International Journal of Community Medicine and Public Health
Bukhsh AT et al. Int J Community Med Public Health. 2024 Oct;11(10):4101-4106
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20242899

Review Article

Evaluation of postoperative pain management strategies in maxillofacial surgery patients

Ayman T. Bukhsh[1]*, Sawsan H. Alnakhli[2], Osama S. Alzahrani[3], Omar M. Barakat[4], Aljazi M. Muwainea[5], Ibrahim S. Alraddadi[6], Abdulaziz A. Alsaleh[7], Nawaf A. Albishri[8], Lamia S. Hakami[7], Ruqayyah H. Almarshadi[9], Ahmed M. Alnujaidi[7]

[1]Department of Oral and Maxillofacial Surgery, King Abdul Aziz Specialist Hospital, Taif, Saudi Arabia
[2]Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia
[3]College of Dentistry, Mansoura University, Mansoura, Egypt
[4]College of Dentistry, Umm Al-Qura University, Mecca, Saudi Arabia
[5]College of Dentistry, Princess Nourah Bint Abdul Rahman University, Riyadh, Saudi Arabia
[6]Dental Department, King Khalid Medical City, Abha, Saudi Arabia
[7]College of Dentistry, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia
[8]Department of Oral and Maxillofacial Surgery, Ministry of Health, Jeddah, Saudi Arabia
[9]College of Dentistry, University of Hail, Hail, Saudi Arabia

Received: 04 September 2024
Accepted: 19 September 2024

***Correspondence:**
Dr. Ayman T. Bukhsh,
E-mail: Dr.Ayman_Bukhsh@hotmail.com

ABSTRACT

Evaluating postoperative pain management strategies in maxillofacial surgery is essential for optimizing patient outcomes and satisfaction. This review assesses various pain management approaches, emphasizing the importance of a multimodal strategy. Effectiveness is measured using standardized pain scales such as the visual analog scale (VAS) and numeric rating scale (NRS), along with evaluating functional recovery indicators like chewing, swallowing, and speaking. Safety considerations focus on monitoring adverse effects from analgesics, ensuring proper wound healing, and minimizing infection risks. Patient satisfaction is gauged through direct feedback on pain management experiences and adherence to prescribed regimens. Cost-effectiveness is analyzed by evaluating resource utilization, including hospital stay duration, additional medical interventions, and medication costs. Studies indicate that comprehensive pain management bundles, although initially more expensive, can lead to long-term cost savings and improved patient outcomes. Implementing a patient-centred, multidisciplinary approach that includes both pharmacological and non-pharmacological methods is crucial for effective pain management in maxillofacial surgery.

Keywords: Postoperative pain, Maxillofacial surgery, Pain management, Patient satisfaction

INTRODUCTION

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.[1] Nociceptors, the sensory receptors for pain, are present in all body tissues. These receptors are activated by thermal, chemical, mechanical, and electrical stimuli, which trigger the subjective experience of pain. Various chemical mediators initiate nociception and sensitize nociceptors. Pain transmission occurs via a series of afferent neurons.[1] Studies have shown that this theory elucidates the concept that pain is not purely introspective but is influenced by how the external world impacts the body and individual. Thus, the concept of pain is extensive and multifaceted.

Oral surgeons have an important role in the holistic management of patients' post-operative pain. Anticipating

and managing post-operative pain is a critical responsibility of clinicians. Often, there is an over-reliance on pharmacological pain management, which is only one aspect of treatment. Other aspects, such as reassurance and maintaining patient comfort levels, are also important.

Post-operative pain exhibits variability in its link to injury.[2] Pain can be protective by prompting immediate withdrawal from harmful stimuli, such as hot or sharp objects, thereby serving as a basis for learning to avoid these stimuli. It also helps prevent further damage when an individual is already injured, as seen in post-operative pain, where individuals avoid activities that exacerbate their pain.

Post-operative pain is a type of acute pain that can potentially become chronic. The progression from acute to chronic pain is a significant area of research.[3] Acute pain serves a biological function by preventing further tissue damage, whereas chronic pain persists beyond the natural healing process, becoming a syndrome and a disease.

