THE ROLE OF NURSE ANESTHETIST IN THE PLANNING OF POSTOPERATIVE PAIN MANAGEMENT

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Abstract
Proper post-operative pain relief has been shown to increase the patient comfort level, help to a quick recovery of the patient physical activities thus reducing post-surgical morbidity. It improves the outcome of the surgery and reduces the length of days which the patients have to be admitted at the hospital. Pharmacological, non-pharmacological, patients' monitoring and documentation are the main findings of this research that can be used by nurse anesthetists in order to manage postoperative pain for surgical patients.

The aim of this literature review is to find out the methods used by nurse anesthetists in order to treat, prevent, and manage the postoperative pain for surgical patients. The purpose of this literature review is to describe the main methods used by nurse anesthetists in order to manage postoperative pain of surgical patients, within Europe, Australia and USA.

The approaches used by nurse anesthetist in prevention and treatment of post operative pain are mainly pharmacological and non-pharmacological, in addition to this, sufficient patient education ,pain assessment, documenting and sufficient communication between the care givers also play a big role In the management of post operative pain.

Keywords
Nurse Anesthetist, Pain Management, Postoperative pain and Nursing Documentation.

Miscellaneous

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1 PAIN AND NURSE ANESTHETIST

Pain should sufficiently be relieved after surgical procedures have been carried out to surgical patients because insufficiently treated pain may lead to slow recovery, complication rate and long hospitalization as well as cost elevation (Sjöström, Stomberg, & Haljamäe 2003, 197).

The reason why pain slows down recovery is because it increases blood pressure, respiration as well as heart rate. Patients also tend to have increased oxygen consumption, weakened immune response and the motility of gastrointestinal is slowed down (Burns, Magee, Cooley, Hensler, Montana, Shumaker, Snyder, & Polk, 2010). Even after many years of research and availability of effective analgesics, surgical patients still suffer from significant amount of pain and that is why there is a need for more research to be conducted in order to realize an effective means of pain management (Rejeh, Ahmadi, Mohammadi, Kezemnejad & Anoosheh 2009).

Nurse anesthetist has a major responsibility of ensuring that surgical patients receive adequate pain relief in order to prevent physiological and psychological effects of pain (Criste 2003, 206). For the nurses working at the recovery room, they should make sure that before the patient leaves the recovery room, they have enough pain relief medicine with for an ongoing period of time (Wilding, Manias & McCoy 2009, 233).

The aim of this literature review is to find out the methods used by nurse anesthetists in order to treat, prevent, and manage the postoperative pain for surgical patients. The purpose of this literature review is to describe the main methods used by nurse anesthetists in order to manage postoperative pain of surgical patients, within Europe, Australia and USA .The materials within Europe are too limited that is why Australia and USA has been included in the research. According to our experiences during our anesthesia practical training we felt the necessity for nurse anesthetist students to be equipped with more information prior and during the practical training concerning the roles of nurse anesthetist when planning post-operative pain management.

The topic was chosen because the authors are interested in knowing roles of nurse anesthetist concerning pain management for the surgical patients. The research will be conducted through literature review, which is a thorough, comprehensive, clear and unbiased collection and evaluation of useful published literature that supports a study (Rhoades 2011, 63).

2 GOOD POST-OPERATIVE PAIN MANAGEMENT AND THE OUTCOME.

Proper post-operative pain relief has been shown to increase the patients comfort level, helps to a quick recovery of the patient physical activities thus reducing post-surgical morbidity. It improves the outcome of the surgery and reduces the length of days which the patient has to be admitted at the hospital (Roth, Kling, Gockel, Hessmann, Meurer, Gillitzer & Age 2005).

Postoperative pain care should be arranged and organized before surgery involving the patient, families, the care provider and other members of the perioperative team. Usually after surgery pain is most intense during the first 24-72 hours though it may continue for several days or even weeks. Analgesics should be administered regularly during the early postoperative period and then later given as required depending with the pain level assessed. Patients' discharge from the postoperative care unit should not be allowed if pain control is not satisfactorily established and continuing pain medication is not given. (Richard, Bernie, Joe, Neil, Kate, Mary, Jennifer, Sullen, Glyn, 2008a, 36).

According to the study carried out at Helsinki university hospital, proper management of post-operative pain has been challenging to establish due to poor communication, insufficient assessment and the individual differences on the experiences in pain. The influences of the attitudes and behaviors of nurses are more powerful to the patient's satisfaction than the influence of pain itself or pain medications. According to the study, patients appreciate the pre-operative stage since they get to know important information, are free to ask questions and get answers. The study found out those patients who had unsatisfactory discussions in the pre-operative stage, their post-operative pain was higher than the ones who had satisfying information at the same stage (Murola-Niemi, Pöybiä, Onkinen, Rhen, Mäkelä & Niemi 2007).

