



Improvements and Difficulties in Postoperative Pain Management

Orli Grinstein-Cohen ▼ Orly Sarid ▼ Dan Attar ▼ Dina Pilpel ▼ Asher Elhayany

BACKGROUND: This review examines postoperative pain (POP) management from the perspectives of healthcare providers, patients, and institutions. It summarizes current thought about POP, including difficulties and recent improvements in the field.

METHODS: Studies were identified from PubMed, MEDLINE, and the search engine Google Scholar and by hand-searching reference lists from review articles and research papers (1998–2009). The search was limited to articles published in the English language. Given the broad review of POP, a complete review of all the potential articles was not possible. Thus, an inclusion criterion was defined, and we retrieved only those studies that included the term *postoperative pain treatment*, together with 1 or more of the following terms: *adult patients, education, interdisciplinary teams, attitudes, physicians, and nurses*. Two hundred twenty studies were retrieved, and 93 studies were sufficiently close to the topic of this review. They were organized according to the following themes: POP management as it relates to healthcare providers, patients, and institutions; changing trends in healthcare education in relation to various POP interventions; and the role of policy makers concerning improvements and challenges in the management of POP.

RESULTS: Interdisciplinary teams are needed to implement multimodal methods to treat POP in ways that will provide patients with interventions that will improve their ability to cope with the physical and psychosocial aspects of POP. This is hindered by a lack of hospital financial resources, a lack of educational programs, a lack of knowledge regarding diverse pharmacological options, and lingering negative attitudes toward certain treatments, especially opioids.

CONCLUSIONS: Successful POP management depends on providers' receiving education and information. Policy makers and organizations are called upon to actively intervene by formulating programs and promoting a feedback system, or else POP will remain a neglected issue.

Introduction

Despite the increased focus on pain management programs and the development of new standards for pain assessment, postoperative pain (POP) remains a con-

cern for patients (Bucknall, Manias, & Botti, 2007; Svensson, Sjöström, & Haljamäe, 2000). At the same time, POP constitutes a healthcare challenge requiring knowledge in how to prescribe and administer drugs, assess and reassess POP, and a broad understanding of cultural and ethnic responses to pain and pain management (Bell & Duffy, 2009). Improvements are hindered by a lack of hospital financial resources and scarcity of educational programs designed to address these needs.

Methodological Considerations

The organization of studies for this review has been challenging because publications have focused on different dimensions and characteristics of POP. Studies were identified from PubMed (1998–2009), MEDLINE (1998–2009), and the search engine Google Scholar (1998–2009) and by hand-searching reference lists from review articles and research papers. The search was limited to articles published in the English language. Given the broad review of POP, a complete review of all the potential articles was not possible. Thus, an inclusion criterion was defined, and we retrieved only those studies that included the term *postoperative pain treatment*, together with one or more of the following terms: *adult patients, education, interdisciplinary teams, attitudes, physicians, and nurses*. Two hundred twenty studies were retrieved. Of these articles, only 93 were sufficiently close to the topic of this review and were organized according to the following themes: POP management as it relates to healthcare providers, patients, and institutions; changing trends in healthcare education in

Orli Grinstein-Cohen, PhD, RN, Lecturer, Recanati School of Health Professions, Faculty of Health Sciences, Ben Gurion University, Beer Sheva, Israel.

Orly Sarid, PhD, Lecturer, Department of Social Work, Faculty of Humanities & Social Sciences, Ben Gurion University, Beer-Sheva, Israel.

Dan Attar, MD, Head of Orthopaedic Department, Soroka Medical Center, Beer Sheva, Israel.

Dina Pilpel, PhD, Professor emeritus, Faculty of Health Sciences, Department of Epidemiology, Ben Gurion University, Beer Sheva, Israel

Asher Elhayany, MD, Director, Meir Medical Center, Kfar Saba, Israel.

The authors have disclosed that they have no financial relationships related to this article.

relation to various POP interventions; and the role of policy makers concerning improvements and challenges in the management of POP.

Another area of concern was the cultural characteristics of POP assessment and management. Because of strong interests in public health, most studies come from Europe and the United States. However, we attempted to include studies from a range of geographic regions and cultures, for example, Southeast Asia and Africa (Ocitti & Adwok, 2000; Soyannwo, Amanor-Boadu, Sanya, & Gureje, 2000; Tsai, Tsai, Chien, & Lin, 2007).

HEALTHCARE PROVIDERS AND POP MANAGEMENT

Improvements in healthcare provider education are needed to achieve better management of POP. Education is needed in three broad areas: (1) knowledge, attitudes, and administration of analgesics (2) assessment and reassessment of POP management; and (3) variations in cultural and ethnic approaches and attitudes toward pain.

Changes in the attitudes, knowledge, and beliefs of nurses that are needed before optimal pain management can be provided are discussed in the scientific literature (Bell, 2000; Sherwood, Adams-McNeill, Starck, Nieto, & Thompson, 2000). The effect of attitudes and beliefs on the administration of opioid analgesics in POP treatment is well documented. These drugs can be delivered by a variety of methods, including patient-controlled analgesia, epidural analgesia, continuous intravenous drip, and intramuscular (Kehlet & Dahl, 2003), subcutaneous (Aubrun, Monsel, Langeron, Coriat, & Riou, 2001), oral (Derry, Derry, Moore, & McQuay, 2009; Evans, Lysakowski, & Tramèr, 2008), and transdermal (Rawal & Langford, 2007) administration. Although narcotic analgesics may cause side effects such as respiratory problems, hypotension, and addiction (Berde & Nurko, 2008; Mahowald, Singh, & Majeski, 2008; Waheed, 2005), clinical studies on the management of POP have shown that opioids and other medications rarely cause respiratory depression and have few side effects overall (Cashman & Dolin, 2004; Green & Tait, 2002; Williams & Wheatley, 2000; Yaddanapudi, Wig, Singh, & Tewari, 2000). Studies revealed that nurses and physicians tended to overestimate the potential for patients to become addicted to narcotic drugs which led to administration of lower doses of opioids than prescribed (Bell, 2000; Sherwood et al., 2000). The extent of this problem is disturbing. Several studies identified that over 80% of nurses in surgical wards overestimated the risk of addiction among postoperative patients (Broekmans, Vanderschueren, Morlion, Kumar, & Evers, 2004; Dahlman, Dykes, & Elaner, 1999; Green & Tait, 2002). Similarly, Bell's large survey of nurses (1990) revealed that only 25% correctly estimated the risk of opioid analgesic addiction to be less than 1%, similar to Dahlman et al. (1999) which found that most nurses did not know this fact.

