

PRACTICAL MANAGEMENT OF PAIN

Fifth Edition

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*To my family—Juliet, Hazel, Paul, Annalisa, Jonathan, Hubert, and Nathalie.
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Preface

This, the fifth edition of the *Practical Management of Pain*, provides cutting-edge developments in pain medicine and reflects maturity of this medical specialty as it has progressed since earlier editions. As in the previous edition, the Editors represent the specialties of anesthesiology, psychology, and neurology that, together with physical medicine and rehabilitation and psychiatry, provide the core of pain medicine. In addition, we recruited Robert Hurley, MD, PhD, to join us as an editor. Rob brings an added perspective to the book. He is knowledgeable in the pharmacological management of acute and chronic pain, performs interventional techniques, and has conducted basic science pain research.

The current edition retains the format of the previous volume. It includes sections on general considerations, basic aspects, evaluation and assessment, clinical conditions, pharmacologic, psychological, and physical medicine treatments, nerve block techniques, interventional techniques, and pain management in special situations. The topics represent the multidisciplinary nature of pain medicine. Similar to the previous edition, the fifth includes an international group of authors, recognizing the scientific contributions of experts from around the world. We have expanded the number of chapters from 72 to 83 with the new chapters covering ultrasound-guided techniques in regional anesthesiology and pain management procedures. In addition to the suggested reading list, there is an extensive set of references in supplementary materials accompanying the published volume.

This volume is intended for the diverse range of pain clinicians looking for applications in their daily practice, pain researchers seeking extensive background on relevant topics, fellows reviewing for the pain medicine boards, and residents who want a complete discussion of the breadth of the field. Each chapter provides practical applications of the various and diverse acute and chronic pain syndromes. Throughout the volume there are distillations of research on all relevant aspects of pain medicine, including current knowledge of mechanisms involved and strategies for assessing and treating patients with chronic pain.

A project of this magnitude could not come to fruition without the efforts and assistance of a large number of people, and the result is truly a team effort. The contributors took time out of their busy academic, clinical, and administrative responsibilities to prepare their chapters. The editors spent an enormous amount of time finalizing the book. Our publishing team at Elsevier, led by Publishing Manager Michael Houston, Senior Content Developmental Specialist Joan Ryan, and Senior Project Manager Sharon Corell, did an excellent job of developing the book and keeping it on track. On a personal note, it is a delight to work with Michael Houston again as he was Dr. Benzon's executive publisher in the first book that he edited, *Essentials of Pain Medicine*. We hope that you will agree that our collective efforts have resulted in an up-to-date, practical, and comprehensive volume worthy of your attention.

The Editors

The History of Pain Medicine

Winston C.V. Parris | Benjamin W. Johnson, Jr.

History is a distillation of rumor.

THOMAS CARLYLE (1795-1881)

Management of pain, like management of disease, is as old as the human race. In the view of Christians, the fall of Adam and Eve in the Garden of Eden produced for man (and woman) a long life of suffering disease and pain. This one act allegedly set the stage for several disease concepts, including the experience of pain in labor and delivery; the concept that hard work is painful; the notion that blood, sweat, and tears are needed to produce fruit; the introduction of pain and disease to human existence; establishment of the fact that hell and its fires are painful; and the expectation that heaven is pure, delightful, spiritually pleasing, and of course, pain free. In these concepts, pain is viewed as a negative experience and one that is associated with disease, morbidity, and the dying process. Many diseases, including infections, plagues, metabolic disorders (e.g., diabetes mellitus), endocrine disorders, hypertension, and cancer, of course, afflict humankind spontaneously and usually cause significant pain without any wrongdoing, negligence, or irresponsibility on the part of the afflicted person.

As we consider the historical perspective, humans have deliberately and knowingly inflicted on one another many experiences associated with pain—from the earliest wars to the more recent irrational shooting incidents in the Arkansas and Oregon public school systems, from the scourging of Jesus to contemporary strife in the Middle East, the Rwandan genocide, the Irish “religious” fratricide, and the conflicts in Bosnia and the Balkans. All wars, including the great wars, World War I and World War II, the American Civil War, the Korean War, and the Vietnam War, have been associated with untold pain, suffering, and death.

Although we as human beings have not learned from these painful episodes and continue to inflict pain on others, the advances and increasing sophistication of the 21st century have brought about new concepts of disease and the painful states that diseases produce. The social illnesses—venereal diseases; the pulmonary, cardiovascular, and neoplastic consequences of smoking; the trauma associated with automobile accidents; the pathology caused by drug abuse and misuse; and the proliferation of viral illnesses (e.g., acquired immunodeficiency syndrome)—have all contributed further pain and suffering to our lot. Therefore, any review of history and politics, economics, and the social interrelationships of the world is inevitably a review of the history of pain. This chapter focuses on some of the major historical events that have influenced pain, its development, and its management and highlights the important phases that have led to

the current conceptualization of pain and its treatment as an independent specialty in modern medicine.

PAIN AND RELIGION

The early concept of pain as a form of punishment from supreme spiritual beings for sin and evil activity is as old as the human race.¹ In the book of *Genesis*, God told Eve that following her fall from grace she would endure pain during childbirth: “I will greatly multiply your pain in childbearing; in pain you shall bring forth children, yet your desire shall be for your husband and he shall rule over you” (Genesis 3:16). This condemnation led early Christians to accept pain as a normal consequence of Eve’s action and to view this consequence as being directly transferred to them. Thus any attempt to decrease the pain associated with labor and delivery was treated by early Christians with disdain and disapproval. It was not until 1847, when Queen Victoria was administered chloroform by James Simpson² for the delivery of her eighth child, Prince Leopold, that contemporary Christians and in particular Protestants accepted the notion that it was not heretical to promote painless childbirth as part of the obstetric process.

From the Old Testament, Job has been praised for his endurance of pain and suffering. Yet Job’s friends wondered whether these tribulations were an indication that he had committed some great sin for which God was punishing him (Job 5:17). Nonetheless, Job was considered a faithful servant by God and was not guilty of any wrongdoing. In fact, he was described as a man who was “blameless and upright” and one who feared God and turned away from evil.³

In the 5th century, St. Augustine wrote that “all diseases of Christians are to be ascribed to demons; chiefly do they torment the fresh baptized, yea, even the guiltless newborn infant,” thus implying that not even innocent infants escape the work of demons. Today, major typhoons, hurricanes, fires, earthquakes, volcanoes, tsunamis, floods, and droughts destroy hundreds and at times thousands of innocent, defenseless people. One ponders the rationale of such pain and suffering endured by otherwise good people while seemingly ruthless and evil persons apparently triumph and prosper in an atmosphere of luxury and comfort.

This paradox can be discouraging at times but is usually upheld by firm Christian belief. In the 1st century, many people who belonged to the Catholic Church were rebuked and suffered ruthless persecution, including death, because of their belief in Jesus as the Messiah. Some who were subsequently described as martyrs endured their suffering in the

belief that they did it for the love of Christ, and they felt that their suffering identified them with Christ's suffering on the cross during his crucifixion.⁴ This may be the earliest example of the value of psychotherapy as an important modality in managing pain. Thus, many present-day cancer patients with strong Christian beliefs view their pain and suffering as part of their journey toward eternal salvation. This concept has led to several scientifically conducted and government-sponsored studies evaluating intercessory prayer as an effective modality for controlling cancer pain.

