

POSTOPERATIVE PAIN MANAGEMENT IN
SAUDI ARABIA: CONSENSUS RECOMMENDATIONS
FROM A SAUDI EXPERT PANEL

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Abstract

Background: Postoperative pain management is challenging. It is estimated that postoperative pain is still undertreated in half of the patients undergoing surgical procedures. Adequate postoperative pain relief accounts for patient satisfaction, accelerated recovery, short hospital stay, and less morbidity. Over the past decade, there has been an increasing interest to improve postoperative pain management modalities. Several approaches and modalities have been discussed in the literature. However, the selection and applicability of these modalities remain controversial and variable according to the clinical setting, patient preference, and the type of surgery. With the lack of clear universal guidance on postoperative pain management techniques, there is an unmet clinical need to reach consensus on the postoperative pain management procedures in Saudi Arabia. Therefore, this consensus recommendations were developed to unify the practices of pain management in Saudi Arabia.

Methods: A Panel of six experts in the field of pain management met for consensus development. This consensus is directed towards anesthesiologists, surgeons, emergency department physicians, general practitioners, nurses and any healthcare professional involved in postoperative care. After reviewing the existing body of evidence on postoperative pain management, the expert panel reached a consensus on the underlying recommendations.

Results: Optimal management of postoperative pain should begin at the preoperative stage, with information tailored to each patient. Close cooperation and communication between all the specialties involved are essential to ensure positive patient outcomes where it is not advisable to

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treat postoperative pain as an isolated entity. Clinicians should work towards an individualized approach that takes patient preferences into account, where the goal of therapy should not simply be achieving an arbitrary pain score but balancing pain relief with individual tolerability. It is recommended that clinicians offer around the clock multimodal analgesia for the treatment of postoperative pain in children and adults.

Conclusion: The existing evidence supports proper patient evaluation, patient education, continuous pain assessment, reduction of postoperative opioid use, and the use of multimodal approaches for postoperative pain management. However, the choice of the components of the multimodal approach is still variable according to the type of the surgical procedure, patient preference, and the care setting.

Keywords: Pain; Pain management; Perioperative; Postoperative; Consensus; Multimodal

Introduction

Appropriate management of acute postoperative pain is important for patients who undergo surgical procedures. Despite the recent advances in pain management strategies, postoperative pain management is still undertreated with more than half of patients who undergo surgical procedures reporting inadequate pain relief.^{1,2}

Adequate postoperative pain management contributes to more patient satisfaction, less morbidity, less hospital stays, and accelerated recovery.³ Therefore, there has been an increasing attention to postoperative pain management in the last decade.

The process of postoperative pain management starts preoperatively by adequate patient education, patient evaluation, and planning of the analgesic modalities that will be used pre-, intra- and postoperatively. Proper assessment of pain characteristics as intensity, quality, and radiation is important for proper pain management.³

Physical modalities and cognitive behavioural modalities of pain management have been proposed recently as part of the multimodal approach of postoperative pain management.⁴ The efficacy of these modalities is still controversial, and the applicability

of these interventions is variable across different countries.

With the advances of pain management modalities, continuous monitoring is important to ensure satisfactory pain management.⁴⁻⁷ There are several pain management modalities, however, there is no consensus on a universal preferred pain management modality. As the choice of the pain management modalities depends on several factors including the type of the surgical procedure, patient preference, and clinical status of the patient, clinical setting, and the availability of the modality. Therefore, selecting the appropriate pain management strategy is also important.

There is a continuous advancement in the field of pain management research and a lack of a clear evidence-based consensus on the management of postoperative pain in Saudi Arabia. Therefore, this consensus guidelines were developed to unify the practices of pain management in Saudi Arabia. After reviewing the existing body of evidence on the postoperative pain management, the expert panel reached a consensus on the underlying recommendations.

Methods

Consensus Setting and Pain Management Experts

A Panel of six Experts in the Field of Pain management met for consensus development purposes. After reviewing the existing body of evidence on the postoperative pain management, the expert panel reached a consensus on the underlying recommendations to address the current practice regarding postoperative pain management in Saudi Arabia. The overall conclusions in this document were scientifically endorsed by the Saudi Society of Pain Medicine (SSPM).

Scope and framework of the guidelines

This consensus is directed towards anesthesiologists, surgeons, emergency department physicians, general practitioners, nurses and, any healthcare professional involved in the postoperative care or the management of postoperative pain in Saudi

Arabia.

The scope of these consensus guidelines covers the following items showed in Table 1.