This lack of knowledge had significant clinical impact. Because nurses and healthcare staff felt insecure about their knowledge of opioid analgesia, patients were given lower doses at longer intervals (Elimelech, Eisenberg, & Deutsch, 1998). Insufficient use of opioids has been identified as one factor affecting the adequate

management of acute pain (Eisenberg & Adler, 2004; Green & Tait, 2002).

Exaggerated fear of respiratory depression from opioid analgesics is another area where improved education is needed. For the last three decades, researchers have been aware of nurses' beliefs that providing narcotic analgesics caused patients to develop respiratory problems after surgery. The nurses blamed the narcotic dosage for the breathing problems, while in fact inadequate analgesia causes a significant percentage of breathing problems. Another study found that up to 20% of nurses agreed that it was better for a patient to suffer pain than to wake up with breathing problems caused by analgesia (Bell, 2000). Similar attitudes were detected among physicians and, hence, the dosage of drugs given by the medical staff was much lower than required and the intervals between doses were too long, resulting in high levels of pain during the first few postoperative days (Elimelech et al., 1998; Manias, Bucknall, & Botti, 2005). These findings were supported in a 2005 article reporting that physicians undertreat pain and prescribe analgesics "as required," when the patient asks for them, rather than routinely, a regular dosage (Manias et al., 2005). In this era of joint decision making, physicians and nurses need to be aware of their tendency to underestimate patients' pain. They need to examine patients' expectations before surgery and then assess pain levels afterward to improve POP management as well (Rosenberger, Jokl, Cameron, & Ickovics, 2005).

In recent years, more healthcare providers have relaxed their attitude toward the use of opioids for acute pain and hospital-based healthcare providers have increasingly prescribed opioids to treat POP, albeit cautiously (Broekmans et al., 2004; Eisenberg & Adler, 2004; Essving et al., 2009; Yau et al., 2004). Newer studies reported that POP was being managed with a combination of opioids and other analgesics (Ng et al., 2006; Rahimi et al., 2006; Svetlicic, Eichenberger, & Curatolo, 2005). A possible explanation for the shift in healthcare providers' attitudes is a new approach to POP management that demonstrates the advantages of multimodal therapy (Gordon et al., 2005; White, 2008). Multimodal therapy is centered on the perception that combining analgesics that have different mechanisms of action can decrease the total amount of medication administered (Polomano, Rathmell, Krenzischek, & Dunwoody, 2008). In multimodal analgesia, the patient receives a combination of opioid and nonopioid drugs that act at different sites on the central and peripheral nervous systems in an effort to minimize opioid use and decrease opioid-related side effects. Other studies recommend that pharmacological treatment should be based on the type and severity of pain and the impact of pain on physical and emotional functioning (Gordon et al., 2005; Polomano et al., 2008).

Educational programs have a positive effect on the attitudes and practice of nurses regarding pain management (Bell, 2000; de Rond et al., 2000). For example, recovery unit nurses had a better attitude and approach to pain management than did nurses on the regular wards. Recovery unit nurses have more training in pain management and work with anesthetists who are experts on multimodal pain therapy (Moss, Tavener, Norton, Lesser, & Cole, 2005). This suggests that working in a

multidisciplinary team can contribute to a better understanding of POP and its treatment.

Protocols for the assessment and reassessment of POP have been developed and implemented among healthcare providers. Pain assessment requires the healthcare provider to collect data and make decisions that determine the best intervention for the patient's pain management (Layman-Young, Horton, & Davidhizar, 2006; Manias, Bucknall, & Botti, 2004).

Attention to improving pain relief has led to calls for the development and use of additional pain measurement tools. Verbal pain assessment is usually done by both direct questioning (Bell, 2000; Soyannwo et al., 2000) and the Verbal Rating Scale. Nonverbal tools were developed to assess pain in specific populations and on a continuous scale. Two commonly used pain-rating scales are the Visual Analog Scale (VAS) and the Numerical Rating Scale (NRS). The VAS was conceptually simple, easy to administer, unobtrusive to the respondent, and seemed suitable for measuring the intensity of POP (Coll, Ameen, & Mead, 2004). The VAS is now routinely included for the measurement of required vital signs (Averbuch & Katzper, 2004; DeLoach, Higgins, Caplan, & Stiff, 1998). Another scale, the NRS, measures subjectively rated pain intensity and is regarded as an acceptable alternative to the VAS (Williamson & Hoggart, 2005). Another example of an educational tool for pain assessment is the KnowPain-50 tool (Harris et al., 2008). This is a questionnaire aimed at evaluating the knowledge, attitudes, and beliefs of physicians toward the treatment of pain to improve their expertise in this area.

