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Effective postoperative pain management shows significant effects on patient outcome and provides a lot of benefits. However, pain management is still poorly implemented, thus leading to patient dissatisfaction, prolong hospitalization and higher hospital expenses.

The aim of the study is to conduct a literature review to identify nurse's experiences in postoperative pain management. The purpose is to provide nurses with additional data or information that might contribute to the promotion of nursing intervention and implementation on pain management postoperatively and eventually boosts patient's recovery.

The research method used was a literature review. Data were extracted from CINAHL and MEDLINE and five articles were chosen in the end. The analysis of the reviewed articles revealed the following categories; limitation in pain management, pain management method, and pain assessment. To realize good postoperative pain management, additional education about pain management needs to be given to nurses, pharmacological and non-pharmacological pain management methods should be concurrently considered, and accurate pain assessment should be implemented.

Keyword/tag (subjects): Pain Management, Postoperative pain, Nurse Experience

Miscellaneous

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1. INTRODUCTION

There are a lot of surgeries done globally, a study funded by WHO (2015), reveals that an estimated 234.2 million major surgical procedures are undertaken yearly worldwide. Nurses hold a vital role throughout the process, may it be in preoperative, intraoperative or postoperative phase.

Pain is one of the most common symptoms and challenge faced by the patient after surgery, and postoperative pain relief is considered to be utmost vital in patient care as well as in surgical nursing practice (Ramsay, 2000; Gupta et al. 2010). Effective nursing pain intervention shows significant effects to the patient outcome (Ramsay, 2000; Tumulak, 2017). Although effective postoperative pain management evidently provides a lot of benefits, studies show that postoperative pain management is still poorly implemented and remains a major challenge in healthcare system (Liu et al. 2016; Rafati, Soltaninejad, Aflatoonian & Mashayekhi, 2016).

Poorly managed pain postoperatively causes unmet patient satisfaction, delayed patient mobilization, prolongs patient hospital stay, and therefore resulting in higher healthcare cost (Tumulak, 2017). For this reason, precise evaluation of each patient's risk is important to allow informed decision making by the patient prior to surgery and target specific interventions which may improve the outcome (Ghoneim, 2016).

This study identifies and reviews nurse's experiences in postoperative pain management particularly with regards to major surgeries. Furthermore, this study could serve as an additional reference for nurses to ensure a better pain management postoperatively; consequently, they can pursue improvement in patient outcome and in quality of care.

2. PAIN AND PAIN MANAGEMENT ON MAJOR SURGERY

2.1. Pain

[The International Association for the Study of Pain (IASP) n.d.] defines pain as an unpleasant sensory or experience related to actual or possible tissue damage, or described in terms of such damage. Merskey (1991) added, that pain is a result either of physical events or physiological process, and it deviates from the person's physical and psychological state. The feeling of pain differs from one person to another, it varies through experiences linked to injury in early life; thus, pain is always subjective. Furthermore, those stimuli which trigger pain is likely related to tissue damage; may be an actual or a potential tissue damage (IASP, n.d.).

Pain can be a result of disorders, diagnostic tests, and even treatments. There are many factors that influence on pain response, such as perception of pain and pain tolerance; these factors include past pain experience, anxiety, and depression, culture, age, gender, genetics and expectations about pain relief. In different clinical settings, nurses encounter patients who are in pain and because nurses, more than any other health care providers spend more time with patients, hence, nurses must be knowledgeable about pain and they must have skills to apply such knowledge in the delivery of care. (Smeltzer, Bare, Hinkle & Cheever, 2010, 231.)

2.2. Types of Pain

Pain can be categorized in many ways; it can be according to its duration, location or etiology. The three typical categories of pain are acute pain, chronic (nonmalignant) pain and cancer-related pain (Smeltzer et al. 2010, 231).

Acute pain as stated by WHO (n.d) arises as a result of damage to the tissue, which stimulates nociceptors and pain disappears when it heals. It is also a pain that has abrupt and sudden onset and usually associated with a defined cause (e.g. wound after surgery, injury in a car accident, or toothache), acute pain can be an indicator that injury has occurred and it is usually short lasting, lasts less than 6 months, a pain that last more than 6 months is already considered a chronic pain (Smeltzer et al. 2010, 231).

Chronic pain is perpetual and long-lasting pain which can be persisted for months (pain felt for 6 months or longer) or even years and causes can be hardly recognized, for instance, nerve damage by viruses, spine arthritis, or serious infection. [American Society of Anesthesiologist (ASA), 2012] define it as "extending in duration beyond the expected temporal boundary of tissue injury and normal healing and adversely affecting the function or well-being of the individual".

WHO (n.d.) claims that chronic pain may start as acute pain, but can still continue and may reappear again due to stimuli or if an injury is aggravated. Furthermore, chronic pain may occur even without identifiable pathophysiology or known illness. With a high possibility, chronic pain carries psychological disorders such as depression and anxiety disorder.

A study conducted by Nickel and Raspe (2001), states that 10% to over 40% of the general population suffers from chronic pain. In 1994, the International Association for the Study of Pain (IASP) has developed a classification of chronic pain, specifically, provided the description of chronic pain syndrome and definitions of pain terms. Moreover, it presents set of descriptions and codes.

Cancer pain is a pain felt by patient directly related to cancer, in which the most common is a result of tumor involvement, it can be also related to cancer treatment such as surgery, chemotherapy or radiation or in some instances, not related to cancer at all (Smeltzer et al. 2010, 231).

More than 80% of patients who undergo surgical procedures experience acute postoperative pain and approximately 75% of those with postoperative pain report the severity as moderate, severe, or extreme (Chou et al. 2016). **Surgical pain** usually lasts 3 to 6 months after surgery. Some of the cases, patients can have nerve damages after breast and thoracic surgery, leg amputation, and coronary artery bypass surgery. After surgery, between 5% and 80% of patients evolve to chronic pain, especially after procedures causing nervous injury (Sadatsune, 2011). Chronic postoperative pain (CPOP) is absolutely prevailing in the hospital settings regardless of if it is a simple surgery like an inguinal hernia or complex surgery such as thoracotomy (ibid).

2.3. Factors Affecting Postoperative Pain

There is a variety of factors, which affects the pain felt by the patient after surgery. One is a **psychological factor,** Turk (2002) pointed that patient's beliefs about the meaning of symptoms, ability to control pain and the impact of pain on his or her life, and worry about the future are just some that have been shown to play a central role in chronic pain. Either before or after surgery, anxiety makes people react to pain more sensitively and intensively. Similarly, individual's emotion, perception, and past experiences affect their response to noxious stimuli (Shang & Gan, 2012). According to Peters, Sommer, de Rijke, et al. (2007), fear of surgical consequences, in the long run, was associated with more pain, worse overall recovery, and quality of life. Moreover, a physical trauma may alter the interpretation of physical sensations. People who attribute their symptoms to an injury appear more likely to view any physical sensation as harmful and noxious, thereby increasing anxiety. These changes may, consequently, lower pain thresholds and tolerance, further increase activity avoidance and functional limitations, and facilitate general deconditioning. (ibid.)

