QUALITY OF POSTOPERATIVE PAIN MANAGEMENT AMONG ORTHOPEDIC PATIENTS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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by

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LIST OF ABBREVIATIONS

ASA	-	American Society of Anaesthesiologist
NSAIDs	-	Nonsteroidal anti-inflammatory drugs.
PCA	-	Patient control analgesia
SD	-	Standard deviation
SPSS	-	Statistical Package for the Social Sciences
USM	-	Universiti Sains Malaysia

KUALITI PENGURUSAN KESAKIT SELEPAS PEMBEDAHAN DI KALANGAN PESAKIT ORTOPEDIK DI HOSPITAL UNIVERSITI SAINS MALAYSIA, HOSPITAL USM.

ABSTRAK

Kualiti pengurusan kesakitan selepas bedah kedua-duanya ditentukan melalui penilaian kesakitan selepas bedah dan hasil tahap kepuasan. Kesakitan selepas pembedahan adalah kesakitan yang dialami oleh pesakit ortopedik yang menjalani pembedahan. Pengurusan kesakitan selepas bedah yang baik menunjukkan kualiti pengurusan kesakitan selepas bedah yang tinggi. Kajian ini bertujuan untuk menentukan kualiti pengurusan kesakitan selepas bedah di kalangan pesakit ortopedik di Hospital USM, di mana boleh ditentukan melalui empat subskala, komunikasi, tindakan, kepercayaan dan alam sekitar. Satu kajian rentas telah dijalankan di kalangan 114 pesakit ortopedik yang diperolehi dari tiga wad ortopedik utama di Hospital USM. Borang soal selidik yang dipenuhi sendiri telah disediakan dalam kalangan umur 18 hingga 74 tahun yang sesuai dengan kriteria. Data tersebut dianalisis dengan menggunakan SPSS versi 25.0 dengan kaedah deskriptif, t-test bebas dan ujian *Pearson correlation coefficient*. Penemuan melaporkan bahawa intervensi berkaitan adalah merupakan skor tertinggi (M=18.88, SD=2.25) dalam menentukan kualiti pengurusan kesakitan selepas bedah. Sementara itu, t-test bebas digunakan untuk menguji secara statistik perbezaan antara lokasi kesakitan dan lebih sakit dari apa yang dijangkakan dengan kualiti pengurusan

kesakitan selepas bedah. Di mana menunjukkan tidak ada perbezaan yang ketara antara lokasi kesakitan dengan tahap kesakitan paling teruk (p=0.404), sakit paling ringan dalam 24 jam pertama (p=0.700), kesakitan yang dialami pada hari ketiga selepas pembedahan, sekarang (p=0.960) dan tahap kepuasan (p=0.071) kepada kualiti pengurusan kesakitan selepas pembedahan. Walau bagaimanapun, terdapat perbezaan yang ketara antara lebih sakit dari apa yang dijangkakan dengan tahap kepuasan kepada kualiti pengurusan kesakitan selepas bedah (p=0.003). Sebaliknya, *Pearson correlation coefficient* digunakan untuk menganalisis hubungan antara komunikasi, tindakan, kepercayaan dan alam sekitar dengan tahap kepuasan kepada kualiti pengurusan kesakitan selepas bedah. Yang tidak disangka, penemuan itu menunjukkan terdapat hubungan statistik yang signifikan, baik dan positif antara komunikasi (r^2=0.441, p<0.000), tindakan (r^2=0.389, p<0.000),amanah (r^2=0.303, p=0.01) dan persekitaran (r^2=0.304, p=0.001) dengan tahap kepuasan. Kesimpulannya, kualiti pengurusan kesakitan selepas bedah di kalangan pesakit ortopedik adalah baik di mana terutamanya usaha untuk memperbaiki terutamanya dipengaruhi oleh penilaian berkaitan amanah.

QUALITY OF POSTOPERATIVE PAIN MANAGEMENT AMONG ORTHOPEDIC PATIENTS IN HOSPITAL UNIVERSITI MALAYSIA, HOSPITAL USM.

ABSTRACT

The quality of postoperative pain management is both determine through assessment of postoperative pain and the outcome of satisfaction level. Postoperative pain is the pain experienced by orthopedic patients who underwent the operation. Good postoperative pain management indicates the high quality of postoperative pain management. This study aimed to determine the quality of postoperative pain management among orthopedic patients in Hospital USM, where can be determined through four subscales, communication, action, trust, and environment. A cross-sectional study had been conducted among 114 orthopedic patients obtained from three main orthopedic wards in Hospital USM. A self-administered questionnaire was provided in the ranged of age 18 to 74 who fit in inclusion criteria. The data were analyzed by using SPSS version 25.0 with the method of descriptive, independent t-test, and Pearson correlation coefficient test. The findings reported that the trust-related interventions were the highest score (M=18.88, SD=2.25) in determining the quality of postoperative pain management. Meanwhile, an independent t-test was used to statistically tested the differences between the site of pain and more pain than expected with the quality of postoperative pain management. Which showed there were no significant differences