Previous studies have shown that improving pain assessment procedures requires the caregiver to acknowledge and have faith in the patient's report (Bray, 2006). For example, most nurses believe that they should obtain a subjective appraisal from the patient concerning his or her level of pain (Bell, 2000; Glynn & Ahern, 2000). Physicians, however, focus on a more objective assessment by acquiring a history and physical examination, as well as laboratory testing (Dennis, 2004). Likewise, practical multidisciplinary training in various intervention methods, regular staff meetings, and routine audits for continuously improving the quality of care were suggested as essential steps for improving pain assessment (Bray, 2006; de Rond, de Wit, & van Dam, 2001).

However, despite ongoing efforts to meet standards of care in the area of pain management, patient assessment and reassessment after the administration of medications by nurses and physicians are still lacking (Bucknall et al., 2007; Svensson et al., 2000). Educational programs for healthcare providers in this area have shown only short-term improvements in POP treatment (de Rond et al., 2001; Kohr & Sawhney, 2005). An educational program conducted with a nationwide sample of hospitals in the United States showed a statistically significant improvement in practices, including documented use of pain rating scales, decreased use of intramuscular opioids, and increased use of nonpharmacological strategies. The program offered healthcare providers an ongoing source of information using an e-mail listserv, a resource Web page,

and telephone assistance from the project staff. About 70% of hospitals were very or extremely satisfied with their participation in this sort of project; however, a patient survey showed no change in pain outcomes (Dahl et al., 2003). Another example was a pain education program for nurses conducted in China. This program included a formal lecture and discussion session, didactic practice with a simulated patient, and case-based discussion (Zhang et al., 2008).

Even though educational programs and training for pain management are provided in nursing and medical schools, some healthcare providers still hesitate to implement evidence-based practices regarding POP. Although the World Health Organization claims that the increase in the medical use of opioids is a sign of progress in pain management (Eisenberg & Adler, 2004), there are still many cases of untreated or undertreated POP patients (Rawal & Langford, 2007). Hospitals are slow to develop multidisciplinary approaches to pain management that will enhance both healthcare providers' and patients' knowledge and dissipate false beliefs regarding POP treatment. Nurses, physicians, patients, and their families need accurate information on various issues of pain alleviation, including the side effects of drug treatment and the risk of addiction and respiratory depression from the use of analgesics (Greer, Dalton, Carlson, & Youngblood, 2001).

In addition, a routine feedback system to assess, reassess, and treat POP is needed. Patients' well-being needs to be maintained before and after surgery by providing them with information about options for pain management as part of standard preoperative protocols. Likewise, healthcare staff needs to receive ongoing, up-to-date training concerning existing and novel methods of pain management, particularly for POP.

Equipping the healthcare provider with a broader perspective on cultural and ethnic variations is required to achieve better POP management. Despite the fact that educational programs exist, the cultural beliefs and attitudes of healthcare providers may influence their behavior toward patients from different ethnic backgrounds (Tsai et al., 2007). Aspects of care regarding POP assessment and treatment within different ethnic and cultural groups need to be explored further. For example, patients need to be told more about what to expect (and demand), and the medical and nursing staff need further education on how to assess pain in people from different cultures (Bradley, Deutsch, McKendree-Smith, & Alarcon, 2005; Ocitti & Adwok, 2000; Soyannwo et al., 2000). Furthermore, healthcare providers need to understand patients' nonverbal communication signals such as groaning, sighing, and expressing agony by facial expressions. This will also improve postoperative care of patients with cognitive problems or those who do not speak the same language as the healthcare provider (LaChapelle, Hadjistavropoulos, & Craig, 1999; Manias et al., 2005; Williams, 2003).

Improved training for healthcare providers and educational interventions for patients are needed. When nurses and physicians participate in educational programs, their attitudes toward the importance of POP assessment and treatment improve (Bell, 2000; de Rond

et al., 2000, 2001). It should be noted that the length of an educational program is important because short-term educational programs (e.g., a study day) do not modify the attitudes of healthcare providers (Dahlman et al., 1999).

In sum, the educational programs contributed to broadening the level of knowledge and skills of healthcare providers in relieving pain. Participants who attended these programs were more willing to assess pain on a daily basis and pay attention to patients' pain complaints (Bell, 2000; de Rond et al., 2000, 2001).

MANAGEMENT OF POP AND PATIENT PERSPECTIVES

Despite the unprecedented interest in understanding pain mechanisms and pain management, patients continue to suffer unacceptable levels of pain after surgery (Apfelbaum, Chen, Mehta, & Gan, 2003; Coll & Ameen, 2006; Manias, Botti, & Bucknall, 2006). Several studies have shown that more than 75% of patients experience severe pain postoperatively (Bell, 2000; Green & Tait, 2002; Hutchison, 2007; Rosenberger et al., 2005). Even when pain assessment was taught, pain management strategies were not always followed. POP management regarding patients' evaluation of pain diminution, degree of satisfaction with the treatment, its effectiveness, and the degree to which patients and/or family were consulted before and after treatment is still less than optimal in surgical wards in many countries (Layman-Young et al., 2006; Stomberg, Lorentzen, Joelsson, Lindquist, & Haljamäe, 2003). Patients reported a lack of information regarding methods of pain management and inefficient implementation of pain management procedures (Manias et al., 2005). Attitudes and misjudgments toward POP management, which were expressed by patients, hampered effective pain control and resulted in poor compliance. For example, fear of the side effects of opioids interfered with better management of POP (Greer et al., 2001; Haythornthwaite et al., 2003).

Other studies reported that patients considered the most important actions of healthcare providers to be listening to their concerns, explaining their condition, and providing them with ways of reducing pain (Pogatzki-Zahn & Zahn, 2006; Rosemann et al., 2006). In addition, patients believed that the healthcare staff (i.e., physicians and nurses), who expressed support and care, was aware of their pain and need for intervention. However, patients often assumed that the healthcare staff did not understand the level of their pain and that the staff's attitude was that pain was to be expected (Bedard et al., 2006; Sherwood et al., 2000).