Table 1

Key items covered in the scope of these consensus guidelines

Pre-operative Optimization	<ul style="list-style-type: none"> ■ Patient Evaluation ■ Patient Education
Postoperative Optimization	<ul style="list-style-type: none"> ■ Pain Assessment ■ Pain Management Modalities ■ Pharmacological Therapies ■ Post-discharge postoperative pain management ■ Considerations for facilities ■ Special Considerations in Saudi Arabia

Data Source and Evidence Acquisition

Data and recommendation were obtained from previous guidelines:⁸⁻¹¹ (1) Clinical Practice Guideline of the American Pain Society, the American Society of Regional Anaesthesia and Pain Medicine, and the American Society of Anaesthesiologists’ Committee on Regional Anaesthesia, (2) the fourth edition of Acute pain management by the Australian and New Zealand College of Anaesthetists (ANZCA) and its Faculty of Pain Medicine (FPMANZCA) in December 2015, and (3) the 2018 update from the PROcedure-SPECific Pain Management (PROSPECT) collaboration of anaesthesiologists and surgeons to provide evidence-based recommendations to prevent and treat postoperative pain after specific surgical procedures.

Recommendations from these guidelines were retrieved and experts introduced further changes, updates, and customizations to fit the postoperative pain management practices in Saudi Arabia. All statements herein were produced with agreement of the participating experts.

Results

The experts agreed on the following sentences:

Aims of postoperative pain management

R1. The aims of postoperative pain management are (1) to improve patient comfort and satisfaction; (2) to facilitate recovery and functional ability; (3) to reduce morbidity and mortality; and (4) to promote

rapid discharge from the hospital which in turn reduces the overall costs.

Pre-Operative Optimization

History and current medical condition

A thorough history and physical examination should be performed to develop an individually tailored pain management plan through a shared decision-making approach.”

Preoperative Evaluation Components

It is recommended that managing team clinicians conduct a preoperative evaluation to guide the perioperative pain management plan, including but not limited to:

- Assessment of medical and psychiatric comorbidities
- Concomitant medications
- History of chronic pain
- Substance abuse
- Previous postoperative treatment regimens and responses
- Acute neuropathic pain and its risk

Patient Evaluation (strong recommendation, low-quality evidence)

Identification of Patients with Risk of Pain

R2. Prior identification of patients at risk of severe postoperative pain is recommended preoperatively to allow for early intervention and better pain management, including but not limited to:

- Age, Gender
- Psychosocial factors
- Moderate-to-severe preoperative pain,
- “Type of surgery” and the risk of surgical nerve injury
- Genetic susceptibility “when applicable”

Preoperative Opioid Status

Medication Continuation

R3. It is recommended to clinicians to fully understand the opioid use of the patient before surgery to help in providing the proper management strategy.

R4. Clinicians should advise patients to continue regularly prescribed opioids during the preoperative period unless there is a plan to taper or discontinue opioids.

Patient Education (strong recommendation, low-quality evidence)

Tailored Information

R5. Optimal management of postoperative pain should begin at the preoperative stage, with information tailored to each patient based on their individual beliefs and preferences.

Details of Tailored Education

R6. Clinicians should provide all patients and responsible caregivers, individually tailored education, including:

- Information on treatment options for postoperative pain,
- Document the plan and goals for postoperative pain management

Educational Material

R6. The best method to provide educational material to patients and responsible caregivers is through:

- Face-to-face instructions/education.
- Written materials,
- Audio-visual materials
- Web-based information

Optimal timing

R7. The time of preoperative education is recommended to be:

- During the planning phase of surgery
- During the preparation phase of surgery [Laboratory and medical check-up]
- Immediately before surgery

Optimal Content

R8. The **content** of preoperative education should include information regarding:

- Indicated changes in the use of analgesics before surgery
- Continuation status of medications (e.g., opioids, benzodiazepines, gabapentinoids, or baclofen) to avoid withdrawal syndrome.
- Information about how & when pain is reported and assessed (including pain assessment tools)

R9. Patient education should aim to correct any misperceptions about pain and analgesics, including:

- Beliefs that pain after surgery does not warrant treatment
- Health care providers will only respond to extreme expressions of pain
- Opioids are always required for postoperative pain
- Opioid use inevitably leads to addiction

R10. Pregnant women who undergo surgery should be informed about the potential effects of treatment options on the foetus and new-born, including both in utero and breastfeeding (e.g., exposure to opioids or others for management of pain)

Pain Management Options And Strategy

Cooperation and communication between specialties

(multidisciplinary team)

R11. Close cooperation and communication between all the specialties involved are essential to ensure positive patient outcomes where it is not advisable to treat postoperative pain as an isolated entity.

Individualized approach

R12. Clinicians should work toward an individualized approach that takes patient preferences into account, where the goal of therapy should not simply be achieving an arbitrary pain score but balancing pain relief with individual tolerability.

Procedure-specific Approach

R13. Advisors suggested adding an addendum that contains tables and examples of the evidence, which could help practitioners in primary and secondary care to follow the best practice and be aware of the alternative options.

Postoperative Optimization

Pain Assessment (strong recommendation, low quality evidence)

Pain Assessment

R14. The managing team should assess pain at rest and with surgery-specific activities (e.g., swallowing after tonsillectomy), as the latter is often more severe and difficult to control than pain at rest.