To fully appreciate the historical significance of pain, it is important to reflect on the origins of the "pain patient." The word *pain* comes from the Latin word *poena*, which means "punishment." The word *patient* is derived from the Latin word *patior*, meaning "to endure suffering or pain." Thus, it is not too outrageous to appreciate that in ancient days persons who experienced pain were interpreted to have received punishment in the form of suffering that was either dispensed by the gods or offered up to appease the gods for transgressions.⁵

As spinal and epidural modes of anesthesia have developed and the techniques have been refined so that mortality and morbidity from them are negligible, childbirth and delivery are increasingly considered relatively painless in most developed societies. Unfortunately, in many countries neither the personnel nor the technology for obstetric regional analgesia is available, and resources to provide such personnel and technology are inadequate, thus making childbirth a primitively painful and at times disastrous event. The history of anesthesia is full of instances wherein attempts to relieve pain were initially met with resistance and sometimes violence. In the mid-19th century, Crawford Long from the state of Georgia in the United States attempted to develop and provide anesthesia, but contemporary Christians of that state considered him a heretic for his scholarly activity. As a result, he literally had to flee for his life from Georgia to Texas. Although surgical anesthesia was well developed by the late 19th century, religious controversy over its use required Pope Pius XII to give his approval before anesthesia could be used extensively for surgical procedures.⁶ Pope Pius XII wrote, "The patient, desirous of avoiding or relieving pain, may without any disquietude of conscience, use the means discovered by science which in themselves are not immoral."

PAIN AND THE ANCIENT CULTURES

Disease, pain, and death have always been considered undesirable. The principles on which medicine was founded were based on measures to overcome human suffering from disease. Thus pain was usually thought of as either emanating from an injury or originating from the dysfunction of an internal organ or system. Traditionally, pain after physical injury (e.g., a gunshot wound or spear injury) was not considered problematic since as soon as the offending injurious agent was removed or once the consequences of the offending injury were corrected, the patient either recovered rapidly or, on occasion, died.⁷ On the other hand, pain from disease (e.g., the pain of an inflamed gallbladder or ruptured appendix) was regarded with more mystique, and treatment was usually tinged with superstitious tradition. The tribal concept of pain came from the belief

that it resulted from an "intrusion" from outside the body. These "intruders" were thought to be evil spirits sent by the gods as a form of punishment. It was in this setting that the role of medicine men and shamans flourished because these were the persons assigned to treat the pain syndromes associated with internal disease. Since it was thought that spirits entered the body by different avenues, the rational approach to therapy was aimed at blocking the particular pathway chosen by the spirit.

In Egypt, the left nostril was considered the specific site where disease entered. This belief was confirmed by the Papyri of Ebers and Berlin,⁸ which stated that the treatment of headache involved expulsion of the offending spirit by sneezing, sweating, vomiting, urination, and even trephination. In New Guinea it was believed that evil spirits entered via a spear or an arrow, which then produced spontaneous pain.⁷ Thus it was common for the shaman to occasionally purge the evil spirit from a painful offending wound and neutralize it with his special powers or special medicines. Egyptians treated some forms of pain by placing an electric fish from the Nile over the wounds to control the pain.⁹ The resulting electrical stimulation that produced relief of pain actually works by a mechanism similar to transcutaneous electrical nerve stimulation (TENS), which is frequently used today to treat pain.

The Papyrus of Ebers, an ancient Egyptian manuscript, contains a wide variety of pharmacologic information and describes many techniques and recipes, some of which still have validity.⁸ This papyrus describes the use of opium for the treatment of pain in children. Other concoctions for treating pediatric pain have included wearing amulets filled with a dead man's tooth (Omnibonus Ferraruis, 1577) as treatment of teething pain. Although early documents specifically address the management of pain in children, it is unfortunate that even today treatment of pediatric pain is far from optimal. This glaring deficiency was highlighted in 1977 by Eland, who demonstrated that in a population of children 4 to 8 years of age, only 50% received analgesics for postoperative pain.³ The results are even more unsatisfactory for the treatment of chronic pain and cancer pain in children. It is unfortunate that the observations of earlier scholars have been ignored. Two erroneous assumptions—that children are less sensitive to pain and that the central nervous system is relatively undeveloped in neonates—are partially responsible for this deficiency.

Early Native Americans believed that pain was experienced in the heart, whereas the Chinese identified multiple points in the body where pain might originate or might be self-perpetuating.¹⁰ Consequently, attempts were made to drain the body of these "pain points" by inserting needles, a concept that may have given birth to the principles of acupuncture therapy, which is well over 2000 years old.¹¹

The ancient Greeks were the first to consider pain to be a sensory function that might be derived from peripheral stimulation.¹² In particular, Aristotle believed that pain was a central sensation arising from some form of stimulation of the flesh, whereas Plato hypothesized that the brain was the destination of all peripheral stimulation.¹ Aristotle advanced the notion that the heart was the originating source or processing center for pain. He based his hypothesis on the concept that an excess of vital heat was conducted by the blood to the heart, where pain was modulated and perceived.

Because of his great reputation, many Greek philosophers followed Aristotle and embraced the notion that the heart was the center for pain processing.¹³ Another Greek philosopher, Stratton, and other distinguished Egyptians, including Herophilus and Eistratus, disagreed with Aristotle and proposed the concept that the brain was the site of pain perception as suggested by Plato. Their theories were reinforced by actual anatomic studies showing the connections of the peripheral and central nervous systems.¹⁴

Nevertheless, controversies between the opposing theories of the brain and the heart as the center for pain continued, and it was not until 400 years later that the Roman philosopher Galen rejuvenated the works of the Egyptians Herophilus and Eistratus and greatly re-emphasized the model of the central nervous system. Although Galen's work was compelling, he received little recognition for it until the 20th century.

Toward the period of the Roman Empire, steady progress was made in understanding pain as a sensation similar to other sensations in the body. Developments in anatomy and, to a lesser extent, in physiology helped establish that the brain, not the heart, was the center for the processing of pain.¹⁵ While these advances were taking place, simultaneous advances were occurring in the development of therapeutic modalities, including the use of drugs (e.g., opium), as well as heat, cold, massage, trephination, and exercise, to treat painful illnesses. These developments brought about establishment of the principles of surgery for treating disease. Electricity was first used by the Greeks of that era as they exploited the power of the electrogenic torpedo fish (*Scribonius longus*) to treat the pain of arthritis and headache. Electrostatic generators were used in the late Middle Ages, as was the Leyden jar; these developments resulted in the re-emergence of electrotherapy as a modality for managing medical problems, including pain. There was a relative standstill in the development of electrotherapy as a medical modality until the electric battery was invented in the 19th century. Several attempts were then made to revive its use as an effective medical modality, but these concepts did not catch on and were largely used only by charlatans and obscure scientists and practitioners. Throughout the Middle Ages and the Renaissance, debate on the origin and processing center of pain raged. Fortunes fluctuated between proponents of the brain theory and proponents of the heart theory, depending on which theory was favored.

Heart theory proponents appeared to prosper when William Harvey, recognized for his discovery of the circulation, supported the heart as the focus for pain sensation. Descartes disagreed vehemently with the Harvey hypothesis, and his description of pain conducted from peripheral damage through nerves to the brain led to the first plausible pain theory, that is, the *specificity theory*.¹⁶ It is interesting to note that the specificity theory followed Descartes' description by some 2 centuries. Several other theories followed the specificity theory and contributed to the foundation for understanding pain and pain mechanisms.