between the site of pain with the pain level at worst (p=0.404), least in the first 24-hours (p=0.700), pain experienced at day three of postoperatively, now (p=0.960), and level of satisfaction (p=0.071) of the quality of postoperative pain management. However, there was a significant difference between more pain than expected with the level of satisfaction of the quality of postoperative pain management (p=0.003). On the other hand, the Pearson correlation coefficient was used to analyze the relationship between communication, action, trust, and environment with the level of satisfaction to the quality of postoperative pain management. Surprisingly, the findings resulted in there were statistically significant, good and positive relationship between communication (r^2=0.441, p<0.000), action (r^2=0.389, p<0.000), trust (r^2=0.303, p=0.01) and environment (r^2=0.304, p=0.001) with level of satisfaction. In conclusion, the quality of postoperative pain management among orthopedic patients was good where mainly the effort to improved was influenced by trust-related assessment.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Postoperative pain is an acute pain that being experienced by patients due to both pathophysiological and the therapeutics effect (Svehla & Beran, 2000), which may be caused by the tissue damage from surgical procedure. Every year, postoperative pain becomes a problem for surgical patients. Despite the advancement of the modalities of postoperative pain management, patients are continuously suffered from pain due to its inadequate pain relief (Al-Khawaldeh, Al-Hussami & Darawad, 2013). It's being reported that, even with high technologies, pharmaceutical advancement, and the availability of published guidelines and standards, there is more than 50% of surgical patients complaints of pain with ineffective pain management, which result in poor quality of life, decrease patients' productivity and increase of health care costs (Duke, Haas, Yarbrough & Northam, 2013).

The problems that possibly arise in achieving the good quality of postoperative pain management may be due to lack of knowledge and negative attitude towards effective pain management and the ability to adequately assess and manage pain among healthcare workers (Al-Khawaldeh et al., 2013). Though the healthcare workers are present with adequate knowledge and theories, there is still deficient found where the clinical application to control and reduce pain are inadequate that lead to inefficient pain management (Duke et al., 2013).

While in other studies, Gan, Habib, Miller, White & Apfelbaum (2014) stated that, even with the increase of awareness and clinical advancement in pain management, there are insignificant differences observed in post-surgical analgesia among surgical patients. Where most patients, 86% out of 300 participants, continue to suffer from postoperative pain. Among these, about 75% of patients had experienced moderate-extreme pain immediately after post-surgical periods and 74%

of patients experienced the same level of pain after discharge (Gan et al., 2014). Furthermore, was reported to become postoperative pain become the biggest concern among surgical patients and is associated with the anxiety regarding surgery-related pain before their surgery is scheduled with 53% of patients had experienced 'high' or 'very high' in inpatients settings to be compared with 40% in outpatients setting. After the surgery, there are approximately 88% of surgical patients received analgesia medication to manage the pain, including receiving on a timed schedule, through patient-controlled analgesia (PCA) devices, PRN analgesic medication, and providing via epidural device or nerve block. Despite that, about 39% of surgical patients who are fully provided with pain management, are reported moderate-severe pain after received the first dose of analgesic medication, and overall, about 79% experienced side effects of analgesia medications, drowsiness, constipation, and nausea (Gan et al., 2014). Studies conducted by Vrancken et al. (2018), report that approximately 16.3% of surgical patients experienced moderate pain while about 12.1% of surgical patients experienced severe pain on the fourth postoperative day with 182 and 136 of the numbers of surgical patients respectively.

The development of the quality of health care services can be determined through the pain assessment which needs to be assessed regularly. The evaluation will be based on patient-reported outcome measures (PROMs), where the patients will report on the symptoms, health condition, quality of life, and so on, and patient-reported experienced measure (PREMs), where the patient experienced the long waiting period (Tamer & Dağ, 2020). To improve the quality of pain management, the American Pain Society (APS) was proposed five key elements as follows: (1) Ensure that the report on the unrelieved pain from patients attracts clinicians attentions, (2) Ensure that information about analgesic are convenient to patients and the orders are understandable and well written, (3) Ensure patients show a promising responsive towards analgesic care and urge them to communicate pain, (4) Ensure that

there are the policies and safeguards for the use of modern analgesic technologies, (5) Ensure to coordinate and assess the result of these measures (American Pain Society,1995). Those elements use as indicators by APS to improve the patients' satisfaction towards pain management thus developed the quality of health care services. The indicators that being proposed by Gordon et al. (2016), to improve the quality of postoperative pain management, which are as follows: the severity of pain is recorded with a numeric rating scales or through a verbal descriptor scales at frequent intervals, alternative pain management methods other than intramuscular injection methods, regularly perform pain management as needed, ensure patients' experienced pain relief from the pain interventions, ensure that pain management able to improve the quality of life and activities of daily living and lastly, ensure that patients' are to be informed about the pain and pain management. Pain assessment is the best method to determine the quality of pain management (Tamer & Dağ, 2020).