Frequency of Assessment

R15. Assessment must be undertaken at appropriately frequent intervals to evaluate and reevaluate:

- Pain intensity,
- the adequacy of treatment
- Functional impact of pain
- Side effects of treatment

Initial Pain Assessment

R16. The initial evaluation of pain is advised to include a description of the pain using the PQRST characteristics:

- Palliative or provocative factors: ‘What makes it less intense?’
- Quality: ‘What is it like?’
- Radiation: ‘Does it spread anywhere else?’
- Severity: ‘How severe is it?’
- Temporal factors: ‘Is it there all the time, or does it come and go?’

Timing of Assessment

R17. It is recommended that the timing of assessments should be after administration of an intervention [time to achieve peak effect], which is:

- 15 to 30 minutes after parenteral drugs
- 1 to 2 hours after oral analgesics
- or when deemed necessary.

R18. Pain reassessments should be performed on regular bases

whenever we are assessing the vital signs, at the time of nursing shift changes and with new caregivers to establish a baseline and promote continuity of care.

Tools of Assessment

R19. It is recommended that clinicians use a validated pain assessment tool to assess, reassess, and track responses to postoperative pain treatments and adjust treatment plans accordingly.

R20. Evaluation tools must be consistent and reliable, as well as validated in Arabic or the local language.

R21. Clinicians should not rely solely on “objective” measures such as pain-related behaviours or vital signs to determine the presence of or intensity of pain since pain behaviours might vary markedly between individuals.

Assessment Tool Selection

R22. The selection of a particular validated pain assessment tool should be on the basis of factors such as developmental status, cognitive status, level of consciousness, educational level, and cultural and language differences.

Validated Pain Intensity Assessment Scales

A. Numeric Rating Scale [NRS]

- Six-point NRS (NRS 0-5)
- Eleven-point NRS (NRS 0-10)
- Twenty-one-point NRS (NRS 0-20)

B. Verbal Rating Scale [VRS]

- Four-point VRS
- Seven-point Graphic Rating Scale
- Six-point Present Pain Inventory (PPI)

C. Visual Analogue Scales [rated 0 to 10 cm or 0 to 100 mm]

D. Pain Thermometer [combines visual thermometer with verbal descriptions of pain]

E. Faces Rating Scales

- Faces Pain Scale-Revised
- Wong-Baker FACES pain rating scale
- Oucher scale

F. FLACC scale or Face, Legs, Activity, Cry, Consolability scale is used as a measurement to assess pain for children between the ages of 2 months and 7 years or individuals that are unable to communicate their pain.¹²

G. CRIES scale is a ten points scale of five physiological and behavioural variables previously shown to be associated with neonatal pain. C--Crying; R--Requires increased oxygen administration; I--Increased vital signs; E--Expression; S--Sleeplessness.¹³

Assessment Tools [Special Considerations]

R23. In patients who cannot adequately report their pain because of cognitive deficits, sedation, developmental stage, or other factors, clinicians might need to use behavioural assessment tools and solicit input from clinicians to assess pain.

Perioperative Analgesia

R24. It is recommended that appropriate perioperative analgesia should be employed in all patients to reduce the risk of persistent postsurgical pains.

Chronic pain

R25. Inadequately treated post-operative pain can lead to the development of chronic pain (persistent post-operative pain)

Rescue Analgesia

R26. It is necessary to prescribe “rescue” medication and specify the steps to be followed if the prescribed analgesic therapy is not sufficient.

R27. There always has to be another option if the present treatment does not work well.

R28. Preventing a period without analgesia is very important and often underestimated.

R29. Rescue analgesia can be provided in two ways, either by starting a continuous administration of analgesics already during the last phase of the surgical procedure, or by a careful administration of a “rescue” bolus dose of an analgesic.

Pain Management Modalities

Multimodal “Balanced” Analgesia (strong recommendation, high-quality evidence)

Multimodal “Balanced” Analgesia

R30. It is recommended that clinicians offer around the clock multimodal analgesia [the use of a variety of analgesic medications and techniques combined with/without nonpharmacological interventions] for the treatment of postoperative pain in children and adults.

Early, systemic multimodal analgesia can improve the management of acute postoperative pain.

The options for components of multimodal therapy for several commonly performed surgeries include:

- Systemic Pharmacologic Therapy
- Local, Intra-articular or Topical Techniques
- Regional Anesthetic Techniques
- Neuraxial Anesthetic Techniques
- Nonpharmacologic Therapies

Use of Physical Modalities (strong recommendation, moderate-quality evidence)

Physical Modalities

R31. It is recommended to use acupuncture, massage, cold therapy, immobilization, bracing, or continuous passive motion as adjuncts to other postoperative pain treatments putting into consideration the cost of equipment and care provider time, and experience.

Transcutaneous Electrical Nerve Stimulation (TENS)

R32. It is recommended that clinicians consider transcutaneous electrical nerve stimulation (TENS) as an adjunct and part of a multimodal approach to other postoperative pain treatments.