The third molar pain model is extensively used to trial novel analgesics.[4] The pain experienced following third molar removal is a validated and reproducible model for assessing analgesic efficacy.[5] This model has advantages, including the predictability and consistency of post-operative pain, which allows differentiation between weak and strong analgesics. The primary need for analgesics is within the first 24–48-hour period, with chronic pain being rarely reported.[6] Patients experiencing iatrogenic nerve damage related to dental procedures are often challenging to manage, with conditions like paraesthesia or dysaesthesia heightening their overall pain experience related to oral surgical treatment.[7]

There are widely accepted methods for measuring pain, though ensuring these measures are objective is challenging given the subjective nature of pain. Patient-reported outcomes are crucial in pain measurement.[8] Measuring modalities include multidimensional and unidimensional scales.[9]

In analgesic trials, the number needed to treat (NNT) is used to compare analgesic efficacy. NNT is defined as the expected number of people who need to receive the experimental rather than the comparator intervention for one additional person to either incur or avoid an event in each period.[10] A lower NNT indicates a greater therapeutic effect of the treatment.

METHODS

This study is based on a comprehensive literature search conducted on 23 May 2024, in the Medline and Cochrane databases, utilizing the medical topic headings (MeSH) and a combination of all available related terms, according to the database. To prevent missing any possible research, a manual search for publications was conducted through Google Scholar, using the reference lists of the previously listed papers as a starting point. We looked for valuable information in papers that discussed evaluation of postoperative pain management strategies in maxillofacial surgery patients. There were no restrictions on date, language, participant age, or type of publication.

DISCUSSION

Preoperative recognition of patients who are at risk for severe postoperative pain allows for timely multidisciplinary intervention, such as the rationalization and optimization of pre-existing analgesic medication (Table 1).[11] A patient-centred, collaborative approach gives patients the time to develop realistic expectations and to be educated about the treatment of severe pain. This strategy enhances the overall pain management plan and improves patient outcomes by addressing potential issues before surgery and ensuring that patients are well-informed and prepared for their postoperative recovery period.[12]

Table 1: Risk factors for post-operative pain.[11]

Patient factors	Surgical factors
Chronic pain/pre-existing acute pain	Major operations
Preoperative use of opioid analgesics	Nature of operation (bony work > soft tissue)
Preoperative use of anti-neuropathic analgesics such as gabapentin	Duration of operation
Anxiety and depression	Cancer operations
Fear of surgery	Urgent operations
Catastrophisation of pain	
Age (18–65 years)	
Obesity	
Female sex	

Assessment of pain

Pain can be assessed using both multidimensional and unidimensional scales.

Multidimensional pain scales

In addition to being beneficial in evaluating complex or persistent acute or chronic pain, the location, severity, and kind of pain can show how it affects a patient's activity level and emotional state.[9]

McGill pain questionnaire

McGill pain questionnaire (MPQ) assesses multiple aspects of pain perception and severity.[13] Among its benefits are validity, reliability, and the capacity to convey the complexity of pain. But it is complicated, demands a lot of patient cooperation and endurance, and can be unpleasant and time-consuming, taking up to 30 minutes to finish.[14]

Short form of the McGill pain questionnaire

Short form of the McGill pain questionnaire (SF-MPQ) assesses pain intensity and no other qualities. SF-MPQ is

easy to use, incorporating commonly used sensory and affective descriptors from clinical studies, making it suitable for mild, moderate, and severe cases.[15] There are five sub-scores in total: sensory, emotional, total MPQ description scores, total PPI intensity scores, and VAS.[16] The scales are ranked as follows: 0=none, b. 1=mild, 2=moderate, and 3=severe.

Wisconsin brief pain questionnaire

The prevalence and intensity of pain are estimated using Wisconsin brief pain questionnaire (BPQ). It can accurately assess a multitude of patients' pain history, intensity, location, source, quality, and interference with activities. It is brief, simple to self-administer, and capable of handling a big number of patients. But because it is so brief, it prevents a thorough evaluation of the pain course.[17]

Unidimensional pain scales

Visual analogue scales

In research on oral and maxillofacial surgery (OMFS), visual analogue scales (VAS) is frequently used to examine a range of subjective experiences, including pain.[18] The VAS consists of a straight, 100-mm (10 cm) line that can be either vertical or horizontal (Figure 1). The sentence's left end reads no pain, but the right end reads pain as bad as it possibly could be. To indicate their level of pain (in millimetres), patients mark a single point on the line.[13]

Figure 1: The visual analog scale (VAS).[9]