Moreover, some studies found that patients from different ethnic or cultural backgrounds chose to suffer in silence, either because of their desire to be a good patient or because of their philosophical point of view that regards pain as a fatalistic experience (Bell, 2000; Tzeng, Chou, & Lin, 2006).

To summarize, despite an increased focus on pain management programs and the development of new standards for pain assessment, patients continue to experience intense pain after surgery. In this era of joint decision making, healthcare providers should be aware of their tendency to underestimate the level of pain and

should examine both the patients' expectations of POP before surgery and the reality of POP to provide the best treatment (Rosenberger et al., 2005). Innovative programs need to focus on nonverbal cues in order to estimate a patient's pain and the way people from different cultures express nonverbal cues. There is a need for patient-focused interventions that are characterized by ease of use, improved adverse effect and safety profiles, and manageable overall costs. A comprehensive pain research agenda is called for to address pain treatment among ethnic minorities (Green et al., 2003).

MANAGEMENT OF POP AND THE INSTITUTION

The importance of establishing an institutional consensus toward the management of POP relief, with special attention to a team approach, was first proposed more than four decades ago (Powell, Davies, Bannister, & Macrae, 2004; Vila et al., 2005). These programs suggested changing the way healthcare providers assessed and treated POP and proposed a multidisciplinary team approach (Karlsten, Ström, & Gunningberg, 2005; Sloman, Wruble, Rosen, & Rom, 2006).

Effective collaboration among healthcare professionals is vital for the treatment and well-being of the patient as patient care becomes more complex. However, evidence suggests that multidisciplinary professional collaboration is still uncommon (Reeves et al., 2001). Furthermore, in the academic arena, each healthcare profession socializes separately with minimal to no collaboration among students. Thus, young professionals arrive in the field equipped with the ideologies and practices they have acquired during their studies and with traditional concepts of the hierarchical rank of each healthcare profession (Goodrich, 2006; Pöyhiä, Niemi-Murola, & Kalso, 2005).

A few studies showed that educational sessions and workshops did improve postoperative care when provided to/by multiprofessional groups (Gordon et al., 2005). Moreover, if follow-up programs were installed in the system and effective collaboration between healthcare professionals and social care professionals was established, postoperative care would be positively affected (Koo, 2007; Strassels, McNicol, & Suleman, 2005).

Discussion

Postoperative pain has been a significant problem for patients and still constitutes a healthcare challenge. Among the factors that continue to impede better POP practice are lack of knowledge regarding diverse pharmacological options, the negative attitudes of the staff toward certain treatments (especially opioids), inadequate educational programs, and a shortage in hospital financial resources (Broekmans et al., 2004; Edwards et al., 2001; Koo, 2007; Manias et al., 2005; Rosemann et al., 2006; Stomberg, Wickstrom, Joelsson, Sjöstrom, & Haljamäe, 2003).

In recent years, the alleviation of pain has been given a high priority by healthcare professions and health authorities (Brown, O'Neill, & Beck, 2007; Werner, Söholm, Rotbøll-Nielsen, & Kehlet, 2002). Moreover,

nonpharmacological interventions for improving POP management have been implemented in several hospitals and include strategies such as teaching patients about pain control options and side effects and instructing healthcare providers regarding different cultural and ethnic attitudes toward pain (Perron, Piguet, & Bovier, 2007; Polomano et al., 2008).

Progress has also been made at the policy-making level. The Joint Commission sought to improve the quality of healthcare in the United States and Europe by ensuring that pain would be assessed and managed in all patients. The commission concluded that acute pain and chronic pain were major causes of patient dissatisfaction with the healthcare system, leading to slower recovery times, creating a burden for patients and their families, and increasing costs (Powell et al., 2004; Vila et al., 2005). With these factors in mind, new standards were developed for pain assessment and management in hospitals and other healthcare settings, including recognizing patient rights, assessing pain, recording results, determining and ensuring staff competency, and establishing policies for patient and family education.

Traditionally, specific educational programs and practices about POP have been conducted separately for each healthcare profession (Linkewich et al., 2007; Manias et al., 2005). However, the impact of such programs was inconclusive. On the other hand, interdisciplinary teams composed of anesthesiologists, surgeons, nurses, and physiotherapists who received the same educational interventions showed a reduction in their patients' pain and fewer postoperative complications (Gordon et al., 2005; Green & Tait, 2002; McDonnell, Nicholl, & Read, 2005; Pesut, Baker, Elliott, & Johnson, 2000; Rawal, 1999; Richards & Hubbert, 2007). Nonetheless, some patients still reported moderate to high levels of pain even when treated by interdisciplinary teams (Bardiau, Taviaux, Albert, Boogaerts, & Stadler, 2003; Bedard et al., 2006; Harris, 2006; Huang, Cunningham, Laurito, & Chen, 2001; Idvall, Hamrin, Sjöström, & Unosson, 2002; Layman-Young et al., 2006; Michel, Sanders, Dolin, & Cashman, 2003).

Conclusion

Interdisciplinary teams that implement multimodal methods of POP treatment, namely, epidural analgesia, patient-controlled intravenous analgesia, and traditional methods of analgesia, provide patients with a large-scale intervention that improves their ability to cope with the physical and psychosocial aspects of POP (Dolin & Cashman, 2005; Green & Tait, 2002; Holdcroft & Power, 2003; Koo, 2003; Myles & Power, 2007; Pogatzki-Zahn & Zahn, 2006).

Successful pain management depends on healthcare providers' ongoing process of education and acquiring new knowledge of the subject. This includes scientifically updated knowledge in neurobiology from molecular research to brain cortex mapping that shows the complex integration of the mechanisms that initiate and maintain pain (Linkewich et al., 2007). Such multidisciplinary educational programs, if implemented, are provided within the workplace and are rarely offered during the formal education process of healthcare professionals.