Use of Cognitive-Behavioral Modalities (strong recommendation, moderate-quality evidence)

Cognitive-Behavioural Modalities

R33. It is recommended that clinicians consider the use of cognitive-behavioural modalities including guided imagery, relaxation methods, hypnosis or intraoperative suggestions in adults as non-invasive part of a multimodal approach.

Systemic Pharmacological Therapies in postoperative pain management

Preoperative/pre-emptive/preventive Optimization (strong recommendation, moderate quality evidence)

R34. Preoperative administration of opioids is not recommended as an intervention to decrease postoperative pain and/or opioid consumption unless the patient is a chronic user of opioid.

Treatment Continuity (strong recommendation, moderate quality evidence)

R35. Postoperative pain should be initially continuous with round-the-clock dosing of analgesics (opioid/non-opioid) during the first 24 hours.

R36. Long-acting oral opioids could be used in the immediate postoperative period depending on patient characteristics, the surgery type and pain intensity.

Opioid Administration (strong recommendation)

R37. Opioids can be used in a patient-controlled analgesia regimen if resources are available.

R38. Pethidine (meperidine) in particular, should be avoided where possible, owing to its considerable side effects and risk of addiction.

R39. In patients who receive systemic opioids for postoperative analgesia, it is recommended that the managing team provide appropriate monitoring and treatment of: sedation, respiratory status, and other adverse events (**strong recommendation, low-quality evidence**)

Opioid Sparing technique

R40. In order to reduce opioid-related AE (Adverse Effects), multimodal analgesia techniques utilizing NSAIDs, such as:

- Paracetamol
 - Nonspecific medications (nsNSAIDs; e.g., diclofenac, ketorolac, ibuprofen) and
 - COX-2 inhibitors (e.g., parecoxib, celecoxib)
- have demonstrated a lower incidence of side effects and improved analgesia, which may lead to shorter hospitalization times, decreased healthcare costs, and improved recovery and function.

In patients who receive systemic opioids for postoperative analgesia, it is recommended that the managing team provides appropriate monitoring and treatment of:

- Sedation,
- Respiratory status, and
- Other adverse events

Mode of administration of opioids for postoperative analgesia includes:

- Oral
- Intravenous (i.v.)
- Subcutaneous

Opioid Route of Administration

R41. It is recommended to start oral administration of opioids as soon as (the patient tolerates oral intake) possible to avoid the patient-controlled analgesia (PCA) and to prepare the patient for discharge.

R42. When needed, PCA can be used for postoperative systemic analgesia when the parenteral route is needed, such as:

- Analgesia for more than a few hours.
- Having adequate cognitive function to understand the device and its safety.
- After procedures that affect the ability to take medications orally or enterally.

R43. I.V. patient-controlled analgesia is recommended route over -health care provider –initiated intermittent bolus dosing of opioids in adults.

R44. I.V. patient-controlled analgesia provides superior postoperative analgesia, improving patient satisfaction and decreasing the risk of respiratory complications.

R45. I.V. boluses of opioids might be considered in the immediate (first few hours) postoperative period for more rapid pain relief and analgesic titration, and in patients with postoperative sedation who are closely monitored.

R46. It is recommended that clinicians avoid using the intramuscular route for the administration of analgesics for the management of postoperative pain.

Opioid-naïve Adults (strong recommendation, moderate-quality evidence)

R47. It is recommended not to administer routine basal infusion of opioids with I.V. PCA in opioid-naïve adults.

The opioid in Obese Patients

R48. Postoperative opioids should be used with caution in obese patients if necessary.

R49. Encourage a multimodal approach.

Multimodal Analgesia (strong recommendation, high-quality evidence)

R50. It is recommended that clinicians provide adults with acetaminophen and/or nonsteroidal anti-inflammatory drugs (NSAIDs) as part of multimodal analgesia for the management of postoperative pain in patients without contraindications.

Multimodal Analgesia Mode of Administration (strong recommendation)

R51. Oral route is the preferred route of administration of acetaminophen or NSAIDs to reduce postoperative pain. Enteral or I.V. acetaminophen and/or NSAIDs may be used to reduce postoperative pain if oral route is to be avoided

COX-2 inhibitors (strong recommendation)

R52. COX-2 inhibitors, such as parecoxib or celecoxib, are preferred over nonselective NSAIDs as they have a similar efficacy yet has significantly less risk for side effects such as:

- Gastroduodenal ulceration
- Inhibition of platelet aggregation
- Renal impairment

R53. It is recommended to avoid long-term use of COX inhibitors in patients with atherosclerotic and cardiovascular disease.

nsNSAIDs or Cox-2 inhibitors (strong recommendation, moderate-quality evidence)

R54. NSAIDs or COX-2 inhibitors may be used as preoperative dose in patients without contraindications

Paracetamol

R55. Paracetamol can be very useful for alleviating mild postoperative pain because it reduces the consumption of opioids without major adverse effects.

