About the Editors

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Adam Young received his medical degree from the University of Illinois (USA) in 2008. He completed a surgical internship at Northwestern Memorial Hospital (IL, USA). Following this, he completed a residency in anesthesiology and a fellowship in interventional pain medicine at Rush University Medical Center (IL, USA). He currently practices both anesthesiology and interventional pain management at Rush University Medical Center. His academic accomplishments include publishing multiple peer-reviewed journal articles and book chapters, presenting at national meetings, and educating resident and fellow physicians.

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Foreword

Advances in postoperative pain management

Adam Young & Asokumar Buvanendran

Postoperative pain management has evolved significantly in the past two decades. Advancements have come in the form of quality improvement initiatives, the introduction of novel analgesics, the advent of innovative techniques and improved understanding of pain signaling. The sum of this progress has translated to a perioperative experience that strives to achieve an expedited recovery with minimal discomfort.

In 1999, the US Department of Veterans Affairs introduced a numeric scale intended to quantify the severity of pain. This number became known as the 'fifth vital sign.' Although the reliability of this additional measurement has been called into question, it is considered to be moderately accurate [1]. The variance is unsurprising as pain is a unique experience and, likewise, pain scores differ between individuals undergoing the same procedure or with the same condition. Simply recording this 'vital sign' during patient encounters does not improve outcomes. This too seems fairly easy to grasp and has been confirmed in prior studies [2]. Gathering of information does not lead to improvements in patient care; how one uses that information is the crucial element. At minimum, recording pain scores has drawn attention to a previously neglected component of healthcare. Beginning in 2001, this attention led the US Congress to declare the coming years to be known as the 'Decade of Pain Control and Research'.

In that decade, more than 25 medications were approved by the US FDA for the treatment of pain. Trials proving effectiveness of these drugs in the treatment of acute pain have followed. Use of COX-2 inhibitors has gained widespread effectiveness and their efficacy has been defined [3], anticonvulsants are now considered in the perioperative period given their ability to decrease the incidence of chronic pain [4], and paracetamol (intravenous acetaminophen) has been recognized for its ability to provide reliable analgesia for a variety of surgical procedures with minimal side effects [5]. The influx of new, effective and safe agents has provided perioperative physicians with an armamentarium of analgesics to incorporate as part of a patient-tailored regimen. Such combinations of medications have been instrumental in attaining adequate analgesia following painful procedures, such as total knee arthroplasty; this superior form of analgesia has allowed them to be completed on an outpatient basis [6].

Influx of technology has given the perioperative physician additional modes of pain control. The use of ultrasound to facilitate perioperative regional anesthesia has become widespread and allows anesthesiologists to perform a variety of new nerve blocks. Blocks that have become commonplace on account of ultrasound guidance include transversus abdominus plane, paravertebral, supraclavicular, saphenous and popliteal nerve blocks. Implantation of catheters for prolonged infusion at home has also become popular for outpatient procedures. Catheter infusion systems can provide up to 72 h of analgesia by continuous infiltration of the wound itself or combined with regional anesthesia in the form of a continuous nerve block. Lastly, the push for the development of minimally invasive surgical techniques has often led to procedures performed with smaller incisions, less disruption of healthy tissue and frequently less pain sensed by the patient.

The sensation of pain is a complex physiologic process resulting in an unpleasant emotional and sensory experience [101]. It would be naive to assume we have a firm grasp on the process; however, advancements have provided insight. The peripheral and central nervous systems exhibit plasticity and have certain predictable responses to noxious stimuli. Chemicals such as substance P, glutamate and neurokinin have been recognized for not only their role in the propagation of acute pain, but also the development of central sensitization leading to chronic pain [7]. There are many more receptors and ligands that have been identified in the signaling of pain, many of which are being targeted for novel pharmacologic agents. Between patients, there are often varying responses to drug therapies; these differences may be explained by epigenetic variability.

Genetic variability may also lead to an understanding of why some patients go on to develop chronic pain and others do not [8].

The treatment of pain is often challenging, as it is individualized and inherently subjective. The awareness of pain may not have improved patient outcomes as of yet. However, a greater understanding of the complexities and intricacies of this experience, coupled with new medications and methods to treat it, have us undoubtedly on the right track.

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References

- 1 Lorenz KA, Sherbourne CD, Shugarman LR *et al.* How reliable is pain as the fifth vital sign? *J. Am. Board Fam. Med.* 22(3), 291–298 (2009).
- 2 Mularski RA, White-Chu F, Overbay D *et al.* Measuring pain as the 5th vital sign does not improve quality of pain management. *J. Gen. Intern. Med.* 21(6), 607–612 (2006).
- 3 Derry S, Moore RA. Single dose oral celecoxib for acute postoperative pain in adults. *Cochrane Database Syst. Rev.* 14(3), CD004233 (2012).
- 4 Clarke H, Bonin RP, Orser BA *et al.* The prevention of chronic postsurgical pain using gabapentin and pregabalin: a combined systematic review and meta-analysis. *Anesth. Analg.* 115(2), 428–442 (2012).
- 5 Macario A, Royal MA. A literature review of randomized clinical trials of intravenous acetaminophen (paracetamol) for acute postoperative pain. *Pain Pract.* 11(3), 290–296 (2011).
- 6 Berger RA, Sanders S, Gerlinger T, Della Valle C, Jacobs JJ, Rosenberg AG. Outpatient total knee arthroplasty with a minimally invasive technique. *J. Arthroplasty* 20(3), 33–38 (2005).
- 7 Willis WD. Role of neurotransmitters in sensitization of pain responses. *Ann. NY Acad. Sci.* 933(1), 142–156 (2006).
- 8 Seungmae S, Grzenda A, Lomberg G, Ou XM, Cruciani RA, Urrutia R. Epigenetics: a promising paradigm for better understanding and managing of pain. *J. Pain* 14(6), 549–557 (2013).

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- 101 International Association for the Study of Pain. Taxonomy. www.iasp-pain.org/Education/Content.aspx?ItemNumber=1698&navitemNumber=576