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Current Medical Research and Opinion

ISSN: 0300-7995 (Print) 1473-4877 (Online) Journal homepage: https://www.tandfonline.com/loi/icmo20

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To cite this article: Winfried Meissner, Frank Huygen, Edmund A.M. Neugebauer, Jürgen Osterbrink, Dan Benhamou, Neil Betteridge, Flaminia Coluzzi, José De Andres, William Fawcett, Dominique Fletcher, Eija Kalso, Henrik Kehlet, Bart Morlion, Antonio Montes Pérez, Joseph Pergolizzi & Michael Schäfer (2018) Management of acute pain in the postoperative setting: the importance of quality indicators, Current Medical Research and Opinion, 34:1, 187-196, DOI: 10.1080/03007995.2017.1391081

To link to this article: https://doi.org/10.1080/03007995.2017.1391081

CURRENT MEDICAL RESEARCH AND OPINION, 2018
VOL. 34, NO. 1, 187–196
https://doi.org/10.1080/03007995.2017.1391081
Article ST-0403.R1/1391081

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COMMENTARY

Management of acute pain in the postoperative setting: the importance of quality indicators

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ABSTRACT

Despite the introduction of evidence-based recommendations for postoperative pain management (POPM), the consensus is that pain control remains suboptimal. Barriers to achieving patient-satisfactory analgesia include deficient knowledge regarding POPM among staff, lack of instructions, insufficient pain assessments and sub-optimal treatment. Effective monitoring of POPM is essential to enable policy makers and healthcare providers to improve the quality of care. Quality indicators (QIs) are quantitative measures of clinical practice that can monitor, evaluate and guide the quality of care provided to patients. QIs can be used to assess various aspects relating to the care process and they have proven useful in improving health outcomes in diseases such as myocardial infarction. In this commentary we critically analyze the evidence regarding the use of QIs in acute POPM based upon the experience of pain specialists from Europe and the USA who are members of the Change Pain Advisory Board. We also undertook a literature review to see what has been published on QIs in acute pain with the goal of assessing which QIs have been developed and used, and which ones have been successful/unsuccessful. In the hospital sector the development and implementation of QIs is complex. The nature of POPM requires a highly trained, multidisciplinary team and it is at this level that major improvements can be made. Greater involvement of patients regarding pain management is also seen as a priority area for improving clinical outcomes. Changes in structure and processes to deliver high-level quality care need to be regularly audited to ensure translation into better outcomes. QIs can help drive this process by providing an indicator of current levels of performance. In addition, outcomes QIs can be used to benchmark levels of performance between different healthcare providers.

ARTICLE HISTORY
Received 26 June 2017
Revised 20 September 2017
Accepted 9 October 2017

KEYWORDS
Analgesia; pain management; post-operative acute pain; quality indicators; quality management

Introduction

Postoperative pain is generally a predictable, short-term self-limiting consequence of the physical injury caused by the surgical procedure. It is an adaptive response that facilitates recuperation by restricting movements and behaviors which might potentially result in further tissue trauma. The underlying inflammatory immune response is the first step to restoration of the damaged tissue.

Patient experiences following surgery have been investigated in many countries including France, Germany, Italy, the Netherlands, UK and USA, and up to 80% of those surveyed experienced postoperative pain[1–8]. A majority of patients complained of moderate, severe or extreme pain in these studies. Severe pain after surgery represents a largely unrecognized clinical problem and is associated with decreased patient satisfaction, delayed ambulation, an increased incidence of cardiac and pulmonary complications, and in some situations with an increased rate of morbidity and mortality[9–14]. Furthermore, it has been reported that postoperative pain is associated with chronic persistent pain in 10–50% of individuals, and in 2–10% of cases it is severe[10].