Gabapentin/Pregabalin (strong recommendation, moderate-quality evidence)

R56. Gabapentin or pregabalin might be used, as a component of multimodal analgesia, with caution.

R57. It is recommended to administer a preoperative dose of **gabapentin** or **pregabalin**, particularly in patients who undergo:

- Major surgery or
- Surgeries associated with substantial pain or
- As part of multimodal therapy for highly opioid-tolerant patients.

Ketamine (weak recommendation, moderate quality evidence)

R58. It is recommended that clinicians consider i.v. **ketamine** as a component of multimodal analgesia in adults for major surgeries.

R59. Ketamine might be particularly useful in the management of highly opioid-tolerant patients and patients who have difficulty tolerating opioids.

Lidocaine (weak recommendation, moderate quality evidence)

R60. It is recommended that clinicians consider the administration of perioperative i.v. **lidocaine infusions** in adults who undergo open and laparoscopic abdominal surgery and other surgeries and do not have contraindications.

Dexamethasone (strong recommendation)

R61. It is recommended to administer a single dose of i.v. **dexamethasone**, if not contraindicated, which has the following advantages:

- Lower pain scores after surgery,
- Less postoperative opioid use,
- Less rescue analgesia for intolerable pain,
- A longer time to the first dose of analgesic and
- A shorter stay in the postanaesthetic care unit
- Reducing the risk of postoperative nausea and vomiting

Acute Postoperative neuropathic pain (strong recommendation)

R62. It is recommended to administer ketamine, opioids (including tramadol or tapentadol), and gabapentinoids (gabapentin or pregabalin) that are the preferred systemic treatment options for acute postoperative neuropathic pain, as a rapid onset of effect is needed.

1.1 Use of Local and/or Topical Pharmacological Therapies**Surgical Site-specific Anaesthesia (strong recommendation, moderate-quality evidence)**

R63. It is recommended to consider the administration of surgical site-specific (subcutaneous and/or intra-articular infiltration) of long-acting local anesthetics for surgical procedures with evidence indicating efficacy as part of multimodal analgesia in several surgical procedures.

R64. It is recommended to administer surgical site-specific peripheral regional anesthetic techniques in adults and pediatric patients for procedures with evidence indicating efficacy as part of multimodal analgesia.

Intrapleural Analgesia (strong recommendation, moderate-quality evidence)

R65. It is not recommended to administer **intrapleural analgesia** with local anaesthetics for pain control after thoracic surgery as part of a multimodal approach as there are newer safer and more effective techniques such as serratus anterior plane block, thoracic paravertebral nerve block, and so forth.

Local anesthesia Indication (strong recommendation, moderate quality evidence)

R66. It is recommended to use continuous, local anesthetic-based peripheral regional analgesic techniques when the need for analgesia is likely to exceed the duration of effect of a single injection.

Clonidine/Dexmedetomidine Administration (strong recommendation, moderate-quality evidence)

R67. It is advised to add **clonidine** or **dexmedetomidine** as an adjuvant for prolongation of analgesia with a single-injection peripheral neural blockade which prolongs the duration of analgesia and potentially reduces the need for a continuous infusion taking into consideration side effects including bradycardia and hypotension.

Epidural Analgesia (strong recommendation)

R68. It is recommended to administer **epidural analgesia** after major abdominal and thoracic surgery and other surgeries where prolonged analgesia is expected to be required.

R69. Epidural Analgesia provides better analgesia than intravenous PCA and allows individualization of dosage, decreased drug use, and greater patient satisfaction.

Neuraxial Analgesia Administration (strong recommendation, high-quality evidence)

R70. It is recommended to offer neuraxial analgesia for major thoracic and abdominal procedures, particularly in patients at risk for cardiac complications, pulmonary complications, or

prolonged ileus.

R71. It is recommended to avoid neuraxial administration of magnesium, benzodiazepines, neostigmine, tramadol, and ketamine in the treatment of postoperative pain.

R72. In the future, separated classification of spinal and epidural analgesia is needed, and then more details on the injected medications and additives could be added.

R73. It is recommended to appropriately monitor patients who have received neuraxial interventions for perioperative analgesia.

Organizational Structure, Policies, and Procedures

Organizational Structure (strong recommendation, low-quality evidence)

R74. It is recommended that facilities in which surgery is performed have an organizational structure in place to develop and refine policies and processes for safe and effective delivery of postoperative pain control.

R75. It is recommended that facilities in which surgery is performed provide clinicians with access to consultation with a pain specialist for patients with inadequately controlled postoperative pain or at high risk of inadequately controlled postoperative pain.

Organizational Policies and Procedures (strong recommendation, low-quality evidence)

R76. It is recommended that facilities in which neuraxial analgesia and continuous peripheral blocks are performed have policies and procedures to support their safe delivery and trained individuals to manage these procedures.

Hospital Readiness (strong recommendation)

R77. It is recommended that each hospital should have its own educational program that educates and continually updates its own staff on the benefits and pitfalls of poor pain management.

