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Non-Pharmacological Pain Management Methods in Intensive Care Units

A Descriptive Literature Review

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Pain management in intensive care is an important aspect in nursing care. Assessing patients' pain is vital as it helps in finding the most suitable method for pain management. Pharmacotherapy is the most used mode of pain management but due to the side effects caused, a use of alternative non-pharmacological methods should be considered. There is also a need to look at the different perceptions that influence the application of these methods. Therefore, the purpose of this thesis is to describe the different types of non-pharmacological pain management methods used in intensive care, as well as nurses, and patients' perspectives on these methods. The aim is to produce literature review about the non-pharmacological pain management methods used in intensive care as well as the perspectives of nurses and patients on the methods used.

CINAHL database and a manual search was used to collect data. The search was narrowed down by using predetermined inclusion and exclusion criteria, which led to the selection of 17 articles that were analyzed by utilizing inductive content analysis. Inductive content analysis table with two main categories and several generic categories that answered the research questions was created. The research questions were "What are the non-pharmacological pain management methods used in intensive care?" and "What are the nurses and patients' perspectives on using the non-pharmacological pain management methods in intensive care?''.

The data collected and analyzed showed that a variety of non-pharmacological pain management methods are currently being used in intensive care and there are multiple factors that affect their application. Most of the methods reduced pain and had physiological and psychological implications such as reduced blood pressure, and anxiolytic effects. The nurses, and patients' perspectives had major similarities, including lack of knowledge and resources, personal beliefs and need for education as the main challenges.

This literature review, that was done for the Neurocenter in the Helsinki and Uusimaa Hospital District HUS, shows that education plays a vital role for both patients and nurses in ensuring that non-pharmacological pain management methods are used. Furthermore, the health care organizations' support by providing resources would be required to ensure the utilization of the pain management methods. More research is also needed on non-pharmacological methods as little research was found on many of these methods.

Keywords	pain, pain management, pain assessment, non-pharmacological, intensive care unit, perspective, and challenge

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Kivun hallinta tehohoidossa on tärkeä osa hoitotyötä. Potilaiden kivun arviointi on elintärkeää, sillä se auttaa löytämään sopivimman menetelmän kivun hallintaan. Lääkkeellinen hoito on yleisin kivunhallintatapa, mutta lääkkeiden sivuvaikutusten vuoksi olisi hyvä jos käytettävissä olisi myös vaihtoehtoisia ei-lääkkeellisiä menetelmiä. On myös tarkasteltava erilaisia käsityksiä, jotka vaikuttavat näiden menetelmien soveltamiseen. Tämän opinnäytetyön tarkoituksena on kuvata tehohoidossa käytettäviä ei-lääkkeellisiä kivunhallintamenetelmiä sekä sairaanhoitajien ja potilaiden näkökulmia näihin menetelmiin. Tavoitteena on tuottaa kirjallisuuskatsaus tehohoidossa käytettävistä ei lääkkeellisistä kivunhallintamenetelmistä sekä tarkastella sairaanhoitajien ja potilaiden näkökulmia käytettäviin menetelmiin.

Aineiston hakuun käytettiin CINAHL- tietokantaa ja manuaalista hakua. Hakua rajattiin ennalta määrätyillä sisäänotto- ja poissulkukriteereillä, joiden perusteella valittiin yhteensä 17 artikkelia. Aineisto analysoitiin käyttäen induktiivista sisältöanalyysia ja luotiin sisältöanalyysitaulukko, jossa on kaksi pääkategoriaa ja useita alakategorioita, jotka vastasivat tutkimuskysymyksiin. Tutkimuskysymykset olivat ‘’Mitä ei-lääkkeellisiä kivunhoitomenetelmiä käytetään tehohoidossa ?‘’ ja ‘’Mitä näkökulmia ei-lääkkeellisten kivunhoitomenetelmien käyttöön on tehohoidossa‘?’.

Tulokset osoittivat, että tehohoidossa käytetään tällä hetkellä useita ei- lääkkeellisiä kivunhallintamenetelmiä ja että, niiden soveltamiseen vaikuttavat monet tekijät. Suurin osa menetelmistä vähensi kipua ja niillä oli fysiologisia ja psykologisia vaikutuksia, kuten verenpaineen laskua ja lievittynyttä ahdistusta. Sairaanhoitajien ja potilaiden näkemyksissä oli suuria yhtäläisyyksiä, pääasiallisina haasteina olivat tiedon ja resurssien puute, henkilökohtaiset uskomukset ja koulutuksen tarve.

Tämä Helsingin ja Uudenmaan Sairaanhoitopiirin HUS:n Neurokeskukselle tehty kirjallisuuskatsaus osoittaa, että koulutuksella on keskeinen rooli, sekä potilaiden, että sairaanhoitajien kannalta ei- lääkkeellisten kivunhallintamenetelmien käytön varmistamiseksi. Tämän lisäksi, kivunhallintamentelmien hyödyntämisen varmistamiseksi tarvittaisiin terveydenhuollon organisaatioiden tukea resurssien antamisen muodossa. Lisää tutkimuksia ei-lääkkeellisistä kivunhoitomenetelmistä tarvittaisiin, koska monista näistä menetelmistä löydettiin vähän tutkimustietoa.

Avainsanat	kipu, kivunhallinta, kivun arviointi, ei-farmakologinen, teho-osasto, perspektiivi ja haaste

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1 Introduction

The pain intensity varies amongst patients in the ICU. The multiple sources of pain include pain, which is caused by invasive procedures, pain that is caused by trauma, accidents or burns, chronic pain that is caused by pre-existing conditions as well as pain that is caused by the non-invasive and therapeutic procedures done in intensive care units. (Koftis, Zegan-Baranska, Szydłowski, Żukowski & Ely 2017: 66–67; Sare & Meryem 2020: 497.) Patients needing intensive care are acutely ill or severely injured and in critical condition. Thus, they might be intubated and sedated with suppressed consciousness level requiring extensive care and monitoring. (Collins 2021b; Silva, Barbosa, Bastos & Beccaria 2017: 241.)

Assessing the pain and the intensity of it in intensive care units is vital for the healthcare professionals for them to provide optimal and effective pain management to relieve the pain felt by the patients. Although the challenge in assessing pain in intensive care units is, that the patient might not be able to express the pain they experience either due to sedation, unconsciousness, mechanical ventilation, or intubation. (Bourbonnais, Malone-Tucker & Dalton-Kischel 2016: 23; Sare & Meryem 2020: 498.) Therefore, the pain of intensive care unit patients is often poorly recognized (Koftis et al. 2017: 67). Inadequate pain assessment methods usually result in ineffective pain management, thus putting patients at an increased risk of longer ICU stays, prolonged need of intubation, delirium, hypoxemia, thromboembolic and pulmonary complications, agitation, morbidity, and mortality. (Bourbonnais et al. 2016: 23, 28; Silva et al. 2017: 241.)

Studies regarding the non-pharmacological pain management methods and the usefulness of these in intensive care units have shown their importance in addition to pharmacological methods (Golino et al. 2019; Momeni, Arab, Dehghan & Ahmadinejad 2020). Various types of non-pharmacological pain management methods exist, including physical, cognitive-behavioral and lifestyle interventions (Berman & Snyder 2021: 1141) but the application of these interventions vary greatly amongst hospitals and nurses (Khalil 2018; Kia, Allahbakhshian, Ilkhani, Nasiri & Allahbakhshian 2021). Studies by Khalil (2018) and Kia et al. (2021) have shown that some of the main barriers and obstacles for the usage of the variety of the non-pharmacological pain management methods in ICU include nurses' heavy workloads, lack of time and insufficient level of knowledge regarding the methods.

The purpose of this thesis is to describe the types of non-pharmacological pain management methods nurses use in intensive care units and the perspectives of nurses and patients' in using these methods. Previous studies of non-pharmacological pain management interventions in intensive care units exist. Also, nurses and patients' perspectives on the non-pharmacological methods and the challenges nurses face in using these methods have been studied. Thus, the aim of this thesis is to produce a descriptive literature review of the existing data to increase and support the knowledge of healthcare professionals and nursing students.

Qualitative research methodology was applied in this research and the data collection method utilized was relevant literature review. The data was collected by searching and reviewing published research articles and studies that were published mainly during the past five years, although three articles were published within the past ten years. The articles and studies were collected from CINAHL complete, MEDLINE and PubMed databases. In addition, manual search was applied. The gathered data was analysed by applying inductive content analysis method.

This descriptive literature review was done for the Helsinki and Uusimaa Hospital District HUS Neurocenter.

2 Background

2.1 Pain

Pain etymology has changed over many years, originally it is derived from the Greek word Poine. The International Association of the Study of Pain IASP has defined pain as "an individualized unpleasant sensory and emotional experience." (IASP 2017.) This experience is affected by psychological, social, and biological factors that determine its severity. These experiences are developed over an individual's lifetime and thus, can never be the same to another individual. (IASP 2017.) The pain an individual experiences usually originates from one of the three pathophysiological origins which are neuropathic, nociceptive or nociplastic (Sonneborn & Williams 2020: 26).

Physiologically pain is felt when the nociceptors, which are the sensory nerve endings in the human body, encounter something that activates painful stimuli. The nerve impulses in the sensory nerves sends quick signals to the brain through nerve tracts in the spinal cord and the brainstem. The pain signal is then processed by the brain which

with the help of a motor response tries to stop or halt the cause of the pain. (Robinson & Chong 2020: 415-416.)

The source of the patients' pain can thus have several different origins. First is pain that originates from invasive procedures that can be done in the ICU such as intubation, endotracheal suctioning, placing of central venous catheterization, pulmonary artery catheter placement, paracentesis, lumbar puncture, tracheotomy, fibreoptic bronchoscopy, pericardiocentesis, chest tube placement. Second is acute pain that originates from trauma, accidents, burns, surgery whether selective or emergency that requires urgent treatment and admission in the ICU. The third source of pain would be pain that is associated with pre-existing chronic pain the patient has had before being admitted in the ICU. These can be caused by diseases such as cancer, neuropathy, kidney stones and many others. There is also the last source of pain that originates from non-invasive and therapeutic procedures that occur while the patient is in the ICU including, mobilization, positioning, collection of samples like urine, blood, imaging procedure like XRAYS, MRI, CT scans. (Koftis et al. 2017: 66-67; Sare & Meryem 2020: 505.)

Pain that goes untreated can have many negative impacts on human body affecting every system in the body including cardiovascular, metabolic endocrine, respiratory, musculoskeletal, cognitive, genitourinary, gastrointestinal, immune systems which some of them can be lifelong. Few examples of the body's reaction to pain that has not been managed appropriately include increased level of adrenocorticotrophic hormone, cortisol, epinephrine, aldosterone and decreased level of insulin and testosterone, gluconeogenesis, hepatic glycogenolysis, insulin resistance, increased heart rate and cardiac workload, decreased level of flows and volumes, atelectasis, decreased urinary output, fluid overflow, decreased level of gastric motility, muscle spasms and impaired muscle functioning, mental confusion and decreased level of immune response. (Hinkle & Cleever 2018: 1179, 1181-1182.) It is essential to acknowledge that the above- mentioned harmful impacts do not represent all the harmful effects, rather numerous other effects exist as mentioned in the work of Hinkle and Cleever (2018: 1181-1182). Furthermore, unrelieved pain can cause developmental issues such as increased vulnerability to stress orders, altered temperaments and higher somatization to mention a few. Also, how the patient will experience the pain in the future can be altered by development of chronic pain syndromes. Overall, unrelieved pain can harmfully impact the patient's quality of life by increasing sleeplessness, fear, and anxiety, and decrease the hopefulness which can lead to suicidal thoughts. (Hinkle & Cleever 2018: 1181-1182.)

2.2 Pain Assessment in Intensive Care

Pain assessment can be defined to be a multidimensional assessment of patient's pain through observation and identification of the character, duration, intensity, location of pain and how it affects an individual's ability to function (Medical dictionary 2009a). BC campus (2014) describes pain not as a single even but a process that is ongoing. It is further explained that assessment should be done when an individual's pain changes from what was recorded previously because sudden changes can be a sign of an underlying pathological process (BC campus 2014).

As described by Bourbonnais et al. (2016: 23) due to the lack of subjectivity or clear description of ICU patients' pain it is vital that the nurses can assess patient's pain to adequately provide pain management interventions.

In pain assessment, patient's self-reporting is the most trustworthy tool in measuring the experienced pain and the intensity of it. A thorough pain assessment should be conducted and documented routinely to measure the efficiency of the treatment and effectiveness of the treatment plan. The need for reassessment of the patient's pain depends on the success of the pain management applied, the hospital unit where patient is being treated and the institutional policies. (Hinkle & Cleever 2018: 1194-1197, 1208.) In general, as described by Hinkle and Cleever (2018: 1196) pain should be assessed at the admission phase, when patient reports pain, and when there is a development in patient's condition either to worse or better, and when changes are done to the pain treatment plan.

Comprehensive pain assessment should cover location, intensity and quality of the pain, onset and duration of the pain, factors that heightens or diminishes the pain, effects of the pain considering the patient's functionality and their quality of life, and short-term goals considering the patient's ability to function. In addition, other information such as past experiences of pain and medical history are important to consider when constructing a treatment plan for the patient. (Hinkle & Cleever 2018: 1196-1197,1202-1203.) A framework called ''The Hierarchy of Pain Measure'' is recommended tool to be used when assessing the pain of a nonverbal patient (Hinkle & Cleever 2018: 1203). The framework consists of five main elements and requires the nurse to try and get a self-report from the patient, consider the patient's possible underlying conditions and pathology, as well as consider possible painful procedures done to the patient, observe the patient's behaviour, assess physiologic indicators, and start the analgesic trial (Hinkle & Cleever 2018: 1203).

Assessing patients' pain in the ICU is vital as it allows for optimum and effective pain management to be applied. Usually when an individual experiences pain, they can express what they are feeling but this is not possible for non-verbal ICU patients that are not able to express the pain due to sedation or mechanical ventilation or intubation. (Bourbonnais et al. 2016: 23; Bray et al. 2019: 323; Sare & Meryem 2020: 498.) The study by Sare and Meryem (2020: 498) further emphasizes on the importance of acknowledging that nonverbal patients like those under sedation or mechanical ventilation pain should not be denied and adequate pain relieve interventions should be availed accordingly.

