The basis of pain management

Introduction

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This book is focused on the evidence-based practice of behavioral and psychopharmacologic treatment strategies for pain syndromes of various types. A large number and a broad variety of health providers use these therapeutic treatment approaches to treat patients with acute and chronic pain syndromes. These types of providers include primary care physicians and advanced practice nurses, psychologists, psychiatrists, neurologists, physical medicine and rehabilitation physicians, anesthesiologists, surgeons (particularly orthopedic and neurological surgeons), a variety of internal medicine subspecialists including oncologists and rheumatologists, podiatrists, and physicians in occupational medicine. Therefore the text is directed to an interdisciplinary audience, and is intended to be used in a variety of training programs and pain medicine practice groups.

An impetus for developing this text at the present time is the recent reorganization of the training essentials of the subspecialty of pain medicine by the Accreditation Council of Graduate Medical Education (ACGME). A cornerstone of the new pain medicine requirements is that the sponsoring facility must include individuals who are board certified in the fields of anesthesiology, psychiatry, neurology, and physical medicine and rehabilitation by the relevant American Board of Medical Specialties (ABMS). This change reflects the judgment by the ABMS and the ACGME that the successful and competent practice of pain medicine includes evidence-based behavioral and pharmacological interventions as well as the procedural and invasive interventions that are usually performed by anesthesiologists. Dr. Ebert recently concluded a 5-year term on the Residency Review Committee (RRC) of the ACGME, and served during 2004 and 2005 as the chair of the Psychiatry RRC. In this capacity he worked with the chairs of the other three RRCs to complete the final editing and negotiation of the ACGME pain medicine requirements. These requirements for accredited pain medicine training programs began in July 2007.

The emphasis on interdisciplinary training in the practice of pain medicine is captured in the introductory paragraph of the new ACGME requirements for training in pain medicine. This statement is as follows:

“Pain medicine is a discipline within the practice of medicine that specializes in the management of patients suffering from acute or chronic pain, or pain in patients who require palliative care. The management of acute and chronic pain syndromes is a complex matter involving many areas of interest and different medical disciplines. Clinical and investigative efforts are vital to the progress of the specialty. Physicians training in pain medicine may originate from different disciplines and approach the field with varying backgrounds and experience. All pain specialists, regardless of their primary specialty, should be competent in pain assessment, formulation, and coordination of a multiple modality treatment plan, integration of pain treatment with primary disease management and palliative care, and interaction with other members of a multidisciplinary team. Therefore, the didactic and clinical curriculum of the multidisciplinary pain program must address attainment of these competencies.”

The current text was designed to fill a noted gap by offering a single source volume that provides comprehensive and state of the art consideration of the bio-psychosocial perspective on pain and pain management, and also detailed presentation of the core assessment and intervention strategies informed by that model. Although written with the pain specialist in mind, it is expected that the text will serve as an important resource for a variety of medical specialists, nurses, advanced practice nurses, psychologists, and other associated health professionals.

Section 1 presents a brief history of the treatment of pain, illustrating the fact that psychological approaches to pain management have existed from the early history.
of pain medicine. This section also develops the concept that the physiology of pain, the perception of pain, and the psychological ramifications of the experience of chronic pain are intertwined. A successful therapeutic plan for a given pain condition requires a biopsychosocial approach to the problem.

Section 2 is a detailed presentation of pain assessment techniques and strategies. Chronic pain presents two broad challenges to proper assessment: the inherently subjective nature of pain complaints and the wide-ranging influence of chronic pain on patient functioning. These challenges necessitate a systematic assessment approach that employs standardized assessment of multiple domains of functioning using several assessment techniques, including questionnaires, behavioral observation, psychophysiological measurement, diary data, and reports of significant others. The chapters include a discussion of the clinical goals of psychological and behavioral assessment of the patient with persistent pain, provision of a rationale and context for the use of psychological assessment in the practice of pain medicine, articulation of recommendations for the core domains of assessment, and provision of an overview of the psychological assessment process. Specific information is presented about the most commonly employed psychological and behavioral assessment methods and specific strategies. The final chapter deals with psychiatric and pain comorbidities.

Section 3 presents behavioral, psychopharmacologic, and psychotherapeutic treatment approaches that are evidence-based components of a treatment plan. Psychological interventions have become commonly employed and generally accepted alternatives or adjuncts to traditional medical, surgical, and rehabilitation approaches to the management of persistent pain and pain-related disability. This section begins with a broad discussion of the role of psychological interventions in the context of pain management, including a review of the evidence and a discussion of contemporary practice and policy related to the application of these interventions. General issues such as the incorporation of psychological interventions in the context of multidisciplinary programs, strategies for enhancing motivation to engage in such treatments, and integration of psychological and psychopharmacologic approaches are reviewed. Subsequent chapters will describe specific treatment approaches and methods (e.g., self-regulatory, behavioral, cognitive-behavioral, supportive) as well as the application of psychological interventions for specific painful conditions.