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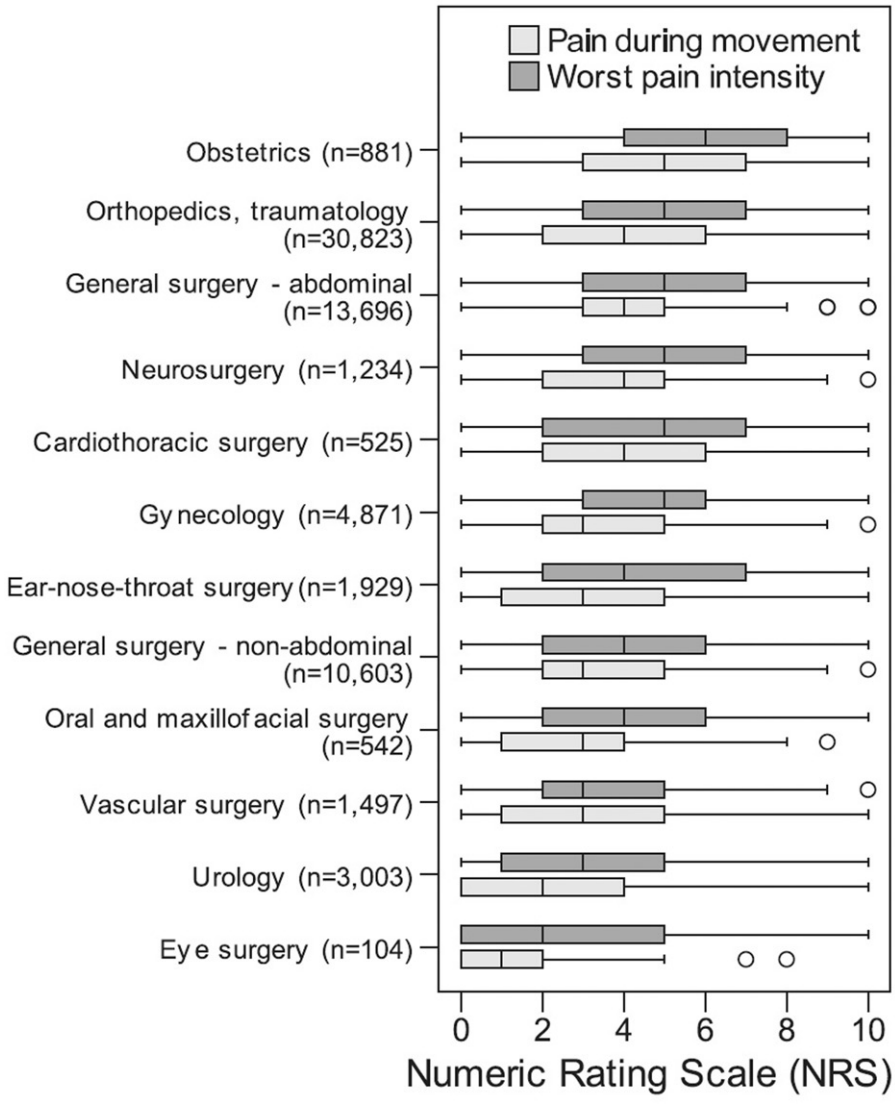

Figure 1. Patient-rated pain scores on the first day after surgery using a 0–10 numerical rating scale. Reproduced with permission from Gerbershagen *et al.*[9].

Gerbershagen and colleagues evaluated postoperative pain intensity in 50,523 patients from 179 surgical groups in 105 German hospitals[9]. Figure 1 shows the pain intensity scores by surgical discipline and it is interesting to note that some of the highest pain scores are associated with relatively "minor" surgical procedures such as appendectomy, cholecystectomy, hemorrhoidectomy and tonsillectomy. The authors concluded that some minor-to-medium level procedures, including laparoscopic investigations, resulted in unexpectedly high levels of postoperative pain and patients undergoing such procedures should be closely monitored. In an Italian study it was found that postoperative pain after ambulatory surgery is often more intense than anticipated and it is the most common reason for hospital readmission[15].

The WHO, along with the International Association for the Study of Pain (IASP) and the European Federation of IASP Chapters, during the first "Global Day against pain", issued a joint declaration that "pain management is a fundamental human right" and the aim must be to ensure that it becomes a future global reality[16]. The primary goal of contemporary postoperative pain treatment is to reduce pain during rest and mobilization and, if appropriate, to reduce opioid consumption and possible opioid-related adverse effects. It is further envisaged that optimal pain management may facilitate early mobilization, improve postoperative outcome and reduce the length of hospital stay[17]. Despite greater focus on understanding and treating postoperative pain, and the development and introduction of evidence-based recommendations and best practices, the general consensus is that postoperative pain control remains suboptimal independent of hospital system, type of surgery or country[7,18–22]. For example, in a series of national surveys performed in the USA the percentage of patients reporting postoperative pain was 77% in 1995, with 61% of these patients experiencing moderate-to-extreme pain[23], 82% in 2003, with 86% experiencing moderate-to-extreme pain[6], and 86% in 2013, with 75% experiencing moderate-to-extreme pain[7]. In a review of pain management in Germany, Maier and colleagues observed that severe postoperative pain was still too common, particularly pain associated with movement[2]. In combination, these factors increase the burden on global

healthcare systems in terms of the time and costs of caring for patients with acute pain[24].

Some of the known barriers to achieving patient-satisfactory analgesia include deficient knowledge regarding pain management among staff, lack of proper instructions, insufficient pain assessments and sub-optimal treatment among others[18,21]. Effective monitoring of postoperative pain management is a key requisite to enable policy makers, researchers and healthcare providers to improve overall performance and the quality of care. Two pertinent questions arising from this medical scenario are: what can we do to improve clinical outcomes for the patient and how can we best measure the success, or otherwise, of any therapeutic approach that has been initiated?