Following this perspective, a series of educational programs and interventions is called for at policy-making levels as well. Specifically, a major area for future investigation can involve a collaborative, interdisciplinary approach to pain management that includes all members of the healthcare team and input from patients and their families. We also cautiously recommend that policy makers and organizations actively intervene in this area and encourage the formulation of specific programs for POP management that employ a feedback mechanism.

REFERENCES

- Apfelbaum, J. L., Chen, C., Mehta, S. S., & Gan, T. J. (2003). Postoperative pain experience: Results from a national survey suggest postoperative pain continues to be undermanaged. *Anesthesia & Analgesia*, *97*, 534–540.
- Aubrun, F., Monsel, S., Langeron, O., Coriat, P., & Riou, B. (2001). Postoperative titration of intravenous morphine. *European Journal of Anaesthesiology*, *18*, 159–165.
- Averbuch, M., & Katzper, M. (2004). Assessment of Visual Analog versus Categorical Scale for measurement of osteoarthritis pain. *Journal of Clinical Pharmacology*, *44*, 368–372.
- Bardiau, F. M., Taviaux, N. F., Albert, A., Boogaerts, J. G., & Stadler, M. (2003). An intervention study to enhance postoperative pain management. *Anesthesia & Analgesia*, *96*, 179–185.
- Bedard, D., Purden, M. A., Sauve-Larose, N., Certosini, C., & Schein, C. (2006). The pain experience of post surgical patients following the implementation of an evidence-based approach. *Pain Management Nursing*, *7*(3), 80–92.
- Bell, F. (2000). A review of the literature on the attitudes of nurses to acute pain management. *Journal of Orthopaedic Nursing*, *4*, 64–70.
- Bell, L., & Duffy, A. (2009). Pain assessment and management in surgical nursing: A literature review. *British Journal of Nursing*, *18*(3), 153–156.
- Berde, C., & Nurko, S. (2008). Opioid side effects—Mechanism-based therapy. *The New England Journal of Medicine*, *358*(22), 2400–2402.
- Bradley, L. A., Deutsch, G., McKendree-Smith, N. L., & Alarcon, G. S. (2005). Pain-related beliefs and affective pain responses: Implications for ethnic disparities in preferences for joint arthroplasty. *The Journal of Rheumatology*, *32*(6), 1149–1152.
- Bray, A. (2006). Preoperative nursing assessment of the surgical patient. *The Nursing Clinics of North America*, *41*(2), 135–150.
- Broekmans, S., Vanderschueren, S., Morlion, B., Kumar, A., & Evers, G. (2004). Nurses' attitudes toward pain treatment with opioids: A survey in a Belgian university hospital. *International Journal of Nursing Studies*, *41*(2), 183–189.
- Brown, D., O'Neill, O., & Beck, A. (2007). Post-operative pain management: Transition from epidural to oral analgesia. *Nursing Standard*, *21*(21), 35–41.
- Bucknall, T., Manias, E., & Botti, M. (2007). Nurses' re-assessment of postoperative pain after analgesic administration. *Clinical Journal of Pain*, *23*(1), 1–7.
- Cashman, J. N., & Dolin, S. J. (2004). Respiratory and haemodynamic effects of acute postoperative pain management: Evidence from published data. *British Journal of Anaesthesia*, *93*(2), 212–223.
- Coll, A. M., & Ameen, J. (2006). Profiles of pain after day surgery: Patients' experiences of three different operation types. *Journal of Advanced Nursing*, *53*(2), 178–187.