Many psychotropic drugs have effects on central pain perception. They also have powerful actions on the psychological state of the individual who suffers from chronic pain. Conversely, chronic pain can precipitate a variety of psychiatric disorders, including depressive disorders and anxiety disorders. This section of the book reviews the major classes of psychotropic drugs that have an effect on pain perception and tolerance and the related acute psychiatric syndromes that can result from having a pain disorder. Antidepressant agents and antianxiety agents are a major focus of this section. Opiate and non-opiate analgesics are reviewed, with particular attention to their psychotropic effects and addictive liability. The mechanism of action and evidence-based therapeutic use of these classes of drugs to treat pain syndromes are covered. The management of patients taking these drugs in a way that minimizes the risk of addiction is presented.

Section 4 presents evidence-based psychological and psychopharmacologic interventions for specific pain syndromes. This section develops a series of evidence-based treatment guidelines that combine the therapeutic approaches developed earlier in the book. Specific pain syndromes that are discussed in individual chapters include pain of spinal origin (including radicular pain, zygaphysial joint disease, discogenic pain), myofascial pain, neuropathic pain, headache and orofacial pain, rheumatological aspects of pain, complex regional pain syndromes, visceral pain, cancer pain (including palliative and hospice care), acute pain, and pain in special populations (such as the elderly, pediatric patients, pregnant women, physically disabled, and the cognitively impaired).

The book concludes with chapters on new research directions for the interdisciplinary treatment of pain, policy issues, and ethical issues in pain treatment. Scientifically sound clinical studies of new cognitive and behavioral treatments of pain are a lively area of research at the present time. Double-blind studies of psychopharmacological drugs used in the treatment of pain are also becoming much more frequent.
Introduction

Pain can be a blessing or a curse. It serves as a built-in warning system that alerts us to injury or disease so it is essential for our health and survival [1]. But if pain persists beyond the usual period of healing, it serves no useful purpose, causes untold physical and emotional suffering, and costs the healthcare system and the economy billions of dollars each year [2–4].

In 2003, the American Productivity Audit reported that lost productive time from common pain conditions such as headache, back pain, arthritis, and other musculoskeletal problems alone cost $61.2 billion dollars [5]. Ironically, federal dollars dedicated to pain research do not measure up. In 2003, less than 1% ($26 million) of all funding from the National Institutes of Health (NIH) was allocated to research having a primary emphasis on pain [6]. Although funding increased in 2004, it declined over the next three years. The nation's investment in pain research is “seriously out of scale with the impact of pain on the nation's healthcare burden” [7]. The Patient Protection and Affordable Care Act (often referred to as the healthcare reform bill), which signed into law in March 2010 [8], includes several provisions that should begin to correct this imbalance. It adds a new section to the Public Health Service Act which establishes a Pain Consortium at the NIH that encourages the Director to expand an aggressive program of pain research, to track advances in federally-funded pain research, identify critical research gaps, and coordinate research across NIH and other agencies, e.g., the Veterans Administration and Department of Defense.

One hundred and fifty years ago, surgeons viewed pain as a sign of a patient’s vitality and felt it critical to healing [9]. We now know that unrelieved acute post-operative pain delays healing, is a leading cause of delayed discharge and readmission to the hospital, and a risk factor for the development of chronic pain [10–12]. Fear of uncontrolled post-surgical pain is among the primary concerns of many patients about to undergo surgery [11]. Their fears appear to be justified as studies continue to document poor pain control for post-operative and trauma pain. More than 73 million surgeries are performed annually in the USA [13]; 70% of those are performed in the ambulatory care setting. One survey showed that about 80% of adults experienced pain after surgery; 86% of those had moderate, severe, or extreme pain [13].

Pain is also one of the most common and perhaps the most feared symptom of cancer [14]. Almost a million and a half new cases of cancer are diagnosed each year, and more than half a million die of the disease [15]. Persons experience pain from their cancer and also from various surgeries, and diagnostic and treatment procedures. One-third of cancer patients have pain at the time of their diagnosis; 65% of patients with advanced, metastatic, and/or terminal disease report pain [16]; more than one-third of survivors “cured” of their cancer have pain, one-third of those experience moderate to severe pain [17, 18]. As cancer evolves into a chronic illness, pain management challenges in the oncologic patient increase in complexity [19]. Survivors whose disease is in remission may be at special risk for undertreatment and become victims of the increasing debate about the appropriateness of opioid therapy for chronic non-cancer pain [20–22].