The study by Voshall, Dunn & Shelestak (2013), shows that there are barriers that prevent the nurses who worked with this group of patients from giving adequate pain management. This is due to inadequate pain assessment, where the lack of administering analgesia medications is to be found. Other than that, the nurses tend to perform non-verbal cues without received self-report from patients (Voshall et al., 2013). Furthermore, other reasons to be included are as follow: a shortage of staff cause lack of time to perform correct pain level assessment, lack of knowledge regarding pain medications among clinical practitioners, patients' feel reluctant to ask for pain medications may be due to lack of rapport between patients and nurses, and potential of opioids adverse effects that may cause the nurses to decrease the dosage administer and thus not adequate dosage are give to manage the pain level intensity after surgery (Voshall et al., 2013). The adverse effects include respiratory depression, excessive sedation, nausea and vomiting, constipation, hypotension, difficulty in passing urine, and shivering (Newman, 2018).

The instrument that will be used to measure the quality of postoperative pain management among orthopedic patients in Hospital USM is Strategic and Clinical Quality Indicators in Postoperative Pain Management which being developed by Idvall, Hamrin, Sjöström & Unosson (2002). The quality of pain management that would be assessed using the instruments focuses on these 4 factors (subscales); communication, action, trust, and environment. The outcomes will be determined by assessing patient pain levels and their satisfaction with the management they received. The original study of Cronbach's coefficient alpha is 0.84. It is indicating that the items have good internal consistency, where the items are highly correlated (Idvall et al., 2002).

Therefore, the main purpose of the study is to explore the quality of postoperative pain management among orthopedic patients in Hospital Universiti Sains Malaysia (HUSM). The findings of this study will be able to contribute to the improvement in the quality of postoperative pain management in Hospital USM. Next, this study was also able to determine the necessary areas to be improved and implementing an effective nursing intervention, and assess the patient's satisfaction towards postoperative pain management. The aim is to assess orthopedic patients' pain experienced on the third day of postoperative and its quality pain management in Hospital Universiti Sains Malaysia.

1.2 Problem Statement

Although the issue regarding the quality of postoperative pain management was globally discussed, the concerns of its quality still become the main problem till today (Shoqirat, Mahasneh, Al-Kwawaldeh & Singh, 2019). Where the increase of efforts and policies to enhance the pain management of surgical patients seem did not produce any expected results (Gupta, Sahi, Bhargava & Talwar, 2015). According to Gupta et al. (2015), this is due to the lack of pain assessment conducted by the doctors, nurses, and other healthcare workers that lead to inadequate pain management and contribute to poor quality of life of the patients.

The assessment of pain is interrelated to determine the quality of postoperative pain management where results in excellent satisfaction received from the patient end (Tamer & Dağ, 2020). The quality of postoperative pain management will be assessed using the instruments which focus on the 4 factors (subscales), includes communication, action, trust, and environment (Idvall et al., 2002). The additional items will be discussed, where the outcomes will be determined through the pain level and satisfaction (Idvall et al., 2002).

The study was conducted based on the duplication from previous studies by Tamer & Dağ (2020). There was a gap in the literature related to the quality of postoperative pain management of the previous study that was conducted in Turkey (Tamer & Dağ, 2020). This is due to the small sample size of the previous study that led to the study limitation, as the findings of the study is being general (Tamer & Dağ, 2020). Therefore, to improve the findings of this study, the focus population was orthopedic patients that take part in postoperative pain management. The estimation of the sample size will be larger. Thus, the quality of postoperative pain management in the orthopedic patient can be increased. Thus, the purpose

of conducting the duplication of this study is to investigate the variables at Hospital Universiti Sains Malaysia.

The specific participant criteria will be applied, where the studies were on orthopedic patients who underwent surgery. These new inclusion criteria will be included in this study, where previously, the studies are being generalized to surgical patients (Tamer & Dağ, 2020). The studies also will take place at Hospital USM, which is allowing the researcher to do research there. The findings somehow will be able to contribute to the existing postoperative pain management protocol, where the quality can be increase. In the previous study, the findings obtained by the researcher only on the quality of pain management and patient satisfaction (Tamer & Dağ, 2020). While in the present study, the quality of postoperative pain management can be determined through the patient's satisfaction with the pain management received. In addition, the satisfaction and outcome of pain level can be classified according to the site of postoperative pain and the type of analgesia provided. This can result in specific pain management based on patient condition, thus, able to improve the quality of postoperative pain management. The aim is to assess surgical patients' pain experienced on the third day of postoperative and its quality pain management at Hospital Universiti Sains Malaysia. The correct measurement tools are essentials.