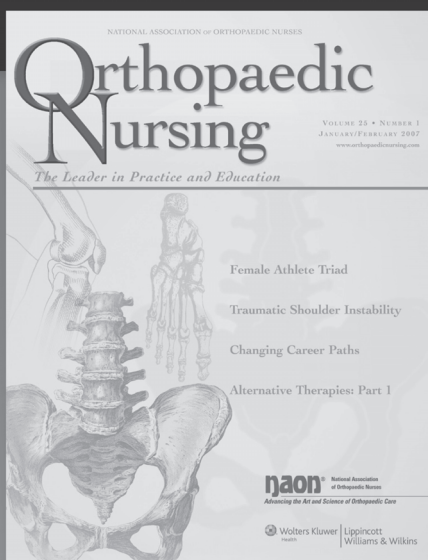
- Coll, A. M., Ameen, J. R., & Mead, D. (2004). Postoperative pain assessment tools in day surgery: Literature review. *Journal of Advanced Nursing*, 46(2), 124–133.
- Dahl, J. L., Gordon, D., Ward, S., Skemp, M., Wochos, S., & Schurr, M. (2003). Institutionalizing pain management: The post-operative pain management quality improvement project. *The Journal of Pain*, 4(7), 361–371.
- Dahlman, G. B., Dykes, A. K., & Elander, G. (1999). Patients' evaluation of pain and nurses management of analgesics after surgery. The effect of a study day on the subject of pain for nurses working at the thorax surgery department. *Journal of Advanced Nursing*, 30(4), 866–874.
- DeLoach, L. J., Higgins, M. S., Caplan, A. B., & Stiff, J. L. (1998). The Visual Analog Scale in the immediate post-operative period: Intrasubject variability and correlation with a numeric scale. *Anesthesia & Analgesia*, 86(1), 102–106.
- Dennis, D. A. (2004). Evaluation of painful total knee arthroplasty. *Journal of Arthroplasty*, 19(4, Suppl. 1), 35–40.
- Derry, P., Derry, S., Moore, R. A., & McQuay, H. J. (2009). Single dose oral diclofenac for acute postoperative pain in adults. *Cochrane Database of Systematic Reviews*, 15(2), CD004768.
- de Rond, M. E. J., de Wit, R., van Dam, F. S., van Campen, B. T., den Hartog, Y. M., & Klievink, R. M. (2000). A pain monitoring program for nurses: Effects on nurses' pain knowledge and attitude. *Journal of Pain and Symptom Management*, 19, 457–467.
- de Rond, M. E., de Wit, R., & van Dam, F. S. (2001). The implementation of a pain monitoring programme for nurses in daily clinical practice: Results of a follow-up study in five hospitals. *Journal of Advanced Nursing*, 35(4), 590–598.
- Dolin, S. J., & Cashman, J. N. (2005). Tolerability of acute postoperative pain management: Nausea, vomiting, sedation, pruritis, and urinary retention. Evidence from published data. *British Journal of Anaesthesia*, 95(5), 584–591.
- Edwards, H. E., Nash, R. E., Najman, J. M., Yates, P. M., Fentiman, B. J., Dewar, A., et al. (2001). Determinants of nurses' intention to administer opioids for pain relief. *Nursing & Health Sciences*, 3(3), 149–159.
- Eisenberg, E., & Adler, R. (2004). Consumption of opioids in a hospital setting—What can we learn from a 10 year follow-up? *The Israel Medical Association Journal*, 6, 19–23.
- Elimelech, R., Eisenberg, E., & Deutsch, M. (1998). Post-operative analgesia. *Harefuah*, 135(12), 588–592.
- Essving, P., Axelsson, K., Kjellberg, J., Wallgren, O., Gupta, A., & Lundin, A. (2009). Reduced hospital stay, morphine consumption, and pain intensity with local infiltration analgesia after unicompartmental knee arthroplasty. *Acta Orthopaedica*, 80(2), 213–219.
- Evans, M. S., Lysakowski, C., & Tramèr, M. R. (2008). Nefopam for the prevention of postoperative pain: quantitative systematic review. *British Journal of Anaesthesia*, 101(5), 610–617.
- Goodrich, C. (2006). Students' and faculty members' knowledge and attitudes regarding pain management: A descriptive survey. *Journal of Nursing Education*, 45(3), 140–142.
- Gordon, D. B., Dahl, J. L., Miaskowski, C., McCarberg, B., Todd, K. H., Paice, J. A., et al. (2005). American Pain Society Recommendations for improving the quality of acute and cancer pain management. *Archives of Internal Medicine*, 165, 1574–1580.
- Glynn, G., & Ahern, M. (2000). Determinants of critical care nurses' pain management behaviour. *Australian Critical Care*, 13(4), 144–151.
- Green, C. R., Anderson, K. O., Baker, T. A., Campbell, L. C., Decker, S., Fillingim, R. B., et al. (2003). The unequal burden of pain: Confronting racial and ethnic disparities in pain. *Pain Medicine*, 4(3), 277–294.
- Green, C. R., & Tait, A. R. (2002). Attitudes of healthcare professionals regarding different modalities used to manage acute postoperative pain. *Acute Pain*, 4, 15–21.
- Greer, S. M., Dalton, J. A., Carlson, J., & Youngblood, R. (2001). Surgical patients' fear of addiction to pain medication: the effect of an educational program for clinicians. *Clinical Journal of Pain*, 17(2), 157–164.
- Harris, B. A. (2006). Interdisciplinary education: What, why, and when? *Journal of Physical Therapy Education*, 20(2), 3–6.
- Harris, J. M., Jr., Fulginiti, J. V., Gordon, P. R., Elliott, T. E., Davis, B. E., Chabal, C., et al. (2008). KnowPain-50: A tool for assessing physician pain management education. *Pain Medicine*, 9(5), 542–554.
- Haythornthwaite, J. A., Wegener, S., Benrud-Larson, L., Fisher, B., Clark, M., Dillingham, T., et al. (2003). Factors associated with willingness to try different pain treatments for pain after a spinal cord injury. *Clinical Journal of Pain*, 19(1), 31–38.
- Holdcroft, A., & Power, I. (2003). Management of pain. *BMJ*, 326, 635–639.
- Huang, N., Cunningham, F., Laurito, C. E., & Chen, C. (2001). Can we do better with postoperative pain management? *American Journal of Surgery*, 182, 440–448.
- Hutchison, R. W. (2007). Challenges in acute post-operative pain management. *American Journal of Health-System Pharmacy*, 64(6), S2–S5.
- Idivall, E., Hamrin, E., Sjöström, B., & Unosson, M. (2002). Patient and nurse assessment of quality of care in post-operative pain management. *Quality and Safety in Health Care*, 11, 327–334.
- Karlsten, R., Ström, K., & Gunningberg, L. (2005). Improving assessment of postoperative pain in surgical wards by education and training. *Quality and Safety in Health Care*, 14, 332–335.
- Kehlet, H., & Dahl, J. (2003). Anaesthesia, surgery, and challenges in postoperative recovery. *The Lancet*, 362(9399), 1921–1928.
- Kohr, R., & Sawhney, M. (2005). Advanced practice nurses' role in the treatment of pain. *The Canadian Nurse*, 101(3), 30–34.
- Koo, P. J. (2003). Acute pain management. *Journal of Pharmacy Practice*, 16(4), 231–248.
- Koo, P. J. (2007). Addressing stakeholders' needs: Economics and patient satisfaction. *American Journal of Health-System Pharmacy*, 64(6–4), S11–S15.
- LaChapelle, D. L., Hadjistavropoulos, T., & Craig, K. (1999). Pain measurement in persons with intellectual disabilities. *Clinical Journal of Pain*, 15(1), 13–23.
- Layman-Young, J., Horton, F. M., & Davidhizar, R. (2006). Nursing attitudes and beliefs in pain assessment and management. *Journal of Advanced Nursing*, 53(4), 412–422.
- Linkewich, B., Sevean, P., Habjan, S., Poling, M., Baily, S., & Korter-Miller, K. (2007). Enhancing nurses' pain management knowledge. *Canadian Nurse*, 103(4), 24–28.
- Mahowald, M. L., Singh, J. A., & Majeski, P. (2008). Opioid use by patients in an orthopedics spine clinic. *Arthritis & Rheumatism*, 52(1), 312–321.
- Manias, E., Botti, M., & Bucknall, T. (2006). Patients' decision-making strategies for managing postoperative pain. *Journal of Pain*, 7(6), 428–437.
- Manias, E., Bucknall, T., & Botti, M. (2004). Assessment of patient pain in the postoperative context. *Western Journal of Nursing Research*, 26(7), 751–769.