To achieve optimal pain relief, strategies need to be put into place to promote best practices, and in the last couple of decades numerous national and international clinical guidelines, quality management systems and accreditation schemes have been published[19,20,25,26]. Such guidelines should be evidence-based and facilitate standardization of procedures, with recommendations for proactive planning such as institutional policies and procedures (including the creation of a 24/7 Acute Pain Service [APS] whenever possible), preoperative assessment and preparation of the patient, perioperative pain management, surveys relating to the effectiveness of postoperative pain management, holding pain management training courses and using effective methods for pain relief such as preventive analgesia, multimodal analgesia, patient-controlled analgesia or others[27–32].

Despite all of these initiatives and the availability of many effective analgesic therapies it is evident that improvements in postoperative pain relief have been less than anticipated. This led to the creation of the Change Pain Advisory Board in early 2015 which is sponsored by the pharmaceutical company Grünenthal GmbH (Aachen, Germany)[19]. The Advisory Board consists of pain specialists from Europe and the USA with considerable research experience of acute pain in the postoperative setting. The overall objective of the group is to advance the management of acute pain by: assessing the limitations of current practice and obstacles to its improvement; raising awareness among healthcare professionals and the public by publishing the results of research studies and specialist discussions; and, finally, by setting up initiatives to address specific issues related to acute pain[19].

Based upon discussions at a Change Pain Acute Advisory Board meeting (March 2016) the aim of this commentary is to present an up-to-date critical assessment of the role of quality indicators (QIs) in the management of acute postoperative pain.

Data sources

Data for this commentary was derived from four main sources:

- Presentations and discussions on QIs given at the 4th International Change Pain Acute Advisory Board meeting (Wiesbaden, 4/5 March 2016)
- A search of PubMed from inception to 28 February 2017 using the search terms {acute pain or postoperative pain} and {quality indicators}. In total this resulted in a list of 429 possible references. Following deduplication the abstracts of the remaining papers were assessed for relevance to the commentary. Six key references were identified.
- Key references identified in articles obtained from the above two sources.
- Key references recommended by the International Advisory Board pain experts.

Quality indicators: background

QIs in medicine are quantitative (performance) measures of clinical practice that can monitor, evaluate and guide the quality of care provided to patients. An ideal indicator would have the following key attributes: it is based on agreed definitions of the quality of healthcare processes/outcomes; it is specific and sensitive to a desired outcome, avoiding false positives and negatives; it is both valid and reliable; it is relevant to the clinical question being posed by the user; and it permits useful comparisons[33]. QIs can be used to assess a range of aspects relating to the provision of clinical care from screening and diagnosis to treatment and follow-up, and in different clinical settings (general vs. disease-specific; and prophylaxis, acute or chronic). In clinical settings such as myocardial infarction the use of performance measures/quality indicators has been shown to improve health outcomes[34,35].

One of the major challenges facing providers in the postoperative setting is its complexity, and the need to consider a wide range of issues that can impact the clinical outcome. These factors influence the type of QI that can be monitored. In practice the QIs have been broadly categorized into three key areas relating to the overall quality of care: structural, process and outcome (Table 1)[33,36].

1. *Structural:* the attributes of the settings in which care occurs (e.g. staff, team, equipment, guidelines and protocols, and organization). Examples would include items such as: access to specific technologies (patient-controlled analgesia devices and MRI scans for example), number of physiotherapists and trained pain nurses assigned to individual units, the creation of cross-departmental multidisciplinary working groups, and revision of clinical guidelines.
2. *Process:* factors relating to what the provider did for the patient and how well it was performed (e.g. appropriate diagnostic investigations, appropriate pharmacological and non-pharmacological interventions, guideline adherence, and interactions between healthcare professionals and patients). These processes are a series of interrelated activities which are performed to help achieve objectives.
3. *Outcomes:* measures pertaining to the health of the patient in relation to the care process and the level of pain (intensity and reduction). Examples would include

Table 1. Quality indicators used in the management of postoperative pain.

Quality Indicators		
Structural	*Process*	*Outcomes*
The ability of the health system to provide the resources needed to deliver clinical programs and services (buildings, number of beds, type of equipment, provision of training programs, guidelines, staffing levels [specialist staff], supplies and finances).	What did the provider do for the patient and how effectively was it performed. Process indicators measure the care activities performed by the healthcare provider.	Outcomes indicators measure the effect of the care process on the health and well-being of the patient. They can be intermediate or long term.
Examples in POPM	*Examples in POPM*	*Examples in POPM*
Dedicated pain nurses	Proportion of patients with pain assessments	Pain intensity
Creation of a 24/7 APS	Timeliness of pain assessment	Timeliness of pain relief
Regular revision of guidelines	Guideline adherence (ratio)	Morbidity/adverse effects
SOPs/protocols	Patients receiving preoperative information	Functional status/mobilization
Access to PCA equipment	Number of training programs	Health status/QoL/work status
Regular training programs	Patients receiving analgesia	Patient satisfaction
	Timeliness of analgesia	

Abbreviations. APS, acute pain service; PCA, patient-controlled analgesia; POPM, postoperative pain management; QoL, quality of life; SOP, standard operating procedures.

items such as: intermediate endpoints such as timeliness of pain relief (e.g. within 30 minutes following a request by a patient); and final endpoints such as functional status, fulfillment of treatment goals, patient satisfaction, quality of life, adverse effects, morbidity, mortality, etc.