1.3 Research Question

The research questions are as follows:

1. What is the quality of postoperative pain management among orthopedic patients in Hospital USM?

2. Are there any differences between pain level and orthopedic patient satisfaction with the site of postoperative pain and more pain than expected provided in Hospital USM?
3. Is there any relationship between communication, action, trust, and environment with orthopedic patient satisfaction in Hospital USM?

1.4 Research Objective

1.4.1 General Objective

The general objective of the study is to determine the quality of postoperative pain management among orthopedic patients in Hospital Universiti Sains Malaysia, Hospital USM.

1.4.2 Specific Objective

The specific objectives of the study are:

1. To identify the quality of postoperative pain management among orthopedic patients in Hospital USM.
2. To examine the differences between pain level and orthopedic patient satisfaction with the site of postoperative pain and more pain than expected provided in Hospital USM.
3. To determine the relationship between communication, action, trust, and environment with the orthopedic patient satisfaction in Hospital USM.

1.5 Research Hypothesis

The hypothesis for this study is as follows:

1. H_0 1 = There are no significant differences between pain level and

orthopedic patient satisfaction with the site of postoperative pain and more pain than expected provided in Hospital USM.

$H_A 1$ = There are significant differences between pain level and orthopedic patient satisfaction with the site of postoperative pain and more pain than expected provided in Hospital USM.

2. $H_0 1$ = There is no significant relationship between communication, action, trust, and environment with orthopedic patient satisfaction in Hospital USM.

   $H_A 1$ = There is a significant relationship between communication, action, trust, and environment with orthopedic patient satisfaction in Hospital USM.

1.6 Significance of The Study

This study contributes to knowledge and practice among the nurses and the patients. Firstly, the contribution to the nurses from the aspect of generating more knowledge on the assessment and management of postoperative pain. The findings of this study can be the guidelines for the nurses in practicing evidence-based practice, as the organization effort to improve the quality of postoperative pain management. With the improvement of the quality of postoperative pain management, patients can control the postoperative pain and result in less pain. Other than that, the nurses were able to update their knowledge through the findings of this study. For example, in the nurse's professional fields, they will encounter patients that came from various educational backgrounds, where they will have their stand. Thus, it is important for the nurses, to deliver a good quality of postoperative pain management to the patients to have always updated the existing knowledge about assessment and management of postoperative and having appropriate knowledge which can result in positive outcomes, include low severity and intensity of pains experienced.

The findings also creating an awareness among nurses to correctly assess and manage patients, so that they are satisfied with services and lessen the pain. It also can be a guideline to enhance the effectiveness of postoperative pain management and increase the effectiveness of surgical department services.

The findings that being gaining from the real-world experienced can increase the rapport between the patients and the healthcare providers. Which at the same time, will help in delivering effective services according to the characteristic of pain that is being described by the patient.

1.7 Conceptual and Operational Definitions

The quality of postoperative pain management is referred to as how the nurses manage the pain postoperatively through 4 elements, includes, communication, action, trust, and environment Idvall et al. (2002) and how the patients' opinion on the pain management they received. The pain management aspect includes pharmacological and non- pharmacological approaches. Effective postoperative pain management will rise the quality of postoperative pain management services and reduced suffering on patients. The main purpose is to minimize the discomfort, enhance early ambulation and functional recovery, and prevent from developing chronic pain (Corke, 2013). While an orthopedic patient in this study is the orthopedic patient that undergoes surgery.

The questionnaire was obtained from the previous study by Idvall et. al. (2002). The permission was obtained from the author or the developer of the questionnaire ownself. Another instrument used in this study also by

obtaining patient information form from the Hospital USM.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter aims to explore the study to a more wide range of theories and clinical approaches available in the literature and to define the gaps of the study. It highlights the description of postoperative pain, which consists of its assessment, management, and the issues before the knowledge of the patients and the nurses towards postoperative pain. A demonstration of the conceptual framework/theories is available at the end of this chapter.

The content that will be discussed in the review of literature includes the concept of pain, postoperative pain, pain management, knowledge of patient on pain, assessment of pain and quality of postoperative pain management, the measurement of the study, and the related factors.

2.2 Review of Literature

2.2.1 Concept of Pain

Task force on taxonomy of the International Association for the Study of Pain (IASP) stated that pain is ‘An unpleasant sensory and emotional experienced associated with, or resembling that associated with, actual or potential tissue damage’ (Merskey & Bongduk, 1994). While, the North American Nursing Diagnosis Association defines pain as a state, in which an individual experiences and reports severe discomfort or an uncomfortable sensation, which is the reporting of pain may be either through direct verbal communication or by encoded descriptors (Kumar & Elavarasi, 2016). In

addition, pain is best descript scientifically as an unpleasant feeling that is sent to the brain by the sensory neurons (Farlex, n.d.). The discomfort feelings may be due to actual or potential injury to the body; its acts as a warning mechanism to protect an organism from harmful stimuli.