The important goals when managing postoperative pain include reducing or eliminating discomfort, promoting recovery process, and avoiding complications. Postoperative pain management involves patients' assessment of pain intensity and treating pain pharmacologically or through comfort measures. Healthcare providers should give more attention to the patients' previous experiences and opinions concerning pain because it provides more guidance to effective pain treatment. It is also important for health care professionals to realize that their own authority and caring attitude will always influence a patient. Frequent assessments are necessary rather than waiting for patient to ring a bell or alarm in order to determine whether the patient needs pain medication. (Idvall, Bergqvist, Silverhjelm & Unosson, 2008.)

Postoperative pain that has not been satisfactorily relieved, results to unnecessary suffering of a patient, increased complications and increased costs. Patients' involvement with the decision concerning pharmacological dosage for pain relief can be effective since some patients knowledge could assist in the pain alleviation. As the reduction of less strong pain medication was started, it helped and some patients said that paracentamol made them feel better than tramadol because tramadol made them feel sicker. Provision of pillows provided security and contributed to better sleep. In addition, the patients also perceived the staff as friendly, helpful and competent (Joelsson, Olsson & Jakobsson 2009).

3 NURSE ANESTHETIST ROLE CONCERNING ACUTE PAIN MANAGEMENT

The roles of nurse anesthetists are not only determined by the country where one comes from but also they are time specific since there is no universal agreed role of nurse anesthetists. Their role evolves continually at different speeds and places. However, nurse anesthetists roles extends outside the operation room, it continues into pre-operative evaluation , sedative management, acute pain management, computerized monitoring of the depth of anesthesia and working in co-operation with the anesthesia doctors and surgeons.(Vickers, 2002).

Nurse anesthetists are specialized nurses that are part of the acute pain team. Specialized nurses have an important role at the acute teams in collaboration with other members of the multidisciplinary. Other than giving advanced analgesic techniques for example epidural analgesia or anesthesia and patient controlled analgesia, they have other major roles to play; this include provision of education and guidelines to the ward nurses, agreements for IM injections, I.V, patient controlled analgesia, pain scores, sedation, nausea, information leaflets for patients and introduction of patient assessment charts in relation to acute pain management. (McDonnell , Nicholl & Read, 2003, 261.)

Knowledge concerning acute pain management should be shared by all members of health care multiprofessional team in order to achieve a good outcome. However, effective treatment of acute postoperative pain is a level of care that should be achieved for all patients. Patients who are under anesthesia and are not in a position to demand opioids analgesia prescribed by the anesthetist doctor, the nurse anesthetists have a role to act as patients' advocate for an improved pain management. (Prowse, 2006.)

Nurses are in the best position when it comes to helping patients with pain since they spend more time with them than any other health care team member. Nurse anesthetists must update their knowledge as new techniques of pain management are developed, this helps to promote safe and effective care. (Rawal 1999.)

4 METHODOLOGY

4.1 Literature Review as a Methodology

In this study, literature review was used as a methodology. Literature review is defined as a comprehensive, clear and unbiased collection and evaluation of useful published literature that supports a study (Rhoades 2011, 63).

Literature review of existing literature is the main means of producing evidence-based resources (Gillenwater & Gray, 2003, 5). Literature review means analytical and organized collection and evaluation of published literature that supports a study (LoBiondo-Wood & Haber 2006.)

" literature reviews retrieve, appraise and summarize all available evidence on a specific health question and are designed to reduce the effects of the reviewers' own bias, a full protocol should be written to define and guide the process" (White & Schmidt 2005,54)

4.2 Research questions

The research questions used in this systematic literature review are:

1. What methods do nurse anesthetists use in order to treat, prevent and manage postoperative pain for surgical patients?

2. How are nurse anesthetists involved in postoperative pain management for surgical patients?

4.3 Database Search

The literature search was conducted through manual hand books and internet via Jamk library starting from 1st May 2011.The databases used in our literature searchers are, CINAHL, Elsevier Science Direct, Pubmed and Ebrary. The key words used included; nurse anesthetist, pain management, nursing documentation and postoperative pain. The total Number of sources we produced through the data bases was 54. (Refer to table 1)

TABLE 1 : Data Search table

Data base	Search word			
	Postoperative	"Nursing Documentation"	"Pain management" AND "Pain assessment"	"Nurse Anesthetist"
Cinahl	773	18		
Elsviersciences	2237		1578	
Pubmed	1634		89	89
Ebraly	839		158	
Manual books		3		2
Total 7396	**5496**		**1822**	**91**

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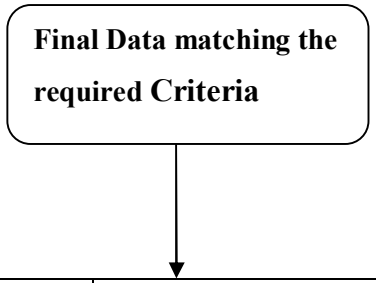
- Publication year 1999-2011
- English Language
- Full text
- Study Deals with; Postoperative pain management, Nursing documentation , Pain management or pain assessment, Nurse anesthetists and their roles concerning pain