The goal of such indicators is to enable decision-makers to differentiate between good and poor quality of care. Holistically the gold standard quality indicator should represent the best clinical outcome for the patient since this would be a direct measure of the key clinical goal of the care process. As such, outcomes QIs permit a valuable insight into the overall performance of the healthcare provider useful for assessing performance over time. They also provide a metric for comparing the performance of different healthcare providers. However, sometimes outcomes QIs are not useful when changes are being sought to improve performance in POPM as they are not always easily achievable. As there is no consensus on a specific outcome representing "good quality", and since there are many factors that can impact the overall results, outcomes measures may not be able to guide specific improvements in structures or processes. In these instances, QIs directly attributed to structures or processes will likely be more appropriate. Stang and colleagues undertook an extensive literature search and completed a systematic review of QIs used for the assessment and management of pain in the emergency department[21]. They identified a total of 23 articles with 20 unique QIs: 19 of these indicators were process- (80%) or structure-related (15%), and only one (5%) measured clinical outcome (patient satisfaction).

Quality indicators: structure

Structure QIs should be able to describe the setting in which postoperative pain management operates. This includes: empowering and training the staff/team to make appropriate decisions; identifying areas in need of improvement; and ensuring that preoperative patient education and perioperative planning is part of the surgical process. Healthcare structure-related QIs should include items such as organizational structure; policies and procedures based on best-practice national guidelines and local policy/strategy; setting up an APS (or equivalent) with standard operating procedures/protocols, goals and performance objectives; staffing levels; and adequate equipment, especially patient-controlled and regional analgesia devices.

In terms of findings relating to "structure QIs" in clinical practice, the PATHOS (Postoperative Analgesic Therapy Observational) survey was a large scale study which evaluated postoperative pain management in 746 hospitals in seven European countries[37]. Approximately 1600 questionnaires were analyzed (59% from anesthetists and 41% from surgeons) and they identified significant weaknesses in postoperative pain management in terms of irregular on-site staff training and three-quarters of respondents not having specific written protocols for all patients on their ward. In a systematic review of pain management in emergency departments, almost half the sites (44%) had no specific training for physicians and approximately one-third had no specific training for nurses (32%) or pain therapy protocols (31%) in place[21].

The introduction of APSs has led to an increase in the use of specialized pain relief methods, such as patient-controlled analgesia, peripheral blocks and epidural infusions of local anesthetic/opioid mixtures, in surgical wards. Implementation of these methods may represent real advances in improving patient well-being and in reducing postoperative morbidity. In a retrospective analysis based upon 44 audits and four clinical trials postoperative management via an APS significantly decreased pain scores; appeared to reduce postoperative nausea and vomiting (PONV), and urinary retention; and in some instances reduced hospital stay[25]. However, the authors acknowledge a number of confounding variables and now, almost 15 years after the original analysis, the structure and cost-effectiveness of APSs need to be confirmed[25,32]. In a study conducted in a 1000-bed hospital in Belgium, pain indicators based on a visual analogue scale (VAS) rating and analgesic consumption were recorded for 3 days post-surgery before and after the implementation of an APS[38]. The APS was set up using standardized protocols with regular (4 hourly) assessments of pain intensity, recording of treatment efficacy on the vital sign chart by acute pain nursing staff

(anesthesiologist supervised). The model included education programs, including lectures about current best practices in postoperative pain management such as those advocated in evidence-based guidelines and regular consensus meetings to develop a pain protocol that was accepted by the whole team. Surveys were carried out before the APS was set up, 3 months after the APS was implemented and repeated after approximately 18 months. Pain relief improved significantly in all surgical inpatients highlighting the benefits of this APS model. The value of a more structured approach to postoperative pain management involving training of key staff[18,39], certification in quality management acute pain programs[40,41] and the introduction of standardized protocols has been reported in recent years[42].

Quality indicators: process

Process indicators assess the activities provided by the healthcare provider and how well they were performed[33]. In healthcare, examples would include items such as: the proportion of patients treated according to guidelines, the proportion of patients assessed by a physician within 24 h of referral, the proportion of patients receiving a particular aspect of care, etc.

In the systematic review reported by Stang and colleagues involving 23 studies using QIs specifically related to pain management in the emergency department, 80% investigated care processes[21]. The most commonly measured process QIs related to documentation and timeliness of pain assessment and reassessment, and the timeliness of analgesia (Table 2). The results of this analysis showed a large variation between the healthcare providers included in the review. For example, the proportion of patients receiving analgesia ranged from 6% to 79% while the timely reassessment of pain relief was only 0% to 55%. These findings highlight areas where changes in practice will clearly improve clinical outcomes.