Pain is also often described in the literature as a subjective complaint, and it is difficult to measure or quantify the pain experienced by the person (Meldrum, 2020). The medical dictionary said that pain is more than just a sensation, or the physical awareness of pain, where the pain is also perception and the subjective interpretation of the discomfort (Farlex, n.d.). In brief, perception provides information about the location, intensity, and nature of the pain. Furthermore, the perceptions of pain may be influenced by the behavioral and emotional responses as is stated in Melzack's gate control theory (Abdalrahim, Majali & Bergbom, 2010). According to the theory, 'Pain stimulation is carried by small, slow fibers (T-cells) that enter the dorsal horn of the spinal cord, which then, the other cells transmit the impulses to the brain. T-cells can give an impact to the smaller fibers that carry pain stimulation, where it can both inhibit or allow the stimulation to be communicated into the central nervous systems' (Physiopedia, 2019). The relation of pain and emotions can be observed through this theory. The gate to control pain will open as the smaller fibers are stimulated. Where the increase in pain and more suffering are to be experienced. It is influenced by the descending nerve fibers in the brain which its function is to regulate thoughts, beliefs, and emotions (Abdalrahim et al., 2010; Melzack, 1996).

Pain is very subjective where it can change its severity or quality at a moment's notice which is influenced by external demands imposed on nervous

systems (Olson, 2013). The nature of pain experiences is individualized, in which every person come with various pain experienced even though they are matched on their physical, social, and psychological factors. Briefly, it has become one of the challenges to treat pain. The multidisciplinary approaches were developed in the treatment of pain due to the changes in the concept of pain.

Traditionally, pain can be classified into acute and chronic pain. Where acute pain refers to a complex process that involves activation of nociceptors, chemical mediators, and inflammation (Johnson, Borsheski & Reeves-Viets, 2013). It is the most common type of pain, which results from a common illness or injuries, cuts, and sprains, or trauma, severe accident, or major surgery, also known as the pain of short duration (Zeller & Burke, 2008). Beyond that, acute pain also acts as an adaptive alarm, where it is alerting people to address the cause of pain and preventing the tissue from further damage (Lumley, et al., 2011). The common cause of acute pain includes broken bones, surgical procedures, dental work, labor and childbirth, cuts and burns (Santos-Longhurst, 2018).

On the other hand, chronic pain, also known as persistent pain, is a long-term pain resulting from unidentifiable causes (Farlex, n.d.). Which lasting for 3 months or more; and in some cases, the pain sensation persists even though the healing process of tissue had been taken place, which significant differences cannot be observed. Chronic pain may be due to diseases processes in specific tissues, such as joint degeneration (osteoarthritis), inflammation (rheumatoid arthritis, inflammatory bowel diseases), tumors growth (caner pain), nerve damage (neuropathic pain), and tissue anoxia (sickle cell diseases)

(Lumley, et al., 2011). It also may be accompanied by symptoms that include tense pf muscle, lack of energy, or limited mobility (Santos-Longhurst, 2018).

2.2.2 Postoperative Pain

2.2.2.1 Acute Postoperative Pain

Postoperative pain is one example of acute pain. Justification can be considered as there is a presence of surgical trauma with an inflammatory reaction and initiation of a neural barrage (Gupta, et al., 2010). The American Society of Anaesthesiologists stated that pain experienced in postoperative settings that present in surgical patients is a type of pain due to pre-existing surgical procedures, or a combination of diseased-related and procedure-related resources (Abdalrahim et al., 2010).

Pain is a common symptom after surgery, where tissue trauma before the surgical procedure has occurred. Briefly, the tissue injury due to surgical procedure results in the release of a substance that is involved in the inflammatory cascade, which acts as a response to heal the affected tissues (Chen, et al., 2018; Watson, 2020). The substances include prostaglandins, histamine, serotonin, bradykinin, vasoactive peptide (substance P, calcitonin gene-related protein, neurokinin A), and other mediators, the stimulation of free nerve endings and nociceptors (nociceptor pain) also been influenced by these substances, where these substances (bradykinin, serotonin, and histamine) play the main role in modifying the threshold activation and the activities of the receptors also sensitize the receptors, while arachidonic acid metabolites only sensitize them (Svehla & Beran, 2000; Rowlingson, 2001; Watson, 2020). Moreover, the damage to the peripheral or central neural structure before the surgical procedure may introduce

neuropathic pain to the patients. The nerve impulse that is produced before tissue damage were sent to the dorsal horns of the spinal cords, which then the impulse was transmitted to the brain, as the brain will interpret the impulse and process the information (Abdalrahim et al., 2010).

The acute postoperative pain usually lasts 3 months prior to the injury which also causes short-term psychological changes. This symptom may be reduced with the proper interventions during preoperative preparation, such as knowledge and psychological.

