Base Search Results

Data Base	Search Terms	Without Limiters	Limiters	Number of Hits	Selected Based on Title	Selected Based on Abstract	Selected Based on Whole Text
CINAHL	delirium and ICU OR critical care, intensive care AND nursing	n=2324	Peer Reviewed English 2016-2021 Full Text Abstract available	n=207	n=46	n=20	n=9
	Delirium and ICU OR critical care, intensive care and/or nurs* AND treatment	n=1839	Peer Reviewed English 2016-2021 Full Text Abstract available	n=152	n= 13	n= 12	n= 5
MEDLINE	delirium and ICU OR critical care, intensive care AND nursing	n=522	2016-2021 Full text English Language	n=55	n=15	n=9	n=5
	delirium and ICU OR critical care, intensive care and/or nurs* AND treatment	n=599	2016-2021 Full text English Language	n=32	n=9	n=2	n=1
MEDIC	delirium and tehohoito and hoitomenetelmät	n=0	Full text 2016-2021	n=0	n=0	n=0	n=0
	delirium and tehohoito	n=13	Full text 2016-2021	n=0	n=0	n=0	n=0
	delirium and hoito	n=45	Full text 2016-2021	n=6	n=0	n=0	n=0
	delirium and hoito and tehohoito	n=10	Full text 2016-2021	n=0	n=0	n=0	n=0
TOTAL		n=5352		n=452	n=83	n=43	n=20

Table of the Studies Selected for the review

Author(s), Year, Country	Journal Name/ Source	Title/Topic	Methodology and Methods	Partici-pants	Main Outcomes
Chen et al. 2019 China	American Journal of Critical Care	Change in Serum Level of Interleukin 6 and Delirium After Coronary Artery Bypass Graft	Quantitative Cohort study design Clinical study	n=266 patients	-Patients with high serum (IL-6 level) after coronary artery bypass graft, has a higher risk to develop postoperative delirium especially during 18th hour of post operation. Monitoring the IL-6 after coronary artery bypass graft can determine the risk of patient for developing delirium.
Blevins & De-Gennaro 2018 USA	American Journal of Critical Care	Educational Intervention to Improve Delirium Recognition by Nurses.	Quantitative Quasi-Experimental Educational Refresher	n=34 nurses	Inadequate knowledge of nurses and lack of awareness regarding delirium puts the patients at risk for development of delirium. Continuous education and training, enhances nurse's skills in identifying delirium and accurate use of appropriate and validated tools used in delirium assessment. Thereby, the delirium screening performance and delirium management on ICU patient will also improve.
Balasanova & Park 2021 USA	Critical Care Nursing Quarterly	Nursing Insights on Delirium in the Intensive Care Unit: A Quality Improvement Study.	Mixed method Survey	n=91 nurses	Common barriers in attending patients with delirium are the collaboration with the medical team, insufficient training, skills and education for the nurses, perceptions of delirium assessment, status of the patients, organization, and environment.
Smith & Grami 2017 USA	American Journal of Critical Care,	Feasibility and effectiveness of a delirium prevention bundle in critically ill patients	Quantitative Cohort study Clinical study	n=447 patients	Delirium prevention bundle is controlling the following parts of patients stay in ICU: Sedation cessation Pain management Sensory stimulation Early mobility Sleep promotion. Study shows that the risk of delirium was reduced for 78% of patients who have been predisposed by these elements delirium prevention bundle was effective.
Eberle et al. 2019 Brazil	Revista Da Escola de Enfermagem Da USP	Non–Pharmacological Management of Delirium from the Perspective of Nurses in an Adult Intensive Care Unit	Qualitative Interview	n=12 nurses	Nurses named working tools on nonpharmacological delirium prevention. The understanding of early recognition and screening tools is known amongst nurses. The barriers on using tools and recognising delirium is known to the study group.
Khan et al. 2020	American Journal of Critical Care	Decreasing Delirium Through Music: A Randomized Pilot Trial	Quantitative Clinical Trial	n=52 patients	Delirium cause inability focus and shift attention however music has grown brain activity in areas of attention. Study suggests 120mins music per day may improve delirium outcome.

Iran					
Bounds et al. 2016 USA	American Journal of Critical Care	Effect Of ABCDE Bundle Implementation on Prevalence of Delirium in Intensive Care Unit Patients	Quantitative Clinical study and data analysis	n=159 patients	The development and duration of delirium had reduced after the implementation of the ABCDE bundle among ICU patients. However, there is no changes on the length of ICU and ventilation stay.
Smith et al. 2019 USA	American Journal of Critical Care	Exercise Physiologists: Key to Providing Early Mobilization in the Intensive Care Unit	Quantitative Clinical Trial	n=216 patients	Patient early mobilization has shortened days needed in hospital and delirium time has been reduce.
Wassenaar et al. 2018 Netherlands	American Journal of Critical Care	Feasibility Of Cognitive Training in Critically Ill Patients: A Pilot Study	Quantitative Clinical Trial and Survey	n=75 patients	The feasibility of the cognitive training was supported by the study, however not the effectivity of the cognitive training. The study stated that the ICU patients also enjoyed doing the training. The study suggested further clinical study regarding the clinical effectiveness of the cognitive training among ICU patients.
Asmar et al. 2021 Palestine	Critical Care Nursing Quarterly	Awareness of Delirium by ICU nurses	Quantitative Questionnaire Cross-sectional	n=63 nurses	Nurses do not know enough of ICU delirium and had false/poor knowledge on interventions. Not even special education and/or long ICU experience would have a positive impact on the knowledge level. Only 11% of the nurses found delirium to be an important condition to be monitored and treated.