In a large European study described above[37], in one-third of patients pain was not assessed and only 44% of respondents indicated that pain scores were included in patients' charts. Idvall and colleagues compared patient and nurse assessments of the quality of care in postoperative pain management using patient and nurse questionnaires[43]. There were differences in nurses' and patients' assessments of the quality of care. For example, patients reported a higher level of "worst pain" scores than did nurses and this has been noted in other studies[43–45]. Beside pain assessment, patient information and participation is considered as one of the key processes in postoperative pain management[20]. For example, patients' perceived involvement in pain treatment decisions was found to be one of the three most important predictors of patient satisfaction[46].

Quality indicators: outcomes

In the postoperative pain setting the key QI should ensure the best clinical outcome for the patient, and in the majority of cases this would be to achieve an adequate level of pain relief with a minimum of adverse effects. However, there is increasing skepticism that pain intensity alone represents a meaningful indicator of overall quality of care because it is poorly linked with relevant outcomes such as postoperative recovery and length of hospitalization[47]. Specifically, the goal "zero pain" as an indicator of quality is discussed controversially, at least in the area of chronic pain, where a reduction of pain intensity to "0" is no longer regarded as a meaningful outcome and should be replaced by functional endpoints (e.g. improved physical function and/or psychosocial outcomes)[48]. We believe this holds true for acute pain management as well.

Moreover, it is likely that clinical QIs may differ from patient to patient, and it will depend on the perspective of the involved stakeholder. In most cases it will be to achieve an adequate/acceptable level of pain relief, but in some situations it might be the speed of pain relief or the ability to tolerate the medication, and in other cases it is often more important to restore function and mobility (Table 1). It seems likely that, in most cases, a balance of several outcomes (e.g. an adequate level of pain reduction with a low incidence of side effects) represents optimal quality from the perspective of an individual patient as well as from care givers. Such a multi-dimensional goal in the field of perioperative pain

Table 2. Process-related quality indicators reported in a systematic review on the management of pain in the emergency department[21].

Process-Related Quality Indicator [number of studies]	Finding
Pain Assessment	
Patients with any documented pain assessment [5]	57%–94%
Patients with documented pain assessment (validated pain score) [1]	23%
Patients with physician-documented pain assessment [1]	85%–86%
Patients with documented pain reassessment after treatment [4]	32%–50%
Timeliness of pain assessment [2]	Mean 40 min to 174 min from arrival to triage
Timely reassessment of pain relief after treatment [4]	0%–55% of patients; mean 113 min
Pain assessment documented before discharge [2]	56% of sites
Patients with pain rated 0/10 at discharge [1]	8%
Pain Management	
Patients administered any analgesia [9]	6%–79%
Patients with analgesia offered at triage [3]	18%–83%
Timely access to any analgesia [12]	Mean or median > min in 6 of 9 studies. 14%–81% of patients had a delay of ≥1 h from arrival to triage
Timely access to parenteral opioid analgesia	Median 0.8 h to a mean 68 min from arrival to triage
Elderly patients treated with meperidine	32.8%
Patients receiving appropriate analgesic dose	92%
Patients receiving analgesic by appropriate route	55%

management could be described as follows: "early rehabilitation and discharge of a satisfied patient with low pain and few side effects". However, research on how to translate such combined outcomes into quantifiable QIs is limited.

Pain assessment is clearly a fundamental contributor to the management of the patient and this is a challenge for the physician. Pain is subjective and cannot be measured directly, and in practice patients are asked to rate their pain on a single unidimensional scale such as the Numeric Rating Scale (NRS) 0–10 (where 0 generally represents no pain and 10 the worst imaginable pain) or a VAS. Such scales can be used to make decisions about administering or withholding opioid analgesics, which is a potential concern since patients may interpret pain levels differently[49,50]. In these studies the authors noted that there was variability of interpretation in scores 4, 5 and 6 with some patients rating their pain as bearable and others, with the same score, as unbearable. This raises the question of whether simple cut-off points as applied in some guidelines (usually 3 to 4) are appropriate. The authors recommend using the 0–10 NRS but with active follow-up so that the healthcare professional understands the patient's perspective[50].