Many more millions of Americans are affected by chronic non-cancer pain [2–4, 23]. A 2006 report from the Centers for Disease Control found that 26% of Americans 20 years or older (or an estimated 76.5 million) had experienced a pain problem that persisted for more than 24 hours; 42% of those said the problem persisted for more than a year [24]. A diary-survey...
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method used to study pain in a representative sample of the population found more pain and a greater severity of pain in persons with lower incomes [25]. Socioeconomic disadvantage is consistently associated with an increased risk of pain [26]. “The undertreatment of chronic pain is not only a medical issue, but also as detailed above, an economic one that has a tremendous ripple effect as it touches not only those who have pain, but their families, employers and communities” (P. Cowan, Executive Director, American Chronic Pain Association, personal communication).

The good news is that pain management has become a priority in many aspects of healthcare in the USA. In fact, Congress declared this first decade of the twenty-first century to be the Decade of Pain Control and Research [27]. There has been growing recognition that the undertreatment of pain is a major public health problem; this has stimulated the development of numerous clinical practice guidelines [28], countless educational programs, and policy statements that acknowledge the importance of effective pain control [29, 30].

In 1999, the US Department of Veterans Affairs (VA) launched an ambitious program called “Pain as a Fifth Vital Sign” to encourage assessment of pain in all patients in all of its medical facilities [31]. Pain assessment and management standards became part of the Joint Commission’s accreditation process in 2001 [32–34], and standards for palliative care were drafted as part of the Commission’s Healthcare Services Certification Programs [35] in 2008. The Centers for Medicare and Medicaid Services (CMS) initiated a pain quality improvement program for the nation’s long-term care facilities in 2002 [36]. Public reporting on the Nursing Home Compare web site is a cornerstone of CMS’s continued efforts to improve the quality of care in long-term care [37]. More recently the VA implemented a stepped care model to provide a single standard of care for veterans as they move through that system [38, 39].

In addition, members of the pain community, state legislators, and federal and state regulators have worked collaboratively to remove uncertainty about the use of opioid analgesics and encourage better pain management. The emphasis has been on promoting balanced policies that prevent diversion and abuse of opioid analgesics while assuring their availability to patients who need them for pain control [40]. The Federation of State Medical Boards released a Model Guideline [30] (now a Model Policy [41]) on the Use of Controlled Substances for the Treatment of Pain to emphasize that treating pain with controlled substances is an integral part of the practice of medicine.

Even though substantial efforts have been made to improve the practice of pain management, multiple challenges continue to impede progress. Sandra Johnson, lawyer and ethicist, has asserted “that the time during which easy changes in policy or education could revolutionize the treatment of patients in pain has passed. We are now operating in what appears to be a complex ecosystem that supports ambivalence, denial, and suspicion of the circumstances of patients in pain and of those who treat them” [42]. This writer takes a more positive view but does believe that the sense of euphoria which pervaded some persons in the pain world a decade ago has been replaced by sobering uncertainties, which must be addressed if we are to ensure that persons obtain relief of their pain.

Knowledge of the basics of pain management strategies is essential for dealing with those uncertainties. This chapter provides an overview of the basic elements underlying effective pain control. It describes the common types of pain and gives a brief review of assessment and treatment strategies, which are subjects discussed in depth in subsequent chapters. There are also references to the medical, legal, and ethical challenges that have arisen as a result of greater demands for better pain control.

Quality pain control is everyone’s responsibility

Despite the ubiquity of pain, the evidence for its inadequate treatment, and realization of the devastating physical and psychological impact of poor pain control, clinicians often find pain difficult to diagnose and treat [43]. In many cases, the origin of the pain is complex and not easily understood. Some patients have psychological problems that complicate management. In some cases, clinicians have been hesitant to use the full spectrum of available analgesics because of limited familiarity with the drugs and their effects. Opioids, in particular, may raise concerns about regulatory oversight or undue fears that patients will become addicted.

“High quality pain management requires appropriate assessment: screening for the presence of pain; completion of a comprehensive initial assessment when pain is present; interdisciplinary collaborative care planning, including patient and family input;
and appropriate treatment that is multidisciplinary, evidence-based, rational, safe, and cost effective," [44]. Frequent reassessments of patients' responses to treatment are essential in order to identify the need for adjustments in the plan of care, or the adverse effects or futility of a particular treatment plan.

Every member of the healthcare team needs to become familiar with the characteristics of the most common types of pain, how to perform a multidimensional assessment of pain in order to establish a pain diagnosis (or diagnoses), how to collaborate as a member of an interdisciplinary team and engage the patient in an appropriate goal-oriented plan of care, and when and to whom to refer when specialty care is required. In the words of Deming, the guru of quality improvement: "Quality is everyone's responsibility."