Selection –cliteria AND Limitation

TABLE 2 : Final data search table



Data base used	Search word			
	Postoperative	"Nursing Documentation "	"Pain management " AND Pain assessment"	"Nurse Anesthetist "
Cinahl	12	8	8	7
Elsviersciences	6		1	2
Pubmed	1		1	1
Ebraly	4		1	1
Manual books		3		1
Total 54	**23**	**11**	**11**	**12**

One research book by McArthur-Rouse& Prosser (2008) which was found in the Ebrary in the beginning of the literature search was a great source for finding more relevant materials from its list of references. The rest of the materials were found through manual search via Nellie portal, e-journals and relevant textbooks from the library of Jyväskylä University of applied science

4.4 Inclusion Criteria

The inclusion criteria for our literature review were set as follows:

1. The articles are based on realistic and proved evidence
2. The literature is published in English language
3. The articles are related to our subject
4. The article matches the ongoing clinical practice in nursing
5. The article is either qualitative or a systematic review
6. The articles are either from within European countries, Australia or USA

4.5 Analysis

The study has used inductive content analysis to review the research articles, it is described as moving from the specific to the general where first data reference has been collected, leading to the sub-category and main category. Content analysis as a research method can be systematic and objective way of explaining and quantifying phenomena. This method makes similar and valid conclusions from data to their background in order to provide knowledge and illustration of facts. (Elo & Kyngäs, 2008.)

Articles found have been independently read through by the authors of this thesis and then rated according to their applicability for this particular topic. The articles that appeared to be applicable and seemed to answer the study questions were saved then the ones that did not match were excluded from this study.

Through the analysis process, in the beginning of the process the data was divided into two main categories: different methods used to promote postoperative pain management and documentation of anesthesia monitoring. After this the data was sorted, aggregated and synthesized deeply. More databases and articles' list of references were broken into two categories forming smaller units which later formed the sub topic.

At this point we recognized the common themes for the main findings. Pharmacological and Non-pharmacological treatment of postoperative pain, Monitoring and documentation of postoperative pain

TABLE 3: Example of Analyzing.

Content	subcategory	Category
In this article it was mentioned that in order to obtain effective pain management, a combination of drugs with different actions are used. (Mitchell, 2004).	Pharmacological	Pain management
In this article it mentioned that when analgesics are given before a surgical incision has been made, pain is reduced (Farris & Fieldler, 2001).		

TABLE 4: Continuation of analysis table.

In this article it mentioned non-pharmacological management of pain should be included in all levels of analgesic management of pain because they help eliminate or improve effect of medications that have reached maximum level (Gould, 2007)	Non-pharmacological	
In this article it indicates that music has been indicated by studies to be a good intervention to help care for patients with post operative pain (Engwall & Duppils 2009).		
In this article it indicated pain level should be documented as rated from the pain scale because it becomes part of the patient's medical record as so should pain relief interventions. (Smeltzer et al 2008)	Pain Assessment	Documentation of Anesthesia monitoring
In this article it illustrates that pain assessment tools are useful to help determine the diagnosis and effectiveness of any intervention. (Cox, 2010)	Pain assessment tools	

5 NURSE ANESTHETISTS ROLES IN THE THREE MAIN SURGICAL PHASE.

5.1 Preoperative Phase

Pre-operative preparation of a surgical patient is the first stage of the enhanced recovery process and is very important since its outcome may affect both intra and post-operative stages either positively or negatively (Houghton & Swart 2010).

During preoperative phase, a surgical patient needs to be prepared in order to reduce risks occurring during post operative phase, the responsible nurse educates, helps to ease anxiety and fear facing the surgical patient. It is during this phase that a patient needs to be prepared on what will happen at the operation room. Educating patient on postoperative exercises are

necessary at this phase to get them prepared physically and emotionally because they will experience bad pains when coughing, taking deep breaths, as well as when exercising. (DeLaune & Ladner, 2005.)

5.2 Intraoperative phase.

Intraoperative phase refers to when a surgical patient is moved to the operation room and ends when the patient is discharged from the operation room and a nurse's objective should be providing safety for the patient (DeLaune & Ladner 2005, 764).

During this phase, the patient is highly dependent upon the health care professionals functioning as a team. On the arrival to the operating room, all relevant documents and needed information must be present, the patient's medical history will be checked for special information and if possible, a verbal verification is recommended. (McArthur-Rouse& Prosser 2008a, 20.)

The nurse anesthetist attaches monitoring device to the patient, this is vitally important for monitoring and safe admission of anesthesia. The electrocardiogram (ECG) is the equipment used to monitor the electrical activity of the heart and is achieved by placing the electrodes in a specific order. The most commonly used during anesthesia is the one called CM5. The non-invasive blood pressure cuff is placed on the limb and is used to measure systolic, diastolic, mean arterial pressure and pulse rate. To notice the changes in oxygen saturation of the red blood cells, a pulse oximetry probe is either positioned on a finger, toe, ear lobe or nose. Capnography is used to measure carbon dioxide amount in the exhaled tidal gases. For additional monitoring, invasive arterial pressure is inserted into the radial artery and it helps to get more accurate information about circulation and the heart state. Central venous pressure shows the condition of circulating volume during anesthesia, it helps in the assessment and management of fluid therapy. Bi spectral index (BIS) record the state of brain as opposed to the effect of the drug, they are used to guide titration of sedatives, analgesics and anesthetic agents (McArthur-Rouse& Prosser 2008b, 21.)