2.3 Pain Assessment Methods in Intensive Care

Intensive care unit or ICU is a hospital division that specializes in treatment of acutely ill or very badly injured patients that require extensive care and continuous monitoring (Collins 2021). Patients in intensive care units are in critical condition, and they can be for example intubated and in mechanical ventilation. In addition, they can be sedated with suppressed level of consciousness. (Silva et al. 2017: 241.)

When patients are alert or conscious and can self-report, three scales are usually utilized in assessing and monitoring their levels of pain. They include numerical rating scale (NRS) where a patient allocates the pain levels in a scale of zero to ten, with ten being the most severe pain in a lifetime experience and zero being no pain at all. The second scale is the visual analogue (VAS) where the patient shows the level of pain by showing on a scale with pictures different levels of pain as shown by the facial expressions on the scale. Lastly is the verbal rating scale (VRS) where the patient vocalises how they feel the pain by using different adjectives that show no pain to extreme levels of pain. (Koftis et al. 2017: 68.)

A study by Koftis et al. (2017: 66) describes the impossibility of using the above-mentioned scales on patients under sedation, semiconscious or mechanically ventilated patients in the ICU. Therefore, new forms of pain assessments methods that are reliable and can be replicated is thus of uttermost importance. Sedated and mechanically ventilated patients' level of pain is usually poorly recognised and acknowledged because usually the patients are being treated for other factors that might be considered more severe. To ensure that ICU patients return to having a higher quality of life upon leaving hospital care thus shows the need for and importance of making sure that their stay in the ICU is less traumatic. (Koftis et al. 2017: 67.)

The behavioural pain scale (BPS) is a pain assessment tool with psychometric properties that has been validated for use with patients who are mechanically ventilated, have no ability to communicate or are sedated in the ICU (Latorre-Marco et al. 2016: 465; Yamada & Ikematsu 2019:769). The BPS scale consist of three behavioural indicators that are facial expression, movements of upper limbs as well as mechanical ventilation compliance. The indicators have scores between one to four and a total of three to twelve. A score of three would mean no pain and twelve severe pains. (Emsden et al. 2018: 207; Latorre-Marco et al. 2018: 207.) Latorre- Marco et al. (2016: 465) states that BPS is recommended especially for patients with behaviours that can be observed and have preserved motor function.

Table 1. Behavioral Pain Scale (Ito, Teruya & Nakajima 2022: 2)

Category	**Description**	**Score**
Facial expression	Grimacing Fully tightened Partially tightened Relaxed	4 3 2 1
Upper limbs	Permanently retracted Fully bent with finger flexion Partially bent No movement	4 3 2 1
Compliance with ventilation	Unable to control ventilation Fighting ventilator Coughing with movement Tolerating movement	4 3 2 1

The use of BPS allows for optimal and effective pain assessment, as a result the need for mechanical ventilation of patients is immensely reduced as is the need for a longer ICU stay. BPS-NI tool is an improvised version of the BPS that is used with patients that are non-intubated and it uses vocalization instead of compliance with ventilation. (Chen, Zu, Wu, An & Zhang 2016: 64; Emsden et al. 2018: 3.) The study by Chanques et al. (2014: 8) mentions that assessment of ventilator waveforms and asynchrony during the patient's face and body observation, which is required in BPS, can be difficult. Thus, listening of ventilator alarms in CPOT is a much better option (Chanques at al. 2014: 8). Several countries have tested and adapted the BPS thereby integrating it into their culture by translating it into their languages making it easier to use in its given environment (Chen et al. 2016: 70, Yamada & Ikematsu 2019: 769-770).

Critical Care Pain Observation Tool (CPOT) is another important and common pain scale used in ICUs all over the world (Emsden et al .2018: 2). CPOT as an assessment

tool is reliable and has validated psychometric properties that has made it one of the most reliable assessment tools in the ICU for non-communicative, unconscious, sedated and mechanically ventilated patients (Emsden et al. 2018: 2; Yamada & Ikematsu 2019: 769). CPOT accesses four categories of behaviours in patients. These indicators include “facial expression, body movements, muscle tension and compliance with me mechanical ventilation.” (Koftis et al. 2017: 68; Emsden et al. 2018: 3; Latorre-Marco 2018: 207.) The CPOT scale is rated or scored between zero to two for every indicator totalling between zero at the lowest point of pain and a score of eight indicating severe pain (Latorre-Marco 2018: 207; Emsden et al. 2018). It is essential to acknowledge that in CPOT tone movements in the muscles of the body are assessed while in BPS only upper limbs are observed (Gomarverdi, Sedighie, Seifrabiei & Nikoosereshi 2019).

Table 2. Critical-Care Pain Observation Tool (Ito et al. 2022: 2; Gomarverdi et al. 2019)

Category	**Description**	**Score**
Facial expression	Grimacing Tense Relaxed	2 1 0
Body movements	Restfulness Protection Absence of movements or normal position	2 1 0
Compliance with mechanical ventilation (MV)	Fighting ventilator Coughing but tolerating MV Tolerating ventilator or movement	2 1 0
Vocalization (non-ventilated patients)	Talking with normal tone Sighing, moaning Crying out, sobbing	2 1 0
Muscle tension	Very tense or rigid Tense and rigid Relaxed	2 1 0

CPOT scale guidelines have been adapted and translated into various languages such as Finnish, Swedish, Danish, Turkish, Italian and many more. Adaptation of CPOT in different countries has allowed the standardization of pain assessment that is reliable and made suitable for the environment they are in. (Emsden et al. 2018: 1-2.) Teaching nurses on the use of CPOT consistently and having trainings to booster their knowledge is important in producing accurate results from the scale (Chanques et al. 2014: 9; Emsden et al. 2018: 6; Yamada & Ikematsu 2019: 772). Implementing CPOT, as found by Chanques et al. (2014: 9) as well as Yamada and Ikematsu (2019: 773), reduces the need for sedation and analgesics, meaning that CPOT in critically ill enables the administration of analgesics to be optimal due to the reliable results from the

scale. BPS and CPOT are not suitable for sedated patients, neuroblocking treatment, quadriplegia, and poly neuropathy compared to Visual Analogue Scale (VAS) and Numerical Rating Scale that are suitable for these patient groups (Latorre-Marco et al. 2016: 469; Latorre-Marco et al. 2015: 207).

It is important to note the difficulty associated with low frequency of behavioural indicators that would otherwise be observed with brain injured patients. This has therefore led to a need of a specially modified CPOT-Neuro that is specific for this vulnerable type of patient. The total score of CPOT-Neuro varies between zero and eight remaining consistent with the total score of all the categories in the original CPOT. Brow lowering is a common reaction in brain injured patients and is therefore given a score of one. Score of two is given to contractions of the face like grimacing which is strong indicator of pain. In body movement the score of one is for purposeful movements for instance cautious movements or limb flexion. Two is given for protective or purposeful movements like reaching for the site of the pain. For ventilator compliance, one is given to activation of alarms. For vocalization, patients verbal complaints is scored as a two. In muscle tension the score of two was removed because it could be a result of spasticity due to brain injury. In autonomic responses, a score of one is given to at least one response for example tearing and face flushing. (Gelina et al. 2021: 2.)

ESCID is a behavioural pain scale designed in Spain and has Spanish abbreviations (Latorre-Marco et al. 2016: 465). The scale is an improved version of the Campbell scale, a pain assessment tool that was established by the Spanish Society of Intensive Medicine and Coronary Units (SEMIYUC). The Campbell scale was created with the aim of evaluating and quantifying pain. The ESCID scale contains five behavioural categories namely ‘’facial muscles, restlessness, muscle tone, mechanical ventilation and consolability’’. (LaTorre-Marco et al. 2015: 207, Lopez-Lopez et al. 2018: 50.) ESCID scores are rated from zero as the lowest score to two being the highest score in each of the five categories (Latorre-Marco et al. 2016: 465). Validated ESCID scale replaced vocalization of the Campbell scale with vocalization with compliance with medically ventilated. The consolability indicator reflects that patient react to the pain observer's interaction though verbal or tactile stimuli. (LaTorre-Marco et al. 2016: 465-469.)

Table 3. The Behavioral Indicators of Pain Scale (Latorre-Marco et al. 2016: 465)

Category	Description	Score
Facial expression	Regularly frowning/clenched jaw Tense, frowning/grimacing Relaxed	2 1 0
Calmness	Frequent movement, including head or limbs Occasional restless movement, shifting position Calm, relaxed, normal movements	2 1 0
Muscle tone	Rigid Increased flexion limbs Normal	2 1 0
Compliance with mechanical ventilation	Fights with the respirator Coughs, however, tolerates MV Tolerates MV	2 1 0
Consolability	Difficult to comfort by touch or talking Reassured by touch or talk Distractible Comfortable, quiet	2 1 0

ESCID was found by Latorre- Marco et al. (2016: 471) to be very crucial in Spanish speaking countries because of its validity and adaptation to the Spanish language. This is significant because it enables cultural integration in pain assessment and allows for improved outcomes for critical care patients and reduced adverse effects of poor pain management (Latorre- Marco et al. 2016: 471).

In addition to BPS, CPOT and the variation of those, another pain assessment tool that exists is Non-verbal Pain Scale (NVPS). The usage of this method requires the observation of facial domains, breathing domains, muscular domain and physiological domains that are related to pain. Facial domain includes observing the patient's face, breathing domain includes observing the patient's respiration, muscular domain includes observing the activity and guarding whereas the physiological domain includes observing vital signs, skin, and pupils. (Chanques et al. 2014: 2-3.) In their research Chanques et al. (2014) studied the psychometric factors of NVPS, BPS and CPOT tools when applied in intensive care unit with non-communicative patients that were either intubated or non-intubated. The results demonstrated that although NVPS, BPS and CPOT tools exhibited good psychometric assets, NVPS was not as reliable, internally consistent, and responsive as were BPS and CPOT tools (Chanques et al. 2014: 1, 6).

Zurich Observation Pain Assessment (ZOPA), on the other hand, is a tool that was developed and validated by Swiss scientists and nurses to be used for patients with neurosurgical and neurological illnesses as well as for patients with decreased level of consciousness and cognition (Fröhlich, Meyer, Spirig & Bachmann 2020: 2). The ZOPA tool includes assessment of four categories consisting of "vocalization, facial expression, body language and physiological indicators." (Fröhlich et al. 2020: 2). These categories include altogether thirteen items that are declared as either absent or present. If even one of the items is detected present, it is then concluded that the patient is pain. (Fröhlich et al. 2020: 2.) The items under vocalization are groaning or moaning and grumbling, whereas the items under facial expression include distorted or affected facial expression, staring, tightened eyes and tears running from eyes as well as gritting of teeth. Body language category include items such as restlessness, kneading or touching part of the body and tensed muscles, whereas physiological indicators consist of changes in vital signs such as in blood pressure or heart rate and breathing as well as changes in colouring including facial rash or sweating. (Fröhlich et al. 2020: 2.)

Fröhlich et al. (2020: 1) studied the consistency of ZOPA with BPS and CPOT in detecting pain of nonverbal intensive care unit patients. As mentioned earlier, although ZOPA was initially designed to be used with neurological and neurosurgical patients, the study by Fröhlich et al. (2020: 2) aimed to find out whether the application of the tool could be expanded to other medical settings such as cardiac, visceral, and thoracic surgery. The study results showed that ZOPA is consistent with BPS and CPOT tools in indicating pain, but ZOPA can detect pain at earlier stage owing to the low threshold value. ZOPA was also found to have some advantages such as easier usage by nurses' due the structure and application of the tool with dichotomous items and the physiological parameters that were also observed aided to detect pain earlier. (Fröhlich et al. 2020: 6.)

Behavioural Pain Assessment Tool, BPAT, is a pain assessment tool containing eight items that the nurse assesses as either absent or present. BPAT was created because BPS and CPOT, although having the strongest psychometric properties compared to several other pain assessment tools, require more complex interpretation of scores and extensive training to apply the tools in a reliable manner. BPAT consists of four facial expressions including neutral expression, grimace, wince, and eyes closed, two verbal responses including moaning and vocal complaints of pain as well as two body muscle responses including rigid and clenched fists. (Gelinas et al. 2017: 811-812.) BPAT was studied by Gelinas et al. (2017: 811, 817-820) on heterogenous intensive care patient population during rest and procedures in 28 countries. The patients consisted of both

self-reporting patients and patients that were not able to self-report. The study (Gelinas et al. 2017: 817-820) demonstrated that BPAT is reliable and valid pain assessment tool across the world.

Physiological pain assessment tools have also been studied and one of them is the Nociception Level Index (NOL) that was studied by Shahiri, Richard-Lalonde, Richebe and Gelinas (2020). As stated by Shahiri et al. (2020: 428-429) various behavioural pain measures exist, which have their limitations especially with highly sedated patients and patients receiving neuromuscular blocking agents, but there is a lack of physiological pain measures. Thus, the Nociception Level Index that gives a combined value of various physiological parameters that measure pain was further studied in intensive care unit with mechanically ventilated patients that were not able to self-report the pain (Shahiri et al. 2020: 428).

The NOL Index is captured by utilizing finger probe and disposable sensors that are sampled 50-500Hz. The sensors consist of accelerometer, photoplethysmography as well as galvanic skin response sensor and peripheral temperature sensor. Various physiological parameters such as ‘’photoplethysmography pulse wave amplitude, heart rate, heart rate variability, skin conductance level, number of skin conductance fluctuations, skin temperature, and their time derivates’’ (Shahiri et al. 2020: 429) are extracted from these sensors. A technique called Nonlinear Random Forest regression is then used to analyse the combined parameters that provides the NOL index that ranges from zero to 100 with values over 25 indicating pain. The study results indicated that NOL is a feasible method as the NOL values distinguished between both nociceptive and non-nociceptive procedures. Furthermore, the values correlated with initial measures collected with self-reports and CPOT. (Shahiri et al. 2020: 428-432.) Thus, as concluded by Shahiri et al. (2020: 433) the NOL index could be a potential pain assessment method to be used especially with nonverbal patient populations, but further studies are required with larger sample sizes covering different diagnosis and varied levels of consciousness.