What is pain?
The International Association for the Study of Pain defines pain as: "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" [45, 46]. Pain is a conscious experience that results from brain activity in response to a noxious stimulus and engages the sensory, emotional, and cognitive processes of the brain. We can distinguish two dimensions of pain: sensory-discriminative and affective-emotional [47–49]. The former represents the ability to localize a stimulus in space and time and assess its intensity, and the latter consists of evaluation and interpretation of the meaning of the pain experience. Some patients have a dominant affective-emotional component and present with increased pain behaviors, anxiety, and depression that must be treated simultaneously in order to achieve effective pain control.

There is no standard laboratory test or diagnostic procedure that can identify or measure pain. There is no “painometer.” All pain is subjective. Furthermore, each person responds individually to a painful stimulus. We learn the meaning of the word through experiences related to injury in early life. Pain is always unpleasant and therefore an emotional experience. Margo McCaffery, nurse educator and advocate, wrote 30 years ago that "pain is whatever the experiencing persons says it is, existing whenever he says it does" [50]. Healthcare professionals must accept the patient's report of pain.

For a variety of reasons, each individual responds differently to pain and to the strategies that are used to provide relief. Emotional factors, cultural and spiritual values and beliefs shape the meaning of the pain experience as well as expectations for pain relief. Previous experiences with pain management shape views about pain. Genetic differences shape our responses to a painful stimulus as well as to drug and non-drug treatments [51]. Assessment and treatment must be tailored to individual needs and responses. Therein lie opportunities and significant challenges.

Although self-report is the single most reliable indicator of pain, there will be times when patients cannot communicate. In those cases, one needs to consider the person's underlying disease state and assume pain is present if those diseases or conditions are likely to cause pain. There may be physical or behavioral changes that suggest pain is present. Some, such as limping or groaning, are obvious indicators; others may be more subtle. Family members or caregivers often know how an individual usually expresses pain and can provide important insights into a patient's pain state.

Classification of pain
There are many ways to categorize pain; the categories may overlap. Pain can be classified in terms of its intensity (mild, moderate, or severe); duration (acute or chronic); pathophysiology (nociceptive, inflammatory, neuropathic, or mixed); or according to type or syndrome (cancer, fibromyalgia, migraine, sickle cell). Classification of pain is essential to guide assessment and treatment approaches, and to establish the goals of therapy. For example, non-opioid analgesics provide relief of mild, but not severe pain. Relief of cancer pain may require a variety of therapies including, but not limited to, surgery, radiotherapy, and analgesics; fibromyalgia is treated with exercise and antidepressants, although some specific drugs for fibromyalgia have been approved recently; an acute migraine headache may be aborted by a triptan, a specific antimigraine drug. Drug and non-drug therapies are used to prevent migraine attacks. Sickle cell pain usually requires aggressive therapy with opioid analgesics. Non-pharmacologic therapies, both physical and behavioral, are essential for the management of most types of pain.

A caution about the classification of pain: some identify pain not due to visible signs of disease or injury as psychogenic pain [52, 53]; this writer believes this term stigmatizes persons and invalidates their report of pain and recommends that it not be used. While

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psychological factors contribute to the pain experience, particularly when pain is chronic [54], patients should be assured that their pain is real – it is not just a figment of their imagination.

**Acute vs. chronic pain**

Pain may be classified as acute or chronic on the basis of its temporal characteristics. Many patients have mixed pain problems. Acute pain is associated with strains, sprains, fractures, surgery, diagnostic procedures, or trauma, and has a short time course as it gradually diminishes as healing occurs. Chronic pain may be continuous or intermittent and is arbitrarily defined as pain that lasts longer than 3–6 months. Recurrent acute pain, as occurs with migraine headache or sickle cell disease, falls in the category of chronic pain. Some causes of, or types of, chronic pain include cancer, burns, rheumatoid or osteoarthritis, peripheral neuropathies, fibromyalgia, phantom limb pain, low back pain, and complex regional pain syndrome (CRPS). The terms chronic and persistent are often used interchangeably. Many prefer the term persistent pain as it “may foster a more positive attitude” since chronic pain is a pejorative term that is often associated with negative images and stereotypes [55, 56].

Some persons with stable chronic pain experience acute exacerbations of their pain. These are of two types: pain flares which are transient, usually benign, increases in pain that can last for hours to days, or worsening pain due to disease progression. The term “breakthrough pain” was coined to describe a sudden worsening of pain in persons with cancer and stable chronic pain [55, 56]. The term is now used more broadly to describe any increase in pain in a person with underlying stable chronic pain [57]. Whether the term should be used in that context is open to debate as is the approach to treatment [58].