Nurse anesthetist has a crucial role at this phase by conducting assessment, regulating pharmacologically and the physiological responses awakened by surgical stimuli, insufficient depth of anesthesia or both. As the nurse anesthetist monitors and treats those responses, a lot of information is gained concerning each surgical patient therefore gaining the knowledge that can be used for planning postoperative pain management. (Sjöström *et al 2003, 197.)*

5.2.1 Pharmacological routines to postoperative pain management

Pharmacological management of post-operative pain should be appropriate to the needs of the patient. The rules are focused on the use of the World Health Organization analgesic ladder because of its usefulness and effective concept in the treatment of mild, moderate and severe pain (Wee & Hillier 2007).

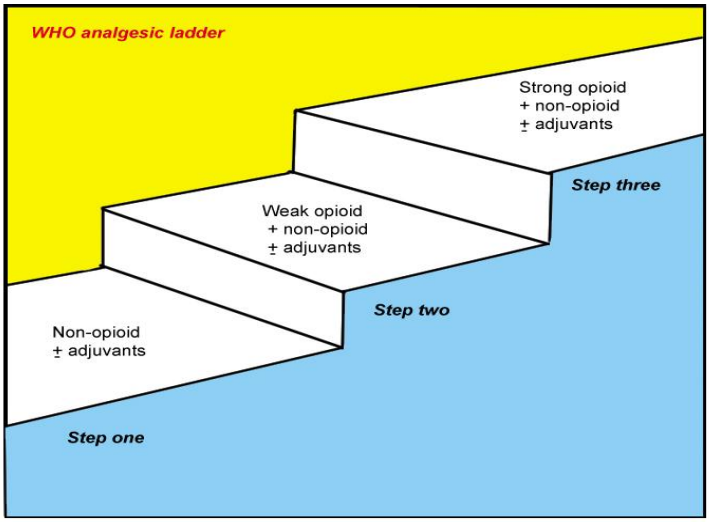


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FIGURE 1: The World Health Organization Analgesic Ladder (Wee & Hillier 2007)

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Analgesics are given during general anesthesia in form of opioids, local anesthetics and others by nurse anesthetists. Nurse anesthetists should be aware that it is their role to know the effect of these drugs since the drugs may wear off in the postoperative period leaving the patient in pain and hence in need of further analgesia. (Richard *et al*, 2008b 1024.)

To manage pain, opioids are most effective though the chosen agent can vary. To obtain effective pain management, combinations of drugs with different actions are used. Non-steroidal, anti-inflammatory drugs acts directly on the wound site, this helps to prevent swelling, therefore when combined with a mild analgesics, they alleviate the pain experienced. Morphine is also suitable since it has a long acting period except that it is not suitable for day surgery patients since it delays their discharge and also increases the postoperative nausea and vomiting. However, it is important to note that NSAIDs should be given early enough so they can be useful by the time a patient wakes up. When given as a premedication, NSAIDs are cheapest and effective. (Mitchell, 2004, 33.)
Local analgesia can be used to reduce pain at the puncture sites especially where laparoscopic surgeries are applied and therefore reducing postoperative pain. (Richard *et al*, 2008b).

When analgesics are given before a surgical incision has been made, pain is reduced or even controlled because pain formation at spinal and cerebral levels is inhibited therefore even making pain experienced after the surgical procedure to decrease. Nurse anesthetists can apply this concept of preemptive analgesia in order to treat pain more effectively before it begins than after (Farris & Fiedler, 2001, 223-228.)

5.2.2 Non-pharmacological routines

Non-pharmacological methods are used as an additional treatment of postoperative pain in order to boost patients' well-being (Engwall &Duppils, 2009).Non-pharmacological management of pain should be included in all levels of analgesic management of pain since it may lead to reduction, elimination or improve the effect of medications which have reached the maximum level of tolerance (Gould, 2007, 46).

Non-pharmacological methods can be grouped as cognitive, behavioral, physical methods, provision of emotional support, helping with daily activities and also creating comfortable environment. These factors enable a patient to obtain sense of control, reducing the feeling of pain and hence promoting in

pain alleviation. Other ways applied by nurses are; educating patients on muscle relaxation, breathing techniques as well as relaxed postures. The pain experiences can be affected by psychological factors like fear, anxiety and patient inability to sense the feeling of control. Therefore, a non-pharmacological method can be used in addition to analgesics for the treatment of postoperative pain. (Ylinen, Julkunen & Pietilä, 2006).