PAIN AND PAIN THEORIES

The specificity theory, originally proposed by Descartes, was formally revised by Schiff based on animal research. The fundamental tenet of the theory was that each sensory modality,

including pain, was transmitted along an independent pathway. By examining the effect of incisions in the spinal cord, Schiff¹⁶ demonstrated that touch and pain were independent sensations. Furthermore, he demonstrated that sectioning of the spinal cord differentially resulted in the loss of one modality without affecting the other. Further work along the same lines by Bliz,¹⁷ Goldscheider,¹⁸ and von Frey¹⁹ contributed to the concept that separate and distinct receptors exist for the modalities of pain, touch, warmth, and cold.

During the 18th and 19th centuries, new inventions, new theories, and new thinking emerged. This period was known as the Scientific Revolution, and several important inventions took place, including discovery of the analgesic properties of nitrous oxide, followed by the discovery of local anesthetic agents (e.g., cocaine). The study of anatomy was also developing rapidly as an important branch of science and medicine; most notable was discovery of the anatomic division of the spinal cord into sensory (dorsal) and motor (ventral) divisions. In 1840 Mueller proposed that based on anatomic studies, there was a straight-through system of specific nerve energies in which specific energy from a given sensation was transmitted along sensory nerves to the brain.²⁰ Mueller's theories led Darwin to propose the intensive theory of pain,²¹ which maintained that the sensation of pain was not a separate modality but instead resulted from a sensory overload of sufficient intensity for any modality. This theory was modified by Erb²² and then expanded by Goldscheider¹⁸ to encompass the roles of both stimulus intensity and central summation of stimuli. Although the intensive theory was persuasive, the controversy continued, with the result that by the mid-20th century, the specificity theory was universally accepted as the more plausible theory of pain.

With this official, though not unanimous blessing of the contemporary scientific community, strategies for pain therapy began to focus on identifying and interrupting pain pathways. This tendency was both a blessing and a curse. It was a blessing in that it led many researchers to explore surgical techniques that might interrupt pain pathways and consequently relieve pain, but it was a curse in that it biased the medical community for more than half a century into believing that pain pathways and their interruption were the total answer to the pain puzzle. This trend was begun in the late 19th century by Letievant, who first described specific neurectomy techniques for treating neuralgic pain.²³ Afterward, various surgical interventions for chronic pain were developed and used, including rhizotomy, cordotomy, leukotomy, tractotomy, myelotomy, and several other operative procedures designed to interrupt the central nervous system and consequently reduce pain.²⁴ Most of these techniques were abysmal failures that not only did not relieve pain but also on occasion produced much more pain than was previously present. A major consequence lingers today—the notion that pain can be “fixed” by a surgical procedure or other modality.

PAIN AND DISEASE

The cardinal features of disease as recognized by early philosophers included calor, rubor, tumor, and dolor; the English translation is heat, redness, swelling, and pain. One of the important highlights in the history of pain medicine was the

realization that even though heat, redness, and swelling may disappear, pain can continue long after and be unresponsive on occasion to different therapeutic modalities. When pain continues long after the natural pathogenic course of disease has ended, a chronic pain syndrome develops with characteristic clinical features, including depression, dependency, disability, disuse, drug misuse, drug abuse, and of course, “doctor shopping.” John Dryden once wrote, “For all the happiness mankind can gain is not in pleasure, but in rest from pain.” Thus many fatal nonpainful diseases are not as feared as relatively trivial painful ones.

Throughout the ages, physicians and healers have focused their attention on managing pain. Thus in managing cancer, an important measure of successful treatment is the success with which any associated pain is managed. Although many technological advances have been made in medicine, it is only within the past 10 to 20 years that significant strides have been made in dealing with chronic pain as a disease entity per se—one requiring specialized study, specialized evaluation, and specialized therapeutic interventions. As better techniques and more effective methods for evaluation and treatment of pain, especially chronic pain, are developed, management of pain will be considered more complete and an important supplement to the great strides made in other areas of chronic disease management.

PAIN IN THE 20TH CENTURY

General anesthesia was formally discovered by William Morton in 1846; in 1847, Simpson used chloroform to provide anesthesia for the labor pains of Queen Victoria during the delivery of her eighth child, Prince Leopold.⁹ This action helped legitimize the practice of pain relief during childbirth. Heretofore, even the concept of analgesia for the relief of labor pain was considered heretical and unchristian. Around the same time the hollow needle and the syringe were invented. Many local anesthetic agents were also discovered in this era. In 1888, Corning described the use of a local anesthetic, cocaine, for the treatment of nerve pain. Techniques for local and regional anesthesia for both surgery and pain disorders proliferated rapidly.

In 1907, Schlosser reported significant relief of neuralgic pain for long periods with injection of alcohol into damaged and painful nerves. Reports of similar treatment came from the management of pain resulting from tuberculous and neoplastic invasion.²⁵ In 1926 and 1928, Swetlow and White, respectively, reported on the use of alcohol injections into thoracic sympathetic ganglia to treat chronic angina. In 1931, Dogliotti described the injection of alcohol into the cervical subarachnoid space to treat pain associated with cancer.²⁶

One consequence of war has been the development of new techniques and procedures to manage injuries. In World War I (1914-1918), numerous injuries were associated with trauma (e.g., dismemberment, peripheral vascular insufficiency, and frostbite). In World War II (1939-1946), not only peripheral vascular injuries but also phantom limb phenomena, causalgia, and many sympathetically mediated pain syndromes occurred. Leriche developed the technique of sympathetic neural blockade with procaine to treat the causalgic injuries of war.²⁷ John Bonica, himself an army

surgeon during World War II, recognized the gross inadequacy of managing war injuries and other painful states of veterans with the existing unidisciplinary approaches.²⁸ This led him to propose the concept of multidisciplinary, multimodal management of chronic pain, including behavioral evaluation and treatment. Bonica also highlighted the fact that pain of all kinds was being undertreated; his work has borne fruit in that he is universally considered the “father of pain,” and he was the catalyst for the formation of many established national and international pain organizations. The clinic that he developed at the University of Washington in Seattle remains a model for the multidisciplinary management of chronic pain. As a result of his work, the American Pain Society (APS) and the International Association for the Study of Pain (IASP) have been formed, are still active, and continue to lead in pain research and pain management. Bonica’s lasting legacy is his historic volume *The Management of Pain*, first published in 1953.

Anesthesiology as a specialty developed but was still associated with significant mortality and morbidity. Anesthesiology departments were considered divisions of surgery and did not reach full autonomy until after World War II. As a result of the morbidity associated with general anesthesia and because several new local anesthetics were being discovered, regional anesthesia and its associated techniques began to flourish in the United States. Bonica also played a major role in advancing the use of epidural anesthesia to manage the pain associated with labor and delivery. Regional anesthesia suffered a significant setback in the United Kingdom with the negative publicity surrounding the 1954 cases of Wooley and Roe, in whom serious and irreversible neurologic damage occurred after spinal anesthesia. It took 3 more decades to fully overcome that setback and to see regional anesthesia widely accepted as safe and effective in the United Kingdom. Several persons contributed significantly to the development of regional anesthesia, including Corning, Quincke-August Bier, Pitkin, Etherington-Wilson, Barker, and Adriani.