In addition to previously mentioned NOL index (Shahiri et al. 2020) other physiological pain assessment methods have been studied. For example, the role of the perfusion index (PI) in pain assessment of sedated non-intubated intensive care patients has been studied (Hasanin, Abdel Raouf Mohamed and El-adawy 2017: 961-962). In their study Hasanin et al. (2017: 961) used the Masimo pulse oximeter probe to measure the PI. The results indicated a good connection between the PI and BPS-NI values after

patient had experienced a painful stimulus. Thus, Masimo device could be an alternative tool to be used in pain assessment. Although as stated, more research is required to validate the findings and study the accuracy of the method in heterogenous patient groups. (Hasanin et al. 2017: 964-965.)

2.4 Non-Pharmacological Pain Management in Intensive Care

Non-pharmacological pain management techniques include various physical, cognitive-behavioural and lifestyle strategies focusing on the body, mind, spirit as well as social interaction. Examples of physical methods are cutaneous stimulation, heat or ice treatments, immobilization, transcutaneous electrical nerve stimulation amongst others. Whereas cognitive-behavioural method includes distracting and relaxation techniques, meditation, biofeedback, and hypnosis to mention a few. (Berman & Snyder 2021: 1141.) When talking about pain management methods it is vital to understand the meaning of the term. As defined in the Medical Dictionary (2009b) pain management is the process in medical care that involves the alleviation of pain either pharmacologically or non-pharmacologically with the purpose of preventing, decreasing, or stopping pain.

Studies have shown that non-pharmacological pain management techniques are important addition to pharmacotherapy in intensive care units to further reduce the pain experienced by the patients (AminiSaman 2018; Babajani, Babatabar Darzi, Ebadi, Mahmoudi & Nasiri 2014; Golino et al. 2019; Jafari, Emami Zeydi, Khani, Esmaeili & Soleimani 2012; Jawed et al. 2021; Momeni, Arab, Dehghan & Ahmadinejad 2020). AminiSaman et al. (2018) found in their research that Transcutaneous Electrical Nerve Stimulation (TENS), when applied on acupuncture points, reduced the pain of intensive care patients who were intubated and in mechanical ventilator. The reduced pain amongst the patients receiving TENS also impacted the usage of analgesics in a positive manner. The participants in the study group required less opioid and sedation drugs than the participants in the sham group. (AminiSaman et al. 2018: 292-294.) Foot reflexology massage and the effectiveness of it as pain management method during the removal of chest tube that followed open heart surgery was studied by Babajani et al. (2014). The study results indicated that patients belonging to the intervention group felt less of ascending pain that was caused by the removal of the chest tube (Babajani et al. 2014: 20). Whereas music therapy was proven to be an effective non-pharmacological pain management method by Jafari et al. (2012). The level of pain intensity of the patients in ICU after open heart surgery was reduced after listening to preferred music (Jafari et al. 2012: 4). This was further demonstrated by Golino et al.

(2019: 52-54) who found in their research that music therapy helped to decrease the patients' self-reported pain, and anxiety levels as well as the patients' respiratory and heart rate.

Indeed, in addition to pain reduction, non-pharmacological pain management interventions such as touch, music therapy and aromatherapy have been shown to impact intensive care patients physiological and psychological aspects in positive manner (Arslan & Ozer 2016). The research by Arslan and Ozer (2016: 867, 870-872) found that physical touch increased patients' haemoglobin levels whereas music therapy and aromatherapy reduced the patients' pulse rate.

New non-pharmacological pain management methods are also being studied. Jawed et al. (2021) studied the feasibility and acceptability of virtual reality intervention from both, healthcare professionals and patients', perspective. The results showed that virtual reality intervention was highly accepted by both participant groups. It was also found, that by using commercially available VR equipment the intervention could be safely used with mechanically ventilated and critically ill intensive care patients. Having said that, implementation of the technology and the potential of the intervention to cause motion sickness, were concerns found in the study. (Jawed et al. 2021: 751-752.) Regardless, the intervention was demonstrated to be potential method for reduction of pain, anxiety, and delirium amongst ICU patients. Although further research is required. (Jawed et al. 2021: 753.)

Several types of non-pharmacological pain management interventions exist as described by Berman and Snyder (2021: 1141) but studies (Khalil 2018; Kia et al. 2021) have shown that the usage of non-pharmacological pain interventions vary greatly between hospitals and ICU nurses. According to studies conducted by Khalil (2018: 36) and Kia et al. (2021: 3) some of the most used non-pharmacological pain management interventions in ICUs included repositioning, usage of equipment designed for increasing comfort such as inflatable mattresses and providing a quiet and comfortable environment for the patient. Other non-pharmacological interventions, that were not used as often as Kia et al. (2018: 3) found out, included acupuncture, acupressure, reflexology, encouragement of consuming of herbal drinks and hydrotherapy. Whereas Khalil (2018: 36) reported, that also application of hot and cold packages, communication with patient and family and providing education for patient and their family were used, although only on few occasions.

Patients with severe pain need to have other methods of pain management that do not heavily rely on medications. This is because of the reliance on pharmacotherapy can be unsafe and often might not be effective in treating pain. This has made it crucial for other modes of treatment to be utilized. Shifting the focus from pharmacological to non-pharmacological pain management is essential and should be integrated in patient treatment thus promoting patient self-management. (Becker et al. 2017; Kidanemariam et al. 2020: 2.) Becker et al. (2017) reports that barriers that impact the application of non-pharmacological pain management interventions are caused by factors that are either patient, provider or systems related. The study mentions treatment beliefs and support, as well as how patient interacts with their providers, as some of the things that cause challenges (Becker et al. 2017).

High cost of treatments, lack of resources, patient attitudes and preferences, and lack of education are some of the components that affect the providence, acceptance, and application of non-pharmacological methods (Becker et al. 2017). Other factors having impact on the application of non-pharmacological pain management methods are the lack of nurses, lack of patient participation, lack of experience on using methods by nurses, heavy workload by the nurses, failure of the hospital administrations in providing the nurses with support in providing methods and lack of time to perform methods (Kidanemariam et al. 2020: 2).

As the scope of this thesis considers the nurses, and patients' perspectives on non-pharmacological pain management techniques as well as the possible challenges that nurses might face in using the methods it is vital to understand the meaning of these two words. Perspective as a noun has been defined in Cambridge Dictionary (2022a) as ''a particular way of considering something''. The Collins (2022a) further describes that a specific perspective is a specific way of rationalising something. Especially something that is affected by person's experiences or beliefs (Collins 2022a). Whereas challenge as a noun has been defined to be ''…something new and difficult which requires great effort and determination'' (Collins 2022b). The effort required to accomplish something successfully can be either mental or physical. Furthermore, challenge has been explained to be something that tests the person's ability. (Cambridge Dictionary 2022b.) Challenges is the plural and 3rd person singular present tense of the word challenge (Collins 2022b).

3 Purpose, Aims and Research Questions

The purpose of this thesis is to describe the different types of non-pharmacological pain management methods nurses use in intensive care as well as nurses, and patients' perspectives on these methods. The aim is to produce a descriptive literature review about the non-pharmacological pain management methods used in intensive care units as well as review the perspectives of nurses and patients on the methods used. This review will help to increase and support the knowledge of healthcare professionals and nursing students.

The research questions this thesis aimed to answer are:

1. What are the non-pharmacological pain management methods used in intensive care?

2. What are the nurses and patients' perspectives on using the non-pharmacological pain management methods in intensive care?

4 Methodology and Methods

4.1 Methodology

Qualitative research methodology in healthcare as explained by Maltby, Williams, McGarry and Day (2010: 48) is based on the understanding and collection of the in-depth experiences of the participants taking part in specific research. Various methodologies exist in qualitative research, but the main ones are phenomenology, ethnomethodology, symbolic interactionism, grounded theory, and constructivism. The aim is to find out about a phenomenon through participants experiences and feelings that can be collected by using various data collection methods such as interviews, focus groups, observation, ethnography, case studies and action research. As the aim of qualitative research methodology is understanding of participants experiences, the analysis of the collected data will require time and the researcher to fully immerse him- or herself with the data and keep revisiting it throughout the research process. (Burns & Grove 2009: 507-508; Maltby et al. 2010: 48-55.) The focus in the qualitative research methodology is the quality of the data rather than the quantity of the data which by contrary is the core of quantitative research methodology in which numerical information is gathered in bigger capacities (Maltby et al. 2010: 22). Thus, as the purpose of this thesis was to

describe the types of non-pharmacological pain management methods nurses use in intensive care units, nurses, and patients' perspectives as well as challenges nurses face in using these methods, the qualitative research methodology approach was better suited to achieve this goal.

4.2 Data Collection Method

The data collection method applied in this thesis was descriptive literature review. The method enabled to identify, assess, analyse, and interpret the phenomena of the types of non-pharmacological pain management interventions nurses use in ICUs, nurses, and patients' perspectives as well as challenges nurses face in using these methods. (Turale 2020: 289-290.)

Relevant literature review aids to create an understanding of the research phenomenon and the existing research data and the knowledge gaps that might exist. It enables to clarify problems that have been researched, problems that require further studying and problems that have not been studied at all. Relevant literature includes sources that are suitable and highly regarded in providing in-depth knowledge that is required to study specific issues and study question. (Burns & Grove 2009: 38, 90-92.) As Burns and Grove (2009: 92) have described, a literature review is an organised written piece of work of published studies and articles of scholars including a presentation of research that has been conducted in the field of certain study. Literature reviews that can be conducted for various reasons should be written so that different themes and identified trends are organised into different sections. The aim of the literature review is to synthesize and evaluate selected published material based on the chosen focus of the review, not list all the published material. (Burns & Grove 2009: 92.)

Descriptive literature review was appropriate in collecting data on this specific topic as in healthcare there is a large amount of data from past research studies and academic books. This avails the previous analysis of information which then the current researcher will have to interpret the findings depending on their understanding. (Meek & McCausland 2014: 28.)

4.3 Data Search and Selection

The data for this thesis was collected by searching, reviewing, and analyzing published research articles and studies about the types of non-pharmacological pain management methods nurses use in intensive care and articles about nurses, and patients'

perspectives on using these methods. The data was searched from reliable databases including CINAHL complete, MEDLINE and PubMed which are some of the main databases used in the Metropolia University of Applied sciences. In addition, a manual search for scientific publications was also applied.

First the authors of this thesis established the inclusion and exclusion criteria that were used to refine the searches to find articles that were relevant to the topic and current. The table of Inclusion and Exclusion List can be found below (Table 4).

Table 4. Inclusion and Exclusion List

Inclusion	**Exclusion**
Articles published in 2011-2022	Articles published before 2011
Articles that are peer reviewed	Articles that are not peer reviewed
Articles relevant to topic and answers research questions	Articles with no relevance to topic or research questions
Articles with adults as research subjects	Articles with neonates and children as research subjects
Articles written and published in English language	Articles written and published in any other language
Articles available in full text	Articles without full text

The inclusion criteria applied in the database search included the following. The research articles had to be published between the years 2011 and 2022 although a five-year time frame, 2016-2021, was initially preferred. This was extended to the 11- year time frame due to rarity of the research articles. All the research articles had to be peer reviewed, relevant to the thesis topic and answer the two research questions established by the authors. Only research articles with adult ICU patients were to be included. Furthermore, the research articles had to be written in English language, to both authors to be able to read the articles, and available in full text.

Having established the inclusion and exclusion criteria, the authors agreed upon the search terms to be used in the database search. The search terms that were agreed upon and based on the research questions included pain management, intensive care unit, non-pharmacological and attitudes as well as the variation and combination of

these main search terms. To narrow down the search, Boolean operators “AND” and “OR” were applied (Stolt, Axelin & Suhonen 2016: 39-41). The final term combinations that were searched with the aid of Boolean operators consisted of the following:

1. Pain assessment in icu
2. Pain and pain assessment AND icu
3. Pain assessment AND icu or intensive care unit or critical care AND adults or adult or aged or elderly
4. Non-pharmacological interventions AND pain management or pain relief or pain control or pain reduction AND icu or intensive care unit or critical care
5. Complementary therapies or alternative therapies or nonpharmacological therapy AND intensive care unit or icu or critical care or critical care unit
6. Non-pharmacological AND pain management AND icu
7. Non-pharmacological pain management AND icu
8. Music therapy or music intervention or musical therapy AND icu or intensive care unit or critical care AND adults or adult or aged or elderly
9. ‘’positioning’’ AND ‘’icu’’ AND ‘’pain’’
10. ‘’cold therapy’’ AND ‘’icu’’
11. Hand massage AND icu or intensive care unit or critical care AND pain management or pain relief or pain control or pain reduction
12. ‘’Complementary therapy’’ AND ‘’Pain management’’ AND ‘’Intensive care unit’’
13. Attitudes or perceptions or opinions or thoughts or feelings or beliefs AND non-pharmacological interventions AND icu nurses or intensive care nurses or critical care nurses

A database search table with search terms and figures can be found attached as Appendix 1.

The database search, by using the above-listed search term combinations, yielded a total number of 923 articles hits. Another 20 articles hits were found through manual search taking the total number of articles hits up to 943. From the total of 943 articles, based on the title, 776 were excluded. After reading the abstract of the 167 articles that were left, another 117 articles were excluded. After reading the remaining 50 articles in full, another 33 articles were further excluded due to the following reasons. The articles did not answer the two research questions, the journals from which the articles were found were not JUFO graded (Publication Forum 2021a) and the articles did not fulfill the CASP checklists criteria (CASP 2021). The remaining 17 articles were selected to be included in this thesis and further analyzed by using inductive content analysis. A PRISMA Flow Diagram below (Figure 1) shows the database research process in more detail.