Genetic aspect contributes prominently to personal reaction to pain. Increasing number of studies has proved how genes are related to pain sensitivity person to person. Although in Ip, Abrishami, Peng, Wong, and Chung (2009) study, gender was not found to be a significant contributing factor to postoperative pain; Fillingim (2008) pointed that dispositional characteristics such as gender, race or ethnicity, personality, and age have been associated with pain responses, as have situational variables, such as mood states, stress, and transient biologic factors. To add with, surgery (type or approach), anesthetic technique, preexisting pain, previous chronic pain syndrome are also determinants of postoperative pain (Company, Soler, Abasolo, Olivas & Navarro, 2001; Ip et al. 2009; Taenzer, Melzack, & Jeans, 1986.)

Nurses should take into account the different factors, which affect pain felt postoperative, because it can help in the management of postoperative pain and postoperative measures as a whole (Taenzer, Melzack, & Jeans, 1986; Wood, 2010).

2.4. Pharmacological Pain Management

One of the most effective and typical ways to relieve pain is the use of medication. It is the duty of the nurse to assess, monitor, and report the effectiveness of the drugs; this includes the medication's adverse effects observed. (Smeltzer et al. 2010, 244.) Below are the medications, use to manage postoperative pain.

Opioids are powerful pain-reducing medication if used properly (FDA, n.d.). Additionally, WHO (2014) defined opioid as alkaloids from the opium poppy (*Papaver somniferum*), and that their synthetic analogues and compound synthesized in the body, opioids interact with the specific receptor in the brain and have the capacity to relieve pain and produce the sense of euphoria. The most common opioid drugs used in managing postoperative pain are morphine, hydromorphone, and fentanyl (Garimella & Cellini, 2013). They added that although morphine is the standard choice for opiates, fentanyl and hydromorphone are more potent and has a shorter onset of action and halflives. Smeltzer et al. (2010, 245) mention some conditions and medication, which may influence the effect of opioid. Because opioids are primarily metabolized in the liver and excreted in the kidney, and patient with kidney or liver problem has a high risk of the toxic effect of opioids, since their kidney or liver is impaired therefore metabolism and excretion of the drug is also impaired. Untreated hypothyroidism and hyperthyroidism require an adjustment in the drug dosage. In addition, careful monitoring is essential on the patient taking opioid with decreased respiratory reserve from disease or aging and patient who are dehydrated, for they are more vulnerable to its depressant effect. Moreover, medications such as monoamine oxidase inhibitors, phenothiazines, and tricyclic antidepressants, may add to the depressant effect of opioid, so patient receiving the above-mentioned medications together with opioid should be carefully monitored if other analgesic is not possible. (245.)

Although opioids provide beneficial effects it has also potential risks, which is why its use has limitations. One of its notable side effects is respiratory depression, which can lead to respiratory arrest and death. Likewise, misuse, abuse and long-term use of opioids lead to dependence and addiction. (FDA, n.d.; Garimella & Cellini, 2013; WHO, 2014.)

Because opioid predisposes a patient to risky adverse effect, **non-opioid medications** are useful adjuvants to manage postoperative pain and help to minimize the use of opioid. Non-opioid drugs targeted mostly pain caused by soft tissue and muscle infiltration (WHO, 1996). It is recommended by American Society of Anesthesiologists (2012) the use of Non-steroidal Anti-inflammatory Drugs (NSAIDs), COXIBs, or acetaminophen as a postoperative multimodal pain management, unless contraindicated. Moreover, it should be administered around the clock with careful dosing regimen and dose route and duration should be in accordance with patient's case (ibid.)

WHO (2003) stated that the use of paracetamol and or Non-steroidal Anti-inflammatory Drugs (**NSAIDs**) postoperatively helps to relieve pain and reduces the need for opioids. NSAIDs are commonly used and often taken orally and some are topical or ophthalmic preparation. NSAIDs inhibit the synthesis of prostaglandin and consequently, it reduces inflammations on the wounded area. NSAIDs have not only anti-inflammatory and analgesic effects, but also antipyretic effect; therefore, it is widely used for minor pains, edema, and arthritis (Park, 2010). A review conducted by Koh, Nguyen, and Jahr (2015) reveals that both intravenous acetaminophen and ibuprofen are safe and effective if used as directed and contribute in the reduction of opioid use. Moreover, paracetamol is used as an alternative to NSAIDs because of the low incidence of adverse effects and should be the drug of choice in high-risk patients (Hyllested, Jones, Pedersen & Kehlet, 2002). **Cyclo-oxygenase 2 inhibitors,** on the other hand, display a supportive data for its beneficial analgesic effect, with regard to their adverse effect (Schug, 2007). Aside from NSAIDs, Paracetamol and Ibuprofen, Aspirin is also used. Aspirin is originated from acetylsalicylic acid or ASA and it has the influence on inhibition of prostaglandin, which causes an inflammatory reaction in the body, which soothes the pain. It is an effective analgesic for moderate to severe acute pain but shows also adverse effects such as drowsiness and gastric irritation. (Derry & Moore, 2012; Edward, Oldman, Smith et al. 2000). A study conducted on dental surgery showed that aspirin offers a more rapid analgesia compared to paracetamol in the early postoperative period (Wray, 2013).

Local Anesthetics works primarily by blocking the signals along cells to the brain, thus pain is not felt in the area. LA can be given via injection, spay or topical application. They are not just used during operation but also to aid in pain after surgery. (Bulut, Yilmazlar, Yavasciaglu and Sarisozen, 2011; Ghenaee, Rahmani & Jafarabadi 2015; Nordqvist, 2017; Smeltze et al. 2010, 248; Thornton & Buggy, 2011).

2.5. Non-Pharmacological Pain Management

Medications that lower pain may lower patients' sense of control and have unwanted side effects such as sedation, nausea, and constipation. In addition, patients and families may fear addiction to opioids (Gutgsell, 2013.) For these reasons, non-pharmacological pain management methods are adapted in many cases. Non-pharmacological pain management can be used together with analgesics to manage pain. The combination approach of pharmacological and non-pharmacological in pain relief can be more beneficial especially to patients having a severe pain that lasts for hours or days. (Smeltzer et al. 2010, p. 231.) The following are non-pharmacological pain management that is use postoperatively.