As recent society has developed and science has prospered, the general public has come to consider pain to be unsatisfactory and unacceptable. Consequently, demands have been made that resulted in the development of labor and delivery anesthesia services, acute pain services, and more recently, chronic pain clinics. Bonica’s vision was not only the development of these clinics but also the founding and maintenance of national and international pain organizations to promote research and scientific understanding of pain medicine. As a result, a tremendous amount of research continues, almost quadrupling each year.

An outstanding contribution in the field of research was the development and publication of the *gate control theory* by Melzack and Wall in 1965.²⁹ This theory, built on the pre-existing and prevalent specificity and intensive theories, provided a sound scientific basis for understanding pain mechanisms and for developing other concepts on which sound hypotheses could be developed. The gate control theory emphasizes the importance of both of ascending and descending modulation systems and laid down a solid framework for the management of different pain syndromes. The gate control theory almost single-handedly legitimized pain as a scientific discipline and led not only to many other research endeavors building on the theory but also to the

maturity of pain medicine as a science.³⁰ As a consequence, the APS, the American Academy of Pain Medicine (AAPM), the American Society of Regional Anesthesia and Pain Medicine, the IASP, and the World Institute of Pain (WIP) flourish today as serious and responsible organizations that deal with various aspects of pain medicine, including education, science, certification, and credentialing of members of the specialty of pain medicine.

PAIN AND THE IMPACT OF PSYCHOLOGY

The history of pain medicine would be incomplete without acknowledging the noteworthy contributions of psychologists. Their influential research and clinical activities have been an integral part of a revolution in conceptualization of the pain experience.³¹ For example, in the early 20th century the role of the cerebral cortex in the perception of pain was controversial because of a lack of understanding of the neuroanatomic pathways and the neurophysiologic mechanisms involved in pain perception.^{32,33} This controversy largely ended with introduction of the gate control theory by Wall and Melzack in 1965.²⁹ The gate control theory has stood the test of time in that subsequent research using modern brain-imaging techniques such as positron emission tomography, functional magnetic resonance imaging, and single-photon emission computed tomography has also described the activation of multiple cortical and subcortical sites of activity in the brain during pain perception. Further elaboration of the psychological aspects of the pain experience includes the three psychological dimensions of pain: sensory-discriminative, motivational-affective, and cognitive-evaluative.³⁴

Psychological researchers have greatly advanced the field of pain medicine by reconceptualizing both the etiology of the pain experience and the treatment strategy. Early pain researchers conceptualized the pain experience as a product of either somatic pathology or psychological factors. However, psychological researchers have convincingly challenged this misconception by presenting research that illustrates the complex interaction between biomedical and psychosocial factors.³⁵⁻³⁷

This biopsychosocial approach to the pain experience encourages the realization that pain is a complex perceptual experience modulated by a wide range of biopsychosocial factors, including emotions, social and environmental contexts, and cultural background, as well as beliefs, attitudes, and expectations. As the acutely painful experience transitions into a chronic phenomenon, these biopsychosocial abnormalities develop permanency. Thus, chronic pain affects all facets of a person's functional universe, at great expense to the individual and society. Consequently, logic dictates that this multimodal etiology of pain requires a multimodal therapeutic strategy for optimal cost-effective treatment outcomes.^{38,39}

Additional contributions from the field of psychology include therapeutic behavioral modification techniques for the management of pain. Such techniques as cognitive behavioral intervention, guided imagery, biofeedback, and autogenic training are the direct result of using the concepts presented in the gate control theory. In addition, neuromodulatory therapeutic modalities such as TENS,

peripheral nerve stimulation, spinal cord stimulation, and deep brain stimulation are also logical offspring of the concepts presented in the gate control theory.

Evaluation of candidates for interventional medical procedures is another valuable historical contribution from the field of psychology. Not only is the psychologist's expertise in the identification of appropriate patients valuable for the success of therapeutic procedural interventions for the management of pain, but the psychologist's expertise is also helpful in identifying patients who are not appropriate candidates for procedural interventions. Thus, psychologists have contributed positively toward the cost-effectiveness and utility of diagnostic and therapeutic pain medicine.

PAIN AND PAIN INSTITUTIONS

THE INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN

The IASP is the largest multidisciplinary international association in the field of pain. Founded in 1973 by John J. Bonica, MD, the IASP is a nonprofit professional organization dedicated to furthering research on pain and improving the care of patients experiencing pain. Membership is open to scientists, physicians, dentists, psychologists, nurses, physical therapists, and other health professionals actively engaged in pain and to those who have special interest in the diagnosis and treatment of pain. The IASP has members in more than 100 national chapters.

The goals and objectives of the IASP are to foster and encourage research on pain mechanisms and pain syndromes and to help improve the management of patients with acute and chronic pain by bringing together scientists, physicians, and other health professionals of various disciplines and backgrounds who have interest in pain research and management. Goals of the IASP also include mandates to promote education and training in the field of pain, as well as to promote and facilitate the dissemination of new information in the field of pain. One of the instruments of dissemination is sponsorship of the journal *Pain*. In addition, the IASP promotes and sponsors a highly successful triennial world congress, as well as other meetings. The IASP encourages the development of national chapters for national implementation of the international mission of the IASP. In addition, the IASP encourages the adoption of a uniform classification, nomenclature, and definition of pain and pain syndromes. Development of a uniform records system in regard to information related to pain mechanisms, syndromes, and management is also a stated goal of the IASP, and education of the general public on the results and implications of current pain research is another mission of the IASP.

The IASP has partnered with the World Health Organization in providing guidelines for assessment and management of chronic pain, especially in developing countries. Cancer pain awareness and its management have been noteworthy contributions of the IASP.

Special interest groups (SIGs) within the IASP have successfully promoted research, understanding, education, and enhanced pain management of the particular special

interest. Areas of interest include pain in children, neuropathic pain, herbal medicine, and cancer pain, among others. The IASP also promotes and administers Chronic Pain Fellowship programs for deserving candidates all over the world.

THE AMERICAN PAIN SOCIETY

Spurred by burgeoning public interest in pain management and research, as well as by formation of the Eastern and Western USA Chapters of the IASP, the APS was formed in 1977 as a result of a meeting of the Ad Hoc Advisory Committee on the Formation of a National Pain Organization. The need for a national organization of pain professionals was realized as growth of the IASP continued. The APS became the first national chapter of the IASP and has constituent regional and state chapters. The APS has its own journal, *The Journal of Pain*, and holds national meetings. Its main function is to carry out the mission of the IASP on a national level.

COMMISSION ON THE ACCREDITATION OF REHABILITATION FACILITIES

As pain clinics developed, it became clear that there was a need for credentialing, not only of pain centers and pain clinics but also of pain clinicians. In 1983, the Commission on Accreditation of Rehabilitation Facilities (CARF) was the first to offer a system of accreditation for pain clinics and pain treatment centers. The CARF model was based on the rehabilitation system, and it quickly became clear that the orientation of the CARF would be physical and psychosocial rehabilitation of patients suffering pain, in contrast to modality treatment to reduce pain sensation. CARF standards mandated that multidisciplinary pain management programs offer medical, psychological, and physical therapy modalities for the management of pain. Pain clinicians were not accredited by CARF, and it quickly became apparent that one could have an accredited pain center without having accredited pain clinicians. The CARF model gained modest acceptance among insurance carriers and third-party payers, primarily because of its emphasis on accountability and program evaluation. Its major goals included such objective measures as increased physical function, reduced intake of medication, and return-to-work issues.