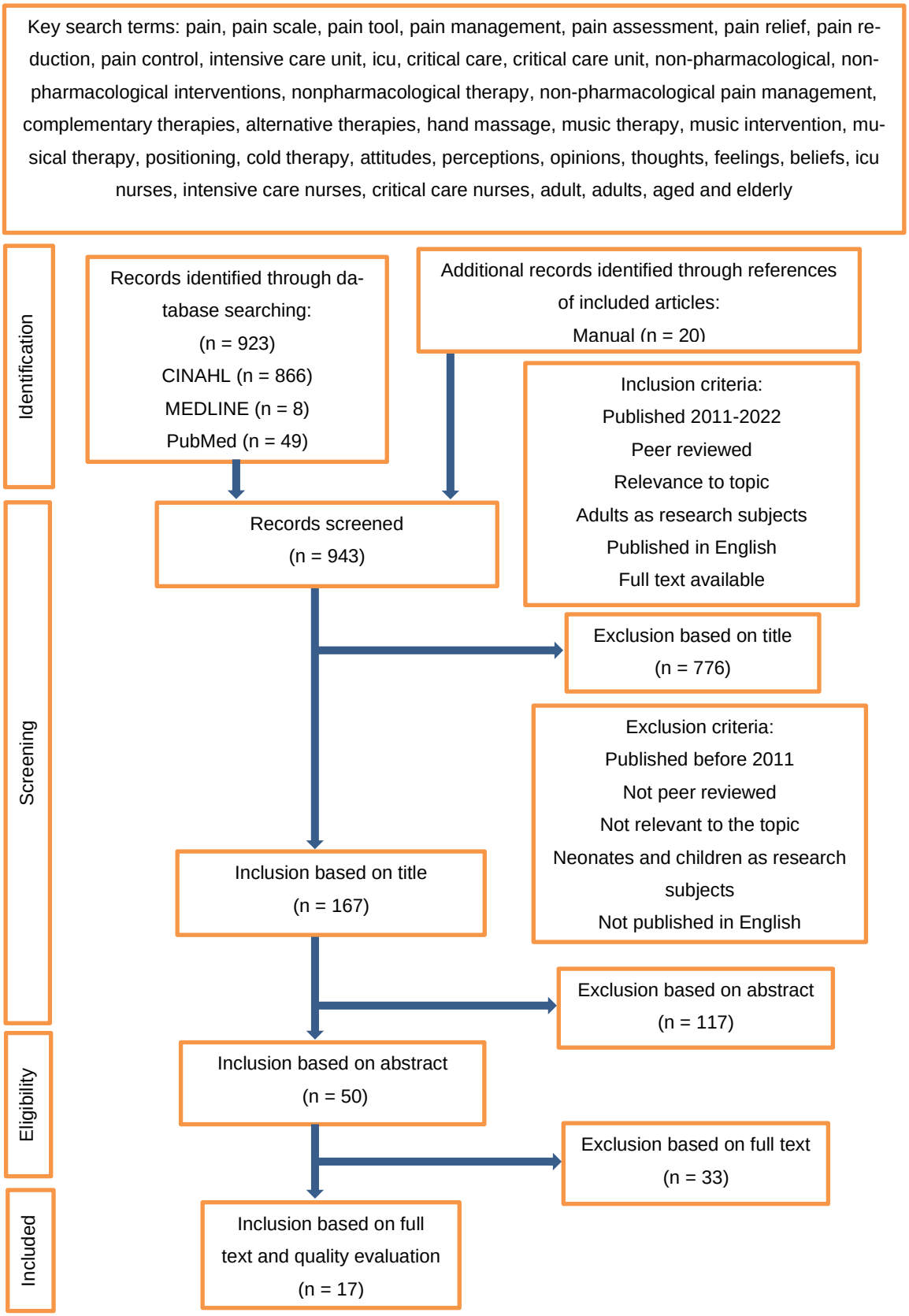

Figure 1. PRISMA Flow Diagram

Having chosen the final 17 articles for the inductive content analysis the articles were then organized into the Evaluated Studies Table (Appendix 2). The articles were viewed in more detail and the following information was written onto the table: authors, year of the publication, country of research, title of the article, research methodology and methods, sample size and main outcomes.

Out of the final 17 research articles chosen for this thesis 12 were found from CINAHL complete database. CINAHL complete, the Cumulative Index to Nursing and Allied Health Literature, is a database that permits nursing students and healthcare allied professionals to reach evidence-based literature from peer reviewed journals and currently widely used journals (Burns & Grove 2009: 94-95). The other five articles were found from the reference lists of viewed articles during the database search process. All five articles were also found from CINAHL database having used the names of the article as search terms. One of the five articles was not freely accessible therefore, the library services at Metropolia were contacted who ordered the research article.

To ensure the quality of the research journals selected for this thesis the authors utilized Publication Forum (JUFO), which is established by the Finnish scientific community. In JUFO different publication channels are rated into four classification levels. Levels one, two and three are classified as basic, leading, and top levels accordingly whereas zero includes articles that have not reached level one. (Publication Forum 2021a & 2021b.) The aim of the Publication Forum is ‘’to support the quality assessment of academic research’’ (Publication Forum 2021b). All the research journals that had published the 17 selected articles had level one JUFO rating. Whereas the quality of the research articles was ensured by utilizing the critical appraisal tools created by Critical Appraisal Skills Programme (CASP). CASP has designed eight different checklists to be utilized when reading research articles. (CASP 2021.) During the data search and selection process both authors were present during the database searches, individually read the 50 articles and applied the CASP checklist criteria (CASP 2021) after which discussion between the two authors regarding the quality of the remaining articles was conducted.

4.4 Data Analysis Method

Qualitative data analysis is challenging as there are no universal rules in the analysis process, and it requires time from the researchers to organise and study the collected data to create a deep understanding of it. Also, qualitative data analysis requires the researcher to have creativity, good inductive skills, and ability to find different type of

patterns and making them into integrated whole. (Polit & Beck 2022: 257.) Furthermore, as Polit and Beck (2022: 257) explain the reporting of qualitative data can pose challenges as the researcher would need to be able to summarise the analysed data in concise form without losing the richness of it.

The amount of data in qualitative research can be enormous, thus the qualitative analysis normally begins with the development of a coding scheme to categorize and organise the data which requires attentive reading of the data and recognising the fundamental concepts. Having said that, the initial coding might need modifications later in the analysis process. (Polit & Beck 2022: 258.) As mentioned earlier, there are no universal rules in the analysis process and so the coding of the data can be done in various ways. The way the coding is done depends on the research question and the desired end- product. (Polit & Beck 2022: 259.)

Regardless of the challenges qualitative data analysis poses, in this thesis an inductive content analysis was applied, which is often utilized in nursing studies (Elo & Kyngäs 2008: 107). Qualitative content analysis comprises of analysing the data to discover main themes and the patterns within those themes. The data is divided into more compact units which are then coded and named based on the content followed by grouping of the coded data based on the shared concepts. (Gray, Grove & Sutherland 2017: 272; Polit & Beck 2022: 261.) Thus, content analysis aids to thoroughly measure either the frequency, order, or intensity of the occurring words, phrases, or sentences in collected research data. It is a systematic and objective way to describe as well as quantify selected phenomenon. (Burns & Grove 2009: 528; Elo & Kyngäs 2008: 108.)

As described by Elo and Kyngäs (2008: 107) content analysis is either inductive or deductive. Both types of processes consist of three stages which are preparation, organizing and reporting. Inductive process is chosen to be used when there is not a lot of former knowledge about specific phenomenon or the knowledge that exist is fragmented. Thus, in this the concepts are obtained from the data as more specific instances and then combined into more generalised statements. (Elo & Kyngäs 2008: 109.)

In the preparation stage the characteristics of the content that the researcher wants to measure will be first defined after which the rules for identification and recording of the characteristics will be developed. A unit, that depends on the research question and thus can be for example a word, portion of pages or a theme, for analysis will be selected. The units are then quantified following certain rules. (Burns & Grove 2009: 528;

Elo & Kyngäs 2008: 109.) The aim for the researcher is to immerse him- or herself with the data which requires questions such as who, where, when, what and why to be asked whilst reading through the material various times (Elo & Kyngäs 2008: 109). The preparation phase is followed by the organizing phase which consist of open coding, formation of categories and abstraction. In the open coding stage, headings and notes are written down regarding the text explaining all the aspects of the content. The notes and headings are then categorised on to coding sheets and categorised freely by utilising the researcher's understanding of what belongs into the same category. Created categories are then grouped into higher order headings and by doing so the researcher reduces the number of categories into fewer and more generic ones. By merging the categories this way, will help the researcher to describe the phenomenon as well as increase knowledge and understanding of it. Abstraction, which is the last phase of the organising stage, a general description of the research topic is formulated via category generation that will continue as far as possible and sensible. After this takes place the reporting phase. (Elo & Kyngäs 2008: 109-111.)

The inductive content analysis process in this thesis started with screening and analysing articles one by one. The main outcomes from the articles were taken and categorized as meaning units. The meaning units were further coded and simplified. From the coded phrases sub-categories were formed which were further categorised into more generic categories. The multiple generic categories answered to one of the two main categories which were the established research questions. The research questions were ‘’What are the non-pharmacological pain management methods used in intensive care?’’ and ‘’What are the nurses and patients' perspectives of using the non-pharmacological pain management methods in intensive care?’’. Below (Table 5) is a short extract from the inductive content analysis table created during the analysis.

Table 5. Example of content analysis in this study

Article	Meaning Unit	Coding	Sub-category	Generic category	Main category
1.	‘’The main finding of this pilot RCT is that hand massage therapy in the ICU seemed to contribute to some pain relief after cardiac surgery.’’	Hand massage in cardiac ICU might help to reduce the pain	Hand massage Possibly effective pain management	Different method Effective method	Non-pharmacological pain management methods used in ICU

5 Outcomes

5.1 Summary of the Data Used

In this descriptive literature review, 17 studies were used. The studies were diverse and spread over six different countries, different intensive care departments and spread between the time frame from 2013 to 2021. The studies were as follows.

From North America; Canada: Boitor, Martorella, Arbour, Michand, and Gelinas (2015: 354) which was done in a cardiac surgery ICU with 40 patients, Boitor, Martorella, Maheu, Laizner and Gelinas (2019: 573) in medical-surgical ICU with 46 patients and Gelina, Arbour, Michaud and Cote (2013: 307) in ICU with 6 patients/family members and 32 nurses. From USA: Golino et al. (2019: 50) in medical-surgical ICU with 52 patients, Feeney et al. (2017: 996) in medical and surgical ICU with 46 patients and Brewer, Turrise, Pond, Kim, Godwin and Pond (2019: 1) with 218 medical, surgical, and perioperative nurses.

From Asia; Iran: Hasanzadeh et al. (2016: 66) in cardiac surgery ICU with 80 patients, Jahangirifard, Razavi, Ahmadi and Forozeshfard (2017: 408) in cardiac surgery ICU with 100 patients, Kia et al. (2021: 2) in general, cardiac surgery and burn ICU wards with 224 patients, Momeni et al. (2020: 1) in trauma ICU with 75 patients and Yarahmadi, Mohammadi, Ardalan, Najafizadeh and Gholami (2018: 71) in cardiac surgery ICU with 180 patients. From Turkey: Kucukakca Celik and Özer (2021: 225) 57 open heart surgery patients, Ciftci and Öztunc (2015: 595) 72 patients in ICU, Ozturk et al.

(2016: 2) 115 coronary artery bypass graft surgery patients and Özturk, Sevil, Sargin and Sait Yucebilgin (2018: 108) 63 patients in the ICU.

From Europe and Africa; Cyprus: Papathanassoglou et al. (2018: 172) 60 general ICU patients. Egypt: Khalil (2018: 33) 60 critical care nurses in a medical, neurosurgery or emergency ICUs.

The instruments used in gathering the data in these studies were diverse. To gather information on the level of pain the patients were experiencing several pain measurement scales were used. Six studies used the Visual Analogue Scale VAS (Ciftci & Öztunc 2015: 595; Feeney et al. 2017: 997; Hasanzadeh et al. 2016: 67; Jahangirifard et al. 2017: 408; Ozturk et al. 2016: 3; Özturk et al. 2018: 108). Critical Care Pain Observation Tool (CPOT) was used by two studies (Boitor et al. 2015: 357; Papathanassoglou et al. 2018: 172). Behavioral Pain Scale was used in one study by Momeni et al. (2020: 2). Papathanassoglou et al. (2018: 176) used the Numerical Rating Scale NRS. Brief Pain Inventory BPI and Faces Pain Thermometer FPT were used by Boitor et al. (2015: 358).

To measure anxiety levels in some of the studies two methods were used. Hasanzadeh et al. (2016: 67) used the Spielberger situational anxiety level inventory scale (STAII). The State-Trait Anxiety Inventory (STAI) was used by Özturk et al. (2018: 108) and Ciftci & Öztunc (2015: 596).

General data was also collected by use of questionnaires (Boitor et al. 2015: 357; Khalil 2018: 34). A pain management questionnaire was used by Kia et al. (2021: 1) to gather information on pain. Hasanzadeh et al. (2016: 67) as well as Kucukakca Celik and Özer (2021: 227) used a short form, modified-McGill pain questionnaire (SFM-MPQ). Yarahmadi et al. (2018: 72) used a two-part questionnaire with two parts, the first part had 10 questions, gathering information on gender, age, marital status, BMI, education qualifications, occupation, surgery type, pain medication history, placement of chest tube and a second part gathered information on visual analogue scale VAS. Ciftci and Öztunc (2015: 596) used a general comfort questionnaire. To better understand the participants opinions two studies used a social demographic and clinical information questionnaire (Brewer et al. 2019: 3; Momeni et al. 2020: 2). Brewer et al. (2019: 3-4) also used complementary and alternative belief inventory and beliefs about medicines questionnaire.

Gelina et al. (2013: 309) used a focus group in gathering data. The study by Brewer et al. (2019: 1) opted to gather information by doing an online survey. Feeney et al. (2017: 997) did a patient survey pre- and post-treatment that included the patient self-report, 10-point numerical and VAS, Rhodes Index, collection of TCM diagnostic information and nurses' evaluation pre-and post- treatment. Ciftci and Öztunc (2015: 595) used a vital signs form used by nurses in collecting information on the vital signs of the patient. Face to face interviews was conducted by Kia et al. (2021: 2) while Boitor et al. (2015: 358) used a structured interview.

5.2 Analysis of Collected Data

During the analysis process the data was categorized into two main units that were based on the research questions. The research questions "What are the non-pharmacological pain management methods used in intensive care?" and "What are the perspectives on different non-pharmacological methods used in intensive care?" These two main categories were further divided into smaller generic categories. The categories have been listed in the ''Category formed through data analysis''-table below (Table 6).