Obviously, there are major differences between acute and chronic pain in terms of timing, causes, and objective signs. Acute pain is useful as a warning sign; its cause is usually known, it diminishes as healing takes place, and there may be changes in vital signs and/or behaviors. Persons with chronic pain may not "look like" they are in pain; however, vegetative or depressive signs may be present. Chronic pain may spread from one site to other parts of the body with diverse physiological and psychological consequences (e.g., CRPS). It results from structural and functional changes in the nervous system. A genetically vulnerable individual who suffers a physical injury such as an ankle sprain may go on to develop chronic pain. Currently one can not predict which patients undergoing surgery or experiencing trauma are at risk to develop persistent pain, although one group of investigators has claimed that they can identify patients at risk by testing their response to experimental pain [59].

**Physiological vs. pathophysiological pain**

Pain can also be classified as normal (physiological) or abnormal (pathological). Nociceptive (physiological) pain represents a normal response to a noxious stimulus or injury of tissues such as the skin, muscles, visceral organs, joints, tendons, or bones. The sensory experience of acute pain is mediated by a specialized system, called the nociceptive system. It extends from the periphery through the spinal cord, brain stem, and thalamus to the cerebral cortex where the sensation is perceived. Intense noxious stimuli activate a subpopulation of primary sensory neurons called nociceptors. Nociception is the term used to describe the process by which information about a noxious stimulus is conveyed from those nociceptors in the periphery to the brain. It is composed of four processes: transduction, the conversion of noxious stimuli into nerve impulses; transmission, the conduction of nerve impulses from the periphery to the spinal cord and then to the brain; perception, the process by which pain is recognized by a conscious person; and modulation, the process by which the brain dampens or facilitates ascending pain impulses (descending inhibitory or facilitory pathways).

Nociceptive pain is divided into two types: somatic pain arising from the bone, skin, and soft tissues is often described as dull or aching and is well localized, whereas visceral pain caused by obstruction or pressure in hollow organs such as the GI tract or liver capsule is described as pressure-like, deep-aching, or cramping. It is often poorly localized and may be referred to distant dermatomal sites. Nociceptive pain can be acute, such as experienced with a fracture of the femur, or chronic as occurs with arthritis or interstitial cystitis. Continuous activation of nociceptive pathways can lead to complex changes in both the peripheral and central nervous systems. Inflammatory responses to tissue injury can lead to peripheral sensitization (increased excitability of peripheral nociceptors) or central sensitization (increased excitability of spinal cord neurons).

Neuropathic pain is the term applied to pain syndromes that result from pathological changes in the peripheral or central nervous systems. It is described with words such as burning, stabbing,
electric shock-like, numbness, or tingling. There may be allodynia (pain due to a non-noxious stimulus) or hyperalgesia (an exaggerated response to a noxious stimulus); there may also be diminished strength and abnormal reflexes. Three symptoms have been found to be significant predictors: tingling, numbness, and increased pain to touch [60]. Post-herpetic neuralgia, diabetic neuropathy, HIV/AIDS, post-thoractomy, post-mastectomy, and chemotherapy-induced neuropathies are examples of neuropathic pain.

Although neuropathic pain may be treated with a variety of drugs including local anesthetics, antidepressants, antiepileptics, and/or opioids [61], there are no treatments that completely, predictably, and specifically control this type of pain. “Despite the best of care and sequential trials of therapy, pain will remain unrelieved or inadequately relieved in 40–60% of patients suffering from neuropathic pain” [62]. This somber assessment has particular poignancy in the context of our belief that patients have the right to relief of pain [63, 64]. It also calls attention to the need to develop measures to prevent neuropathic pain. An exciting development in this area is the finding that a live attenuated vaccine aimed at boosting immunity to varicella zoster virus (VZV) significantly reduces the incidence of both herpes zoster and post-herpetic neuralgia [65]. Herpes zoster, commonly called shingles, is a distinctive syndrome caused by reactivation of VZV. This reactivation occurs when immunity to VZV declines because of aging or immunosuppression.

Positron emission tomography and functional magnetic resonance imaging have been focused on defining the network of brain structures (the pain matrix) involved in normal physiological pain and investigating the neural basis of chronic pathological pain [66, 67]. Imaging studies have shown that chronic pain is accompanied by significant atrophy in certain brain regions. For example, Apkarian and colleagues have found that patients with chronic back pain showed 5–11% less neocortical gray matter volume than control subjects and that the loss was more severe in the subgroup of these patients with neuropathic pain. May found decreases in regional gray matter in patients suffering from six different pain syndromes: phantom pain, chronic back pain, irritable bowel syndrome, fibromyalgia, and two types of headache [69]. While the alterations were different for the different syndromes, “they overlapped to an astounding extent.”