Needed Steps in Saudi Arabia

1. Providing education, training, and materials that include audio recordings, videos and messages.
2. Emphasizing and promoting the importance of pain management services.
3. Conveying seminars, especially in underprivileged areas, like the remote regions, starting by anaesthesiologists and pain management staff, then other healthcare providers such as physicians and nurses, patients should be included as well.
4. Training on the pain assessment tools is the first and most important step in pain management.
5. Offering fellowships, currently, there is a fellowship for pain management which is recognized by the Saudi commission for health specialities. Nevertheless, the maximum accepted number is up to 15 fellows yearly.
6. Arranging competency workshops to enhance the performance of pain management staff.
7. Implementing auditing tools to assure proper application of the services and quality measures.
8. Unifying the policy and procedures throughout the country.
9. Having a national pain management registry.
10. Adapting national guidelines that can be shared across all hospitals.
11. Data collection and analysis through cross-sectional or retrospective studies.
12. Data pooling from different hospitals and regions would help to determine various obstacles and challenges all over the country.
13. Determining the limitations such as the availability of the medications and other resources, including PCA and epidural machines, in addition to qualified staff-related issues.
14. Developing a quality improvement program that can be implemented across (all) the hospital.
15. Producing an electronic questionnaire to assess the current status of pain management services. The questionnaire should be easy to answer and includes number and type of surgeries, pain management procedures, and hospital length of stay.
16. After conducting the questionnaire, top priority limitations could be identified, then suggested solutions could be submitted to the administration with guidelines and a plan to improve the service and implement changes to the current practice.
17. The communication could be done under the umbrella of the Saudi Society of Pain Medicine.
18. Guidelines would be submitted to the council of cooperative health insurance, then to the Ministry of Health (MOH) to adapt it.
19. The use of virtual learning tools to educate medical staffs and public.

Discussion

Postoperative pain management is an important part of the surgical operations. Due to the tissue's trauma during surgeries, postoperative pain might be devastating if not properly managed. Proper postoperative pain management helps the patient to achieve comfort and satisfaction and decrease dysfunctionality and morbidity. It also speeds up the recovery, shortens the hospital stays, and decreases the cost. In 2009, a study compared methods of analgesia on more than 5,200 patients after performing various surgeries. Patient satisfaction was higher in patients who had weekly rotations of their anesthesiologists who performed regular evaluation of analgesia status and properly managed patient complaints.¹⁴

Proper preoperative patient evaluation is important to determine the possible risks and to plan for the suitable pain management modality. This step includes the identification of at-risk patients, the opioid status, and the concomitant medication use. Patients at high risk of postoperative pain require cautious supervision with multimodal approaches. Based on this evaluation, the pain management modality is determined.

A thorough history and physical examination should be performed to develop an individually tailored pain management plan through a shared decision-making approach including but not limited to: (1) assessment of medical and psychiatric comorbidities; (2) concomitant medications; (3) history of chronic pain; (4) substance abuse; (5) previous postoperative treatment regimens and responses; and (6) acute neuropathic pain and its risk factors. As mentioned previously, patients should be assessed for opioid status in the preoperative optimization stage. In addition, patients and families should be informed that the use of other central nervous depressants (including alcohol) or illicit drugs in combination with opioids can result in accidental overdose and death.

Preoperative pain management education plays an important role in preparing the patient psychologically for the postoperative pain. Psychological factors such as anxiety and stress prior to the operation contribute to more severe pain after the surgery. Therefore, proper patient education about the surgical pain is important to

reduce this anxiety and correct patient misconceptions about pain management. Patients who received preoperative pain management education reported that pain was less severe during the first postoperatively 24 hours compared to those who did not receive the education.¹⁵

In addition, proper patient education has been associated with higher patient satisfaction and less anxiety. Our experts also agreed that patient and caregiver education should start as early as the clinic visit and continue to the very day of the surgery. Previous literature suggested that preoperative education and shared goal settings help engage patients and their families and had a positive impact on the collaboration and the realistic expectations for postsurgical pain management.¹⁶ The tailored information provided to the patient should be customized according to patient age, language, and culture to ensure proper understanding and avoid any misconceptions about pain management. The preoperative education can be delivered through several methods including face-to-face meeting, a phone call, written papers, videos and illustrations, audio messages, or online educational information. The Saudi panel of experts discussed the content that should be disclosed to unify the communication by healthcare staff across the Kingdom. Alignment between clinicians and nurses on the content of pain education is vital to ensure a single dimension of coordination and setting expectations.¹⁶

A Canadian study showed that on the level of physicians; general practitioners (GPs), anesthesiologists and psychiatrists were the main members of multidisciplinary teams responsible for pain management. Almost 50% only of GPs and anesthesiologists were integrated in these teams. While only one in five teams had a psychiatrist. Surprisingly in this survey, non-physician personnel were more involved in multidisciplinary teams of pain management including nurses, physiotherapists, and psychologists. In this survey, only 77% of multidisciplinary teams reported having regular meetings to align their plans. However, our panel's recommendation agreed that an interdisciplinary approach will have a positive impact on pain management and enhancing function through joint planning, problem solving, and exchange of skills and knowledge.¹⁷

Despite the advances in our understanding of pain mechanisms and nociception, postoperative pain management is still challenging. Reports showed that a substantial proportion of patients undergoing surgeries remain undertreated. There are many variables that should be determined in the pain management strategies (1) the agents used whether opioids or non-opioids, (2) the route of administration whether oral, intravenous, neuraxial, or regional, and (3) the mode of management whether patient controlled vs. “as needed”.