THE AMERICAN ACADEMY OF PAIN MEDICINE

As CARF gained prominence, many pain clinicians realized that neither CARF nor the APS completely met their practice and professional needs. Furthermore, it became obvious that there was a major deficiency in evaluating the competence of pain physicians in that there were no uniform standards for training and credentialing of these pain clinicians. Thus in 1983, at a meeting of the APS in Washington, DC, a group of physicians (of whom chapter author Winston Parris was privileged to be a member) formed the American Academy of Algology (the term *algology* is derived from the words *algos* [Greek for “pain”] and *logos* [Greek for “study”]). The name was changed 2 years later to the AAPM, a name that is more acceptable in mainstream medicine.

This academy was formed to meet the needs and aspirations of pain physicians in the United States. Its major focus was to address the specific concerns of pain physicians and to enhance, authenticate, develop, and lead to the credentialing of pain medicine specialists. As a medical specialty society, the academy is involved in education, training, advocacy, and research in the specialty of pain medicine. The practice of pain medicine is multidisciplinary in approach and incorporates modalities from various specialties to ensure comprehensive evaluation and treatment of patients with pain. The AAPM represents the diverse scope of the field through membership from a variety of origins, including such specialties as anesthesiology, internal medicine, neurology, neurologic surgery, orthopedic surgery, psychiatry, and psychology. Goals of the AAPM include the promotion of quality care of both patients experiencing pain as a symptom of a disease and patients with the primary condition of pain through research, education, and advocacy, as well as advancement of the specialty of pain medicine.

As we enter the managed care era, it is clear that issues such as reimbursement, contract negotiations, fee scheduling, practice management, mergers, acquisitions, and other business-related matters are becoming increasingly important to pain practitioners. The political and business arms of the AAPM are becoming instrumental in helping guide physicians through the murky waters of managed care and pain medicine.

In an attempt to provide credible credentialing in pain medicine, the AAPM sponsored the American College of Pain Medicine (ACPM), which organized, developed, and administered the first credentialing examination in 1992. Successful candidates received the Fellowship of the American College of Pain Medicine. In the process of attempting to receive recognition of the American Board of Medical Specialties (ABMS), the name was changed on the recommendation of the ABMS to the American Board of Pain Medicine (ABPM).

Since the development of AAPM, most of the organization's goals have been met:

1. Successful lobbying for a seat for pain medicine in the House of Delegates of the American Medical Association.
2. Successful establishment of a credentialing body, the ABPM (formerly the ACPM), which offers annual credentialing examinations for eligible physicians. Among the many criteria, the minimum criterion is that candidates be ABMS-certified in their primary specialty.
3. Establishment of *The Clinical Journal of Pain*, which initially served as the official journal of the AAPM and has now been replaced by the journal *Pain Medicine*.

Additional goals include an attempt to establish uniform practice parameters and outcome measures for different pain modalities.

THE AMERICAN BOARD OF PAIN MEDICINE

The ABPM is the examination division of the AAPM and serves the public by improving the quality of pain medicine through certification of pain specialists. It evaluates candidates who voluntarily appear for examination after a credentialing process and certifies them as *Diplomates in Pain Medicine* if they successfully pass the examination process.

This mission serves the public by helping ensure that physicians passing the examination have an approved level of expertise and currency of knowledge in pain medicine. More than 2000 physicians have become diplomates of the ABPM.

THE AMERICAN SOCIETY OF REGIONAL ANESTHESIA AND PAIN MEDICINE

The American Society of Regional Anesthesia (ASRA) is the preeminent society on regional anesthesia. The society is based in the United States; other societies on regional anesthesia are based in Europe, Asia, and Latin America. Cognizant of the fact that anesthesiologists account for the majority of pain medicine practitioners and interventional pain physicians and perform translational and clinical research, the ASRA started another annual meeting dealing exclusively with pain medicine. The annual meeting of the ASRA that deals with regional anesthesia is held in the spring, whereas its annual meeting on pain medicine is held in the fall. To better fulfill its mission, the ASRA has changed its name to the American Society of Regional Anesthesia and Pain Medicine and the name of their highly cited journal, *Regional Anesthesia*, to *Regional Anesthesia and Pain Medicine*. This journal is the official publication of the American, European, Asian and Oceanic, and Latin American Societies of Regional Anesthesia.

THE AMERICAN SOCIETY OF INTERVENTIONAL PAIN PHYSICIANS

The American Society of Interventional Pain Physicians (ASIPP) is a national organization that represents the interests of interventional pain physicians in the United States. The society was founded in 1998 by Dr. Laxmaiah Manchikanti and associates for the purpose of improving the delivery of interventional pain management services to patients across the United States, whether in hospitals, ambulatory surgical centers, or medical offices. The ASIPP has an active political action committee that has been instrumental in achieving numerous legislative victories benefiting its constituents and their patients. Goals of the ASIPP include the preservation of insurance coverage, coverage for interventional pain procedures, advancement of patient safety, advancement of cost-effectiveness, and establishment of accountability in the performance of interventional procedures. Also included in the goals of the ASIPP are the pursuit of excellence in education in interventional pain management, improvement of practice management, enhancement of regulatory compliance, and elimination of fraud and abuse. The ASIPP journal is indexed and called *Pain Physician*.

THE AMERICAN ACADEMY OF HOSPICE AND PALLIATIVE MEDICINE

The American Academy of Hospice and Palliative Medicine (AAHPM) was founded in 1988 to advance the specialty of hospice medicine in the United States. Goals of the AAHPM include providing education and clinical practice standards, fostering research, facilitating personal and professional development, and sponsoring public policy advocacy for the terminally ill and their families. The academy's philosophy includes the belief that the proper role of the physician is

to help the sick, even when cure is not possible. In addition, the AAHPM aims to help patients achieve an appropriate and easy passage to death as one of the most important and rewarding services that a physician can provide. The academy endorses the philosophy that the medical profession should attend to all the needs of the dying patient and family and should encourage and promote patient autonomy.

THE AMERICAN ACADEMY OF OROFACIAL PAIN

The American Academy of Orofacial Pain (AAOP) is an organization of health care professionals dedicated to the alleviation of pain and suffering through education, research, and patient care in the field of orofacial pain and associated disorders. Goals of the AAOP include the establishment of acceptable criteria for the diagnosis and treatment of orofacial pain and temporomandibular disorders, sponsorship of annual meetings and a medical journal, and encouragement of the study of orofacial pain and temporomandibular disorders at undergraduate and postgraduate levels of dental education.

THE AMERICAN ACADEMY OF PAIN MANAGEMENT

The American Academy of Pain Management (AAP Management), founded in 1988, is an inclusive interdisciplinary organization serving clinicians who treat people with pain through advocacy and education and by setting standards of care. AAP Management is open to a diverse group of pain clinicians and emphasizes inclusivity of all health care specialties. The organization boasts a large, diverse membership and an online University of Integrated Studies that offers graduate-level online courses for health practitioners. In addition, various levels of pain credentialing are available, depending on the level of education of the student or practitioner.