According to the theory of pain, non-pharmacologic pain management interventions inhibit the ascending transmission of noxious stimuli through the central nervous system and therefore interfering with pain perception. When cognitive behavioral therapy is applied as an intervention, pain transmission is blocked from the dorsal horn by activating descending neural pathways from higher brain centers that are responsible for cognition and affect. Cognitive behavioral therapies include having positive coping skills and self capabilities, distractions, relaxation training, avoiding fear practices and good communication. (Cameron & Sawatzky, 2008.)

Tension can increase pain, in particular tensions such as headaches and pains related to joints and muscles .Relaxation has a positive effect normally in various parts of the body, one of these includes relieving of pain because by promoting and increasing muscular and mental relaxation, there is a direct action on the pain mechanism created by changes in the sympathetic nervous system (Davis, 2000a, 154.)

Many studies have indicated that music can be used as an intervention to help care for patients with postoperative pain and it can be used preoperatively, intraoperatively as well as at the post anesthesia care unit. Music gives pleasure and therefore bringing physiological and psychological responses to the listeners. (Engwall, Duppils 2009, 370 -382.)

Various researches have indicated that postoperative pain can be reduced by relaxation methods and music therapy at a low cost (Lukas 2004). The researchers indicated that music can help to distract a patient under anesthesia from alarms when a problem is noted which aids in keeping the level of anxiety low. Headphones are most recommended to play music so

that even the slightest noise in the OR cannot be heard (Nilsson, Rawal & Unosson, 2003, 702.)

Psychomotor methods are also applied by nurse anesthetists for example keeping the patient warm, dry and relaxed position as well as ensuring that the patient in not tensed. It is important to create a comfortable environment by keeping proper lighting, acting empathetic and being calm (Ylinen *et al*, 2006)

5.3 Post Anesthesia Care Unit

The definition of recovery is a return to original state, together with post-anesthetic care it means the return of patient's normal physiological functions from the effects of anesthesia and surgery the one being focused on particularly being cardiovascular or respiratory functioning's and the purpose of the post-anesthetic care unit is to monitor, support, treat and prevent further complications until the return of normal functions are achieved. The nurse-anesthetist must hand over the care of the patient formally to a recovery room nurse (Syme & Craven 2009, 576.)

After surgery, the anesthetists (anesthetic doctor and nurse anesthetist), transfer the patient to the post-anesthetic care unit. Supplementary oxygen is administered to the patient because insufficient oxygenation of tissues may cause hypoxia. The continuity of care is carried out by a qualified recovery practitioner after the handing over of the patient by the anesthetists. The patient's clinical condition and vital signs are closely monitored until they acquire sufficient physiological stability. (McArthur-Rouse & Prosser 2008, 35.)

At the PACU, managing pain is a very important feature of perianaesthesia patient care and therefore it is the role of the nurse to ensure proper pain assessment and management of the patients' postoperative pain (Östman & Person, 2004, 304).

Comfort measures and pharmacological management are the two most effective ways of relieving the patient's pain. Comfort measures differ, some are physical and some psychological, it is important function of the nurse to make sure that unnecessary discomforts are minimized. Patient reassurance

is an effective way of reducing anxiety and is important to all patients regardless the type of surgery (Mackintosh 2007, 51-55.)

6 IMPORTANCE OF DOCUMENTATION BY THE NURSE ANESTHETIST

"A document is a written, printed or electronic text that provides a record of information that is typically used by healthcare professionals as a resource, such as hospital protocols, policies or guidelines patient" (Braaf, Manias, &Riley 2011 1025).

Documentation has many functions, safety and quality of patient care in surgery critically depends on the documentation functioning as a communication exchange tool among the healthcare workers for patients' continuity of care (Braaf, Manias, &Riley, 2011, 1034).

Good nursing care depends greatly on the availability to high quality of information, it is nurse's responsibility to communicate about their patients current health condition and future plans, the main source of information for this is via the nursing record system or the nursing care plan, it is very important that it is structured well to assist and ensure the continuity of patient care (Saranto & kinnunen 2009, 465).
"*Effective communication is emphasized as a fundamental component of nursing and is recognized as an integral part of delivering high-quality patient-focused care"* (Boscart, 2009).

Multidisciplinary surgical teams use documentation in different perioperative pathways i.e. during preoperative, intra-operative and post-operative time. The documentation is gathered from the beginning of the patients surgical journey and gradually is put together in the post anesthetic care unit (PACU) and it is critically needed in the clinical handing over of the patient where it is used to help in the verbal method of communication and increases reliability of information during the handing over of the patient (Braaf, Manias, &Riley, 2011, 1025).

It is a professional responsibility of a nurse anesthetist to provide and maintain the continuity care path of a patient and best way to achieve this is through documentation. Documentation is also an important tool for the nurse

anesthetist since it is their source of defense in case of complaints from a patient. (Cunningham 1998, 35)

Documentation during surgery is the most important recording done by the monitoring nurse anesthetist. It is important to record the anesthesia used on the patient, their concentrations and the time they were given to the patient. It is also very important to record the physiologic parameters, these include blood pressure, temperature and the entire important surgical milestone, and they should clearly be noted and marked. Any alarmed changes, doctor's reaction to them and the important discussions between the nurse anesthetist and the anesthesiology doctor must also be noted. (Husain 2008, 18.)