Principles of assessment

Assessment is the essential first step in pain management [70, Chapter 4]. Without a thorough baseline assessment, it is not possible to develop a rational approach to treatment. Furthermore, frequent re-assessments are essential to evaluate the effectiveness of treatment strategies. A thorough pain history should include location, quality, intensity, temporal characteristics; aggravating and alleviating factors; impact of pain on function and quality of life, the meaning of the pain; past treatments and responses; patient fears, expectations and goals; and associated medical and psychological conditions. A history of drug use is essential and should include prescription and non-prescription medications, and herbal remedies. A pain body diagram completed by a chronic pain patient can provide information about the quality and location of the pain. Different colors can be used to identify the different qualities of pain, e.g., blue for burning, black for numbness, red for stabbing, yellow for aches.

Intensity is one of the most important parameters to be determined. Tools to assess intensity are typically one-dimensional and include visual analog, verbal descriptor, and numeric scales. The visual analog scale is a 10 cm line anchored on one end by “no pain” and at the other end by “pain as bad as it could possibly be.” The patient makes a mark on the line to correspond to the level of his discomfort and the distance from the low end of the scale to the patient’s mark is used as a numerical index of the patient’s pain intensity. Verbal descriptor scales with such terms as mild, moderate, or severe may be useful. Some include the word excruciating. A numeric pain rating scale is appropriate in most clinical settings. The most common is an 11-point scale where 0 = no pain and 10 = worst pain imaginable. Since this is an ordinal scale, a score of 8/10 is not twice as severe as a score of 4/10. A numeric 6-point scale is often used for children. There is also an observational rating scale for children from 2 months to 7 years. “Faces scales” were first developed for young children; now there are variants that may be useful for the elderly; these scales have from six to eight facial expressions that depict a range of emotions. Herr and colleagues have evaluated a number of pain intensity scales for older adults [71].

Always remember that pain is a subjective experience with a different meaning to each person. The pain rating reflects the patient’s interpretation of what that pain means to him/her at that moment; it is a
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combination of the patient's physical discomfort and emotional response to the discomfort. Changes in pain intensity are valuable when measured for single individuals (e.g., before and after a treatment), but they should not be used to compare pain between different individuals. One person's 4/10 might be another's 8/10.

What is a meaningful reduction in pain intensity? Data from clinical trials suggest that about a 30% reduction in pain intensity is meaningful from a patient's perspective, and this is true for persons with acute as well as chronic pain [72]. However, the change in pain intensity that is meaningful to patients increases as the severity of the baseline pain increases: for patients with moderate pain a 35% reduction corresponds to much improvement; a 45% reduction corresponds to very much improvement. For patients with severe pain, the percentage of pain relief must be larger to obtain meaningful degrees of relief [73].

Non-verbal patients, such as those in coma or with dementia or other cognitive impairments, must be assessed for pain by observing body language, movement, autonomic arousal, and non-verbal pain behaviors. Agitation and disturbing or aggressive behavior in non-verbal older adults may be indicative of pain, not surprisingly, analgesic use is less in those with cognitive impairment and in older subjects having impaired abilities to communicate [74].

Remember that chronic pain is a multidimensional phenomenon that can adversely affect a patient's function, quality of life, emotional state, social and vocational status, and general well-being. Therefore, assessment of chronic pain should also be multidimensional. Focus groups of persons with chronic pain identified a total of 19 important aspects of daily life affected by chronic pain: sleep, sex life, employment, home care, relationships, family life, social and recreational activities, emotional well-being, fatigue, weakness, and cognitive functioning [75]: “These findings emphasize the importance of assessing the patient with chronic pain and not just the pain” [76].

Patients need to be reassured that their pain is being taken seriously. A respectful and professional attitude must be maintained. It is always important to believe patients' reports of pain and distress, particularly in the case of patients with chronic non-cancer pain who may have had difficult encounters with previous healthcare professionals, who may have dismissed them as prevaricators or drug seekers: “Even if psychological issues, including addiction, are present, respectful validation of the patient's suffering is invaluable to assessment and will lead to more effective treatment planning” (MM Backonja, personal communication).

Overview of pain management

Many different strategies are employed in managing pain, but a general approach applies to the treatment of any type of pain: identify and eliminate or minimize the cause (if possible), and treat with a combination of pharmacologic and non-pharmacologic therapies. Combine drug and non-drug modalities in a balanced manner that is tailored to the type of pain and the individual.