Heat therapy (also called thermotherapy) is helpful in managing pain and discomfort from stiff and sore muscles and joints. Heat has the opposite function of cold therapy. Applying heat to a body part stimulates blood circulation to the injury site. This oxygen-rich blood brings nutrients to the affected area, promoting healing. Heat also helps to remove lactic acid buildup from overtaxed muscles, which allows them to "un-clench". On the other hand, cold therapy (also called cryotherapy) is a good front-line approach to numbing nerve endings and reducing fluid build-up. Keeping swelling and pain controll allows you to use the affected body part. Cold applied on and off in intervals constricts vessels and slows blood flow to the site of the injury. This keeps swelling under control. (Havens, 2017.)

Relaxation Techniques helps also in managing postoperative pain. Relaxation is defined as an absence of physical, mental, and emotional tension. The resolving of muscle tension caused by anxiety is the mainstay of relaxation exercises. Because skeletal muscles close to the incision site significantly influence postoperative pain, relaxation exercises resolve the tension in the skeletal muscles and thus reduce postoperative pain. (Saside, 2010.)

Distraction is the most common type of cognitive-behavioral method. It is an intervention that is often used to guide attention away from painful stimuli. Current research indicates that distraction can lead to the reduction in procedure times and number of staff required for procedures, especially in children. Distraction is most effective when pain is mild to moderate (it is difficult to concentrate when pain is severe). Moreover, **guided imagery** helps patients use their imagination to divert thoughts from the procedure to a more pleasant experience. Imagery provides distraction and reduces the perception of pain by eliciting descending signals from the brain that can help block the pain signals. Guided imagery may also be effective in reducing anxiety and pain in adults. (Pain Assessment and Management Initiative, 2016.)

Based on Burgan (n.d.) from University of Minnesota, **massage** causes physiological changes in your body through the relaxation response, which is an involuntary, yet predictable response of the nervous system to massage techniques and touch. Mechanical responses, which are physical effects that occur in the body when pressure is applied to the soft tissues. Together, these responses can produce physical and emotional benefits. In addition, American Massage Therapy Association (2008) research indicates that massage can decrease postoperative pain, decrease postoperative pain intensity, decrease postoperative pain unpleasantness/distress, decrease sympathetic responses to postoperative pain, accelerate the rate of decline in the intensity of postoperative pain, accelerate the rate of decline of the unpleasantness of postoperative pain, decrease doses of analgesics and increase levels of calmness/feelings of well-being.

Hypnosis involves leading the patient into a focused, trance-like state. By concentrating attention intensely on one specific thought, memory, feeling, or sensation and blocking out all distractions, patients become calm, relaxed, and open to hypnotic suggestion. A study conducted by Howard (2007) reveals that hypnosis has also been associated with decreased postoperative orthopedic pain, faster surgeon-rated recovery, and no postoperative complications. Likewise, Nghai (2000) stated that, according to clinical and experimental research, hypnosis is very

effective pain management. And added that despite the visible evidence, the techniques are still not used to a great degree.

Music therapy, on the other hand, is defined as the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program, offers a low-risk, low-cost, nonpharmacologic adjunct to standard care. This helps to relieve the anxiety, fear, and other components of suffering. (Gutgsell, 2013.)

2.6. Major Surgery

According to Pilcher (1917), major surgery is a procedure that requires a general anesthesia; operations, which involves the great cavities of the body; and predisposes the patient to complications such as hemorrhage, and even death. He further added that major surgeries require special anatomical knowledge and manipulative skills. Moreover, major surgery usually involves major organs and definitely requires hospitalization and special care (Emory University. n.d; John Hopkins University, n.d.). Table 2 shows the classifications of surgery basing from National Institute for Health and Care Excellence (NICE) guideline [NG45] published 2016.

Table 1. Classification of Surgery

Surgery Grade	Example of procedure
Grade 1: Minor	• excising skin lesion • draining breast abscess
Grade 2: Intermediate	• primary repair of inguinal hernia • removal of varicose veins in the leg • tonsillectomy or adenotonsillectomy • knee arthroscopy
Grade 3: Major	• total abdominal hysterectomy • endoscopic resection of prostate • lumbar discectomy • thyroidectomy
Grade 4: Major	• total joint replacement • lung operations • colonic resection • radical neck dissection

3. AIMS, PURPOSE AND RESEARCH QUESTIONS

The aim of the study is to conduct a literature review to identify nurse's experiences in postoperative pain management. The purpose is to provide nurses with additional data or information that might contribute to the promotion of nursing intervention and implementation on pain management postoperatively and eventually boosts patient's recovery. Specifically, it seeks to answer the following question:

What are the nurses' experiences in postoperative pain management on major surgery?

4. METHODOLOGY

4.1. Literature Review

The study used literature review as the research method. Literature review assesses, analyzes and synthesizes scholarly articles, which corresponds to a specific topic. It is a research method which aims to provide an objective analysis of published literature and its findings. It provides an overview, evaluates, and summarizes the best available literature relevant to the research topic. (Cronin, Ryan & Couglan, 2008; Siu & Comerasamy, 2013, 15; University of California, n.d.)

In conducting a literature review, there are processes involved; first selecting a review topic, searching the literature, gathering, reading and analyzing the literature, writing the review and lastly citing the references used (Cronin et al. 2008). A literature review requires a well-defined and meticulous process and this is done to prevent unreasonably exclusion of significant studies. Furthermore, Boland, Cherry and Dickson (2017, 227-228) and Okoli and Schabram (2010) have provided a more detailed step-by-step process in doing a systematic literature review, including the processes mentioned above, they added steps such as having a comprehensive plan, wherein researchers create protocol document, a time-table on what and when to do, this also includes a detailed plan whom and where to seek help or resources needed for the study and it should be executed as planned; quality assessment of the chosen literature by using an appropriate tool that suits the study and then dissemination after writing up the review following the institutional guidelines.

Systematic literature review is significant, because it helps evaluates what is the current knowledge available, therefore identify knowledge gaps in the literature, stipulates rationale-based data, provides sound and quality conclusions and recommendations since systematic reviews require a thorough assessment to the quality of literature or studies included, and in a way, it also shapes future research. Additionally, it helps in the development of evidence-based practice, research, and development. (Mallet, Zanker, Slater & Duvendack, 2012; Schlosser, 2006).

4.2. Scientific Article Selection Process

The data for this literature review were collected from the article databases CINAHL and MEDLINE. In order to obtain related and accurate articles used for the study, PICOS (refer to **Table 2**) were utilized and keywords were drawn from there (Beecroft, Booth and Rees, 2013). Keywords such as, ”postoperative pain”, management* OR treatment* OR intervention* OR therapy* OR car*, and experienc* OR perception* OR attitud* OR view* OR feeling* were used in searching for the articles. The whole process was done with the research adviser supervisions. Limitations were set such as inclusions and exclusions to came up with articles related to the set topic.