Pain assessment is an important step towards proper postoperative pain management. Improving the postoperative pain assessment will contribute to better postoperative pain management. Our panel recommended regular assessment of pain as a cornerstone of adequate control of postoperative pain. There is no global consensus on the optimal frequency of pain assessment; however, the frequency may depend on several other factors including the location and type of surgical procedure. Initially after surgeries, the frequency of pain assessment is the highest reaching up to 4 hours in the first 2 days. Frequency usually decreases with longer durations of follow up. The rate of adherence to pain assessment is an important aspect to ensure the adequacy of pain control.¹⁸

In addition, the recent advances in postoperative pain management techniques increases the need for continuous monitoring. Physicians and staff involved in the pain management team should be well-trained and educated about the use of the different pain assessment scales. The timing and the tools of pain assessment are still variable from setting to another and from a situation to another. Several validated pain intensity scores are currently used in practice, this includes the numerical rating scales, the verbal rating scale, and the visual analogue scale. Not only does the pain assessment include pain intensity but it also includes the evaluation of pain radiation, pain quality, pain timing, and factors increasing or decreasing the pain. The most commonly used tool for pain evaluation in adults is the eleven-point NRS. While the FLACC and CRIES scales are recommended for children and neonates, respectively.

Experts acknowledged the importance of individualized approach to postoperative pain

management, most importantly, the crucial role of the patient in this approach and decision. Previous literature even suggested having a pain threshold set, on a scale between 0 and 10, in agreement between the pain management team and the patient.¹⁶ Individualized approaches were proven to have several advantages including the reduction of opioid demand and selecting the best fit of pain management options. Several factors should be accounted for when individualizing pain management including type of surgery, age, comorbidities, and history of opioid usage.¹⁹

The panel were also aligned with the global direction of procedure-specific approach to pain management. A survey in 2013, reported 25-30% less pain when applying a quality management system based on a procedure-specific protocol that individualized the approach to pain management. Interestingly, this approach also improved the quality of life and postoperative satisfaction of patients.²⁰ The PROSPECT (PROcedure-SPEcific Postoperative Pain Management) Working Group is another example of the global directive towards procedure-specific pain management. The PROSPECT is a panel of international anesthesiologists and surgeons developing recommendations through weighing the risk benefit of each treatment modality in specific surgical procedures.¹¹

Preoperative optimization has been suggested as a pre-emptive measure that can minimize postoperative pain. A meta-analysis of 39 studies showed a significant reduction in postoperative analgesic consumption by using preoperative administration of non-steroidal anti-inflammatory drugs (95% CI from -0.61 to -0.14), or COX-2 inhibitors class (95% CI from -0.95 to -0.33).²¹ Gabapentin also achieved significant reductions in postoperative analgesic consumption (95% CI, -1.60 to -0.38).²¹ However, no significant effects were observed using opioids, propionic acids or oxycam derivatives.

Several systemic pharmacological agents can be used for postoperative pain management. However, the selection of these agents depends upon the type of pain and patient conditions.

Oral administration of opioids is more preferred for patients who can use the oral route although both oral and i.v. opioids are not significantly different in terms

of postoperative analgesia. Opioids administration should be monitored around the time, particularly, during the first 24 hours. Long-acting opioids are not advisable for the postoperative period because they require dose adjustments and have not been proven superior to short acting opioids. Several opioid agents can be used for postoperative pain management.

Celecoxib has been used in doses of 200 to 400 mg and within 30 minutes to 1 hours preoperatively.²² However, it is contraindicated in patients undergoing cardiac surgery owing to the increased risk of cardiovascular events. The literature does not provide enough data comparing the preoperative celecoxib vs. NSAIDs.

Some non-pharmacologic agents exhibit synergistic effects with opioids and therefore, they can be effective in reducing the opioid doses. NSAIDs are the effective non-opioid pharmacologic agents to reduce postoperative opioid consumptions.²³ Acetaminophen, gabapentinoids (if neuropathic pain exists), and low-dose ketamine also have opioid sparing effects.