A host of resources is available to assist with treatment decisions. The American Pain Society (APS) and other professional organizations have published more than a dozen evidence-based guidelines [28]. The APS first released Principles of Analgesic Use in the Treatment of Acute Pain and Cancer Pain in 1987. The 6th edition (fall 2008) provides "updated information on the clinical pharmacology of analgesics and includes a list of nearly 400 resources" [76]. The reader is also encouraged to take advantage of the excellent systematic reviews of various healthcare interventions provided by the Cochrane Collaboration [77]; these are available on their web site at no charge.

Managing acute pain

There have been major advances in the management of acute pain, in particular post-surgical pain, in the past two decades [11, 12, 78-80]. Systemic analgesics (nonopioids, opioids, and adjuvants) are the foundation of multimodal therapy for acute pain, but non-drug methods (patient education, heat/cold, massage, distraction/relaxation, others) are essential as well. Poorly controlled acute pain can result in increased catabolism, increased cardiorespiratory work, immunosuppression, and coagulation disturbances [12]. Ideal management of post-operative pain provides effective pain relief; reduces opioid-related adverse effects (opioids are often a component of treatment), and surgical stress; and decreases morbidity, mortality, and duration of hospital stay. It has been assumed
that multimodal analgesia, the use of a combination of analgesics that work by different mechanisms, would improve post-operative pain control. While multimodal analgesia (use of non-steroidal anti-inflammatory drugs or acetaminophen in combination with opioid analgesics) does have an opioid-sparing effect, there are conflicting reports about whether it does or does not reduce the risk of opioid side effects [11, 81].

Programmable infusion pumps that deliver an opioid intravenously have been in use for more than 25 years; patient controlled analgesia (PCA) devices allow patients to self-deliver opioids on an as-needed basis within dosing parameters set by the physician. Patients are highly satisfied with this method of drug delivery, but unfortunately there is not clear evidence of PCAs superiority over nurse-controlled analgesia [11]. Bear in mind that acceptable nurse-controlled analgesia does not equate to PRN (as needed) administration of meperidine by the IM route, rigid use of standard doses, or unimodal therapy.

Epidural analgesia using local anesthetics and opioids is widely practiced as a component of multimodal therapy; it reduces cardiac, pulmonary, thromboembolic, and renal complications, and provides superior analgesia. It has been reported that epidural analgesia, regardless of analgesic agent, location of catheter placement, and type and time of pain assessment, provides better post-operative analgesia than parenteral opioids [11, 82].

The management of acute post-operative pain may also involve wound infiltration with local anesthetics, peripheral nerve blocks, and the use of adjuvants such as gabapentin and ketamine. Gabapentin reduces opioid requirements and is thought to reduce central sensitization. Many other non-pharmacologic options have been explored as adjuvants to conventional analgesics: acupuncture, music therapy, hypnosis, and transcutaneous electrical nerve stimulation [83].

A growing challenge is the difficulty of managing acute pain in patients who are being treated chronically with opioid analgesics [11, 84, 85]. They may have developed some level of tolerance to these drugs and are at risk of undertreatment and of experiencing withdrawal if they are dosed inadequately. Chronic pain patients undergoing acute surgical procedures generally report elevated pain scores compared with matched controls and consistently require two- to three-fold more opioid [84]. It is important to maintain baseline opioid therapy and to provide adequate additional analgesia peri-operatively. The addition of non-opioid therapy and the use of peripheral and central blocks may be of benefit. The magnitude of opioid tolerance in persons who have been on chronic opioid therapy is difficult to assess, especially because some who have been on high dose opioid therapy may have developed opioid hyperalgesia [11, 85].

Managing cancer pain

In 1986, the World Health Organization introduced the analgesic ladder and provided guidelines to improve the management of cancer pain worldwide [14]. Opioid analgesics are the drugs of choice for the management of the moderate to severe pain associated with cancer. Numerous other therapies are also available, and a variety of strategies have been used to disseminate the knowledge about how to treat cancer pain effectively [86, 87], and yet, as documented at the beginning of this chapter, inadequate treatment continues [17, 18]. Fears and misunderstandings about tolerance, physical dependence, and addiction continue to be barriers [88]. It is incomprehensible that persons who are dying of cancer may not be getting adequate relief of their pain [89]. Where is our sense of moral outrage?

Managing chronic non-cancer pain

Traditional approaches to the treatment of chronic non-cancer pain are based on a biomedical model: pain results from an identifiable injury or disease process. Identify and treat the underlying problem and pain will be relieved. Unfortunately, chronic pain is not likely to be caused by a single factor that can be eliminated by a single therapeutic modality. In fact, there may be no identifiable cause. In most cases of chronic non-cancer pain, multiple mechanisms are at play and the presentation is complex [90, 91]. Physical, psychological, and social factors affect pain perception and modulation, and pain behaviors. The biopsychosocial model is considered the most appropriate conceptual framework for understanding the clinical course of persistent pain and for developing effective treatment strategies [92, 93].