Table 6. Categories formed through data analysis

Main categories:	Non-pharmacological pain management methods	Perspectives on non-pharmacological pain management methods
Generic categories:	-Non-pharmacological pain management methods used in ICU -Effects of different non-pharmacological methods on pain intensity -Physiological impacts of different methods -Psychological impacts of different methods	-Nurses' perspectives -Patients' perspectives -Institution based challenges -Nurses based challenges -Patient based challenges

Out of the 17 research articles selected for the final analysis 16 research articles mentioned variety of non-pharmacological pain management interventions used in ICUs. Whereas 13 research articles showed the results of studies done on specific non-pharmacological methods. With the aid of the inductive content analysis four generic categories were established which were: non-pharmacological pain management methods

used in ICU, effects of different non-pharmacological methods on pain intensity, physiological impacts of different methods and psychological impacts of different methods. Another two generic categories, effective method, and insufficient method were also established which were combined with the initial five generic categories based on whether the changes in pain intensity, physiological, psychological and activities were positive or negative.

To answer the second research question regarding the perspectives on using nonpharmacological pain management methods, 7 articles were utilized. The scholarly literature findings were categorized into five individual parts named as, patients' perspectives, nurses' perspective, nurses-based challenges, patient-based challenges, and institution-based challenges.

5.3 Non-pharmacological Pain Management Methods

5.3.1 Non-pharmacological Pain Management Methods Used in ICU

Within the 17 research articles 36 different non-pharmacological pain management techniques and the combinations of those were established. Although some of the techniques were only mentioned once or twice in research articles that talked about nurses and patient's perspectives or challenges faced by nurses in using the methods (Brewer et al. 2019; Gelinas et al. 2012; Khalil 2018; Kia et al. 2021). Whereas some of the methods were researched and discussed in more detail and were mentioned more often (Boitor et al. 2015, Boitor et al. 2019; Ciftci & Öztunc 2015; Feeney et al. 2017; Golino et al. 2019; Hasanzadeh et al. 2016; Jahangirifard et al. 2018; Kucukakca Celik & Özer 2021; Momeni et al. 2020; Ozturk et al. 2016; Papathanassoglou et al. 2018; Özturk et al. 2018; Yarahmadi et al. 2019).

Some methods, such as massage, had many variations that were individually mentioned. For example, hand massage was studied in two articles by Boitor et al. (2015) and Boitor et al. (2019) and foot massage was studied by Momeni et al. (2020). Simple massage that was discovered to be popular amongst nurses, patients, and family members was studied by Gelinas et al. (2012: 313). Then again pressure massage was studied as part of an integrative intervention also including relaxation, guided imagery and listening to music (Papathanassoglou et al. 2018).

Indeed, a few other methods were either studied or mentioned on their own or part of a combination therapy setting. These included cold application (Gelinas et al. 2012: 315;

Kucukakca Celik & Özer 2021) and cold application combined with aromatherapy or music (Hasanzadeh et al. 2016; Yaramahdi et al. 2018). Whereas aromatherapy on its own was further studied by Gelinas et al. (2012) and music as a pain management method was discovered by Ciftci and Öztunc (2015), Gelinas et al. (2012), Golino et al. (2019). Music therapy had its own variations as studied by Golino et al. (2019) that included patients given option to choose the song by themselves and even singing along it or playing relaxation music.

Other non-pharmacological pain management methods discovered and studied in more detail were TENS that was studied in two of the research articles (Jahangirifard 2018; Ozturk 2016) as well as acupuncture and its effectiveness that was studied by Feeney et al. (2017). Acupuncture was also mentioned in the work by Kia et al. (2021: 3) as a method that nurses do not apply often. Reflexology was another method studied in more detail by Özturk et al. (2018) although Gelinas et al. (2012: 315) and Kia et al. (2021: 3) had discovered in their work reflexology to be less used amongst nurses.

Some of the non-pharmacological pain management techniques used in ICU that were discovered through the content analysis process were only listed to be either more popular amongst the nurses or patients and thus, either used more often or less often. According to Gelinas et al. (2012: 313) for example distraction and family presence facilitation were considered less interesting as pain management methods. Whereas touch, active listening, reality orientation, support to communication, application of heat and cold as well as exercise therapy were considered interesting methods by patients and family members (Gelinas et al. 2012: 313-315). Positioning was found to be one of the most used methods by Gelinas et al. (2012: 313-315), Khalil (2018: 35-36) and Kia et al. (2021: 3). Education and teaching were found to be commonly used by Gelinas et al. (2012: 313-315) and Kia et al. (2021: 3) whereas Khalil (2018: 35-36) reported it to be less commonly used method. Providing of quiet and comfortable environment was discovered to be used often by Kia et al. (2021: 3) whereas Gelinas et al. (2012: 313-315) and Khalil (2018: 35-36) found this as less used method. The usage of comfort devise was found to be a common method by both Kia et al. (2021: 3) and Khalil (2018: 35-36) whereas consumption the usage of herbal drinks was found to be less used by both studies. Other often applied non-pharmacological pain management methods were relaxation therapies, mediation (Gelinas et al. 2012: 313-315) and communication (Khalil 2018: 35-36).

Whereas methods discovered to be used to lesser extent included reassurance, bathing, animal assisted therapy (Gelinas et al. 2012: 313-315), breathing and massage

techniques, music and distraction, guided imaginary (Khalil 2018: 35-36), acupressure and hydrotherapy (Kia et al. 2021: 3).

5.3.2 Effects of Different Non-pharmacological Methods on Pain Intensity

Majority of the studies found non-pharmacological pain management methods to be effective in decreasing the intensity of the pain which would further increase the patient comfort. The methods that were found to decrease patients' pain intensity level were either individual or combined non-pharmacological methods. The individual methods included hand massage (Boitor et al. 2015: 359, 362), foot massage (Momeni et al. 2020: 4), music therapy (Ciftci & Öztunc 2015: 597), acupuncture (Feeney et al. 2017: 999), cold application (Hasanzadeh et al. 2015: 69; Kucukakca Celik & Özer 2021: 221; Yarahmadi et al. 2018: 73), lavender oil inhalation (Hasanzadeh et al. 2015: 69), TENS (Jahangirifard et al. 2018: 410) and reflexology (Özturk et al. 2018: 110). Whereas the two combined non-pharmacological pain management methods which were shown to be effective in decreasing the pain intensity were combination of cold application and lavender oil inhalation (Hasanzadeh et al. 2015: 69) and integrative therapy form consisting of relaxation, guided imagery including listening to music, and moderate-pressure massage (Papathanassoglou et al. 2018: 175, 183).

Having said that some studies reached contradicting results indicating that some non-pharmacological methods may not be effective or have significant impact on the pain intensity levels after all. For example, although Boitor et al. (2015: 359, 362) found that after each of the three hand massage interventions the levels of pain intensity of cardiac surgery patients were decreased, a more current study by Boitor et al. (2019: 575) on cardiac surgery patients revealed that the average pain intensity level amongst intervention and control groups over 24- hour period was similar at moderate level. However, the highest level of pain was also the lowest amongst the participants in the intervention group (Boitor et al 2019: 575). Also, Yaramahdi et al. (2018: 73) found that the combination therapy of cold application and music as well as music therapy on its own, did not reduce pain intensity of patients undergoing chest tube removal and thus, these therapies could be considered ineffective. Whereas Ozturk et al. (2016: 3-4) found that TENS as a non-pharmacological pain management method did not decrease the intensity of pain of cardiac surgery patients as significantly as did parasternal block. Although, Ozturk at el. (2016: 5) did discover that during certain postoperative hours there was significantly lower VAS scores also in the TENS intervention group applying those times of pain assessments have an impact on reported pain.

5.3.3 Physiological Impacts of Different Methods

The content analysis also showed that some of the non-pharmacological pain management methods proved to be effective in the sense of providing positive physiological changes. The physiological change that was most often described and reported was lowered or improved systolic or diastolic pressure or both. The non-pharmacological pain management methods that improved blood pressure included hand massage which was studied by Boitor et al. (2015: 362) and who found hand massage to have an impact on diastolic pressure. Another method was music therapy which was proven to decrease systolic and arterial pressure (Ciftci & Öztunc 2015: 597). TENS method studied by Jahangirifard et al. (2018: 410-411) found improved pulmonary functions at 24, 48 and 72 hours postoperatively. Whereas from the combination methods Papathanassoglou et al. (2018: 183) found the combination of relaxation, guided imagery including listening to music, and moderate-pressure massage to lower the systolic arterial pressure.

Decreased heart rate was another physiological change by non-pharmacological methods discovered whilst analysing the research articles. Golino et al. (2019: 54) found that even a single music therapy session decreased patients' heart rate, although the level of decrease in heart rate was dependant on the type of music intervention. As Golino et al. (2019: 54) found out, relaxation group had greater decrease in heart rate than song choice group.

Other positive physiological changes provided by the application of different non-pharmacological pain management methods discovered were improved oxygen level (Ciftci & Öztunc 2015: 597) and decreased respiration rate when music therapy was utilized (Golino et al. 2019: 54). Furthermore, reduced muscle tension was found by Boiter et al. (2015: 362) in their study regarding hand massage. Especially when hand massage therapy was repeated various times over 24 hours (Boiter et al. 2015: 362).

It is worthwhile to mention that although physiological changes may have been reported due to the application of non-pharmacological pain management methods, the changes were not necessarily considered substantial. For example, Feeney et al. (2017: 1000) who studied acupuncture as a non-pharmacological pain management method, reported lowered blood pressure and decreased heart rate after the application of acupuncture but according to them the changes were not significant. Also, the change in level of nausea reported by the patients was found to be not significant (Feeney et al. 2017: 999).

5.3.4 Psychological Impacts of Different Methods

Psychological changes were another generic group discovered from the data. Decreased anxiety was reported in majority of the research articles as a psychological change due to the application of a non-pharmacological pain management method. Music was shown to have anxiolytic effect by Ciftci and Öztunc (2015: 600) as well as Golino et al. (2019: 54). Ciftci and Öztunc (2015: 597, 600) described that patients' face and state anxiety levels reduced, thus making patients' more relaxed and increasing their overall comfort level. In the research done by Gelinas et al. (2012: 314) massage was found ‘'...useful, relevant and feasible for pain management in the ICU, mostly through the reduction in anxiety.'' Acupuncture (Feeney et al. 2017: 999), aromatherapy, cold application, combination of aromatherapy and cold application (Hasanzadeh et al. 2016: 71) all decreased the level of anxiety. Having said that, Hasanzadeh et al. (2016: 71) did find that aromatherapy and combination therapy were more effective than cold application on its own. Also, combination therapy studied by Papathanassoglou et al. (2018: 183) that included relaxation, guided imagery including listening to music, and moderate-pressure massage was found to be effective anxiolytic method.

Presence of family was reported to have a calming effect and aided to keep patients' moral up (Gelinas et a. 2012: 314). Music therapy's song choice intervention was found effective in the form of decreasing patients' psychological distress, whereas music therapy's relaxation intervention was found to be increasing patients' sleepiness and psychological state (Golino et al. 2019: 54). Improved sleep and increased level of relaxation to minimum of moderate level were found by Papathanassoglou et al. (2018: 183) in their study by integrative therapy method. Furthermore, Papathanassoglou et al. (2018: 183) also discovered that fear was another positive psychological change achieved by integrative therapy method.

5.4 Perspectives on Non-pharmacological Pain Management Methods

5.4.1 Nurses' Perspectives

The articles show interest and familiarity in different nonpharmacological pain management methods by nurses, the study by Gelina et al. (2013: 313) reports nurses showing interest in simple massage, music therapy, distraction, and facilitation of family presence. In one study the positive beliefs and attitudes of nurses towards natural treatments or holistic approaches had an impact in the willingness of nurses to

consider using nonpharmacological interventions (Brewer et al. 2019: 6-7). Sceptical beliefs about the ability or the usefulness of complementary and natural treatments is reported by Brewer et al. (2019: 7) as a barrier that prevents providing interventions. The nurses are reported to find usefulness, relevance, and feasibility of some of the intervention in pain management like music therapy, massage and distraction which makes for a positive outlook. However, with the distraction techniques nurses reported a negative outcome by distracting the nurses. (Gelina et al. 2013: 313–314.) In cooperating family members in the treatment by ensuring their presence was also a factor that the nurses felt was important as it was a source of calming down patients and increasing their moral (Gelina et al. 2013: 313–314). Nurses are reported to support the need for patient education which was shown by Gelina et al. (2013: 313) and Brewer et al. (2019: 7) where they expressed the need for explaining disease process, treatment procedures and positioning. Nurses expressed the need for in cooperating intervention-based studies for nursing students like massages to give them the knowledge needed in performing interventions as shown in the study by Momeni et al. (2020: 6).

5.4.2 Patients' Perspectives

Four of the studies examined intensively the patients' opinions, thoughts, and feelings towards nonpharmacological pain management methods. Reduction of anxiety was reported by patients. The study by Feeney et al. (2017: 999) reports patients affirming that acupuncture gives a common anxiolytic effect. In the study by Gelina et al. (2013: 314) family members and patients report that massage was useful in reducing their pain, mostly through a reduction in their anxiety. Furthermore, they reported that having their family members with them made them calm down. The knowledge of some variety of the non-pharmacological intervention by the patients and their family members was also important among the patients as they were able to discuss them, albeit some more than others, as previously mentioned in this review. (Gelina et al. 2013: 313–315.) Studies by Gelina et al. (2013: 313), Ciftci and Öztunc (2015: 597), Golino et al. (2019: 52-54), Papathanassoglou et al. (2018: 175, 183) had patients reporting that non-pharmacological pain management methods tend to reduce pain in a variety of levels depending on the individual interventions. There were methods that were found feasible, practical, and relevant by patients and the family members. These included aromatherapy, exercise therapy, touch, heat and cold application, active listening, reality orientation (Gelina et al. 2013: 315). Individual opinions about interventions seemed to influence the patient's acceptance or rejection of a non-pharmacological methods (Feeney et al. 2017: 1001).