2.3 The Assessment of Pain

To observe for the changes or progress of the pain, routine assessment is necessary to ensure the effectiveness of pain management is achieved. Hence, properly diagnosed, measured, and documented are compulsory. The American Pain Society (APS) in 1996 declared that pain is the fifth vital sign, where the importance of pain assessment is as important as the assessment of existing vital signs (Levy, Sturgess & Mills, 2018). The multidimensional approach had been practiced assessing pain experiences as the whole pain would be assessed accordingly. It is being applied for almost 15 years (Beyaz & Erdem, 2011).

Multidimensional approaches of pain assessment enable the health practitioners to assess the pain through both verbal descriptors and a visual. The evaluations of pain as a whole should be done as the postoperative pain is not isolated to the surgical site only (Small & Laycock, 2020). The tools to measure the pain using this approach able to cover patient comfort, change to the pain quality and the severity, pain control, functioning, and sleep. Other than that, the tool use may improve the perioperative pain assessment, but further evaluation is needed (Small & Laycock, 2020; Twining & Padula, 2019).

The components of pain assessment are as follows: 1) Pain onset, which can be described as abrupt and sudden or insidious and gradual. The recognition of the origin of the pain may be crucial in determining the suitable management to alleviates the pain. While the mechanism of injury that involved trauma in acute pain can assist in pain diagnosed by health practitioners; 2) Pain location/radiate, where the clinicians are locating the source of pain and observe the radiation of the pain. It is useful in narrowing the diagnosis where the specific management of the pain can be performed. Different types of pain result in different anatomical aetiologies of pain. For example, in postoperative pain where patients experienced nociceptive pain, the pain may be localized to the injured tissue; 3) Duration, typically the pain that lasts for 3-6 months from the onset of pain is considered as acute pain where it is associated with an abrupt onset and the identifiable events such as due to surgical procedure; 4) Course or temporal pattern, the observation of the pattern of the pain may include worsening, improving or statically over the time from the onset of pain. The changes of the intensity or the location origin may lead to the worsening of the pain evolution (American Pain Society, 1995). The timing when the pain becomes more intense should be noted in the pain assessment, where it will provide an advantage in planning the management prior to the pain; 5) Character and quality of the pain, where the patients are self-reporting the characteristics of the pain experiences such as sharp, dull, stabbing, burning, crushing, throbbing, nauseating, shooting, twisting or stretching pain. The patient itself is recognizing the quality of the pain. However, it is very subjective and especially difficult to report it for the new or unique sensation of pain; 6) Aggravating/provoking factors, it is related to what factors worsen the pain. For example, the pain becomes more worsen when there is a movement to

the body. The descriptions can aid in forming the pathophysiologic mechanism of the pain by the clinicians. Factors that influence the worsening of the pain includes environmental, mechanical, metabolic, and psychological factors (American Pain Society, 1995); 7) Alleviating factors, while the alleviating factors are the contrast to the aggravating factors, where it is focused on what the factors contribute in making the pain feel much better. It helps in determining the management attempt that helps or not helps in relieving the pain. Consequently, it helps in determine the coping behaviors of the regime. It is also important to assess the alleviating factors where the decision on continuing or terminating the treatment can become the circumstances in exacerbating or propagating the pain; 8) Associated symptoms, able to help in narrowing the diagnosis and rule out the specific treatment concerning the pathological and systemic diseases. Where it may be localized to the painful area such as inflammation produce erythema, warmth, or local edema (American Pain Society, 1995); 9) Severity, the severeness can be assessed using the pain scale was on a scale of 0 to 10, with the zero being no pain and 10 being the worst pain. Pain also may be assessed both through verbal and nonverbal. And how the pain-giving impacts daily living activities. The impacts that may contribute include sleep, mood, appetite, or social relationship. The assessment of objective quantification of pain becomes the greatest challenge to clinicians. As pain experiences for every person are varied even though they present with similar pathophysiology or symptoms that are associated with the pain; 10) Barriers to pain assessment, this frequently occurs due to the significant reliance of the assessment to the only of the subjective reports from the patients. This is only available to patients who can communicate excellently. While patients who are nonverbal or having communication difficulty,

showing complicated and difficulty in assessing the pain experienced by them (Small & Laycock, 2020). Moreover, the barriers in pain assessment include the pain threshold. Where it can be divided into two terms: perception tolerance and tolerance threshold. The perception threshold is the minimum intensity that one's experienced as being painful, while the tolerance threshold is the maximum intensity of pain that is being experienced by the patients. The threshold felt is varied within the demographic characteristics. Other than, the challenge that may be faced when assessing the pain is the exaggerating symptoms for secondary gains, this usually occurs when there is abuse to the prescriptions of opioids (Kishner, 2018; Chou et al., 2016).