Patient-reported outcomes are the key focus of PAIN OUT, a European Commission funded project aimed at improving postoperative pain management[46,51,52]. The goal is to create a registry that can be used for benchmarking patient-reported outcomes data for local quality improvement. Data acquisition is via a revised American Pain Society Patient Outcomes Questionnaire (APS-POQ-R) which covers the following: pain severity (4 items); pain interference with physical function (4 items) and affect (4 items); adverse effects (4 items); perceptions of care (6 items); and an item on the use of non-pharmacological treatments[51]. Five additional items added by the PAIN OUT expert group addressed issues such as severe pain, the patient's wish for more treatment than received, the patient's wish for less treatment than received, sleep quality and preoperative pain conditions. The questionnaires were completed on postoperative day one when the patient returned to the ward. A large survey involving >16,000 surgical patients from 14 countries included in the PAIN OUT registry analyzed patient ratings of satisfaction with their postoperative pain treatment[46]. In this evaluation patient-reported satisfaction with pain treatment in the early postoperative phase was influenced by the degree of pain reduction, greater perceived participation in decisions regarding treatment and adequate provision of pain treatment. Pain intensity, type of anesthesia and pain treatment techniques had little direct influence on the level of satisfaction, but may be linked indirectly via improved pain relief. The authors concluded that while the patients' satisfaction with postoperative pain treatment was associated with their actual pain experience, it was more strongly influenced by their impressions of improvement and appropriateness of care[46]. In a separate report from the PAIN OUT investigators involving 166 patients undergoing orthopedic or general surgery a proportion of patients continued to experience severe pain after 7 days post-surgery. Using two validated health-related quality of life (HRQoL) instruments it was shown that HRQoL was strongly associated with the level of pain and provides additional data on the impact of postoperative pain on the patient's function and well-being[53].

The "Road to excellence in pain management: research, Outcomes And Direction (ROAD)" study was an outcomes-based pain management program which utilized four QIs, including the outcomes QI, "patient satisfaction with pain control". Two methodologies were used to evaluate patient satisfaction, chart review and direct patient feedback (post-discharge telephone interview) and results to date have been very favorable[54]. More recently, in Sweden, the "Strategic and Clinical Quality Indicators in Prospective Pain Management (SCQIPP)" questionnaire was used to investigate individual experiences of the quality of postoperative pain management in 160 patients (75% elective and 25% acute) undergoing soft-tissue surgery[55]. The items of this questionnaire covered four main aspects related to structure and process: communication, action, trust and the environment. In addition, three questions relating to the level of pain prior to discharge were asked and graded on a 7 point Likert scale, as well as two outcomes-related questions: "have you experienced more pain than you expected (yes/no)?"; "how satisfied are you with the overall pain management?" (5 point Likert scale). Overall, in 14 questions covering the topic of "quality of postoperative pain management", the perceived quality was rated as low for 7 items and acceptable for the remaining 7 items. None of the items in the questionnaire were given a rating of "high level of postoperative pain management". This data highlights the need for improvements in pain control and is in contrast to the responses given for "satisfaction with analgesic treatment" which were generally good[55]. In some clinical situations speed of pain relief is an important outcome. For example, it has been shown that in patients suffering acute pain following a third molar extraction faster acting analgesic formulations provide earlier onset of pain relief, superior overall pain relief and a lesser need for additional analgesia[56].

Quality indicators in practice

In Germany, several groups of experts in the field of postoperative pain, supported by quality assurance methodology, initiated quality management systems aimed at improving postoperative pain treatment. One of these quality management systems, entitled "Treatment of postoperative and post-traumatic pain", guided and certified by the German quality and safety monitoring agency, TÜV Rheinland, was introduced in 2008 at the University Hospital of Greifswald (Germany). The quality management system[2] has been introduced in all surgical departments. Another initiave started in Germany (2006) was Certkom e.V. (www.certkom.com), now run under the auspices of the German Pain Society[1] was Certkom eV which was founded by four societies: the German Pain Society, MEDICA[3] – the German Society for Interdisciplinary Medicine eV, the German Society for Palliative Medicine[4] and the German Professional Association for Nursing Care (DBfK) eV (www.certkom.com). The aims of Certkom eV are to promote qualification measures in the field of pain diagnosis, pain therapy and palliative medicine;

and a key component is a certification process designed to improve scientific standards in the field of pain medicine and quality management. A fundamental component of a quality management system is the creation of a multi-professional Acute Pain Service; a hospital-based team dedicated to the management of acute pain so as to provide optimal care. To be effective they need to work to a set of QIs that can differentiate between good and poor quality.

As reported by Usichenko and colleagues[22] the quality management system at the University Hospital of Greifswald included:

- structured patient information about postoperative pain treatment (including patient leaflets);
- procedure-specific, multimodal analgesic protocols, modified to meet the patients' individual requirements, based on guidelines for treatment of postoperative pain compiled by an international team of experts and by experts of the German Society of Anaesthesiology and Intensive Care (DGAI);
- standardized pain measurement (at least once every 8 h), its documentation, and therapeutic consequences of pain level >3 as measured on a 0–10 NRS;
- protocols with pathways for the treatment of analgesia-related adverse affects (including prevention and treatment of postoperative nausea and vomiting);
- organization of an anesthesia-based 24 h APS;
- development of a multidisciplinary task-force in surgical departments comprising medical doctor, surgical doctor, nursing staff and access to APS, with responsibilities for training and access to hospital's management department to ensure organizational and financial framework for the proper administration of postoperative pain treatment;
- definition of the formal responsibilities of nurses and physicians;
- development of an internal information source on postoperative pain management for all departments (Pain Manual) including standard operating procedures (SOPs) for postoperative pain therapy and monitoring, accessible online on the university hospital intranet;
- continuation of training of the personnel involved in the field of postoperative pain treatment;
- quality assurance measures including external and internal audits. An external audit is performed once a year by TÜV Rheinland. Internal quality measures include internal audits of each surgical department twice a year and the present project "Evaluation of quality management system implementation".