Table 2. PICOS

Patient/Problem	Postoperative Pain
Interview/Interest	Postoperative Pain Management
Comparison	Nurse’s Experiences
Outcome	Well managed Postoperative Pain
Study Design	Literature Review

First, the researchers screened all the published articles available, by scanning the titles and basing from the inclusion and exclusion set for the study the articles were chosen. Duplicate copies and published research having the same title were examined next. Then the article’s abstracts were reviewed; sorting were done based on the limitations set for the study. The remaining articles were downloaded and assessed. From there, the researchers considered only articles that quantify the limitations (refer to **Table 3**) set for the study. After careful and meticulous selection of related articles, five (5) articles were chosen. **Figure 1** shows the processes or

steps done in choosing articles to be included in the study, the flowchart is adapted from Siering, Eikermann, Hausner, Hoffman-Eber & Neugabauer (2013) Appraisal Tools for Clinical Practice Guidelines: A Systematic Review.

Three (3) from the chosen articles are coming from Europe, specifically England, Ireland and Italy, the remaining two (2) studies are from Asia (Iran and Turkey). Out of the 5 articles, only one used a qualitative research method, another research used a combination of qualitative and quantitative research method and the rest used a quantitative research method (refer to **Appendix A**). The chosen five (5) articles were reexamined and were appraised; the articles were graded using an evaluation tool (refer to **Appendix B**). The articles abstract and title, introduction and aim, method and data, sampling, data analysis, ethics and bias, findings or result, transferability or generalizability and implications and usefulness were assessed in each article and a scale of 1-4 was used to appraised each category, a score of 4 was given if the article in that category (for example abstract and title) is good, 3 for fair, 2 for poor and a score of 1 if it is very poor. In the checklist, additional descriptions were included, which guided and helped the researcher in appraising the articles. The researchers have done a separate evaluation using the same tool and after the chosen articles are graded, the two evaluations were compared, the researchers have discussed the similarities and differences between the evaluations, final evaluation was made. The scores were tallied and the average scores were drawn. The evaluation result was presented to the research adviser for consultation.

Table 3. Limitations set for the study.

> Full text available for the data base > English language, published studies translated into English will be considered. > Studies that are published from 2006 up to 2017 > Nurses working in a hospital setting, either or both in the surgical ward or in the operating theater. Nurse's experiences, age, gender, ethnicity will not affect the selection process. >Pain management that are used postoperatively or after surgery. >Major surgeries only.

4.3. Data Extraction and Synthesis of Data

The study has adapted content analysis to analyze the data collected, it aims to understand and answers the research topic. Content analysis is a systematic way to extract and compress contents, out of the huge text, and is used to identify trends and patterns in the articles. To established reliability of the study, the classification set for the study should maintain consistency and recording instructions set should be met (Stemler, 2001). Furthermore, Wamboldt (1992) added that content analysis determines validity because it focuses on human communication, thus offering practical applicability and relevance of the research to practice.

Content analysis can be deductive or inductive, in this study the researchers used inductive analysis. Pope, Ziebland, and Mays (2000) stated that inductive analysis is done by reviewing the pieces of literature carefully and first creating the themes and categories, then identifying the shared features on the articles and lastly refining, regrouping or putting together the collected data.

Upon approval of chosen articles, its contents have been carefully read. Basing on the research question categories were set, this helped in the utilization of the study analysis. **Figure 2** shows the categories and subcategories drawn from the data. The articles were assessed and evaluated carefully, the primary source (downloaded article) was highlighted. Important pieces of information have been extracted and recorded in a spreadsheet following the categories set. The spreadsheets have been examined, verifying the data were done from the primary source, after that patterns have been identified and synthesized (similarities, differences and also the correlation of extracted data) and conclusions were drawn. Finally, the findings and conclusions were written following the JAMK guidelines in writing a research paper.

Figure 1. Flow chart for selection of published articles.