2.4 Pain Management

Effective postoperative pain management is far more important to lead to a better quality of the postoperative pain management services. There is an ethical dilemma arise related to the relief of pain experience by patients. The issue receives less attention for the past years in modern bioethics to be compared with other issues such as respect for autonomy and informed consent (Ferrell et al., 2001). There are neglected issues among the healthcare profession in their obligation to treat pain especially among traumatic and postoperative pain which remain untreated and undertreated. A study about pain management shows that almost 80% of patients undergoing surgical procedures complained of acute postoperative pain and about 75% complaints of the severity as moderate, severe, or extreme (Carvalho et al., 2018).

The discussion on the barriers to effective pain management had been reported in the literature. The barriers that hinder the effectiveness of pain management are related to several elements, includes, system-related, staff-

related, nurse-related, physician-related, and patient-related. The system-related barriers include the limited access to the resource due to the often compete with other clinical issues which being more priorities by the global health compare to the need of relieving pain (King & Fraser, 2013). Also, shows that there is a lack of exposure to the standards and protocols of pain management among the clinical practitioners and the failure to be responsible for relieving pain compared to other health-related problems (Al-Mahrezi, 2017; Carvalho et al., 2018). Staff-related barriers include the lack of knowledge and skills related to pain, especially due to the subjective character of pain. Poor communication and cooperation between doctors and nurses cause poor quality in pain management. Where about 70% out of 247 nurses having problems communicating with the doctors about managing pain. Knowledge of pain is important to enhance the effectiveness of pain management that the clinical practitioner can offer (Mędrzycka-Dąbrowska, Dąbrowski, & Basiński, 2015). And also, the most difficult barrier in ensuring the effectiveness of pain management is the physician-related barrier. There are various barriers related to the physician that become the issue in effective pain management, which include, unable to identify the priority in patient care due to the over-reliance on the scientific approach rather than a humanistic approach (Carvalho et al., 2018). The poor rapport between the physician and the patients also became the cause as it will prevent the physician to give the best treatment to the patients. A study by Elcigil et al., which is cited by Mędrzycka-Dąbrowska, Dąbrowski, & Basiński (2015) , states that lack of regular and consistent pain assessment by a physician, 63%, and invisible physician's behavior towards pain experienced by the patients

become the main issue in physician-related barriers. Physician fears of the adverse effects of the opioid analgesic cause reluctance in prescribing the medications to patients and lead to inadequate pain management. Nurse-related barriers include inadequate knowledge about effective management as being evidenced by the study conducted by Ferrell et al., which found only 0.5% of content related to pain management in nursing textbooks (Mędrzycka-Dąbrowska et al., 2015). Heavy workload experienced by nurses becomes one of the factors in negligence of effective pain management, where the nurses have no ample time to give education about pain management to patients especially in performing non-pharmacological approaches. They also underrated the importance of pain assessment of the pain intensity and its consequences (Al-Mahrezi, 2017). The nurses also face a problem of shortage in human power, as it becomes the excuse in putting pain management among less important procedures (Carvalho et al., 2018). Lastly, the barriers in preventing the patient to receive effective pain management include patient-related barriers where patients themselves having conflict in receiving the opioids analgesic due to the side effects of the medications such as over-dosing and addiction (Al-Mahrezi, 2017). The patient may encounter with financial issue cause the refusal of getting the treatment of alleviating the pain intensity (Carvalho et al., 2018).

2.4.1 Postoperative Pain Management

Untreated or ineffective pain management towards the postoperative due to the surgical procedure can result in the decrease of alveolar ventilation, which may induce hypoxemia caused by the decrease of PAO2 to enable the alveoli to function well (Powers & Dhamoon, 2020), and a decrease of vital capacity

and the pneumonic consolidation (Harsoor, 2011). There is also a high risk of developing tachycardia, hypertension, myocardial infarction, insomnia, and poor wound healing. In certain cases, untreated postoperative pain can lead to an increase in morbidity and mortality rate which may be associated with pulmonary embolism, pneumonia, delayed wound healing, and unmotivated (Apfelbaum et al., 2003; Harsoor, 2011). Other than that, uncontrollable acute pain can lead to chronic pain with the reduction of quality of life (Garimella & Cellini, 2013).

The correct postoperative pain management should be performed after the full assessment of postoperative pain has been completely done, which the intensity and the severity of pain have been determined. The main goal in managing postoperative pain is to reduce or eliminate pain and discomfort with a minimum adverse effect as possible (Garimella & Cellini, 2013). Pain can be managed within these two approaches, in which pharmacological and non-pharmacological approaches. Multimodal analgesics were introduced in the fight against pain perioperatively. Multimodal treatment is the administration of two or more drugs that act by the different mechanisms for providing analgesia effects, which may be administered through the same route or different routes (American Society of Anesthesiologists, 2012). This type of treatment allowed the combination of drugs that have a different mechanism of action to produce synergic effects, thus the lower doses of individual drugs are used and also reduce the burdens of side effects from single drugs (Small & Laycock, 2020). The multimodal treatment of pain in the pharmacological approach includes systemic pharmacologic therapy; local, intra- articular, or topical techniques; regional anesthetic techniques, and neuraxial anesthetic

techniques.