AMERICAN SOCIETY FOR PAIN MANAGEMENT NURSING

Founded in 1990, the American Society for Pain Management Nursing (ASPMN) is an organization of professional nurses dedicated to promoting and providing optimal care of individuals with pain through education, standards, advocacy, and research. Their goals include providing access to specialized care for patients experiencing pain, providing education of the public regarding self-advocacy for their pain needs, and providing a network for nurses working in the pain management field. This society also sponsors educational conferences and is formulating a means of adding compensational value to the specialty of pain management nursing. The ASPMN has published a number of scholarly position papers regarding best-practice nursing standards for such situations as male infant circumcision, procedural analgesia and sedation, patients who are unable to self-report pain complaints, and others.

THE NATIONAL HEADACHE FOUNDATION

Founded in 1970, the National Headache Foundation (NHF) works to create an environment in which headaches are viewed as a legitimate health problem. Goals of the NHF

include promotion of research into the causes and treatment of headache and education of the public regarding the legitimacy of headache as a biologic disease.

THE WORLD INSTITUTE OF PAIN

The WIP is an international organization that aims to promote the best practice of pain medicine throughout the world. Its goals are to educate and train personnel of member pain centers by the use of local hands-on training international seminars and exchange of clinicians. Updating member pain centers with state-of-the-art pain information via newsletters, scientific seminars, and journal and book publications is an additional goal. One of the most important goals of the WIP is to develop an international examination process for testing and certifying qualified interventional pain physicians. After showing proficiency in both general pain knowledge and safe performance of interventional procedures, successful candidates are awarded the designation of *Fellow of Interventional Pain Practice* (FIPP). The journal of the WIP, *Pain Practice*, is indexed and has a very respectable initial impact factor.

THE WORLD SOCIETY OF PAIN CLINICIANS

The World Society of Pain Clinicians (WSPC) is an international organization whose goals are to bring together clinicians with a common interest in the treatment of pain. Additional goals are to stimulate education and learning in the field of pain and to encourage dissemination of information on pain throughout the world. The WSPC also endorses and encourages auditing and scientific research on all aspects of pain, especially treatment. The WSPC sponsors a biannual international congress on the clinical aspects of pain and has its own journal, *Pain Clinic*.

THE INTERNATIONAL SPINE INTERVENTION SOCIETY

The International Spine Intervention Society (ISIS) is a society of physicians interested in the development, implementation, and standardization of percutaneous techniques for precision diagnosis of spinal pain. The organization sponsors forums for exchange of ideas, encourages research undertaking, and holds public lectures. The mission of the ISIS includes consolidation of developments in diagnostic needle procedures, identification and resolution of controversies, public dissemination of developments, and recommendation of standards of practice based on scientific data.

THE INTERNATIONAL NEUROMODULATION SOCIETY

Founded in 1989, the International Neuromodulation Society (INS) is a multidisciplinary international society that promotes therapeutic neuromodulation at a clinical and scientific level. The primary means of exchanging knowledge consist of regular scientific meetings and the journal *Neuromodulation*. The first national chapter of the INS was the American Neuromodulation Society.

AMERICAN PAIN FOUNDATION

Founded in 1997 by three past presidents of the APS, the American Pain Foundation (APF) was an independent, nonprofit, grassroots organization serving people with pain through information, advocacy, and support. Its goals included serving as an information clearinghouse for people with pain, promoting recognition of pain as a critical health issue, and advocating for changes in professional training regulatory policies and health care delivery systems to ensure that people with pain have access to proper medical care. The APF was the first pain organization specifically formed to serve the interests of people with diverse disorders associated with the presence of significant pain. Regrettably, the organization was dissolved in early 2012 because of financial difficulties.

THE NATIONAL PAIN FOUNDATION

Founded in 1998, the National Pain Foundation (NPF) seeks to advance the recovery of persons in pain through education, information, and support. The NPF empowers patients by helping them become actively involved in the design of their treatment plan. The organization's website has interactive features that encourage patients to identify the information that they need to manage their pain in the most understandable way. The NPF strives to fill the gap in the understanding, awareness, and accessibility of pain treatment options.

PAIN AND THE HOSPICE MOVEMENT

Hospice is a medieval term representing a welcome place of rest for pilgrims to the Holy Land. The concept of hospice dates back to the reign of Emperor Julian the Apostate, when Fabiola, a Roman matron, created a place for sick and healthy travelers and cared for the dying.⁴⁰ Hospitals in general were regarded as Christian institutions, and in medieval times most hospitals were used as hospices and vice versa.⁴¹

During the 11th century, several hospices were based in and operated by monasteries. The 17th century Catholic priest St. Vincent DePaul founded the Sisters of Charity in Paris as a home for the poor, the sick, and the dying. St. Vincent DePaul's work for the poor and the sick created a significant impact not only on the Catholic Church but also on other contemporary religions. The Protestant pastor Fliedner was so influenced that he founded Kaiserwerth 100 years later. Nuns from the Sisters of Charity and Kaiserwerth accompanied Florence Nightingale to Crimea to care for wounded soldiers and other citizens who were either sick or dying.⁴²

In 1902, the Irish Sisters of Charity founded St. Joseph's Hospice, which was staffed by Cecily Saunders 50 years later. Dr. Saunders was the first full-time hospice medical officer, and she was regarded as the founder and medical director of St. Christopher's Hospice in England. She was initially trained as a nurse and served in World War II. After becoming injured, she received training as a medical social worker. She subsequently developed a keen interest in terminal cancer patients and underwent training in medical school to become a physician. She emphasized the

importance of taking patients at their word during pain assessment and of scheduling the dosing of opioids on a time-contingent basis as compared with an as-needed dosing schedule. She also advocated the need for frequent pain assessment to effectively manage cancer patients' pain. In addition, she sought to convince the medical community that it was totally unnecessary and inhumane for cancer patients to die in pain.⁴³ For all her efforts and leadership, she is regarded as the “mother of palliative care” and was knighted for her contributions to the hospice movement and care of dying cancer patients. Dame Saunders' views and works are widely taught in medical and nursing schools today and form the basis of palliative care.

PAIN AND THE FUTURE

Pain medicine has come a long way. A review of the history of pain demonstrates that until the time of Bonica, pain management was considered to be unimodal and unidisciplinary and was largely managed haphazardly and without any clear structural organization. Today, new drugs, innovative techniques, and creative procedures have expanded the scope of pain medicine. In addition, new research is contributing daily to modern concepts of pain and its management; these concepts are having positive effects on the development of pain medicine. Evidence-based guidelines on neuropathic pain by distinguished groups such as the IASP NeuroP SIG, European Federation of Neurological Sciences, and Canadian Pain Society have been published.

The contributions of the IASP, WIP, WSPC, APS, AAPM, ASRA, and the many other international, national, regional, state, and local organizations devoted to pain and pain management are all having a significant impact on the dissemination of knowledge, promotion of research, and realization of networking on local, national, and international levels. Pain practitioners and investigators are no longer isolated, and a flurry of published manuscripts and textbooks now cover a wide array of topics on pain medicine. Credentialing is well on its way, and two credible organizations are responsible for credentialing pain physicians in the United States. They include the diploma offered by the ABPM and the Certificate of Added Qualification by the American Board of Anesthesiology. Diplomas are offered by examination. In addition, the WIP offers a FIPP certification by examination.

With the recent trend of adverse changes in the global economy, including changes in medical economics, such as the realities created by managed care and the different health maintenance organizations, pain medicine has had to redirect its strategies for effective delivery and fair reimbursement for services rendered. These developments have also spawned new health care provider relationships and payment models for more cost-effective delivery of pain evaluation and treatment services. Many pain-oriented SIGs are dealing with these issues, and it is clear that the scientific community concerned with pain must develop reliable and reproducible outcome measures to maintain high quality, credibility, integrity, and competence in the management of chronic pain.