Numerical rating scale

Numerical rating scale (NRS) developed by Downie in 1978, consists of a vertical or horizontal line with 11 numbers ranging from 0 to 10, representing no pain to the worst possible pain, respectively (Figure 2).[19,20] This is an easy assessment instrument that can be presented verbally or in writing, and it is simple to score. However, because it cannot distinguish between words and numbers, it is not appropriate for the elderly or very young children.[13]

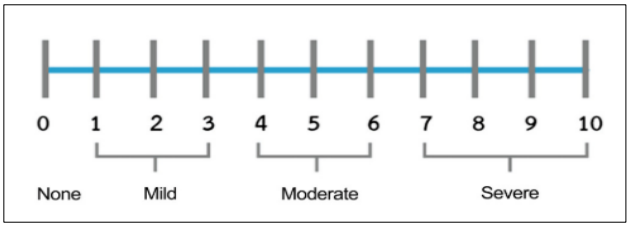

Figure 2: Numerical rating scale.[9]

Faces pain scale

Faces pain scale (FPS) was a 7-point scale that deviated from the standard 0–5 or 0–10 metric, making it more challenging to use.[21] Bieri et al. developed a version with seven line-drawn faces arranged horizontally, illustrating a range from no pain to severe agony. Hicks et al. modified the FPS to a more suitable 0–10 scale. The six remaining faces depicted increasing levels of pain severity, while a neutral face, showing neither smiles nor tears, represented no pain. Patients select the face that best represents their pain level, with each face being assigned a score from 0 to 10, indicating the spectrum from minimal to extreme discomfort.[20]

Wong-Baker faces pain rating scale

Wong-Baker faces pain rating scale (WBS) presents faces from a happy face at 0 (no pain) to a crying face at 10 (worst pain). Patients indicate the face that best describes their pain, making it a widely used method for assessing pain in pediatric patients.[22]

Techniques for handling postoperative pain following maxillofacial surgery

Pharmacological pain management

Simple analgesics

Simple analgesics include paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), and COX-2 inhibitors. A recent Cochrane review examining single-dose oral analgesics for moderate or severe pain found that combining NSAIDs with paracetamol resulted in a three-fold reduction in pain and a decreased need for additional analgesics compared to using either drug alone.[23] This combination should be considered for all postoperative patients unless contraindicated. However, chronic use of NSAIDs can adversely affect the gastrointestinal, renal, and cardiovascular systems due to COX-1 inhibition, leading to issues such as gastric erosions and ulcers in a considerable proportion of patients.[24] The risk of gastrointestinal complications can be mitigated with proton pump inhibitors like omeprazole and by substituting NSAIDs with COX-2 inhibitors such as celecoxib.[25] NSAIDs can also cause renal adverse effects, especially in patients with pre-existing conditions like renal impairment or those taking specific medications.[11]

Opioid analgesics

Opioids are essential for managing moderate to severe postoperative pain and are usually prescribed as a course of treatment to be reduced over time.[26] Acute side effects include nausea, constipation, itching, drowsiness, respiratory depression, and risk of overdose.

The prescription of strong opioids for chronic non-cancer pain has increased significantly in the UK since 2000,

leading to initiatives like the opioids aware resource to guide patients and prescribers.[11,27]

Weak opioids

Weak opioids such as codeine phosphate and tramadol are commonly used in the UK, with relative potencies of 0.1 compared to morphine. Codeine's effectiveness varies due to differences in metabolism among individuals, making it unsuitable for certain patients, including children under 12 and those with ultra-rapid CYP2D6 metabolism. Patients with poorly controlled epilepsy should not take tramadol because of its excitatory serotonergic effects.[11]

Strong opioids

Strong opioids like morphine, oxycodone, and fentanyl are used for postoperative analgesia, with oxycodone being 1.5-2 times as potent as morphine and fentanyl being 10 times more potent. These opioids are typically administered intravenously as patient-controlled analgesia or orally in slow and immediate-release forms. Transdermal delivery is not suitable for acute pain relief due to slow onset and lack of rapid titratability. Chronic opioid use can lead to tolerance, dependence, and addiction, requiring a multidisciplinary approach to manage postoperative analgesia effectively.[11]

Opioid-induced hyperalgesia

Opioid-induced hyperalgesia manifests as increased sensitivity to pain and can be exacerbated by higher doses of opioids. Remifentanil is associated with postoperative hyperalgesia when used in high doses intraoperatively.[28]