The implementation of an organizational approach centered on an APS and procedure-specific multimodal analgesic protocols has led to a clinically significant improvement in postoperative pain treatment accompanied by a decrease in analgesia-related adverse effects. This has resulted in an overall improvement in patient satisfaction and QoL[22].

The Dutch Inspection of Healthcare (DIH) has used QIs to measure the quality of postoperative pain management for a number of years. The basic philosophy is that the QIs provide a signal about the quality of care. Hospitals are inspected annually and questions are only asked by the DIH if there are indications that the quality of care is low. In addition, the hospitals themselves report on a yearly basis. Both external and internal quality improvement is essential, but it is also important that the amount of data collected (registration load) is kept to manageable levels. The basic set of QIs in this developmental model comprises two measures:

1. The percentage of standardized pain measurements in postoperative patients, which is calculated by the number of surgical patients that have undergone a standardized pain measurement on the ward (numerator), divided by the total number of surgical patients on the wards (denominator).
2. The percentage of patients with a pain score higher than 7 at any time during the first 72 hours postoperatively. This is calculated by the number of patients with a pain score above 7 in the first 72 hours at any time (numerator), divided by the total number of patients who systematically measured pain scores (at least 6 measurements per patient during the first 72 hours after surgery) (denominator).

Disadvantages of these QIs are that they provide limited information about the total pain management process, there is limited validation of their reliability/accuracy, and the fact that the system is based on trust and may be vulnerable to fraud/misinterpretation. This topic was recently covered in a national survey of 16 Dutch hospitals (from a total of 96 hospitals) involving a total of 3895 patient records[57]. Compliance with pain assessments was determined on the first 3 days postoperatively on the basis of the number of assessments performed on each day (0, 1, 2, ≥3). While only 12% of patients had pain measurements three times a day on all 3 days, 53% had at least one pain measurement on all 3 days. This level of compliance is lower than that reported by the Dutch Inspection of Health Care (78%), but the criteria employed were more stringent in the current survey[57]. Advantages of these QIs used in the Netherlands are that they fulfill the KISS principle: keep it short and simple and there is >10 years' experience of using them. In practice they seem to work and the information is being used by the media to create an annual list of the top 100 hospitals in the Netherlands. Whilst the list may be disputable, it does create awareness among stakeholders and contributes positively to requests for additional resources to improve care. The percentage of standardized pain measurements has risen and the percentage of patients with NRS >7 has dropped, compared with the period before the two QIs were introduced.

The DIH will never judge a hospital based on the reported indicators alone. Indicators are a tool for risk-based assessment and supervision, and may supplement information from other sources. A set of indicators for a complex sector such as a hospital is never finished and the on-going

development of QIs is dependent on results and feedback from within the hospital (the visible care program, www.IGZ.nl).

Discussion and conclusions

Delivering high-quality postoperative pain management is a complex clinical scenario involving multiple healthcare personnel, the healthcare facility, evidence-based guidelines and protocols, and much more, but at its center is the patient. Patient satisfaction with postoperative pain management is complicated and does not solely depend upon pain intensity[46]. These authors found that some patients reported high levels of satisfaction with pain management despite experiencing severe pain. The paradoxical nature of this finding appears to relate to factors such as greater involvement of patients when treatment options are being discussed, adequate availability of pain treatment, and a professional/caring environment. The contribution of specialist pain nurses is well recognized and they play a fundamental role across the care process from preoperative assessment to individualized postoperative pain management strategies[39,43,58,59].

Quality indicators are essential to determine current levels of performance, and to monitor on-going performance and progress as a result of changes in the care process. Regarding postoperative pain management, interpretation of the current literature is complicated. In general there appears to be an overwhelming view that postoperative pain management has only improved a little over the last couple of decades[6,7,23]. While reports of improvements in structures and clinical processes as a result of specific interventions have been published, their applicability to everyday care in clinical practice may be less relevant. There are many potential reasons for this dichotomy: (1) pain may be only one factor affecting the patient and others (mobility, PONV, other adverse effects, affective disorders, etc.) may contribute to a sustained low level of overall quality; (2) the paradox with patients reporting high levels of satisfaction despite low QI process ratings[46,55]; (3) while the QI being measured may show improvement in a specific modality or process, the change may not be sufficient or relevant to improve the level of appropriate outcomes because it does not mirror the complex nature of the overall recovery process; (4) lack of financial support to deliver "best practice" (guidelines, protocols, staffing, training, monitoring, etc.); and (5) poor communication between the health professionals within the care team (surgeon, anesthetist, nurses and physiotherapist?) to the detriment of the patient. As noted recently, the problem of undertreated postoperative pain does not result from a lack of effective therapeutic approaches and techniques in all cases, and failure to deliver a coherent, organized, multidisciplinary approach is also a concern[32]. There is evidence to show that failings relating to APSs to deliver appropriate levels of care may be because of financial constraints and low priority[60].