5.4.3 Institution based Challenges

The lack of resources by the hospitals had a significant impact on the application and delivery of the interventions (Brewer et al. 2019: 7). Lack of staff and nurses in hospitals made it difficult in delivery of services and this had a notable impact on the nurses as their time is rushed and they cannot have enough time to perform patient education or interventions (Brewer et al. 2019; Khalil 2018: 37). With shortages of staff come the lack of time to ensure the delivery of services as the nurses are few with a lot of responsibilities to follow and not enough time (Brewer et al. 2019: 7; Khalil 2018: 37). Delivery of interventions also was found to be influenced by hospital policies that determine if the nurses are allowed to deliver certain interventions or not, and what capacity the delivery can be done (Khalil 2018: 7). To provide some of the interventions the nurses and patients need equipment's which when not availed by the institution then negatively impacts the implementation or delivery of the interventions (Khalil 2018: 37). With insurance companies determining what kind of coverage a patient got for procedures, the lack of reimbursements by insurances affected availability of interventions by hospitals. It was shown that lack of intervention competent providers in a hospital would affect the capability of the facility to provide a specific intervention to the patients. With facilities requiring some interventions only be provided through physicians' prescriptions, this hindered the capability of a nurse to provide interventions when needed. Lastly, hospitals not ensuring that patient education on the different interventions was provided made it a challenge in providing these services. (Brewer et al. 2019: 7, 9.)

5.4.4 Nurses based Challenges

The positive effects of nurses using the non-pharmacological pain managements also have a lot of challenges. The use of certain methods might prove to be efficient to the patients but might have a negative effect on the nurses administering them (Gelina et al. 2013: 314). An example by Gelina et al. (2013: 314) mentions distraction techniques which can prove to be a distraction to the nurses. Other studies mention the lack of time that would be allocated to providing interventions as a problem the nurses experienced (Khalil 2018: 37; Kia et al. 2021: 3). Nurses also reported the lack of knowledge and education on the interventions prevented the nurses from being able to deliver the interventions (Brewer 2019: 7; Khalil 2018: 37). The heavy workload that nurses experienced in their work due to staffing shortages hindered the ability to apply the methods (Brewer 2019: 9; Kia et al. 2021: 3; Khalil 2018: 37; Momeni et al. 2020: 5-6). The cultural differences between the patients and the nurses were also mentioned as affecting

the delivery of the interventions (Kia et al. 2021: 3). Lack of experience by nurses in providing interventions influenced their ability to provide interventions as more experienced nurses were more willing to provide interventions than a nurse that has practiced for a shorter time (Khalil 2018: 36). Kia et al. (2021:3) reports that being tired or fatigued was one of the reasons why they were not able to provide interventions. Nurses not providing optimal patient education is a challenge as mentioned by Momeni et al. (2020: 5-6). Nurses also mention that the number of responsibilities that they have while providing care for patients was another challenge in providing interventions (Kia et al. 2021: 3). The personal attitudes and beliefs of nurses influenced their willingness to provide interventions (Brewer et al 2019: 9; Khalil 2018: 35). Sceptical beliefs on complementary and natural treatments were reported to be a factor that was expressed by nurses and a need to overcome this through education was important (Brewer et al. .2019: 7). Kia et al. (2021: 3) mentions the lack of adequate pain management by the nurses or the less common belief by nurses that unconscious patients feel no pain can have a negative influence in the application of interventions. According to Brewer et al. (2019: 9) study the patients need for a “quick fix” made it challenging for nurses to administer nonpharmacological pain management methods as pharmacological pain management produced a faster result than the latter. Furthermore, the unavailability or lack thereof of resources was also reported to be one factor that caused challenges in intervention delivery. Lastly, the perceived liability that nurses may face by applying these interventions as they believed that it was out of their scope of practice made the nurses not willing to use the interventions. (Brewer et al. 2019: 9.)

5.4.5 Patients based Challenges

Among the findings by Brewer et al. (2019: 9) showed that a patients fear of pain and need for an intervention that is felt quicker makes it a challenge because nonpharmacological interventions would not be considered a quick relief and due to their fear, pharmacological options would be considered instead. Brewer et al. (2019: 7) reports that the costs of interventions that the patients incur would become a challenge as this causes a financial strain on them. According to Brewer et al. (2019: 7) and Momeni et al. (2020: 5-6) limited time, understaffing and limited resources were mentioned by patients and the family members. Patients and their family members' personal beliefs were reported as a challenge that may affect the application of interventions. Lack of reimbursements by insurance companies on complementary and alternative methods was also mentioned as a challenge which affects patients' ability to get interventions. (Brewer et al. 2019: 7-9.) Lack of patient education provided to the patients by nurses was reported by Momeni et al. (2020: 5-6) as a challenge as it leaves the patient with

lack of knowledge on an intervention. In the study by Kia et al. (2021: 3) reports negative effects that cultural barriers or beliefs between patients and nurses have with acceptance and application of interventions.

6 Discussion

6.1 Ethics

In research, ethics means ‘’… a system of moral values that concerns the degree to which research procedures adhere to professional, legal, and social obligations to study participants’’ (Polit & Beck 2022: 383). Taking ethical concerns into account in nursing research is important as during the research the line between nursing practice and the collection of the data can get distorted. The existing several codes of ethics and regulations have been established in response to the breaches of moral principles and human rights that have occurred amongst researchers and studies in the past. The major violations of moral principles and human rights in research include the Tuskegee Syphilis Study between 1932 and 1972, the Nazi Medical Experiments between 1933 and 1945, the Guatemala Sexually Transmitted Disease study between 1946 and 1955, the Willowbrook Study between mid- 1950s and early 1970s and the Jewish Chronic Disease Hospital Study in the 1960s. (Gray, Grove & Sutherland 2017: 157-159; Polit & Beck 2022: 60-61.)

The codes of ethics that have been developed in response to the above- mentioned human rights violations in research include Nuremberg Code that are the ethical standards developed in 1949 in response to the Nazi Medical Experiments. Whereas the Declaration of Helsinki which was established in 1964 and which was revised in 2013 is one of the numerous other international standards of ethics that have been developed. In addition, many disciplines such as nursing and medicine around the world have created their own code of ethics. Examples of the established nursing ethics include the American Nurses Association’s (ANA) ‘’Ethical Guidelines in the Conduct, Dissemination, and Implementation of Nursing Research’’ and ‘’Code of Ethics for Nurses with Interpretive Statements’’, Canadian Nurses Association’s ‘’Code of Ethics for Registered Nurses’’ and International Council for Nurses’ (ICN) ‘’ICN Code of Ethics for Nurses’’ (Polit & Beck 2022: 61). Whereas in Finland the National Advisory Board on Social Welfare and Health Care Ethics (ETENE) considers principles in ethical matters in social welfare and health care sector. Amongst many duties ETENE presents initiatives,

establishes statements and recommendations, offers expertise as well as spreads information on both national and international ethical concerns. (ETENE 2021.) In addition, governments have created regulations to protect participants in research studies. Belmont Report issued in 1978 by the National Commission for the Protection of Human Subjects in Biomedical and Behavioural Research in the United States having accepted an important code of ethics, provides model for many guidelines that disciplinary organisations have adopted in United States. (Polit & Beck 2022: 61.)

The standards of ethical research conduct are founded on three primary ethical principles that are stated on the Belmont Report. The first one is beneficence, stating that the researchers have the responsibility to prevent harm and increase the benefits in studies for humans. Thus, covering the participants' right to freedom from harm, discomfort, and exploitation. The second principle is respect for human dignity that contains participants' right to both, self-determination, and full disclosure. Justice is the third principle covering the research participants' right to fair treatment and right for privacy. (Polit & Beck 2022: 62-65.)

There are various strategies how researcher can obey the ethical principles in their research. These strategies as described by Polit and Beck (2022: 65-69) include assessment of risks and benefits for the participant taking part in the research by evaluating that the risk and benefit ratio is appropriate. Second strategy is obtaining an informed consent from the participant which means that the participant has been given adequate amount of information regarding the research and thus, can make an independent decision to either take part in the research or decline participation. Third strategy is to protect participants' privacy with confidentiality procedures. This can be done by providing anonymity for the participants for example by not collecting any personal information which prevents the researcher from connecting the collected research data with the participant. If anonymity cannot not be offered due the nature of the research method, then a promise of confidentiality from the researcher that the participants' data will not be published should be given. Methods to ensure confidentiality are storing collected data in locked cabinets, using substituting identification numbers, and reporting of the collected data within participants only. Fourth strategy is to do with respectful communication with the participants throughout the study. The researcher can also offer debriefings and referrals for the participants after the collection of the data which shows respect and caring from the researchers' side. It is important to acknowledge that when working with participants that are vulnerable, such as children, disabled or severely ill people and pregnant women, the researcher should pay particular attention to ethical

standards as additional protection is required. Fifth strategy to avoid and correct researcher's possible biased self-evaluation is to utilise external review committees, that can be called Human Subjects Committees, Research Ethics Boards, or Institutional Review Boards, to review research plans. (Polit & Beck 2022: 65-69.)

The aim of research is to produce scientifically reliable and sound knowledge. Thus, research misconduct is another ethical aspect to acknowledge in research which covers the falsification, fabrication, and plagiarism in research. (Gray, Grove & Sutherland 2017: 184-185.) As described in the work of Gray, Grove and Sutherland (2017: 185) falsification is the act of interfering and manipulating the research material, data, processes, and equipment which leads to inaccurate representation of the research in the research record. Whereas fabrication is the act of inventing false research results and records as well as the false reporting of those. Plagiarism is the act of taking and using other peoples' studies, ideas, words, or research results without acknowledging them and giving them the credit. Thus, in 1989 the federal government established the Office of Research Integrity (ORI) following the growing number of misconducts in scientific research. The duty of the ORI was to oversee the establishment of the rules and regulations considering research misconduct and to oversee the research misconduct investigations. (Gray, Grove & Sutherland 2017: 184-185.)

The promotion of responsible conduct in research in Finland, including the aspects of prevention of research misconduct, encouraging the conversation, and spreading the knowledge on research integrity as well as monitoring of the international progresses, is the duty of the Finnish Advisory Board on Research Integrity (TENK) that was appointed by the Finnish Ministry of Education and Culture. The ''Responsible conduct of research and procedures for handling allegations of misconduct in Finland'' (RCR) are the guidelines established by the Finnish Advisory Board on Research and Integrity. The first national guidelines were created in 1994 which have since been revised in two occasions and updated in 2012. (TENK 2012.)

In this research the main ethical issues to consider were research misconduct related. As the aim was to produce a descriptive literature review, plagiarism, falsification, and fabrication of collected data were the main ethical aspects to pay attention to. To avoid plagiarism, referencing of collected data were applied throughout the research process. In addition, the guidelines regarding responsible conduct of research and research misconduct set by the Finnish Advisory Board on Research Integrity were adhered to (TENK 2012). Furthermore, Turnitin- programme was utilised.

6.2 Validity

There are different definitions of validity. For example, it can be defined as ‘’the degree to which an instrument measures what it is intended to measure’’ or as ‘’a quality criterion referring to the degree to which inferences made in a study are accurate and well-founded’’ (Polit & Beck 2022: 403). Trustworthiness and high quality are important aspects in qualitative research but there has been debate on how to define these. Some consider validity as a suitable quality criterion in qualitative as well as in quantitative research whereas others disagree with this. In addition, there has been debate whether a set of generic quality standards should apply to various qualitative traditions or whether they should have specific standards. Due to these debates and disagreements qualitative research lacks common vocabulary for quality criteria which creates confusion. (Polit & Beck 2022: 275-276.) Having said that, a quality criteria framework by Lincoln and Guba (1985) is one that has been accepted in the field of qualitative research. They have suggested five criteria, credibility, dependability, confirmability, transferability, and authenticity to increase the trustworthiness of qualitative research. Credibility is to do with the establishment of trust in the truthfulness of the research findings and the understanding of those findings whereas dependability is about data being stable over time and conditions. Confirmability is to do with research data representing the information research participants have provided and that data being interpretated without bias whereas transferability is how well the research findings can be generalised. Authenticity means that the readers of the study can better understand the lives described in the research. (Polit & Beck 2022: 276-277.)

There are strategies that researcher can utilise to increase the trustworthiness of the research. These strategies are based on the five criteria mentioned above and should be applied in every phase of the research including data collection, coding, analysis, and reporting. (Polit & Beck 2022: 277.) This is supported by the work of Elo and Kyngäs (2008: 112) in which they state that by describing both the analysis process and the results in detail it will give the reader a clear understanding of the analysis process as well as the limitations and strengths of the research and thus, increases the trustworthiness and validity. The strategies the researchers should utilise as listed and described by Polit and Beck (2022: 278-284) include ‘’reflexivity, careful documentation and audit trail, persistent observation, prolonged engagement, comprehensive field notes, audio recording, verbatim transcription, transcription rigor, saturation of data, triangulation, member checking, intercoder reliability checks, peer review, search for dis-

confirming cases, inquiry audit, documentation of quality-enhancement efforts, impactful and evocative writing, full and vivid description, documentation of researcher credentials and background as well as documentation of reflexivity''.

When using content analysis in qualitative research the general qualitative research trustworthiness and validation criteria and strategies, as described above, would apply in increasing the validity of the research (Elo and Kyngäs 2008: 112). Having said that, as mentioned by Elo and Kyngäs (2008: 112) when utilising content analysis method there are certain trustworthiness aspects to consider in the reporting of the analysis and the results. It is vital that the collected data is simplified, analysed, and categorised so that it reflects the focus of the study in trustworthy manner. The researcher can prove and increase the validity of the research by explaining the meanings of the various categories used in the research, that should be both conceptually and empirically justified. This can be done by covering the research data extensively and by demonstrating the connection between the research data and the results for example by using tables and appendices. A clear explanation of the research context, selection, and characteristics of the study participants as well as the data collection together with the analysis process, will make the research more reliable. Citations in the written research will also increase the overall validity as the researcher can prove and show the sources and the origin of the categorised data. (Elo & Kyngäs 2008: 112-113.) Having said that, as mentioned by Elo and Kyngäs (2008: 113) overuse of citation can make the research work and the analysis look incomplete, thus citation usage should be done selectively.

In this thesis the aim was to apply all the qualitative research trustworthiness criteria possible based on the data collection and analysis methods selected to be used in this research. The data used in this thesis was collected from reliable database, in this case from CINAHL. To ensure the quality of the journals the Publication Forum, JUFO, was utilized. Whereas to ensure the quality of the articles chosen, the CASP check list was used. The articles and collected data were reviewed by both authors. The data collection and analysis processes were documented, explained, and showed in the form of different tables that were attached to this work. These tables include the Database search table (Appendix 1), PRISMA Flow Diagram (Figure 1) and an example of the analysis table created in the analysis process (Table 5). Also, some citations were used selectively.