Local anesthetics

Local anesthetics are widely used in maxillofacial practice, with regional techniques being preferred for specific surgical sites. Continuous delivery through a catheter is recommended for prolonged postoperative pain management. It has been demonstrated that intravenous lidocaine during surgery lowers the need for opioids and improves postoperative pain scores.[11]

Ketamine

Ketamine, an NMDA receptor antagonist, reduces pain intensity and the need for opioids, with minimal psychomimetic effects at doses below 0.5 mg/kg.[29] It is beneficial for opioid-tolerant patients and those with opioid-induced hyperalgesia.[30,31]

Gabapentinoids

Pregabalin and gabapentin may decrease the need for opioids to treat postoperative pain and have anti-neuropathic effects. However, because of their minimal advantages and higher risk of side effects, routine use of them is not well-supported.[32,33]

Corticosteroids

Corticosteroids, such as dexamethasone and methylprednisolone, administered perioperatively, have been shown to reduce postoperative pain and swelling in orthognathic and third molar surgeries, with minimal risk of adverse effects.[11]

α2 adrenoceptor agonists

Dexmedetomidine and clonidine activate α2 adrenoceptors, providing analgesia and reducing opioid consumption. However, clonidine is associated with significant hypotension and bradycardia at higher doses.[34]

Psychological and physical pain management

Various psychological and physical pain management techniques including relaxation techniques, hilotherapy, and acupuncture (Table 2).[11]

Table 2: Psychological and physical pain management techniques.[11]

Technique	Description
Relaxation	Techniques include deep breathing, meditation, and guided imagery. Further research is needed to determine the effectiveness of these techniques in managing postoperative pain.
Hilotherapy	Application of cold compression through a facemask at a regulated temperature of 15°C. This method has been shown to significantly reduce pain and swelling 48–72 hours postoperatively. Clinical trials are needed to confirm its efficacy for specific procedures and to establish the optimal duration of treatment.
Acupuncture	Involves inserting fine needles at specific points on the body. A meta-analysis of 15 studies found that acupuncture significantly reduced postoperative pain scores and opioid consumption, with a 29% reduction in morphine use at 72 hours postoperatively. Three of these studies involved patients undergoing oral and maxillofacial surgery.

Organizational

The availability and engagement of well-resourced acute pain services has the greatest potential to benefit patients who have moderate or severe pain.[35] Acute pain teams should target those most at risk, as this has the greatest potential to alleviate distress.[36]

Evaluation of post-operative pain

Evaluating the effectiveness of pain management involves several key measures. Pain relief is assessed by evaluating pain intensity using standardized pain scales such as VAS and NRS, which help quantify the effectiveness of pain relief strategies. Additionally, the duration of effective pain control, particularly for long-acting medications and nerve blocks, is a critical measure of success. Functional recovery is another important aspect, which includes assessing how quickly patients can return to their daily activities and normal functions. Specific to maxillofacial surgery, evaluating the recovery of oral functions such as chewing, swallowing, and speaking is essential.[37] Safety in pain management involves monitoring adverse effects and ensuring proper infection and healing processes. Monitoring for common side effects of analgesics is crucial, including gastrointestinal issues with NSAIDs, sedation or nausea with opioids, and any adverse reactions to local anesthetics. Additionally, assessing for long-term complications like chronic pain or dependency on pain medications, especially opioids, is important. Evaluating the impact of pain management strategies on wound healing and the incidence of infections is also necessary. Effectiveness in reducing postoperative inflammation without compromising healing is another key aspect of safety.[38] Patient satisfaction in pain management is assessed through subjective measures and compliance. Direct patient feedback on their pain management experience, comfort levels, and overall satisfaction provides valuable insights. Additionally, evaluating the impact of pain management on the patient's quality of life during the recovery period is crucial. Compliance involves assessing how well patients adhere to prescribed pain management regimens and understanding the reasons for any non-compliance.[39] Evaluating the cost-effectiveness of pain management strategies involves several key aspects. Resource utilization, such as the length of hospital stay and the need for additional medical visits or interventions, plays a significant role. Additionally, the costs associated with various pain management medications and techniques must be considered. For instance, studies have shown that while implementing a comprehensive pain management bundle may initially increase costs, it can be more cost-effective by improving patient outcomes and reducing long-term expenses. Such approaches have demonstrated varying degrees of cost-effectiveness depending on the surgical procedure and the number of pain management elements implemented.[40]