The Change Pain Advisory Board in Germany[19] identified a number of priority areas to improve postoperative pain management including:

1. Greater involvement of patients regarding pain management
2. Improve education and training of the multidisciplinary team managing the patient
3. Optimizing treatment (evidence-based; synergistic analgesia; patient-controlled or regional analgesia if backed by evidence, etc.)
4. Organizational structure and processes, e.g. the setting up of an Acute Pain Services team; 24/7 if possible; greater adherence to protocols; greater reliance on patient-reported outcomes, etc.
5. Financial
6. Legislative

Pivotal to ensuring that such measures have the greatest chance of improving outcomes for postoperative patients is regular audit. Application of the most suitable QIs will be central to this process with the goal of facilitating improvements by making the changes measurable, visible and sustainable. A good example of this relates to the creation of APSs which led to an increase in the use of specialized pain relief methods. In an early review of APSs (a total of 12 suitable studies involving 15,265 patients), 9 studies (9921 patients) reported lower pain scores at rest and 7 studies (11,845 patients) lower pain scores during activity[25]. While patient satisfaction was high in those studies that measured it, there was only a weak correlation between it and pain relief.

In conclusion, POPM is a challenge for the medical community as evidenced by only small improvements over the last 20 years. This does not appear to be related to the lack of effective therapies and techniques in some situations, but more to the overall management approach. The very nature of POPM requires a highly trained, multidisciplinary team and it is at this level where major improvements can be made. The different professional groups involved in the care process, with greater involvement of the patient, in a potentially dynamic situation mandates an organized/structured approach. Changes in structure and processes to deliver high-level quality care needs to be regularly audited to ensure translation into better outcomes, and QIs – if appropriately chosen and applied – are essential to help drive this process by providing an indicator of current levels of performance. In addition, outcomes QIs can be used to benchmark levels of performance between different healthcare providers.

Transparency

Declaration of funding

This article was based on a meeting held in Wiesbaden, Germany, 4–5 March 2016, which was supported by an unrestricted educational grant from Grünenthal GmbH, Aachen, Germany.

Declaration of financial/other relationships

W.M. has disclosed that his institution has received sponsorship/grants from Grünenthal and Pfizer; is a consultant to Grünenthal, BioQuiddity, Medicines Company, and Mundipharma; and is on the Speakers' Bureau of Grünenthal, Mundipharma, Menarini. F.H. has disclosed that he has received grants from Spinal Modulation, and is a consultant to Grünenthal. E.A.M.N. has disclosed that he is a consultant to Grünenthal. J.O. has disclosed that he is a consultant to Grünenthal and Mundipharma, and is on the Speakers' Bureau of Grünenthal and Mundipharma. D.B. has disclosed that he has received grants from Grünenthal, Smiths. B.M. has disclosed that he received consultancy honoraria from Astellas, Boehringer Ingelheim, Grünenthal, Mundipharma and TEVA; and he received speakers' honoraria from Mundipharma and Pfizer. F.C. has disclosed that she is a consultant to Grünenthal. N.B. received consultancy fees from Grünenthal, Pfizer, Lilly. J.D.A has nothing to disclose. W.F. has disclosed that he has received honoraria or consultation fees from Grünenthal, Baxter, MSD, Smiths; has participated in a company sponsored speaker's bureau. D.F. has disclosed that she has received grants from Grünenthal, Medicine company, Biocodex. H.K. has disclosed that he is an advisory board member for MSD and Grünenthal. A.M.P. has disclosed that he is in receipt of honoraria or consultation feeds for Grünenthal, Menarini and ESTEVE, and has participated in a company sponsored speaker's bureau for Grünenthal, Menarini and ESTEVE. J.P. has disclosed that he is a consultant speaker and researcher for Inspirion, Mallinckrodt, DSI, Grünenthal GmbH, BDSI, DepoMed, Adapt Pharma, Salix, and Neumentum. M.S. has nothing to declare.

CMRO peer reviewers on this manuscript have no relevant financial or other relationships to disclose.

Acknowledgements

The authors thank Dr Steve Clissold and Dr Peter Weber, Content Ed Net, Germany for editorial support, which was sponsored by Grünenthal GmbH, Aachen, Germany.

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