Some of the trustworthiness criteria as set by Lincoln and Guba (1985) described by Polit and Beck (2022: 278-284) were not applicable in this research due the chosen

data collection and analysis method. These were for example method triangulation, in which various data collection methods would be utilised, and member checking, which is used when utilising interviews as data collection method. (Polit and Beck 2022: 280-281.)

6.3 Discussion of The Results

The purpose of this thesis was to describe the different types of non-pharmacological pain management methods nurses use in intensive care as well as the perspectives of nurses and patients' regarding the use of these methods. The collected and analysed data for this thesis revealed 36 different, either individual or combination, non-pharmacological methods from which some of these methods were studied in more depth than others that were merely listed. (Boitor et al. 2015; Boitor et al. 2019; Ciftci & Öztunc 2015; Feeney et al. 2017; Gelina et al. 2013; Golino et al. 2019; Hasanzadeh et al. 2016; Jahangirifard et al. 2017; Khalil 2018; Kia et al. 2021; Kucukakca Celik & Özer 2021; Momeni et al. 2020; Ozturk et al. 2016; Papathanassoglou et al. 2018; Yarahmadi et al. 2018; Özturk et al. 2018.)

Methods that were studied more were hand massage (Boitor et al. 2015; Boitor et al. 2019), foot massage (Momeni et al. 2020), reflexology (Özturk et al. 2018), music therapy (Ciftci & Öztunc 2015; Golino et al. 2019), acupuncture (Feeney et al. 2017), cold application and the different combination therapies including cold application (Kucukakca Celik & Özer 2021; Hasanzadeh et al. 2016; Yarahmadi et al. 2018), TENS (Jahangirifard et al. 2017; Ozturk 2016) and integrative therapy consisting of relaxation, guided imagery including listening to music, and moderate pressure massage (Papathanassoglou et al. 2018).

The effectiveness of the different non-pharmacological pain management methods mentioned above varied considering the impact on pain intensity level as well as impact on physiological and psychological factors. Having said that, majority of the studies analysed found the methods to be efficient in lowering the level of pain intensity. For example, music therapy was discovered to be a useful method by decreasing the pain intensity level either on its own or as part of the combination therapies. (Ciftci & Öztunc 2015: 597; Golino et al. 2019: 52-54; Papathanassoglou et al. 2018: 175, 183.) These findings have been further backed by other studies for example by Jafari et al. (2012: 4). Also, the studies regarding different massage methods either on their own, such as hand massage (Boitor et al. 2015: 359, 362) and foot massage (Momeni et al. 2020: 4), or as part of combination therapies (Papathanassoglou et al. 2018: 175, 183)

were found to decreasing ICU patients' level of pain. Earlier studies, such as the study done by Babajani et al. (2014: 20), have also exhibited the effectiveness of foot reflexology massage. Cold application and varied combinations of cold application therapies were also amongst the effective non-pharmacological pain management methods (Kucukakca Celik & Özer 2021: 221; Hasanzadeh et al. 2016: 69; Yarahmadi et al. 2018: 73). Also, TENS was established to be successful method in reducing pain (Jahangirifard et al. 2017: 410) which was supported another study conducted by AminiSaman et al. (2018).

Some of the non-pharmacological pain management interventions did not only reduce pain, but they also had significant positive impacts on both, physiological and psychological factors. These positive impacts have also been demonstrated in other studies such as the study by Arslan and Ozer (2016). Hand massage (Boitor et al. 2015: 362), music therapy (Ciftci & Öztunc 2015: 597), TENS (Jahangirifard et al. 2017: 410-411), and integrative therapy format (Papathanassoglou et al. 2018) all improved or decreased patients' blood pressure. Whereas music therapy also decreased both heart and respiration rate (Golino et al. 2019: 54). Hand massage also was found to reduce muscle tension (Boitor et al. 2015: 362) while music therapy improved oxygen levels (Ciftci & Öztunc 2015: 597).

When talking about the non-pharmacological pain management methods' psychological impacts it became clear that majority of the methods did not only reduce patients' pain but also their anxiety. Methods that had anxiolytic effect were music therapy (Ciftci & Öztunc 2015: 600; Golino et al. 2019: 54), massage (Gelinas et al. 2012: 314), acupuncture (Feeney et al. 2017: 999), aromatherapy and combination therapy of cold application and aromatherapy (Hasanzadeh et al. 2016: 71) and integrative therapy format (Papathanassoglou et al. 2018: 183). The anxiolytic effect of further improved intensive care patients' comfort level (Ciftci & Öztunc 2015: 597, 600; Golino et al. 2019: 54). In addition, decrease of psychological distress as well as improved and better sleep were positive impacts of effective non-pharmacological pain management methods (Gelinas et al. 2013: 314; Golino et al. 2019: 54; Papathanassoglou et al. 2018: 183). All which overall can contribute to intensive patients' speedier recovery.

Then again, it is worth to mention that contradicting research results were found amongst the different non-pharmacological pain management methods. For example, hand massage (Boitor et al. 2019: 575) and TENS (Ozturk et al. 2016: 3-4) were shown to be ineffective when considering the sustained effects as pain management method as well as when compared to pharmacological pain management interventions.

Whereas in other occasions, it was found that non-pharmacological pain management methods contributed towards reduced pain intensity and improved physiological measures, but the changes were not statistically notable enough (Boitor et al. 2019: 575; Ozturk et al. 2016: 4; Yaramahdi et al. 2018: 73).

As can be seen from the findings above, various non-pharmacological methods can be effective not only in lowering the pain intensity but also having physiological and psychological impacts. The usage of effective non-pharmacological pain management methods can have many positive impacts such as reduced need for analgesics (AminiSaman et al. 2018: 292-294; Feeney et al. 2017: 999; Jahangirifard et al. 2017: 411). Analgesics are known to cause adverse effects such as pruritus, nausea, vomiting, constipation, and respiratory depression for example. Thus, diminished need for analgesics use also reduces the occurrences of adverse effects. (Hinkel & Cheever 2018: 1224.) Also, by managing the pain effectively with effective pain management methods will help the patient to avoid the results of ineffective pain management such as prolonged stay in intensive care and intubation and pulmonary complications to mention a few (Bourbonnais et al. 2016: 23, 28; Silva et al. 2017: 241).

In this review the several similar factors or perspectives were found to be affecting the implementation and application of the non-pharmacological pain management interventions. They were namely patient based, nurses based and institutional based this is similar to studies by Becker et al. (2017) and Kidanemariam et al. (2020). The need for medications to treat pain was found to be an easier and quicker solution to managing pain which was also found by Becker et al. (2020) that stated that the over reliance on pharmacotherapy as a faster and easier options for patients make other options not be easily applicable. Brewer et al. (2019: 9) also in this review find the dilemma of “quick fix” by patients to be a source of challenge for nurses making other methods that are not pharmacologically improbable to use.

The limited time that the patients have with the nurses becomes a problem as this might not be enough to receive the appropriate and specific intervention based on patient’s needs, this exacerbated because of the problem of understaffing and the limited resources that the hospitals might set aside for such interventions in hospitals. This was found by Becker et al. (2017) and Kidanemariam et al. (2020:9) who both described these factors as influencing nonpharmacological methods. In the same instance it is notable that due to staffing shortages there is a heavy workload that is placed on nurses as revealed by Kia et al. (2021: 3), Khalil (2018: 37), Brewer et al. (2019: 9) and Momeni et al. (2020: 5-6) which also affects the application of methods to

patients and is a major problem for hospitals. This finding has also been demonstrated in the study by Kidanemariam et al. (2020: 2).

From both the nurses and patients' perspectives lack of knowledge on the methods was found to of significant importance in the factors that influence their choice on using certain methods. This shows the importance of enhancing education both for the patients and the nurses as it allows for gaining knowledge and know how on how to use of methods and importance of the methods. (Becker et al. 2017; Kidanemariam et al. 2020: 9.) In the study done by Gelina et al. (2013: 314) patients expressed having moral support from their family members to be a source of a calm is a significant finding because it shows the importance of family members in patients care, reducing their anxiety and pain. The findings of the study by Becker et al. (2017) proposed that peer and family support interventions can be potentially effective strategies helpful to patients.

It is worth noting that albeit some methods being found to be useful for patients they could be a source of distraction for the nurses (Gelina et al. 2013: 314). Gelina et al. (2013: 314) names distraction techniques as one of such methods, this leaves the dilemma whether a nurse should offer such pain management method or not considering both probable positive and negative outcomes. The costs of having these methods are notably high as found by Brewer et al. (2019: 7), this is a similar challenge that Becker et al. (2017) mentions in their study.

Becker et al. (2017) identifies attitudes and preferences as factors that cause challenges in using of non-pharmacological pain management methods. They state that there is need for education by nurses, patients, and hospitals to ease these barriers (Becker et al. 2017). This is shown in this review by the studies done by Brewer et al. (2019: 6-7) who reports that positive attitudes and beliefs on natural treatments or holistic approaches can make nurses become more accepting and willing to use these methods. Whereas Feeney et al. (2017: 1001) shows the influence of patient’s personal opinions on acceptance of non-pharmacological methods.

As mentioned in the results of this review, the need for education on different non-pharmacological pain management for nursing students is needed in ensuring that they gain knowledge on different methods that they can use when needed in nursing environments (Momeni et al. 2020: 6).

6.4 Conclusion and Recommendations

The results of this descriptive literature review showed that numerous non-pharmacological pain management interventions applicable to be utilized in intensive care exists (Boitor et al. 2015; Boitor et al. 2019; Ciftci & Öztunc 2015; Feeney et al. 2017; Gelina et al. 2013; Golino et al. 2019; Hasanzadeh et al. 2016; Jahangirifard et al. 2017; Khalil 2018; Kia et al. 2021; Kucukakca Celik & Özer 2021; Momeni et al. 2020; Ozturk et al. 2016; Papathanassoglou et al. 2018; Yarahmadi et al. 2018; Özturk et al. 2018).

The effectiveness of these methods varies, and there are contradicting research results considering the effectiveness of them. For example, some studies found music therapy and the different variations of it effective in reducing intensive care patients' pain whereas other studies found the impact of the methods not significant enough or ineffective. (Boitor et al. 2019: 575; Boitor et al. 2015: 359, 362; Jahangirifard et al. 2017: 410; Ozturk et al. 2016: 3-4.) Having said that majority of the methods found in this literature review were established successful in pain management by lowering the pain intensity felt by the patients.

Furthermore, non-pharmacological pain management interventions were found to have both physiological and psychological impacts. These included for example improved, and reduced blood pressure and reduced level of anxiety. (Boitor et al. 2015: 362; Ciftci & Öztunc 2015: 597, 600; Feeney et al. 2017: 999; Gelinas et al. 2012: 314; Golino et al. 2019: 54; Hasanzadeh et al. 2016: 71 Jahangirifard et al. 2017: 410-411; Papathanassoglou et al. 2018: 183.)

Nurses, and patients' perspectives concerning the application of non-pharmacological pain management interventions found in this thesis were similar to previous studies and could be categorized to be either nurses-, patients-, or institutional based factors. (Becker et al. 2017; Kidanemariam et al. 2020.) There were differences between nurses and patients interest shown in various types of non-pharmacological pain management methods as some of the methods, such as distraction methods, were also found to be distracting for the nurses (Gelina et al. 2013: 313-314).

The main institutional based factors impacting the usage of non-pharmacological interventions included lack of resources, lack of time, hospital policies (Brewer et al. 2019: 7; Khalil 2018: 7, 37). Whereas in addition to above mentioned institutional based factors that further caused heavy workloads for nurses (Brewer et al. 2019: 9; Khalil 2018: 37; Kia et al. 2021: 3; Momeni et al. 2020: 5-6) some of the other main factors making

the use of non-pharmacological pain management interventions challenging from nurses' perspective were insufficient knowledge and education (Brewer et al. 2019: 7; Khalil 2018: 37), cultural differences, fatigue (Kia 2021: 3), and personal beliefs and attitudes (Brewer et al. 2019: 9; Khalil 2018: 35). All these were acknowledged by patients as well (Brewer et al. 2019: 7; Momeni et al 2020: 5-6). Moreover, patients fear of pain and need for quicker pain relieve and the possible additional cost of interventions were established as main patient-based factors influencing the usage of non-pharmacological methods (Brewer et al. 2019: 7, 9).

Further studies on non-pharmacological pain management methods appropriate to be used in intensive care units are required as during this thesis process it became apparent that not many studies in this field exist. The authors of this thesis found it difficult to find up-to-date and academically approved research studies of non-pharmacological pain management methods used in adult ICUs. The studies that were found to be academically acceptable were conducted mainly in cardiac intensive care units, thus there would be room for more studies to be conducted on non-pharmacological methods in different intensive care areas.

Both authors found the topic and the research process of this thesis important and educative. The knowledge gained from the topic during the research process is vast and vital considering the future career as nurses. Also, as was found during the analysis process, this thesis could increase the knowledge of already graduated nurses with working history as lack of knowledge about the non-pharmacological methods was discovered to be one of the challenges nurses faced in using these methods (Khalil 2018: 37). Regardless of the field nursing students decide to specialise, knowledge of non-pharmacological pain management interventions is essential addition to pharmacological pain management methods. As was found, the non-pharmacological pain management methods are not only valuable in reducing pain, but they also impact other physiological and psychological factors that promote patients' recovery process (Ciftci & Öztunc 2015: 600; Feeney et al. 2017: 999; Gelinas et al. 2012: 314; Golino et al. 2019: 54; Hasanzadeh et al. 2016: 71; Papathanassoglou et al. 2018: 183) and can reduce the adverse effects of pharmacological pain management methods causes (Hinkel & Cheever 2018: 1224).

In addition to increased knowledge of non-pharmacological pain management methods, the authors learned about and gained understanding of different research methods, methodologies and conducting a literature review. During the process the authors learned where and how to find academically sound studies which is vital when working

as healthcare professional as this enables to provide up-to-date and reliable care to the patients and clients.