- Manias, E., Bucknall, T., & Botti, M. (2005). Nurses' strategies for managing pain in the postoperative setting. *Pain Management Nursing*, 6(1), 18–29.
- McDonnell, A., Nicholl, J., & Read, S. (2005). Exploring the impact of acute pain teams (APTs) on patient outcomes using routine data. Can it be done? *Journal of Research in Nursing*, 10(4), 383–402.
- Michel, M. Z., Sanders, M. K., Dolin, S. J., & Cashman, J. (2003). Effectiveness of acute postoperative pain management. *British Journal of Anaesthesia*, 91(3), 448–449.
- Moss, E., Tavener, T., Norton, P., Lesser, P., Cole, P. (2005). A survey of postoperative pain management in fourteen hospitals in the UK. *Acute Pain*, 7, 13–20.
- Myles, P. S., & Power, I. (2007). Clinical update: postoperative analgesia. *The Lancet*, 369(9564), 810–813.
- Ng, H. P., Nordstrom, U., Axelsson, K., Perniola, A. D., Gustav, E., Rytberg, L., et al. (2006). Efficacy of intra-articular bupivacaine, ropivacaine, or a combination of ropivacaine, morphine, and ketorolac on postoperative pain relief after ambulatory arthroscopic knee surgery: A randomized double-blind study. *Regional Anesthesia & Pain Medicine*, 31(1), 26–33.
- Ocitti, E. F., & Adwok, J. A. (2000). Post-operative management of pain following major abdominal and thoracic operations. *East African Medical Journal*, 77(6), 299–302.
- Perron, J. N., Piguët, V., & Bovier, P. A. (2007). Long-term effectiveness of a multifaceted intervention on pain management in a walk-in clinic. *Monthly Journal of the Association of Physicians*, 100(4), 225–232.
- Pesut, B., Baker, S., Elliott, B., & Johnson, J. (2000). Leadership through interdisciplinary teams: A case study of an acute pain service. *Canadian Journal of Nursing Leadership*, 13(4), 5–10.
- Pogatzki-Zahn, E. M., & Zahn, P. K. (2006). From preemptive to preventive analgesia. *Current Opinion in Anaesthesiology*, 19(5), 551–555.
- Polomano, R. C., Rathmell, J. P., Krenzschek, D. A., & Dunwoody, C. J. (2008). Emerging trends and new approaches to acute pain management. *Journal of PeriAnesthesia Nursing*, 23(1), S43–S53.
- Powell, A. E., Davies, H. T. O., Bannister, J., & Macrae, W. A. (2004). Rhetoric and reality on acute pain services in the UK: A national postal questionnaire survey. *British Journal of Anaesthesia*, 92(5), 689–669.
- Pöyhkä, R., Niemi-Murola, L., & Kalso, E. (2005). The outcome of pain related undergraduate teaching in Finnish medical faculties. *Pain*, 115(3), 234–223.
- Rahimi, S. Y., Vender, J. R., Macomson, S. D., French, A., Smith, J. R., & Alleyne, C. H., Jr. (2006). Postoperative pain management after craniotomy: Evaluation and cost analysis. *Neurosurgery*, 59(4), 852–857.
- Rawal, N. (1999). 10 years of acute pain services—Achievements and challenges. *Regional Anesthesia and Pain Medicine*, 24(1), 68–73.
- Rawal, N., & Langford, R. M. (2007). Current practices for postoperative pain management in Europe and the potential role of the fentanyl HCl iontophoretic transdermal system. *European Journal of Anaesthesiology*, 24(4), 299–308.
- Reeves, S., Zwarenstein, M., Goldman, J., Barr, H., Freeth, D., Hammick, M., et al. (2001). Interprofessional education: effects on professional practice and health care outcomes. *Cochrane Database of Systematic Reviews*, 1, CD002213. doi:10.1002/14651858.CD002213.pub2
- Richards, J., & Hubbert A. (2007). Experiences of expert nurses in caring for patients with postoperative pain. *Pain Management Nursing*, 8(1), 17–24.
- Rosemann, T., Wensing, M., Joest, K., Backenstrass, M., Mahler, C., & Szecsenyi, J. (2006). Problems and needs for improving primary care of osteoarthritis patients: The views of patients, general practitioners and practice nurses. *BMC Musculoskeletal Disorders*, 2(7), 48.
- Rosenberger, P. H., Jokl, P., Cameron, A., & Ickovics, J. R. (2005). Shared decision making, preoperative expectations, and postoperative reality: Differences in physician and patient predictions and ratings of knee surgery outcomes. *Arthroscopy: Journal of Arthroscopic and Related Surgery*, 21(5), 562–569.
- Sherwood, G., Adams-McNeill, J., Starck, P. L., Nieto, B., & Thompson, C. J. (2000). Qualitative assessment of hospitalized patients' satisfaction with pain management. *Research in Nursing & Health*, 23, 486–495.
- Sloman, R., Wruble, A. W., Rosen, G., & Rom, M. (2006). Determination of clinically meaningful levels of pain reduction in patients experiencing acute postoperative pain. *Pain Management Nursing*, 7(4), 153–158.
- Soyannwo, O. A., Amanor-Boadu, S. D., Sanya, A. O., & Gureje, O. (2000). Pain assessment in Nigerians—Visual Analogue Scale and Verbal Rating Scale compared. *West African Journal of Medicine*, 19(4), 242–245.
- Stomberg, M. W., Lorentzen, P., Joelsson, H., Lindquist, H., & Haljamäe, H. (2003). Postoperative pain management on surgical wards—Impact of database documentation of anesthesia organized services. *Pain Management Nursing*, 4(4), 155–164.
- Stomberg, M. W., Wickstrom, K., Joelsson, H., Sjöstrom, B., & Haljamäe, H. (2003). Postoperative pain management on surgical wards—Do quality assurance strategies result in long-term effects on staff member attitudes and clinical outcomes? *Pain Management Nursing*, 4(1), 11–22.
- Strassels, S. A., McNicol, E., & Suleman, R. (2005). Postoperative pain management: A practical review, Part 2. *American Journal of Health-System Pharmacy*, 62(19), 2019–2025.
- Svensson, I., Sjöström, B., & Haljamäe, H. (2000). Assessment of pain experiences after elective surgery. *Journal of Pain and Symptom Management*, 20(3), 193–201.
- Sveticic, G., Eichenberger, U., & Curatolo, M. (2005). Safety of mixture of morphine with ketamine for postoperative patient-controlled analgesia: An audit with 1026 patients. *Acta Anaesthesiologica Scandinavica*, 49(6), 870–875.
- Tsai, F. C., Tsai, Y. F., Chien, C. C., & Lin, C. C. (2007). Emergency nurses' knowledge of perceived barriers in pain management in Taiwan. *Journal of Clinical Nursing*, 16, 2088–2095.
- Tzeng, J. I., Chou, L. F., & Lin, C. C. (2006). Concerns about reporting pain and using analgesics among Taiwanese postoperative patients. *Journal of Pain*, 7(11), 860–866.
- Vila, H., Smith, R. A., Augustyniak, M. J., Nagi, P. A., Soto, R. G., Ross, T. W., et al. (2005). The efficacy and safety of pain management before and after implementation of hospital-wide pain management standards: Is patient safety compromised by treatment based solely on numerical pain ratings. *Anesthesia and Analgesia*, 101(2), 474–80.
- Waheed, U. (2005). Analgesia in the intensive care unit. In A. Holdcroft & S. Jagger (Eds.), *Core topics in pain* (pp. 109–117). Cambridge, England: Cambridge University Press.
- Werner, M. U., Söholm, L., Rotbøll-Nielsen, P., & Kehlet, H. (2002). Does an acute pain service improve