Complete resolution of chronic pain is rarely achieved in spite of comprehensive multidisciplinary pain management, although as stated earlier, a 30% reduction in pain intensity represents a clinically significant improvement for most persons [72]. The purpose of treatment is to relieve pain and to improve function. Functional improvement goals vary from patient to patient: return to work, live independently, enjoy friends and family. A combination of
pharmacologic treatment with educational, behavioral, and physical/rehabilitative therapies provides the most successful approach for patients with chronic non-cancer pain. Physical/rehabilitative therapies may be needed to treat deconditioning and disability, behavioral/psychological treatment to enhance coping and improve mood, and medications to treat underlying mood disorders. Depression and anxiety are common in chronic pain patients and may pre-exist or complicate pain management strategies; their effective treatment may reduce, though not necessarily eliminate, the need for analgesic drugs. It is essential to identify persons with current or past substance abuse disorders or psychiatric issues and refer them to appropriate specialists, to seek a neurology consultation if active/progressive neurological disease is suspected, or a rheumatology consultation if a collagen/vascular disorder or arthritic process is thought to be the source of the pain. Surgical procedures and a variety of interventional approaches may also be critical to the management of chronic pain problems [94, 95].

Multidisciplinary pain centers have been shown to be both therapeutically efficacious and cost-effective relative to conventional medical treatment [2–4]. Yet few such pain centers exist and even if they do, many third-party payers refuse to reimburse such programs. Patients in many healthcare systems and private group practices have limited access to specialty chronic pain services.

Of course, interdisciplinary pain care also occurs in the primary care setting [96]. Several investigators have demonstrated improvements in pain intensity and pain-related function with the use of collaborative approaches [97–99]. A recent study showed that a primary care-based collaborative intervention for chronic pain was significantly more effective than "treatment as usual" and concluded that such an intervention can have positive effects on pain disability and intensity, and on depressive symptoms [100].

This brief overview does not address the multiple challenges that confront the patient with chronic non-cancer pain and the clinician who is dedicated to providing care. Issues of access and payment have been touched on briefly. The reader is strongly encouraged to examine those subjects in greater depth and to review the extensive literature that addresses the role of opioid analgesics in the management of chronic pain as well as the conflicts related to the role of interventional techniques in pain control.

It is critical to understand the basis for the uncertainty and confusion about the role of opioids in the management of chronic non-cancer pain [101]. Their use has increased dramatically in the past 10–15 years in spite of the controversies [102–106]. There is uncertainty about their long-term efficacy and safety with conflicting reports about whether opioid treatment fulfills any of the key outcome goals: pain relief, improved quality of life, and improved function [107]. Concerns have also been raised about their effects on hormonal and immune function, and about the possibility of opioid-induced hyperalgesia [108], which would significantly limit their clinical usefulness. Addiction remains a concern although it is relatively unusual if persons treated with opioids have no history of substance abuse [22]. The APS has recently released Clinical Guidelines for the Use of Chronic Opioid Therapy in Chronic Noncancer Pain which concludes that "opiod analgesics can be effective therapy for carefully selected and monitored patients with chronic non-cancer pain" [109].

Unfortunately, there has been a concomitant increase in misuse and abuse of these drugs [110] and in opioid-related mortality [111]. The Food and Drug Administration recently announced that it will require manufacturers of long-acting opioid formulations to develop comprehensive Risk Evaluation Mitigation Strategies [111]. Any such strategies must be crafted very carefully because they may have the unintentional effect of depriving persons with persistent non-cancer pain of a treatment that may be essential to their quality of life. One would hope that these patients would be approached in the same way as any population with a chronic disease. Unfortunately, that is often not the case, and in many instances concerns about the risks of treatment outweigh consideration of the benefits to the patient’s quality of life. A prominent advocate with an interest in the ethics of pain has written “that the message that has been sent and clearly received by physicians is that their primary responsibility is to help regulators prevent drug diversion and the excessive prescribing of opioid analgesics, not to effectively manage the pain of their patients” [112].

Pain medicine like many aspects of healthcare is fragmented by competing disciplines. This conflict is illustrated by the difference between the philosophies for treating chronic pain espoused by multidisciplinary pain centers and primary care collaborations and the discipline of medicine referred to as interventional pain management. According to the American Society of Interventionalist Pain Physicians: “An interventionalist perceives comprehensive treatment programs as programs with interventional techniques as the