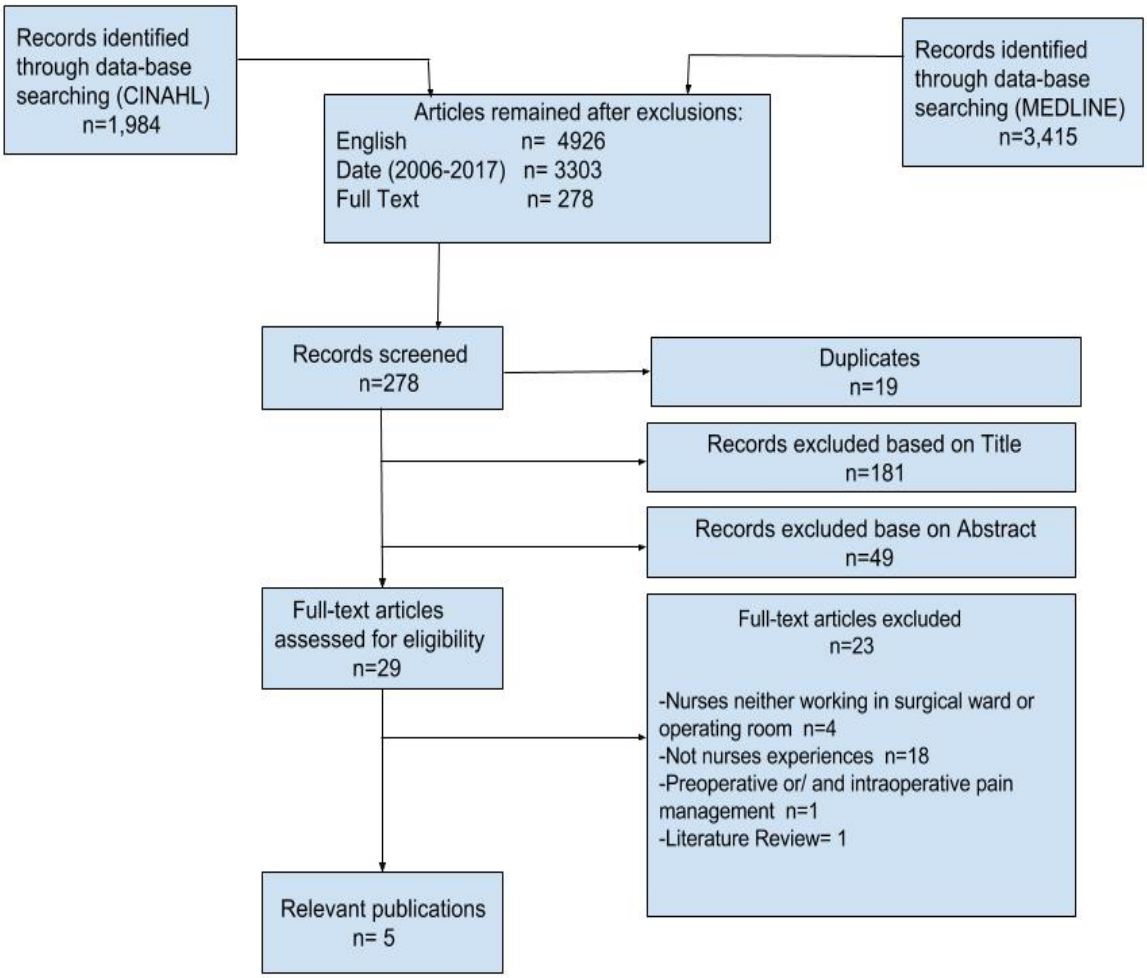
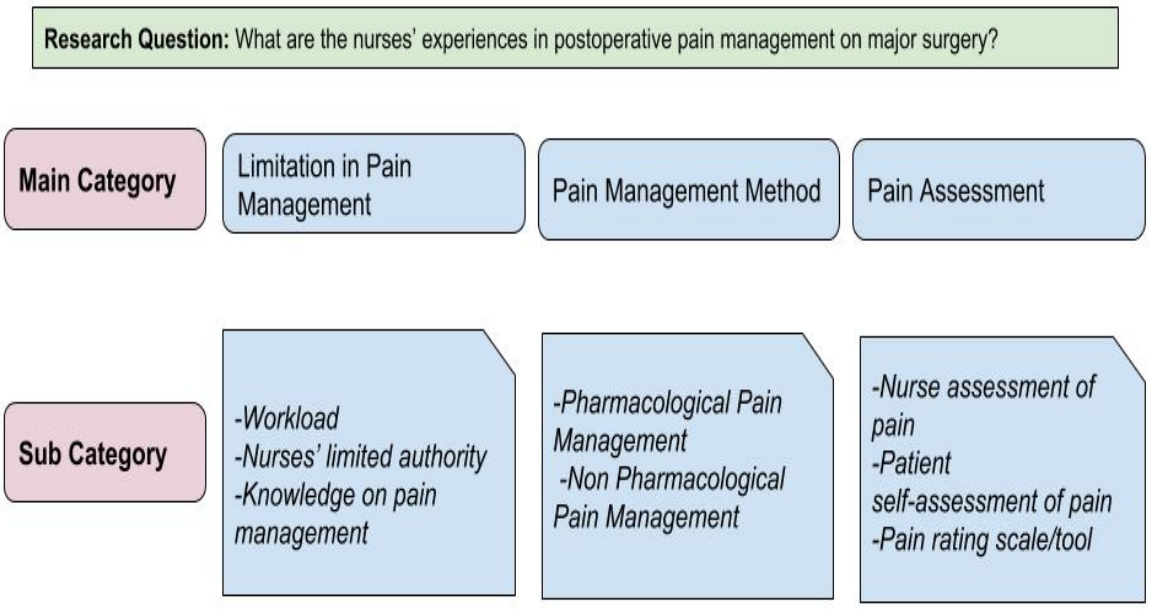


Figure 2. Classifications of data gathered.



5. RESULTS

The literature review focuses on answering the research question about the nurses' experiences in postoperative pain management on major surgery. There are three (3) main themes surfaced from the literature review and they are as follows:

a. Limitations in pain management

b. Pain Management Methods

c. Pain Assessment

Limitations in pain management. Most of the reviewed researches claim that nurse's **workload**, having too much things to do with a limited time is one the main obstruction in an effective pain relief and causes delay in rendering management of pain (Guardini, Talamini, Fiorillo, Lirutti & Palese 2008; Rejeh, Ahmadi, Mohammadi, Kazemnejad & Anoosheh, 2009). It is also viewed as one of the reasons why nurses have limited time spent with patients (Rejeh et al. 2009). The study of Celebioglu, Kucukoglu, and Odabasoglu (2015) mentions that timing of shift has an effect on the frequency of managing pain. To add with, nurses claim that specifically on night shifts, where there is a limited number of nurses on duty and a lot of work, and thus, management of pain is often disturbed (Rejeh et al. 2009).
This can also justify why nurses choose fentanyl over morphine because of its time efficiency (van Raders, Aubry, Friderg, Huygens & Koch, 2007).

Moreover, **knowledge on pain management** were found to be a problem. Vickers, Wright, and Staines (2014) disclose that nurses have knowledge deficit on pharmacology and addiction knowledge, even though most of the nurses rated their own pain management knowledge as good. Moreover, in the same study, participants have knowledge deficit on appropriate dosing of morphine. On the same note, lack of educational preparation in pain management, which includes deficiency on pain management inclusion in the nursing curriculum, were asserted as the reason in nurses poor pain management skills (Rejeh et al. 2009).

Lastly, it was also mentioned that **nurse's limited authority** proves to be a limitation in pain management. Rejeh et al. (2009) mention that the structure and culture of

the healthcare system affect nurse's intervention in pain management and that the participants believed that organizationally related variables such as job description and official rules limits their authority and attitude for pain management. In the study, participants pointed out that in the health care system it is mostly physician-centered, which limits nurse's role and decisions in pain management. It was also extracted on the same study, that supervisors believed that students entering the practice environment when faced with patient with pain, they are just permitted in administering the drugs and following doctor's order.

Pain Management Methods. Basing from reviewed studies, it was determined that use of the **pharmacological method** is more common compared to non pharmacological method. Guardini et. al. (2008) pointed that even though nurses knew that non-pharmacological pain management can be effective, their knowledge on it is lacking along with tons of workloads.

Some of the mentioned medications are fentanyl and morphine and nurses prefer fentanyl basing on the set criterion (van Raders et. al., 2007). Additionally, Guardini et. al. (2008) declares that it is better to administer pain medication as needed rather than around the clock. Furthermore, aside from the study conducted by Guardini et. al. (2008) and van Raders et. al. (2007) also mentions about the use of patient-controlled anesthesia (PCA), wherein the patient has control on the dosages of pain medication.

On the other hand, **non-pharmacological** pain management were also discussed in some of the studies and the methods mentioned that were used by nurses are verbal encouragement, deep breathing exercises, giving rewards, relaxation techniques, positioning, touch, ventilation, music, distraction, imagery, and reading books. It surfaces in the result yielded by Celebioglu et al. (2015) that, music was the least preferred non-pharmocological pain method by nurses, while touch was the most frequently used in providing emotional support. On the same study, female nurses and more educated nurses were revealed to be using non-pharmacological methods, such as cognitive- behavioral methods for managing pain.