To this end, training of pain specialists is being given serious consideration, and a matching program for pain medicine fellowship positions is on the horizon. It is likely that in addition to the current 1-year pain medicine fellowships,

attempts will be made to establish residencies in pain medicine. It is clear that in addition to offering these post-graduate measures, administrators of medical schools must re-evaluate their educational programs and make their curricula more inclusive of pain medicine. With such changes taking place, the future of pain medicine looks bright as a result of major contributions at all levels by dedicated and committed pain clinicians and researchers.

KEY POINTS

- The word *pain* comes from the Latin word *poena*, which means “punishment.” The word *patient* is derived from the Latin word *patior*, meaning “to endure suffering or pain.”
- The history of anesthesia is full of instances in which attempts to relieve pain were initially met with resistance and at times violence.
- Developments made in anatomy and physiology helped establish that the brain, not the heart, was the center for processing pain.
- The tenet of the specificity theory, proposed by Descartes and revised by Schiff, was that each sensory modality, including pain, was transmitted along an independent pathway.
- The use of chloroform to provide anesthesia for the labor pains of Queen Victoria helped legitimize the practice of pain relief during childbirth.
- The clinic that Bonica developed at the University of Washington in Seattle remains a model for the multidisciplinary management of chronic pain.
- Regional anesthesia suffered a significant setback with the negative publicity surrounding the 1954 cases of Wooley and Roe, in whom serious and irreversible neurologic damage occurred after spinal anesthesia. It took 3 decades to overcome this setback and establish regional anesthesia as safe and effective.
- An outstanding contribution in the field of research was development and publication of the *gate control theory* by Melzack and Wall in 1965.
- Psychological researchers have greatly advanced the field of pain medicine by reconceptualizing both the etiology of the pain experience and the treatment strategy.
- Several organizations advance the science and practice of pain medicine, including the International Association for the Study of Pain (IASP), American Pain Society (APS), American Society of Regional Anesthesia and Pain Medicine, American Academy of Pain Medicine (AAPM), World Institute of Pain (WIP), International Spine Intervention Society (ISIS), National Headache Foundation (NHF), and the American Society of Interventional Pain Physicians (ASIPP).
- Pain medicine practitioners are certified by the American Board of Anesthesiology and the American Board of Pain Medicine (ABPM).
- Changes in the pain medicine fellowship program related to the length of training and a matching program are being considered.

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Taxonomy and Classification of Chronic Pain Syndromes

Harold Merskey

DEFINING PAIN

The first task of the authors of any taxonomy is to know what they are talking about. Sometimes knowledge is taken for granted. A taxonomy of pain needs some understanding of the term itself. We all assume that we know the meaning of the word pain—and indeed we do. Nevertheless, for a long time there was no unanimity about how to define pain. There is still no absolute unanimity, but a consensus appears to have formed in favor of the definition of pain offered by the International Association for the Study of Pain (IASP) in 1979¹ and subsequently published in the *Classification of Chronic Pain* produced by the IASP.² The definition of pain—“an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage”—was based on an earlier one³ that had achieved some recognition; it was intended to deal with the situation that although pain was normally understood to be the consequence of physically damaging stimulation or a disorder in the body, many patients appeared to have pain but did not have overt tissue damage.

Morris⁴ observed that the key to the IASP definition is to dissolve any necessary connection between pain and tissue damage. It depends on use of the word *pain* regardless of whether physical change is apparent. It is important to recognize that pain is always a subjective psychological state. At the same time, the note on this definition emphasized that pain “most often has a proximate physical cause.”³ The IASP definition has been adopted fairly broadly and helps minimize the idea that there is some sort of pain that patients imagine and that is not the same as the pain of “real injury or disease.” In the personal opinion of this writer, much pain that is primarily organic in origin has an organic basis that is incompletely explained. Sometimes this happens for reasons of mere convenience; that is, every-day transient pain is not usually investigated, nor does it need to be. At other times it may happen because of difficulties in diagnosis, even with chronic severe disorders. The lack of physical proof should never be taken on its own as a sufficient indicator of a psychological cause of pain.

THE NATURE OF CLASSIFICATION

Taxonomy means the arrangement of rules. *Taxonomy* as a term is derived from two Greek words—*tasso* and *nomia*—meaning “arrangement” and “rules.” In other words, it deals

with the principles of classification and not with the content of classifications. It is about how to set up a classification and not about the detail of what goes into it. It ordinarily applies to the science of classification of living organisms. Classifications are also produced for nonliving organisms and material that was never alive.

There are two types of classification, natural and artificial. A *natural* classification deals with the material of physics and biology and anything else in the natural world, such as types of stars or forms of animals—in other words, the material world. An *artificial* classification deals with arrangement of the products of human activity, for example, a telephone directory.

In an artificial classification there is no necessary connection between the basis on which the classification is produced and the inherent nature of the subject matter. Thus, the list of names in a telephone directory by alphabetical order is arbitrary but works extremely well.⁵

An ideal classification should not only be comprehensive but should also locate each item within it in a place of its own without overlap. The periodic table in chemistry is a wonderful example of scientific beauty and a perfect or almost perfect classification wherein every element belongs in its own place relative to the other elements. In biology, a superior form of classification is a phylogenetic one based on evolutionary relationships.

Medical classifications are established on a very different basis. In the International Statistical Classification of Diseases and Diagnostic Guidelines, 10th Revision (ICD-10),⁶ the classification is arranged by causal agents, such as infectious diseases or neoplasms; by systems of the body, such as cardiovascular or musculoskeletal; by symptom pattern and type of symptoms, as in psychiatric illnesses; and even by whether the condition or event is related to the artificial intervention of an operation. Illnesses or categories may be grouped by time of occurrence, such as congenital or perinatal disorders, and at the basic level are grouped as symptoms, signs, and abnormal clinical and laboratory findings.

In the ICD-10 there is code 080 for delivery in an uneventful case, including spontaneous breech delivery. Major groups are subdivided by system (e.g., neurology), by symptom pattern (e.g., epilepsy or migraine), by the presence of hereditary or degenerative disease (e.g., Huntington’s disease and hereditary ataxia), by location of the disorder (e.g., extrapyramidal disorders), by anatomic and physiologic characteristics (e.g., extrapyramidal and movement disorders, such as Parkinson’s disease and dystonia), by

location (e.g., polyneuropathies), and by infectious and chemical causes. With these approaches, categories overlap repeatedly. Pain is found in the group of symptoms, signs, and clinical and laboratory findings as “R52—pain not elsewhere classified.” This particular code excludes some 19 others that reflect pain in different parts of the body and excludes “psychogenic” pain (code F45.4) and renal colic (N33). Thus, pain occurs at various levels of diagnosis and categorization in the ICD-10.

The overlap found in medicine is inevitable. There must always be some provision for conditions that are not well described and will overlap with others that are well described. The purposes of medicine require attention to the many different aspects of disease that enter into the classifications. That should be apparent from the examples cited.