First and foremost, the pharmacologic approach of the multimodal analgesic is the systemic pharmacologic therapy in which the medications to relieve pain postoperatively include non-opioids, opioids, steroids, gabapentin, or pregabalin, IV ketamine, and IV lidocaine (Horn, 2020). Non-opioid pain medication encompasses the non- steroidal anti-inflammatory drug (NSAIDs) and acetaminophen (paracetamol), which the consumption is to reduce opioid consumption due to prevent the over-dosage of opioid drugs (Sjøgren, Elsner, & Kaasa, 2015).

NSAIDs include acetylsalicylic acid (ASA, aspirin), dipyrone (metamizole), and other types of drugs with different classes. To reduce the inflammatory to the surgical trauma, NSAIDs act in blocking the synthesis of prostaglandins by inhibiting the production of the enzyme cyclooxygenase (COX) (White, 2005). It is also reported that the administration of NSAIDs can reduce the intravenous patients controlled analgesic (IVPCA) morphine, which reduces the administration of opioids, especially when undergoing major surgery (Small & Laycock, 2020).

An injectable NSAID, ketorolac, administered with propofol/ nitrous oxide as an adjuvant to promote comfort and improved postoperative analgesia which also able to decreased the incidence of postoperative nausea and vomiting, and enhance the tolerable to the oral fluid, thus increase the chance in earlier discharge from hospitalization to be compared with patients who received opioids compounds such as fentanyl (White, 2005). Moreover, in multimodal therapy, the consumption of acetaminophen enhanced the opioid-sparing effects, which besides NSAIDs, acetaminophen also able to

reduce the amount of morphine dosage administration. It has also proven that the combination of acetaminophen with other analgesics (ibuprofen, codeine & oxycodone) can improve acute postoperative pain in adults (Small & Laycock, 2020). Significantly, the IV paracetamol (PCM) can decrease the aftereffects of a surgical procedure such as nausea and vomiting and reduce the doses of other analgesic medications (Garimella & Cellini, 2013).

Opioids are the mainstay in postoperative pain management. Despite its side effect of respiratory depression that leads to hypoxia and respiratory arrest, opioid is the first-line management of the postoperative pain. Regular vital signs monitoringis done along with opioids administration (Garimella & Cellini, 2013). While common side effects that may encounter by patients include nausea and vomiting, pruritus and reduction in bowel motility that cause constipation. Orally administration is more preferable compared with other routes such as parenteral, transdermal, neuraxial, and rectal routes. However, in certain circumferences where intravenous administration is necessary, thus, IVPCA is recommended (Horn, 2020). The examples of the most common opioids in postoperative pain management that administer via IV are morphine, hydromorphone, and fentanyl. Morphine is associated with rapid onset of action which is 6-30 minutes (DrugBank, 2020). The prolonged use of opioids can result in addiction and dependence, which is why the healthcare professional introduced multimodal therapy that reduces the doses of opioids with the administration of non-opioids analgesics.

In other cases, when the encounter with patients that tolerant to opioids, gabapentin or pregabalin was administered as its consumption able to reduce the early doses of opioids as a systematic review being reported in 2007

(Tiippana, Hamunen, Kontinen, & Kalso, 2007). It is prescribed during the preoperative phase as it accompanies evidence in preventing persistent postoperative pain (PPSP) (Small & Laycock, 2020). A study conducted by Buvanendran et. al., in the patients that undergo total knee replacement which consume the pregabalin 300 mg during the preoperative phase, taking 150 mg BD for the first 10 days and continue with 50 mg BD from days 10-14 in the postoperative phase (Schmidt, Ruchelli, Mackey, & Carroll, 2013). Then, result in the improvement of range of motion, observed after 30 days postsurgical. It is because, pregabalin induced an increase of sedation and confusion on the day of surgery which reduced the pain experienced (Schmidt et al., 2013).

Gabapentin is an adjuvant medication which administered along with other medicines to help in treating seizure in people who have epilepsy. It belongs to the anticonvulsant classes. It acts in decreasing the abnormal excitement in the brain whereby gabapentin changing the way the body senses the pain that results in relieves of pain (MedlinePlus, 2020). Although the use of gabapentin as the multimodal therapy in postoperative pain management had been approved by the American Pain Society, there is systematic reviews and meta-analyses stated that gabapentin drugs are associated with minimal opioid-sparing effects and the increase of incidence of serious adverse effects, SAEs (Fabritius et al., 2017). Where based on the article the use of gabapentin in postoperative is not recommended. The SAEs reported in the consumption of gabapentin result in the re-admission to hospital, prolonged hospital stay, postponed operation due to sedation effects, allergic reaction, stroke, pulmonary embolism, myocardial infarction, acute kidney injury, pneumonia,