CONCLUSION

Effective postoperative pain management in maxillofacial surgery requires a comprehensive, multidisciplinary approach that ensures pain relief, safety, patient satisfaction, and cost-effectiveness for optimal patient outcomes.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

REFERENCES

1. Bailey E, Bailey E. Prevention and management of postoperative pain in oral surgery. Prim Dent J. 2018;7(3):57-63.
2. Moore RA. Bandolier's little book of pain. Oxford University Press. 2003.
3. Bromley L, Brandner B. Acute pain. Oxford University Press. 2010.
4. Moore RA, Derry S, Aldington D, Wiffen PJ. Single dose oral analgesics for acute postoperative pain in adults-an overview of Cochrane reviews. Cochrane Database Syst Rev. 2015;9.
5. Cooper SA, Beaver WT. A model to evaluate mild analgesics in oral surgery outpatients. Clin Pharmacol Ther. 1976;20(2):241-50.
6. Urquhart E. Analgesic agents and strategies in the dental pain model. J Dentistry. 1994;22(6):336-41.
7. Renton T, Yilmaz Z. Managing iatrogenic trigeminal nerve injury: a case series and review of the literature. Int J Oral Maxillofac Surg. 2012;41(5):629-37.
8. Scott J, Huskisson E. Graphic representation of pain. Pain. 1976;2(2):175-84.
9. Sirintawat N, Sawang K, Chaiyasamut T, Wongsirichat N. Pain measurement in oral and maxillofacial surgery. J Dent Anesth Pain Med. 2017;17(4):253-63.
10. Higgins J, Altman D, Sterne JA. Assessing risk of bias in included studies. In: Higgins JPT, Green S (editors). Cochrane Handbook for Systematic Reviews of Interventions Version 5.1. 0. The Cochrane Collaboration. 2011;243-96.
11. Evans SW, McCahon RA. Management of postoperative pain in maxillofacial surgery. Br J Oral Maxillofac Surg. 2019;57(1):4-11.
12. Dykstra KM. Perioperative Pain Management in the Opioid-Tolerant Patient With Chronic Pain: An Evidence-Based Practice Project. J PeriAnesth Nursing. 2012;27(6):385-92.
13. Flaherty SA. Pain measurement tools for clinical practice and research. AANA J. 1996;64(2):133-40.
14. McAloon C, O'Connor PC, Boyer M. Patient's perception of pain on admission and discharge from the emergency department. N Jersey Nurse. 2003;33(8):7.
15. Melzack R. The short-form McGill pain questionnaire. Pain. 1987;30(2):191-7.
16. Melzack R, Raja SN. The McGill pain questionnaire: from description to measurement. J Am Soc Anesthesiol. 2005;103(1):199-202.
17. Daut RL, Cleeland CS, Flanery RC. Development of the Wisconsin Brief Pain Questionnaire to assess pain in cancer and other diseases. Pain. 1983;17(2):197-210.
18. Briggs M, Closs JS. A descriptive study of the use of visual analogue scales and verbal rating scales for the assessment of postoperative pain in orthopedic patients. J Pain Symptom Management. 1999;18(6):438-46.