Pain Assessement. Although all the studies suggest that pain assessment plays an important role in pain management, three from the studies discussed more specifically about pain assessment. In order to rate **pain scales and tools** are used such as Visual Analog Scale (VAS) and Numerical Rating Scale (NRS) and further reveals that nurses recognize **patients self-assessment of pain** as a valid measure (Guardini et. al., 2008). Moreover, Vickers et al. (2014) state that there is a significant difference in patients who are smiling and the one who is grimacing when it comes to the assessment of pain. Furthermore, Celebioglu et al. (2015) argue that nurses claim that children generally experience middle level of postoperative pain.

6. DISCUSSIONS

6.1 Discussion of Results

Limitations in pain management. According to van Dijk, Schuurmans, Ablas, Kalkman and van Wijck, (2017), nurses have more positive beliefs to pain management than that of patients. In line with the earlier statement, nurses in the reviewed studies recognize the importance of their role in pain management. Despite this fact, there are limitations, which impede nurses in delivering effective pain management. Workload has been listed as one of the main barriers in carrying out effective pain management to patients. Research supports this showing that heavy workload affects the care outcomes given to patients, pieces of evidence such as activities left undone and incomplete information on documentation were found because of lack of time (Ball, Murrells, Rafferty, Morrow & Griffifths, 2013; MacPhee, Dahinten, & Havaei, 2017; Shihundla, Lebese & Maputle, 2016). Moreover Elliot, Young, Brice, Aguilar, and Kolm (2014) states that increased hospital workload has the potential negative effect on the efficiency and cost of care. In connection with the earlier statements, Carayon and Gurses (2008) imply that staffing and nurses workload should be well managed to increase safety and quality of care.

Similarly, it was also identified that nurses have knowledge deficiency on pain management such as pain medication and other alternative pain management methods. Study result by Becker, Dorflinger, Edmond, Islam, Heapy, and Fraenkel (2017) supports this, mentioning that nurses acknowledge their knowledge deficit in

the rationale of use of some alternative pain management methods. On the other hand, Lui, So and Fong (2008) states that although there is knowledge deficit and inappropriate attitudes to pain management among nurses, nurses who had a longer working experience in the field reveals to perform and applies knowledge to pain better. In nursing field, nurses are dealing with lives and there can no be mistakes, a mistake in drug computation, for example, can cause life. Nurses are the ones who stay the longest with patients. Nurses are the first one to notice if there are changes in patient's condition such as response to treatment, this is because nurses are the one who stays longest with the patient and most involved in their overall care, for example in medication administration (Hughes & Blegen, 2008; Nuseir, Kassab & Almomani, 2016). Simonsen, Daehlin, Johanson, and Farup (2014) suggested that in order to improve nurse's medication knowledge and reduce the risk of error, medication knowledge should be put into importance during the nurses' nursing education and in the medication process during clinical practice.

Generally, being educated about pain management helps nurses to deliver an effective pain relief and to determine if care given is helpful or does the patient needed more interventions. But study results of Ene, Nordberg, Bergh, et al. (2008) shows that some of the nurses don't evaluate the effect of given analgesics. Having knowledge in pain management postoperatively can lead to improvement and advancement on its management. There are lots of available postoperative pain management knowledge, but nurses should equip themselves with such information and training in order to deliver a quality care to patients. (Craig, 2014; Nuseir et al. 2016).

Correspondingly, Yang (2010) indicates that development of knowledge ensures advancement of professional knowledge and competence. Bucley (2000), suggests that there should be a concurrent need for improved nurse education and practice. Furthermore, Bell and Duffy (2009) recommends nurses to assess their pain management practice to improve pain management effectiveness and at the same time enhancement on quality of care given.

Pain Management Methods. As was mentioned from the results, pharmacological pain management was widely used. Relatedly, use of pharmacological pain management has been helpful in the reduction of postoperative pain (Haldar, Kaushal, Gupta, Srivastava & Singh, 2015 & Ming, Hung, Huang, et. al., 2017). Although Layzell (2014) and Hutchison (2007), pointed out that medications used to manage postoperative pain management also has side effects. Maybe one of the most concerns about medication side effect is addiction, especially that opioids are the first line of pain treatment postoperatively. But according to FDA (n.d.) and WHO (2014), proper use and regulation of opioids if done reduces, the risk of dependency and addiction. On a different perspective, one study suggests that the high price of opioids in developing countries contributes to poorly managed postoperative pain (Woldehaimanot, Eshetie, & Kerie, 2014).

Whereas, non-pharmacological pain management approach shows a significant effect in reducing postoperative pain scores and relieving discomforts (Chailler, Stolarik, & Woodend, n.d.; Wong, Lin, Lee & Liu, 2012). The same with the study of Cignacco, Hamers, Stoffel et al. (2007), it shows that despite unclear shreds of evidence, some of the non-pharmacological interventions have an evident favorable effect on pulse rate, respiration, and oxygen saturation on the reduction of motor activity, and on the excitations states after invasive measures. One of the studies reviewed mentioned that music is the least non-drug therapies (Celebioglu et al. 2015). Wherein Jose, Verma, and Arora (2012) claims that music therapy has been significant in reducing postoperative pain level. While providing emotional support is the most common method used by nurses to manage pain non-pharmacologically, a study conducted by Bilek (2014) discloses that no one from the respondents (nurses) mentions about it when asked on the nonpharmacological pain method that they use in the hospital.

Despite the benefit that can be gained from the use of non-pharmacological pain management such as side effect safety compared to medications, as was pointed out from the results it is still rarely used. And the seldom used of alternative methods can be secondary to nurses workload. Wherein conducting a non-pharmacological pain management requires time spent to the patient. Another reason and was

mentioned on one of the reviewed articles was, lack of knowledge on the alternative methods. (Guardini et. al., 2008). On the study conducted by Bilek (2004, 21) nurses reveals that the main problem is the patients' unwillingness to try alternative methods in relieving pain aside from their lack of time, lack of knowledge and efficacy. Moreover, retrieved from the same study, some nurses claim that they haven't had any learning about nonpharmacological pain management and wishes to have more education in this area (19.) In addition to the above statements, nurses also claims to have doubts on the efficacy of non-pharmacological methods aside from their reports on the belief of the patients that medications are more effective method to manage pain (Becker et al. 2017).

Interestingly, nurses were optimistic about the use of complementary and alternative medical therapies (CAM), but they also recognize that they needed guidance and direction of its use (Esper, 2014). And on the positive note, researchers advocate the use of combined pharmacological and non-pharmacological method in managing postoperative pain (Power, 2005).