- postoperative outcome? *Anesthesia & Analgesia*, 95(5), 1361-1372.
- White, P. F. (2008). Multimodal analgesia: Its role in preventing postoperative pain. *Current Opinion in Investigational Drugs*, 9(1), 76-82.
- Williams, A. C. C. (2003). Facial expression of pain: An evolutionary account. *Behavioral and Brain Sciences*, 25, 439-455.
- Williams, B., & Wheatley, R. (2000). Epidural analgesia for postoperative pain relief. *Bulletin of the Royal College of Anaesthetists*, 2, 1-4.
- Williamson, A., & Hoggart, B. (2005). Pain: A review of three commonly used pain rating scales. *Journal of Clinical Nursing*, 14(7), 798-804.
- Yaddanapudi, L. N., Wig, J., Singh, B., & Tewari, M. K. (2000). Comparison of efficacy and side effects of epidural tramadol and morphine in patients undergoing laminectomy: A repeated dose study. *Neurology India*, 48(4), 398-400.
- Yau, V., Chow, E., Davis, L., Holden, L., Schueller, T., & Danjoux, C. (2004). Pain management in cancer patients with bone metastases remains a challenge. *Journal of Pain and Symptom Management*, 27(1), 1-3.
- Zhang, C. H., Hsu, L., Zou, B. R., Li, J. F., Wang, H. Y., & Huang, J. (2008). Effects of a pain education program on nurses' pain knowledge, attitudes and pain assessment practices in China. *Journal of Pain and Symptom Management*, 36(6), 616-27.

For more than 32 additional continuing nursing education articles on the topic of orthopaedic nursing, go to nursingcenter.com/ce

Bimonthly: ISSN 0744-6020



CALL FOR RESEARCH MANUSCRIPTS AND RESEARCH REVIEWERS

Orthopaedic Nursing, Official Journal of the National Association of Orthopaedic Nurses, is actively soliciting Research Manuscripts and Research Reviewers.

TOPICS OF INTEREST INCLUDE RESEARCH TARGETING:

- Pain management, mobility, coping, functional ability and quality of life in the orthopaedic population
- Practice setting issues such as work environment, satisfaction, and outcomes
- Leadership

FOR FURTHER INFORMATION, PLEASE CONTACT

MARY FAUT RODTS, DNP, CNP, ONC, FAAN

Rush University College of Nursing
600 S. Paulina Room 1072A
Chicago, Illinois 60612
E-mail: onjeditor@aol.com

To SUBSCRIBE, CALL 1-800-638-3030
OUTSIDE THE US (301)223-2300

Orthopaedic Nursing is now indexed by ISI/Thomson Scientific. Data is being accumulated for calculation of Impact Factor which will be published in the 2007 Journal Citation Report.

DF/BG F3NBK881 AIK88ZZ