The limitations of this thesis included the timeframe given to conduct the literature review. This also impacted the scope of the work as thesis of University of Applied Sciences.

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Table 1. Database Search Table

Database	Search term	Limitations	Hits	Chosen by title	Chosen by abstract	Chosen by full text
CINAHL	Pain assessment in icu	-	76	15	1	0
CINAHL	Pain assessment AND icu or intensive care unit or critical care AND adults or adult or aged or elderly	-Full text -2016-2021 -English language	31	22	10	1
CINAHL	Non-pharmacological interventions AND pain management or pain relief or pain control or pain reduction AND icu or intensive care unit or critical care	-2016-2021 -English language	11	7	3	2
CINAHL	Complementary therapies or alternative therapies or nonpharmacological therapy AND intensive care unit or icu or critical care or critical care unit	-2011-2021 -English language	173	28	2	0
MEDLINE	Non-pharmacological AND pain management AND icu	-	8	5	1	0
PubMed	Non-pharmacological pain management AND icu	-2011-2021 -English language	49	9	1	0
CINAHL	Music therapy or music intervention or musical therapy AND icu or intensive care unit or critical care AND adults or adult or aged or elderly	-2011-2021 -English language	60	16	6	4
CINAHL	‘’positioning’’ AND ‘’icu’’ AND ‘’pain’’	-2016-2022	13	8	1	0
CINAHL	‘’cold therapy’’ AND ‘’icu’’	-	9	1	1	0
CINAHL	Pain assessment or pain scale or pain tool AND icu or intensive care unit or critical care	-2016-2022	480	30	7	1
CINAHL	Hand massage AND icu or intensive care unit or critical care AND pain management or pain relief or pain control or pain reduction	-	5	3	2	2

CINAHL	‘’Complementary therapy’’ AND ‘’Pain management’’ AND ‘’Intensive care unit’’	-	4	1	1	1
CINAHL	Attitudes or perceptions or opinions or thoughts or feelings or beliefs AND non-pharmacological interventions AND icu nurses or intensive care nurses or critical care nurses	-	4	2	2	1
Manual search	-	-	20	20	12	5

Table 2. Evaluated Studies Table

Evaluated Studies Table				
Author(s), year, country	**Topic/title**	**Methods**	**Sample/ Participants**	**Main Outcomes**
1- Boitor, M., Martorella, G., Arbour, C., Michand, C. and Gelinas, C. **2015** Canada	Evaluation of the Preliminary Effectiveness of Hand Massage Therapy on Postoperative Pain of Adults in the Intensive Care Unit Cardiac Surgery: A Pilot Randomized Controlled Trial	Quantitative CPOT, FPT and BPI Randomized controlled trial	**n=40** Post operative cardiac surgery patients in ICU	Hand massage therapy was established as a reliable nonpharmacological pain management method that is simple and inexpensive.
2- Boitor, M., Martorella, G., Maheu, C., Laizner, A, M and Gelinas, C. **2019** Canada	Does Hand Massage Have Sustained Effects on Pain Intensity and Pain-Related Interference in the Cardiac Surgery Critically Ill? A Randomized Controlled Trial	Quantitative Self-report Randomized Control Trial	**n=46** Adult cardiac surgery patients in a medical-surgical ICU	The study shows that use of hand massage non-pharmacological pain intervention enables patients to experience longer pain free or reduced pain intensity periods. Hand massage when done with other recovery activities could reduce interference with functioning.
3- Brewer, N.J., Turrise, S.L., Kim-Godwin, Y.S. and Pond, Jr. R.S. **2019** USA	Nurses Knowledge and Treatment Beliefs: Use of Complementary and Alternative Medicine for Pain Management	Quantitative Online survey Descriptive correlational study	**n=218** Medical, surgical, and perioperative nurses utilising CAM	Nurses had a positive attitude towards the use of CAM, but this depended on the nursing unit that the patient was in and the nurse's knowledge, patients' beliefs, and nurses' ability to use the various CAM methods. Patient education on CAM is found to be necessary and further research is needed on the CAM referrals that patients are given. CAM is a unique way of non-pharmacological pain management and reduction of adverse effects of medications given to patients.
4- Ciftci, H. and Öztunc, G. **2015** Turkey	The Effects of Music on Comfort, Anxiety and Pain in the Intensive Care Unit: A Case in Turkey	Quantitative Patient identification form, vital signs form, VAS, patients' anxiety scale, STAI-1, STAI-2 and general comfort question-naire	**n=72** Patients admitted to ICU with the Cerebrovascular Accident (CVA) diagnosis	The study found that the patients' general comfort level and oxygen saturation increased with the help of the music therapy. Whereas the levels of systolic tension arterial and the scores of VAS, State Anxiety Level, and Faces Anxiety Scale all decreased.

		Experimental study conducted as self-controlled clinical study		
5- Feeney, C. et al**.** **2017** United States of America	Acupuncture for Pain and Nausea in the Intensive Care Unit: A Feasibility Study in a Public Safety Net Hospital	Mixed method Pre- and post-treatment patient survey including patient self-report, 10-point numerical and visual analogue scales, Rhodes Index, collection of TCM diagnostic information and nurses' evaluation pre- and post-treatment Prospective feasibility study	**n=46 patients** Medical and surgical ICU patients in a public safety net hospital	Acupuncture was found to be feasible treatment method in ICU patients and patients were receptive to it with no major adverse effects. A third of the patients in ICU were eligible for recruitment out of which 42% consented for the treatment. A decrease in pain amongst patients receiving acupuncture treatment was recorded, the mean decrease being 2.39. A major decrease in the usage of morphine after treatments was also recorded. Patients reported acupuncture treatment having overall beneficial impact. Although whether acupuncture is a practical adjunctive therapy form on its own in ICU was questioned.
6- Gelina, C., Arbour, C., Michaud, C. and Cote, J. **2013** Canada	Patients and ICU Nurses Perspective on Non-pharmacological Interventions on Pain Management	Qualitative Focus groups Descriptive design	**n=38** Patients/family members = 6 Nurses = 32	This study finds that music, distraction, massage, and family presence facilitation were feasible, useful, and relevant nonpharmacological methods that they had experienced in the ICU. Interventions like teaching procedures and relaxation techniques, active music listening, and reality orientation were used less in the n ICU. Non-pharmacological are low cost and safe to provide. These interventions are useful and compliments the pharmacological pain relief, but further research is needed to support their effectiveness
7- Golino, A.J. et al. **2019** United States of America	Impact of an Active Music Therapy Intervention on Intensive Care Patients	Quantitative study Self-report Pre-test and post-test, within subject, single group design	**n=52** Patients at the 12- bed adult medical-surgical ICU. Participants' diagnoses included ST-elevation myocardial infarc-	The study results showed that after participating in one 30 min long music therapy session the patients reported lower pain and anxiety levels and had lower heart and respiratory rates compared to pre-test rates. No changes in oxygen satu-

			tion, cardiac arrest, gastrointestinal bleeding, respiratory failure, renal failure, and stroke	ration levels were recorded. Regardless of the intervention group the results were similar except that more participants fell asleep in relaxation group, and they had greater decrease in heart rate level compared to music choice group. Study also showed that the patients age sex or presence of a family member did not have any impact on the responsiveness to the interventions. Furthermore, the presence a of music therapist may be an important variable as they can tailor the intervention to the patients specific physiological and psychological needs.
8- Hasanzadeh, F. et al. **2016** Iran	The Effect of Cold Application and Lavender Oil Inhalation in Cardiac Surgery Patients Undergoing Chest Tube Removal	Qualitative VAS, short form, modified-McGill pain questionnaire (SFM-MPQ) and the Spielberger situational anxiety level inventory (STAII) scale Randomized comparative trial	**n=80** Cardiac surgery ICU patients with chest tube for at least 24h	The patients in the three treatment groups that were receiving either cold treatment, aromatherapy with lavender oil treatment or cold and aromatherapy treatment, all recorded considerably reduce pain intensity and anxiety. The pain intensity and anxiety levels were recorded in four different occasion which were immediately, five, 10 and 15 minutes after CTR. The results of the modified-McGill pain questionnaire (SFM-MPQ) amongst the patients in the intervention groups did not vary significantly. Whereas the anxiety level recorded immediately after CTR was considerably lower amongst patients receiving aromatherapy or cold and aromatherapy compared to group that was receiving only cold treatment.
9- Jahangirifard, A., Razavi, M., Ahmadi, Z, H and Forozeshfard, M. **2017** Iran	Effects of TENS on Postoperative Pain and Pulmonary Function in Patients Undergoing Coronary Artery Bypass Surgery	Quantitative Research VAS Randomized clinical trial	**n=100** Patients undergoing elective coronary artery bypass surgery	Post operative pain while a patient is resting, or coughing was reduced using Transcutaneous electrical nerve stimulation (TENS). Moreover, TENS was found to improve pulmonary function and reduce the use of

				narcotics by coronary artery bypass surgery patients.
10- Khalil, N.S. **2018** Egypt	Critical Care Nurses' Use of Non-pharmacological Pain Management Methods in Egypt	Qualitative study Questionnaires Descriptive exploratory study	**n=60** medical, neurosurgery or emergency ICUs nurses at Al Manial University Hospital in Egypt.	The study established that non-pharmacological pain management methods were rarely applied by the critical care nurses. Nurses with more experience used non-pharmacological methods more than nurses who had less experience in years. The methods that were rarely but mainly used included putting patient in comfortable position, communication, as well as using comfort devices. Barriers in using non-pharmacological methods included nurses lack of knowledge, time, workload, unstable patients, and patients' inability to communicate. It was also established that education, work experience and the area of work did not have impact on the utilisation of the few non-pharmacological pain management methods.
11- Kia, Z., Allahbakhshian, M., Ilkhani, M., Nasiri, M. and Allahbakhshian, A. **2021** Iran	Nurses' Use of Non-pharmacological Pain Management Methods in Intensive Care Units: A Descriptive Cross-sectional Study	Qualitative study Pain management questionnaire and checklist Face-to-face interviews were utilised Descriptive cross-sectional design	**n=224** ICU nurses in general, burn cardiac surgery wards	55.8% of the nurses applied non-pharmacological pain management interventions. The most used methods were repositioning, comfort equipment as well as providing quiet and comfortable environment. Obstacles in using non-pharmacological pain management interventions included fatigue, number of other responsibilities, heavy workload, and lack of nurses per shift. Demographic variables did not have notable impact on the application of non-pharmacological methods. Overall, the study established that usage of non-pharmacological methods amongst ICU nurses was low. Also, most participants had not done a course on non-pharmacological pain management method course.

12- Kucukakca Celik, G. and Özer, N. **2021** Turkey	Effect of Cold Application on Chest Incision Pain Due to Deep Breathing and Cough Exercises	Quantitative Short- Form McGill Melzack Pain Questionnaire and repeated measurements Experimental study	**n=57** open heart surgery patients	Pain assessment was done before, immediately after, as well as five minutes post breathing and coughing exercises in four different occasions with two hours in between. The study showed that the pain reduced significantly in the experimental group after the usage of cold gel packs in the first and third evaluation.
13- Momeni, M., Arab, M., Dehghan, M. and Ahmadinejad, M. **2020** Iran	The Effect of Foot Massage on Pain of the Intensive Care Patients: A Parallel Randomized Single-Blind Controlled Trial	Quantitative Research BPS and social demographic and clinical information questionnaire Randomized, parallel, single-blind controlled trial study	**n=75** Trauma ICU patients.	The pain of the participants who had been divided was assessed before, immediately and one week after the intervention. The patients in the two experiment groups received per foot 5 minutes massage 6 days a week. At the end of the study the average pain scores in the experimental groups showed notable reduction. The pain scores in the experiment group that received foot massage from a family member reduced from 4.48 to 3.36 and in the group that received massage from nurses reduced from 4.76 to 2.96.
14- Ozturk, N.K. et al. **2016** Turkey	Comparison of Transcutaneous Electrical Nerve Stimulation and Parasternal Block for Postoperative Pain Management after Cardiac Surgery	Quantitative VAS A randomized, controlled prospective study	**n=115** Cardiovascular surgery patients	Patients receiving parasternal block experienced lower level of pain, which was recorded after 4h, 5h, 6h, 7h and 8h of the surgery. The need for opioids amongst patients receiving parasternal block was lower compared to TENS and control group.
15- Papathanassoglou, E.D. et al. **2018** Cyprus	Effects of an Integrative Nursing Intervention on Pain in Critically Ill Patients: A Pilot Clinical Trial	Quantitative Research CPOT, NRS and Self-report A randomized, controlled, double-blinded repeated-measures trial	**n=60** General ICU patients	The intervention and control group both had 30 patients. The intervention group received daily 55 minutes long intervention during five days. The study established moderate to large reduction in pain in the intervention group also in the secondary outcomes were moderate to size decrease.
16- Yarahmadi, S., Mohammadi, N., Ardalan, A.,	The Combined Effects of Cold Therapy and Music Therapy	Quantitative A two-part questionnaire	**n=180**	Patients were divided into four groups out of which three of them were inter-

Najafizadeh, H. and Gholami, M. **2018** Iran	on Pain Following Chest Tube Removal Among Patients with Cardiac Bypass Surgery	(First part including 10 questions regarding age, gender, BMI, educational qualifications, occupation, marital status, type of surgery, history of regular use of painkillers, and placement of a chest tube prior to surgery whereas second part included VAS) A factorial randomized-controlled clinical trial	Patients admitted to the Cardiac Surgery ICU	vention groups either receiving cold therapy, music therapy or both. The level of pain, which was recorded in three occasions every 15 minutes was lower in the groups receiving either cold therapy or the combination therapy. Although there was not considerable difference in the pain intensity level between group.
17- Özturk, R., Sevil, U., Sargin, A. and Sait Yucebilgin, M. **2018** Turkey	The Effects of Reflexology on Anxiety and Pain in Patients After Abdominal Hysterectomy: A Randomized Controlled Trial	Quantitative Patient identification form, VAS and STAI Randomized controlled trial .	**n=63** Women admitted to ICU and gynaecology services of Ege University Hospital	The level of pain and anxiety was assessed before and straight after and one hour after the intervention for three days. The study established that there was a significant decrease in the level of pain and the usage of analgesia in the different group. Also, the anxiety levels were lower in the intervention group.