Pain Assessement. American Pain Society suggests that pain be the fifth vital sign, which prompts nurses to reassess and document pain everytime vital signs are obtained (Wells, Pasero & McCaffery, 2008). There are a lot of scales and tools available for use to assess pain such as VAS and NRS and some of these were mentioned in some of the reviewed researches. To differ, a study by Chatchumni, Namvongprom, Erikson, and Mazaheri (2016) claims that nurses were not using tools in pain assessment, which can be a cause unreliability of assessed pain. In connection to this, nurses also reported that they haven't use VAS, neither did pain assessment when a patient is on rest and activity (Ene, Nordberg, Bergh, Johansson, & Sjöström, 2008). While Bilek (2004, 19) reveals otherwise, nurses claim that pain assessment tools are available in their unit and most of the respondents say they use it at least 3 times a week. Nurses, who conduct pain assessment should be knowledgeable about its use and its indication. When assessing pain, patients case or situation must take into consideration; for example, the use of NRS for most people for its practicality and easy use while faces pain scale are used for younger children. Besides rating pain, nurses should also be knowledgeable on the other signs and symptoms, which

conveys that patient is in pain such as perspiration, facial expressions, changes in vital signs, guarding behavior and other unknown factors affecting postoperative pain (Breivik, Borchgrevink, Allen et al. 2008; Lichius, Geibler, Komann, Schlattmann & Meissner 2016).

According to Fink (2000), doing a proper pain assessment can lead to a successful pain management outcomes and this includes integrating patient in the process. Garland and Kenny (2006) and Hasfeldt, Maindal, Toft, Lauridsen, and Birkelund (2015) implies that it is vital to involve patient and also their family in pain management. It reveals in one of the reviewed articles that nurses recognizes patients self-assessment of pain as a valid measure (Guardini et. al., 2008). In contrast to this, a study conducted by Chatchumni, Namvongprom, Erikson, and Mazaheri (2016) discloses that nurses missed the opportunity to include self-reported pain into account. Similarly, an individualized care, effective communication, and good plan improves quality of pain management and increases the chance of plan realization (Hayes & Gordon, 2015). This is also supported by the statement that patient-centered care is considered to be the central to the high quality of care (Cleary, 2012). Each person has individual needs, which requires an individualized care. Therefore, nurses should always consider an individualized care or management; a care planned and given to one patient may not be suitable for another patient. And to add with, an effective pain management requires a multidisciplinary approach and involvement of different pain management methods combinations (Trudeau, Lamb, Gowans, & Lauder, 2009; Mckintosh, 2007; Layzell, 2008.)

6.2 Limitations

The researchers have set limitations on the article selection process of this research, in order to come up with studies, which answers their research question. Indeed many of research articles were omitted, due to cost restriction and irrelevantness to the research question. Consequently, thousands of research articles were narrowed down to only 5.

By the decision made on the use of CINAHL and Medline database, it cannot be said if results were different if other database were also considered. In order to produce a decent outcome of this study, the year of research was set from 2006-2017, which is not too aged or new and articles in English were only used.

The yielded studies were not also properly distributed geographically wise, which were not intentional. The review articles were written in Iran (1), UK (1), Ireland (1), Turkey (1) and Italy (1), so this study doesn't reflect global perspectives. And since this research is based on nurse's experiences, patient's self-pain management wasn't discussed even though it is an important factor affecting postoperative pain. DIfferent views or perception of pain wasn't considered.

6.3 Ethical Considerations

The authors complied ethical principles provided by the Finnish Advisory Board on Research Integrity and the literature review was also done based on it.

Based on the National Advisory Board on Research Ethics (2009, 14), "An ethical review examines the plan for collecting data, how the study will be carried out, the information that will be given to subjects and the plan for processing and storing data from the perspective of avoiding risks and harm." Therefore, data were collected openly on official websites such as CINAHL and MEDLINE and they were archived securely on private computers. After concluding the research, all of the documents were discarded immediately. No private or sensitive information was included and the research question was created ethically. Sources of information were derived from trustworthy and reliable publications or websites and those sources were referenced responsibly.

6.4 Validity and Reliability

To maintain the reliability of this study, researchers have done a separate appraisal of articles, reviews and other selection processes of this research and discussed thoroughly their results. A clearly planned selection process was followed throughout

the process to avoid bias. Limitations set for the study were also clearly followed from the start.

7. CONCLUSIONS

It is given that pain assessment plays a crucial role and has a significant effect on the management of postoperative pain. Thus, scales and tools to assess the pain should be chosen and used properly. In managing patient pain, pharmacological and non-pharmacological methods are principally adopted and it was suggested that the combination of its uses are of help. Moreover, being knowledgeable about pain management is a must for nurses and basing on the results of the study, it suggests that nurses need additional education in the said field. Nowadays, despite the advancement and studies done, postoperative pain management still continues to be a concern, and some of the listed issues that impede nurses from providing patients with better pain management care are nurse's heavy workload, limited authority and insufficient knowledge on pain management.

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APPENDIX A

Summary of the articles included in the study.

Article/ Title	Authors/ Year/ Country	Purpose/ Aim	Method	Sample	Validity/ Reliability	Result
Nurses' experiences and perceptions of influencing barriers to Postoperative pain management	Rejeh, N., Ahmadi, F., Mohammadi, E., Kazemnejad, A. & Anooshesh, M. *2009*. Iran	To identify nurses' experiences and perceptions about the barriers to postoperative pain management.	Qualitative: Content Analysis, Semi structured interview	26 Iranian Nurses (educational hospital in Tehran city)	Lincoln and Guba's four trustworthiness critearia: credebility, confirmability, transferability and dependability	From the participants' points of view, 'lack of educational preparation', 'nurses' limited authority', 'limited nurse– patient relationship', and 'disturbances in pain manage- ment interventions' are considered barriers to pain management.
Nurses' views on ease of patient care in postoperative pain management	van Raders, P., Aubry, M., Friberg, M., Huygens, C. & Koch, T. *2007*. England	Summarizes results from Nurse Ease-of-Care Questionnaires that were completed to assess the convenience and ease of use of each pain management modality from the perspective of the nurse	Quantitative (random-controlled trial), Questionnaires	Nurses	Linkert scale,mean scores, percentage (paired sign test), statistical significance, (fisher's exact test), central tendency	Findings suggest that nurses consider fentanyl ITS to be easier to use than morphine IV PCA.