19. Downie W, Leatham P, Rhind V, Wright V, Branco J, Anderson J. Studies with pain rating scales. Ann Rheumat Dis. 1978;37(4):378-81.
20. Li L, Liu X, Herr K. Postoperative Pain Intensity Assessment: A Comparison of Four Scales in Chinese Adults. Pain Med. 2007;8(3):223-34.
21. Bieri D, Reeve RA, Champion GD, Addicoat L, Ziegler JB. The Faces Pain Scale for the self-assessment of the severity of pain experienced by children: development, initial validation, and preliminary investigation for ratio scale properties. Pain. 1990;41(2):139-50.
22. Garra G, Singer AJ, Taira BR, Chohan J, Cardoz H, Chisena E, et al. Validation of the Wong-Baker FACES Pain Rating Scale in pediatric emergency department patients. Acad Emerg Med. 2010;17(1):50-4.
23. Ong CKS, Seymour RA, Lirk P, Merry AF. Combining Paracetamol (Acetaminophen) with Nonsteroidal Antiinflammatory Drugs: A Qualitative Systematic Review of Analgesic Efficacy for Acute Postoperative Pain. Anesth Anal. 2010;110(4):1170-9.
24. Laine L. Approaches to nonsteroidal anti-inflammatory drug use in the high-risk patient. Gastroenterology. 2001;120(3):594-606.
25. Momeni M, Katz JD. Mitigating GI Risks Associated with the Use of NSAIDs. Pain Med. 2013;14(1):S18-22.
26. Hermanowski J, Levy N, Mills P, Penfold N. Deprescribing: implications for the anaesthetist. Anaesthesia. 2017;72(5):565-9.
27. Zin CS, Chen L-C, Knaggs RD. Changes in trends and pattern of strong opioid prescribing in primary care. Eur J Pain. 2014;18(9):1343-51.
28. Fletcher D, Martinez V. Opioid-induced hyperalgesia in patients after surgery: a systematic review and a meta-analysis. Br J Anaesth. 2014;112(6):991-1004.
29. Gorlin AW, Rosenfeld DM, Ramakrishna H. Intravenous sub-anesthetic ketamine for perioperative analgesia. J Anaesthesiol Clin Pharmacol. 2016;32(2).
30. Farrington M, Hanson A, Laffoon T, Cullen L. Low-Dose Ketamine Infusions for Postoperative Pain in Opioid-Tolerant Orthopaedic Spine Patients. J PeriAnesth Nursing. 2015;30(4):338-45.
31. Barreveld AM, Correll DJ, Liu X, Max B, McGowan JA, Shovel L, et al. Ketamine Decreases Postoperative Pain Scores in Patients Taking Opioids for Chronic Pain: Results of a Prospective, Randomized, Double-Blind Study. Pain Med. 2013;14(6):925-34.
32. Fabritius ML, Geisler A, Petersen PL, Nikolajsen L, Hansen MS, Kontinen V, et al. Gabapentin for post-operative pain management – a systematic review with meta-analyses and trial sequential analyses. Acta Anaesthesiol Scand. 2016;60(9):1188-208.
33. Fabritius ML, Strøm C, Koyuncu S, Jæger P, Petersen PL, Geisler A, et al. Benefit and harm of pregabalin in acute pain treatment: a systematic review with meta-analyses and trial sequential analyses. Br J Anaesth. 2017;119(4):775-91.
34. Devereaux PJ, Sessler DI, Leslie K, Kurz A, Mrkobrada M, Alonso-Coello P, et al; POISE-2 Investigators. Clonidine in patients undergoing noncardiac surgery. N Engl J Med. 2014;370(16):1504-13.
35. Sussman M, Goodier E, Fabri I, Borrowman J, Thomas S, Guest C, et al. Clinical benefits, referral practice and cost implications of an in-hospital pain service: results of a service evaluation in a London teaching hospital. Br J Pain. 2017;11(1):36-45.
36. Lee A, Chan SKC, Ping Chen P, Gin T, Lau ASC, Hung Chiu C. The Costs and Benefits of Extending the Role of the Acute Pain Service on Clinical Outcomes After Major Elective Surgery. Anesth Anal. 2010;111:4.
37. Gerbershagen HJ, Rothaug J, Kalkman CJ, Meissner W. Determination of moderate-to-severe postoperative pain on the numeric rating scale: a cut-off point analysis applying four different methods. Br J Anaesth. 2011;107(4):619-26.
38. da Costa BR, Pereira TV, Saadat P, Rudnicki M, Iskander SM, Bodmer NS, et al. Effectiveness and safety of non-steroidal anti-inflammatory drugs and opioid treatment for knee and hip osteoarthritis: network meta-analysis. BMJ. 2021;375:n2321.
39. Berger S, Saut AM, Berssaneti FT. Using patient feedback to drive quality improvement in hospitals: a qualitative study. BMJ Open. 2020;10(10):e037641.
40. Bojic S, Ladjevic N, Palibrk I, Soldatovic I, Likic-Ladjevic I, Meissner W, et al. Cost-effectiveness of the Perioperative Pain Management Bundle a registry-based study. Front Public Health. 2023;11:1157484.

Cite this article as: Bukhsh AT, Alnakhli SH, Alzahrani OS, Barakat OM, Muwainea AM, Alraddadi IS, et al. Evaluation of postoperative pain management strategies in maxillofacial surgery patients. Int J Community Med Public Health 2024;11:4101-6.