Combining morphine with either the non-specific NSAIDs or the selective COX2 inhibitors improves the pain scores, decreases the postoperative nausea and vomiting, sedation, and the duration of postoperative ileus. However, non-specific NSAIDs or the selective COX2 inhibitors are contraindicated in the event of renal hypoperfusion (particularly in patients with clearance of plasma creatinine below 50 mL/min). For the treatments of acute postoperative neuropathic pain, opioids, anticonvulsant, and antidepressant drugs might be used. Some studies also suggest that NSAIDs might be helpful. However, these interventions have limited efficacy for the management of acute postoperative neuropathic pain.²⁴

Multimodal analgesia is defined as the approach of using multiple analgesic medications and techniques to target multiple mechanisms of action in the nervous system. The multimodal approach makes use of the additive and synergistic effects between multiple drugs to achieve better pain relief compared to the use of one class of medications.

A body of evidence suggests the use of multimodal analgesia is effective in postoperative pain management. There has been a clinical need to reduce

postoperative opioid doses. Multimodal analgesia achieves this by making use of the synergistic effects of other non-opioid medications as non-specific NSAIDs. A retrospective analysis of 1,540,462 arthroplasties showed that the number of nonopioid modalities employed was inversely correlated with the total dose of opioids used post surgically.²³

Several non-pharmacological modalities can be used as part of the multimodal approach. This includes physical modalities such as Transcutaneous Electrical Nerve Stimulation (TENS), acupuncture, massage, and cold or heat therapy. Physical modalities have the advantage that they are relatively safe, therefore, they might be considered as adjuvant therapies in the multimodal approach. In addition, cognitive behavioural modalities as the guided imagery, music, relaxation interventions, and hypnosis might be used. However, the delivery of these modalities requires specialist psychologists, or psychotherapists as part of the multidisciplinary pain management team.

As part of the multimodal analgesia, surgical site-specific anesthesia can be used. This includes the use of subcutaneous or intraarticular infiltration of long-acting local anesthetics or extended release formulations, according to the nature of the surgery.^{25,26} A meta-analysis on patients who underwent open abdominal surgeries, showed that patients receiving epidural analgesia had faster gut function improvement and reduced pain scores compared to patients receiving other analgesic methods. Lower pain scores were reported in 24 and 48 hours on movement and at rest.²⁷ Thoracic epidural analgesia administration before surgery and up to 3 days after, was found to have benefits on the surgical outcome and morbidity in these patients.²⁸ PCA has the advantage of proper pain control by the patients themselves allowing titration of drug doses. Previous studies compared the efficacy of IV PCA with PCEA. Both modes of administration showed effective pain relief with minimal sedation. However, PCEA was found to have superior efficacy and safety levels compared to IV PCA. A study by Liu et al found that neuraxial analgesia had no impact on rates of mortality after coronary artery procedures. In addition, tracheal extubation, less pulmonary complications, and cardiac dysrhythmias improved with the reduction of pain scores.²⁹

According to previous literature, the panel highlighted the possible side effects of magnesium sulphate such as bradycardia and hypotension along with the lack of enough data related to neurotoxicity, headache, disorientation, and sedation. Although midazolam is not preferred in peripheral nerve blockage, there is a controversy around its possible neurotoxicity from intrathecal and epidural administration.³⁰ Tramadol also showed no clinical effect when used with local anesthetics in peripheral blockage,³¹ and previous recommendations advised against the routine use of it as an adjuvant.³⁰ The dose dependant effect of neuraxial ketamine and its known psychotomimetic adverse events are the main reasons for avoidance of its use in postsurgical pain management.³²

The panel stressed on the importance of close monitoring of local anesthetics in perioperative pain management due to their possible side effects and avoid potential toxicity. Data of previous literature does not support the use of intrapleural analgesia during thoracic surgeries owing to the risk of systematic absorption and toxicity. In addition, if intrapleural analgesia with local anesthetics is done as part of the multimodal approach, continuous monitoring for toxicity is required.³³

As part of the multimodal analgesia, subcutaneous and/or intraarticular infiltration of long-acting local anesthetics can be used. Evidence on the efficacy of local anesthetic infiltration is not conclusive. Some studies showed evidence of clinical benefit in surgeries as total knee replacement, arthroscopic knee surgeries, cesarean section, laparotomy, and hemorrhoid surgery while other studies showed no significant benefit.^{25,34} For infants undergoing circumcision, topical anesthetics should be combined with nerve blocks

while monitoring the toxic dose.

Finally, the experts agreed on several improvements that should be implemented to improve postoperative pain management in Saudi Arabia. These suggestions will increase the hospital readiness to manage postoperative pain, will enhance the pain management training of the treating physicians, and will enhance future research and collaboration in the field.

Conclusion

After reviewing the existing body of evidence on postoperative pain management, the expert panel reached a consensus on the underlying recommendations. The existing body of evidence supports proper patient evaluation, patient education, continuous pain assessment, reduction of postoperative opioid use, and the use of multimodal approaches for postoperative pain management. However, the choice of the components of the multimodal approach is still variable according to the type of surgical procedure, patient preference, and the setting.

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