Surgical nurses in teaching hospitals in Ireland: understanding pain	Vickers, N., Wright, S. & Staines, A. *2014*. Ireland	To determine the baseline level of knowledge and attitudes regarding pain of nurses working in three teaching hospitals in Dublin.	Cross-sectional, Descriptive Research Design.	94 Nurses from 16 surgical wards in academic teaching hospital in Dublin, Ireland.	Content Validity: KASRP.Test retest reliability. Internal consistency reliability.	Results revealed that the mean percentage score overall was 65.7%. Widespread knowledge deficits were noted in this study, particularly in the domain of pharmacological management of pain. Further analysis revealed respondents had an inaccurate self-evaluation of their pain management knowledge.
Turkish Nurses' Use of Nonpharmacological Methods for Relieving Children's Postoperative Pain	Celebioglu, A. Kucukoglu, S. & Odabasoglu, E. *2015*. Turkey	Investigate and analyze Turkish nurses' use of nonpharmacological methods to relieve postoperative pain in children	Cross-sectional and descriptive. Questionnaires, checklist and scale.	143 Nurses whose patients has undergone surgical procedure at 4 wards in 2 hospitals in eastern Turkey.	Descriptive statistics, X2 test, P test	Of the 143 nurses, 73.4% initially had applied medication when the children had pain. Most of the nurses (58.7%) stated the children generally experienced a middle level of postoperative pain. The most frequent practices that the nurses applied after the children's in surgery were (1) "providing verbal encouragement" (90.2%), a cognitive-behavioral method; (2) "a change in the child's position" (85.3%), a physical method; (3) "touch" (82.5%), a method of emotional support; and (4) "ventilation of the room" (79.7%), a regulation of the surroundings. Compared with participants with other educational levels, the cognitive-behavioral methods were the ones most commonly used by the more educated nurses (P<.05): (1) encouraging patients with rewards, (2) helping them think happy

						thoughts, (3) helping them use their imaginations, (4) providing music, and (5) reading books. Female nurses used the following methods more than the male nurses did (P c . 05): (1) providing encouragement with rewards, (2) helping patients with deep breathing, (3) keeping a desired item beside them, (4) changing their positions, and (5) ventilating the room.
The Effectiveness of Continuing Education in Postoperative Pain Management: Results From a Follow-up Study	Guardini, I., Talamini, R., Fiorillo, F., Lirutti, M. & Palese, A. *2008*. Italy.	to assess the effectiveness of a course on “pain,” evaluated by a pretest-posttest design, with a questionnaire	Quantitative: questionnaires	168 participants	Questionnaires used were consistent and have undergone trial. Kappa statistics. P test (two tailed). Wilcoxon score test.	Of the 10 test questions participants answered, seven showed a signi cant difference between the posttest taken at the end of the course and the posttest taken after 18 months.

APPENDIX B

Checklist for Article Appraisal

This checklist is copied from Hawker, S., Payne, S., Kerr, C., Hardey, M. & Powell, J. 2002. *Appraising the Evidence: Reviewing Disparate Data Systematically*. Qualitative Health Research 12(9): 1284- 1299.

The articles will be assessed and graded following the below criteria.
Good= 4
Fair= 3
Poor= 2
Very Poor= 1

Result: The lower the score the poorer the quality of the article.

Note*:* 1. Abstract and title, 2. Introduction and aims, 3. Method and data, 4. Sampling, 5. Data analysis, 6. Ethics and bias, 7. Findings/ result, 8. Transferability/ generalizability, 9. Implications and usefulness

	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	*Total & Comments*
Author/s: Title: Article 1 Date:										
Author/s: Title: Article 2 Date:										
Author/s: Title: Article 3 Date:										
Author/s: Title: Article 4 Date:										
Author/s: Title: Article 5 Date:										

1. Abstract and title: Did they provide a clear description of the study?

Good	Structured abstract with full information and clear title.
Fair	Abstract with most of the information.
Poor	Inadequate abstract.
Very Poor	No abstract.

2. Introduction and aims: Was there a good background and clear statement of the aims of the research?

Good	Full but concise background to discussion/study containing up-to date literature review and highlighting gaps in knowledge. Clear statement of aim AND objectives including research questions.

Fair	Some background and literature review. Research questions outlined.
Poor	Some background but no aim/objectives/questions, OR Aims/objectives but inadequate background.
Very Poor	No mention of aims/objectives. No background or literature review.

3. Method and data: Is the method appropriate and clearly explained?

Good	Method is appropriate and described clearly (e.g., questionnaires included). Clear details of the data collection and recording.
Fair	Method appropriate, description could be better. Data described.
Poor	Questionable whether method is appropriate. Method described inadequately. Little description of data.
Very Poor	No mention of method, AND/OR Method inappropriate, AND/OR No details of data.

4. **Sampling:** Was the sampling strategy appropriate to address the aims?

Good	Details (age/gender/race/context) of who was studied and how they were recruited. Why this group was targeted. The sample size was justified for the study. Response rates shown and explained.
Fair	Sample size justified. Most information given, but some missing.
Poor	Sampling mentioned but few descriptive details.
Very Poor	No details of sample.

5. Data analysis: Was the description of the data analysis sufficiently rigorous?

Good	Clear description of how analysis was done. Qualitative studies: Description of how themes derived/ respondent validation or triangulation. Quantitative studies: Reasons for tests selected hypothesis driven/ numbers add up/statistical significance discussed.
Fair	Qualitative: Descriptive discussion of analysis. Quantitative.
Poor	Minimal details about analysis.
Very Poor	No discussion of analysis.

6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered?

Good	Ethics: Where necessary issues of confidentiality, sensitivity, and consent were addressed. Bias: Researcher was reflexive and/or aware of own bias.
Fair	Lip service was paid to above (i.e., these issues were acknowledged).
Poor	Brief mention of issues.
Very Poor	No mention of issues.

7. Results: Is there a clear statement of the findings?

Good	Findings explicit, easy to understand, and in logical progression. Tables, if present, are explained in text.

	Results relate directly to aims. Sufficient data are presented to support findings.
Fair	Findings mentioned but more explanation could be given. Data presented relate directly to results.
Poor	Findings presented haphazardly, not explained, and do not progress logically from results.
Very Poor	Findings not mentioned or do not relate to aims.

8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population?

Good	Context and setting of the study is described sufficiently to allow comparison with other contexts and settings, plus high score in Question 4 (sampling).
Fair	Some context and setting described, but more needed to replicate or compare the study with others, PLUS fair score or higher in Question 4
Poor	Minimal description of context/setting.
Very Poor	No description of context/setting.

9. Implications and usefulness: How important are these findings to policy and practice?

Good	Contributes something new and/or different in terms of understanding/insight or perspective. Suggests ideas for further research. Suggests implications for policy and/or practice.
Fair	Two of the above (state what is missing in comments).
Poor	Only one of the above.
Very Poor	None of the above.