As nurse anesthetists monitor a patient, they are able to regulate the pharmacological and physiological responses brought about by the surgical stimuli, insufficient depth of anesthesia or sometimes both. By documenting this, they are able to earn information that is vitally important when planning postoperative pain management. (Sjöström *et al*, 2003, 197)

It is through documentation that nurse anesthetist can be able to identify most reoccurring nursing diagnoses which include; positioning injuries ,infection risks , anxiety ,changes in body temperature, risks for peripheral neurovascular dysfunction, pain ,injuries as well as fears .However, it is important to be able to make correct clinical judgment concerning a potential patient problem so that correct nursing diagnoses is applied with appropriate intervention in order to get expected outcome. It is important that a nurse anesthetists monitor problems that can be caused by trauma, treatment methods and medications administered, then use physician and nurse initiated interventions to reduce the complexity on those happenings. (Junttila & Salanterä, 2010, 57-68.)

6.1 Pain assessment

Pain is considered the fifth vital sign, pain assessment helps to diagnose the cause, understand the impact, identify proper pain relief methods and evaluate their effectiveness. The key areas of pain assessment are; location, intensity, type of pain, onset and duration, previous treatments and pain reliefs and the last being associated symptoms and effect on activities. Knowing the

location of pain helps in the diagnosis. Pain is experienced differently by different people and that is why it is important to ask the patient to rate their pain and asked to describe the characteristics of the pain for this may help to differentiate between nonciceptive and neuropathic pain. Knowing when the pain started and the duration it has lasted may shed some light on the cause and type of pain. Pain relief pharmacological history of the patients may help to identify the best pain relief methods (Briggs 2010).

Assessment and management of pain requires good interrelationship with the person in pain and in order to assess the pain, the nurse needs to review the patient's description of pain; other factors that may contribute to pain and also how the patient responds to pain relieve strategies. Pain level should be documented as rated from the pain scale because it becomes part of the patient's medical record as so should pain relief interventions. Pain assessment should include figuring out the level of pain relief an acutely ill patient needs in order to obtain quick recovery or improve function or if a chronically ill patient needs to obtain comfort. (Smeltzer, Bare, Hinkle & Cheever 2008, 270).

6.2 Pain assessment tools

Before the use of pain assessment tool, it is important to know the cause of pain since this may help in deciding on the best tool and required management. Subjective measurements of the patient's pain are usually the most reliable indicator of the presence of pain and its severity (Parsons & Preece 2010).

Pain assessment tools are used to help in diagnosis and determining the effectiveness of any intervention. Tools used to assess pain should be understood by both patients and staff and must be valid and reliable measurement of pain. (Cox, 2010)

The pain assessment tools are categorized as follows; self report measurement scales, this includes the numerical, verbal and visual analogue scales, some of its advantages are that they are quick, simple and easy for the patients to understand. Its disadvantages are that they are unilateral, they measure pain and not give the description of the pain. Simple descriptive and

numerical scales is another category of pain assessment tool, this category uses words, numbers or a combination of both to describe the intensity of pain and the effectiveness of pain relieving measures. The other category is the McGill pain questionnaire, is a pain assessment tool which covers the location, quality, duration and factors affecting the pain (McArthur-Rouse&Prosser 2008).

There are three types of tools which are mostly used in the surgical settings, these are; the verbal rating scale (VRS), the visual analogue scale (VAS) and the numerical rating scale(NRS) (Parsons &Preece 2010).

Pain is usually subjective therefore making the evaluation of pain intensity rely more on the patients' self assessment. However, all pain measurement systems relying on patients' cooperation are limited to patients with speaking, hearing and language difficulties and cognitive impairment and may fail to assess pain intensity correctly in small children, unconscious or patients with delirium. (Ledowski, Ang, Schmarbeck & Rhodes, 2009.)

Response towards nociceptive stimulus can be measured as an indicator of inadequate analgesia though this cannot be useful for during operations when patients are paralyzed. Parameters like Entropy are suggested to indicate the nociceptive component of anesthesia. Other indicators include changes in skin conductivity and suppression of photoplethysmographic pulse wave interval (PPWA). Photoplethysmography can be found in pulse oximeters. Surgical Stress Index (SSI) is recently introduced and it is based on normalized pulse beat interval (PBI) and (PPWA) with a simple numerical index between (0-100) used for the assessment of surgical stress or nociception. When SSI is high it indicates a high noxious stimulation or low opioids concentration. Studies have indicated that SSI is a better measure of nociception that entropy parameters, heart rate or PPWA only that it is less accurate when used to conscious patients. (Mustola, Parkkari, Uutela, Huiku, Kymäläinen & Toivonen, 2010.)

7 IMPORTANT FINDINGS

7.1 Pharmacological treatment of postoperative pain

Pharmacological treatment of postoperative pain begins at the preoperative phase when a premedication is administered (Robinson & Hall, 2008). It is very important for nurse anesthetists to be able to understand the effectiveness of any pain medication given during surgery and also to be able to realize the timing when it can be most effective. (Nagelhoult *et al*, 2009.)

The duration and type of a surgery also determines which opioid a nurse anesthetist should administer. Non-steroidal anti-inflammatory drugs should be given long before surgery begins and when given during surgery other mild analgesic should be combined in order to be most effective. (Mitchell, 2003.)

However, a nurse anesthetist should always remember to administer an analgesic immediately before a surgical incision has been made in order to control pain formation and this aid to controlled postoperative pain management (Farris & Fiedler, 2001)

7.2 Non-pharmacological treatment of postoperative pain

Non-pharmacological treatments of pain are the adjuvant to pharmacological methods and they help to improve patient's recovery from pain (Engwall & Sörensen, 2009). Providing comfortable environment could be ensuring that the surgical patient gets a warm blanket when they arrive at the operation room, proper lighting and positioning, introducing yourself to them so they can feel comfortable, acting calm which helps to reduce fear and anxiety which are associated with pain (Ylinen *et al 2006).* Nurse anesthetist needs to make sure that the surgical patients get educated on the procedures that they will undergo and how to take care of themselves after surgery for example showing them various breathing exercises as well as how to position themselves to prevent pain after surgery (DeLaune & Ladner, 2005).

Music has also been studied to be a good non-pharmacological method to reduce postoperative pain. Music can be used to help interrupt surgical patients from alarms as well as it can be used to help them relax therefore

reducing anxiety. It can be used preoperatively, intraoperatively and also at the post anesthesia care unit (Nilsson *et al,* 2003.)

7.3 Monitoring and documentation of postoperative pain

Assessment and documentation starts in the pre-operative stage, when the patient's general condition is checked to determine the safety of the procedure, documentation is later continued in the intra-operative stage when the surgery is taking place, at the same time, the nurse anesthetist monitors the patients vital signs.

Pain assessment is mostly done at the post-anesthetic care unit, where the patient is taken immediately after the surgery. The assessment is done by the assistance of pain assessment tools, the pain assessment tools which are mostly used in surgical settings are; the verbal rating scale (VRS), the visual analogue scale (VAS) and the numerical rating scale (NRS).

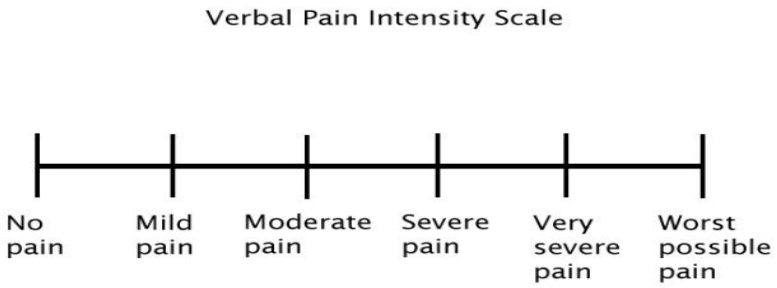

FIGURE 2. The verbal rating scale (Parsons &Preece 2010)

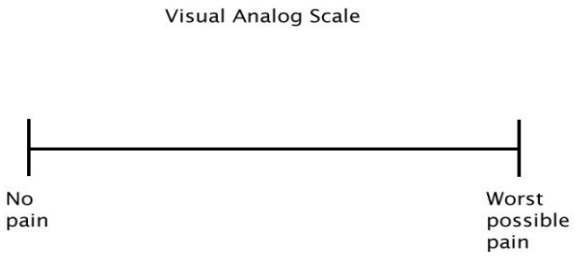

FIGURE3. The visual analogue scale (Parsons & Preece 2010)

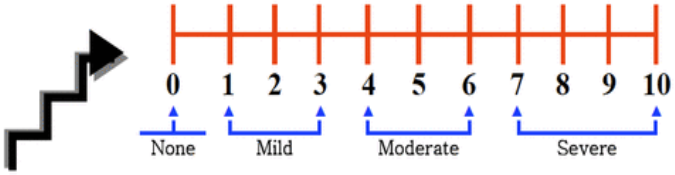

FIGURE 4. The numerical rating scale (Parsons & Preece 2010**)**

Monitoring of a surgical patient during surgery is one of the main role of nurse anesthetists and every physiological change should be recorded and be able to explain its course as well as how to deal with that change. Nurse anesthetist gains a lot of information therefore gaining skills that can be used to plan postoperative pain management (Ströström *et al* 2003.) However, Assessment of pain can be impossible to assess with a paralyzed patient since they are not in a position to act when they are in pain. With the introduction of surgical stress index (SSI) nurse anesthetists can be able to manage pain during surgery which is vital for the management of post operative pain. (Mustola *et al 2010)*

Documentation enables nurse anesthetists be able to realize reoccurring diagnoses which could occur due to positioning injuries, infections risks, anxiety, body temperature changes, peripheral neurovascular dysfunction,

pain injuries and fears. With this information it becomes even easier to plan treatment of postoperative pain.
Problems caused by trauma or disease in the operation room should also be monitored and appropriate treatments given to surgical patients and consultations should be made from the physicians and use of appropriate nursing interventions in order to help reduce even bigger complications from occurring (Junttila & Salanterä , 2010.)

7.4 Continuation of care report

Nurse anesthetists are required to give report that concerns the patient after surgery for the continuation of patients care. The report is crucial because it indicates the important demographic data, diagnosis, surgical procedure performed, anesthesia agents used, fluid and blood loss, their replacements, vital signs and any complications that might have been encountered during surgery. All these are critical when planning the patient postoperative pain care. (Smeltzer *et al* 2008.)

8 DISCUSSION

The Aim of this literature review is to find out the methods used by nurse anesthetists in order to treat, prevent and manage postoperative pain for surgical patients. The purpose of this literature review is to conduct a comprehensive description in order to closely examine roles of nurse anesthetists in relation to postoperative pain of surgical patients, within different parts of Europe, Australia and U.S.A.

8.1 Reliability and Ethical considerations.

Throughout the literature research process, data used was critically collected from only research articles which were based upon approved articles, to ensure the right criteria was followed.

The database have been collected from famous authorities such as WHO, excellent journals such as Journal of advanced nursing, Australian nursing journal, Journal of peri-anesthesia Nursing. AANA Journal course, Journal of

Clinical Nursing. Articles were also sought from CINAHL, EBRARY AND ELSVIER SCIENCE DIRECT databases. All there databases were quite reliable and good resources in the health care field. These were also latest research results in the field of heath care. We also looked for relevant books at the library of Jamk University of Applied Sciences helped to produce reliable sources to our work. They were from Europe, United States and Australia.

8.2 Limitations

This literature review was limited by the amount of research articles used as data sources used to conduct the review. In addition, certain relevant research articles may have been left out because of cost restrictions for obtaining them. Furthermore, authors of this review are nursing students with no previous research experience which might have contributed to some research mistakes.

8.3 Discussion on the results

8.3.1 Approaches used by Nurse Anesthetists in order to prevent postoperative pain

Pharmacological treatment of postoperative pain is an important method used to by nurse anesthetists in order to prevent postoperative pain among surgical patients. Nurse anesthetists can only prevent post operative pain when they administer analgesics at the right time with the right analgesic. The duration of surgery will also determine the Opioids to be administered. Patient should not leave the operation room without enough analgesics and this is a role of a nurse anesthetist to ask from the anesthetist doctor on the continuing pain medications which should be effective and enough for the patients.

Non-pharmacological approach is also used to help treat postoperative pain. These may include the provision of comfortable environment like giving a warm blanket to a surgical patient in the operation room, proper lighting and

positioning , not being a “stranger to patient” which means you must introduce yourself to them. Provision of education to patients is also vital aspect which should never be left out and this could include; breathing exercises, proper positioning after surgery. In addition to these, music has also been discovered as a non-pharmacological approach of treating pain, and it is used preoperatively, intraoperatively as well as postoperatively. Music distracts and sooths therefore helps to reduce pain exercised postoperatively.

The approaches used by nurse anesthetist in prevention and treatment of post operative pain are mainly pharmacological and non-pharmacological, in addition to this, sufficient patient education ,pain assessment, documentation and sufficient communication between the care givers also plays a big role in the planning of post operative pain management.

8.3.2 Nurse Anesthetists managing postoperative pain.

Monitoring of patient during surgery is a major role of nurse anesthetists and it is during this time that a nurse anesthetist can gain a lot of information that can be used to for post operative pain management. Furthermore documentation of patients’ progress should also be carried out since it can be referred to for the treatment of pain or for the continuity care path. Pain assessment should always be performed at all levels of the surgical phases in order to allow proper pain treatment. However, nurse anesthetists should always be updated on the new improved techniques that are used to measure pain in order to provide reliable results concerning pain assessment.

8.6 Professional growth

This subject has been chosen due to the interest of the authors in the perioperative field of nursing which can help in the orientation in the future working life by gaining more knowledge and skills through the process.

It was very challenging, having no experience as authors of bachelor’s thesis before and this being the first. The authors were able to do it due to our

commitment, proper time management, researching as much as possible and taking the criticisms and directions from our mentors' positively.

This thesis helped the authors develop skills in project managing, setting goals, carefully planning and setting deadlines for the goals which also helped them improve on time management skills and team work.

8.7 Conclusion and Recommendation.

The approaches used by nurse anesthetist in prevention and treatment of post operative pain are mainly pharmacological and non-pharmacological, in addition to this, sufficient patient education ,pain assessment, documentation and sufficient communication between the care givers also plays a big role in the planning of post operative pain management.

To conclude, proper surgical pain management is important to surgical patients not only because it eases the pain but also shortens their admission from the hospital. We recommend the future researchers to further the studies by doing more research on pain management of surgical patients after discharge as it is very crucial to patients' continuation of care.

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