WHICH TYPES OF PAIN NEED CLASSIFICATION

From the point of view of a pain practitioner, only some types of pain need classification, and indeed it would be inappropriate to classify all types of pain in a chronic pain classification. A large proportion of the pain that human beings and other creatures experience in the world is brief and transitory. As a rule, it is accompanied by overt damage that needs its own appropriate treatment or it passes quickly. Pain is the most common symptom in the whole of medicine. Therefore, any attempt to classify all types of pain would inevitably lead to an overall classification of medicine that would have a particular focus that is unnecessary for most medical cases. Illnesses with pain that have needed a special classification are those in which pain is a significant persistent problem. This conclusion still leaves a large field for a classification of pain but saves the pain specialist from having to write the classification for all the rest of medicine as well.

Among specific systems of classification, the ICD-10 is used worldwide for the purpose of documenting mortality and morbidity.⁶ In the United States, a slightly modified version of the previous international system of classification, namely, ICD-9CM, is used. (CM stands for Clinical Modification.) This modification was promoted by the U.S. government to provide the additional data required by clinicians, researchers, epidemiologists, medical record librarians, and administrators of inpatient and outpatient community programs. In the United States, ICD-9CM is published by the Department of Health and Human Services, Public Health Services, Health Care Financing Administration.

The international ICD-10 system comprises a table of names and numerical codes for these names. The ICD-10 consists of three volumes. Volume I is a tabular list that contains the report of the International Conference for the 10th Revision, the classification itself at three- and four-character levels, a classification of the morphology of neoplasms, a special tabulation list for mortality and morbidity, definitions, and the nomenclature regulations. Volume II includes an instruction manual, and Volume III is an alphabetical index. The latter also includes expanded instructions on use of the index.

In the United States, ICD-9CM coding has particular importance because of the 1988 Medical Catastrophic Coverage

Act, which although later repealed, required the use of ICD-9 codes on “Medicare Part B” claims. This requirement continued with ICD-9CM, and to date, ICD-9CM has not been replaced in the United States. Pain specialists in the United States may believe that the ICD-9CM classification does not cover their requirements for appropriate billing of work done and may prefer a pain-based classification.

Of course, classifications have a number of purposes besides billing. The primary one is to exchange standardized information so that “stroke,” “cholecystitis,” and “depressive disorder,” for example, have the same meanings to different colleagues. Meanings should be the same both within the same country and throughout the world. This should facilitate statistical comparisons of the occurrence and management of disease and serve as a basic tool for scientific progress by establishing standards of diagnosis and description that can be compared between workers within countries and internationally.

Such classification can help provide an understanding of disorders, but it does so only by giving shape to the advances of investigators, whether alone, in working groups, or in national and international organizations. Classifications also serve as a means of recognizing work done and providing standards for payment. This is one of the reasons for their relative popularity with both medical professionals and administrators.

Classifications, of necessity, cannot provide “absolute truth.” Thus even when a classification recognizes a disorder as a “condition,” a “disorder,” or a “disease,” it is not the classification that provides the knowledge that justifies these various titles but rather the existing level of scientific knowledge. To the extent that a classification identifies current scientific knowledge and claims it to be acceptable, it may establish unity, but classifications as a rule only follow scientific knowledge.

This also means that just as classifications take material as they find it, they are not expected to provide perfect decisions or standards by which we can state that something is “a disease,” a “disorder,” a “syndrome,” or merely a “symptom.” The one word of these four for which the meaning is not in dispute is *symptom*, the patient’s statement of a complaint. All four words involve or have involved some dispute regarding whether they reflect the true nature of the phenomena with which physicians deal. Physicians become concerned about whether they recognize something as a disease or “only a syndrome” or “just a symptom.” It is not the function of a classification to determine the answers to such questions. In fact, it can be extraordinarily hard to determine what constitutes a syndrome and whether diseases should have a fixed standard.⁷

THE INTERNATIONAL ASSOCIATION FOR THE STUDY OF PAIN CLASSIFICATION

The IASP classification focuses on chronic pain. A small number of pain syndromes that are not necessarily chronic were included for comparative purposes because they might be relevant to pain specialists (e.g., acute herpes zoster, burns with spasm, pancreatitis, prolapsed intervertebral disk) or because the acute version frequently becomes chronic. The classification is based on five axes. The first

axis is anatomic localization, which was chosen for both historical and practical reasons. The historical reasons are that there was previously difficulty in establishing a chronic pain classification based on etiology and that there was too much argument or potential argument about causes. It was also recognized that in essence pain is referred to parts of the body and it is always a somatic symptom, whatever its cause. In addition, location provides a useful means of distinction between different conditions. Accordingly, the IASP classification presents a list of relatively generalized syndromes followed by regional ones. Relatively generalized syndromes include peripheral neuropathy, stump pain, phantom pain, complex regional pain syndrome, central pain, syringomyelia, polymyalgia rheumatica, fibromyalgia, rheumatoid arthritis, and so forth. Pain of psychological origin is also included. Relatively localized syndromes are subdivided according to whether they affect the head and neck, limbs, thorax, or abdomen or whether they have a spinal or radicular distribution or origin.

The IASP classification set out to provide categories and codes for all the relevant conditions. Not all pain is continuously chronic. Some pain that is severe *and* chronic remits between episodes (e.g., migraine and cluster headache), but these types of pain are also included under the rubric of chronic pain. Some chronic pain consists of pain that persists past what has usually been considered to be the normal time needed for healing. However, this is not always the case, and the decision of what constitutes the normal time for healing is much argued. Indeed, it is now understood—but not so well understood in 1986 when the first edition of the classification was published—that pathophysiologic processes may well maintain pain long after the normal expectation of pain from injury has ended. I personally question whether we should even mention the normal time needed for healing when discussing chronic pain.

Be that as it may, the IASP Taxonomy Committee recognized that some pain persists despite no apparent explanation, other pain persists with an explanation (e.g., the pain of osteoarthritis), and still other pain, which is not always continuous, can recur. Patients with these types of pain, by virtue of their intractability, were considered proper subjects for a classification of chronic pain.

MULTIPLE AXES

An anatomic classification alone is not sufficient. Some effort has to be made, even if it is tentative, to describe the nature of the pain and different types of pain, to note the system in which it occurs, to set up a system that indicates which disturbance seems to be most responsible for the pain, to describe the features of the pain even though they might vary within diagnoses, and to attribute cause when possible. Accordingly, the classification of chronic pain specifies five axes for describing pain.

The first axis is the anatomic axis, and the second axis is the system most related to the cause of the pain (besides the nervous system, which is always involved in pain). The systems identified were (1) the central, peripheral, and autonomic nervous systems and special senses; (2) psychological and social function of the nervous system (which was given a separate coding); (3) respiratory and vascular

systems; (4) the musculoskeletal system and connective tissue; (5) cutaneous and subcutaneous tissue and associated glands (e.g., breast, apocrine), the gastrointestinal system, the genitourinary system, and other organs or viscera (e.g., thyroid, lymphatic); and (6) unknown systems. A code was also allowed wherein more than one system was found to contribute to the pain.

The third axis describes the temporal characteristics of the pain and its pattern of occurrence. A code was allowed for instances in which temporal patterns were not recorded but distinctions were made as follows: single episode, continuous or nearly continuous, nonfluctuating or fluctuating, recurring irregularly, paroxysmal (e.g., tic douloureux), occurring regularly (e.g., premenstrual pain), sustained with superimposed paroxysms and other combinations, and none of the above.

The fourth axis accepts statements of intensity, and the fifth axis identifies etiology. Causes can include genetic or congenital disorders; operations; burns; infections; inflammation; neoplasms; toxic, metabolic, degenerative, mechanical, or functional (including psychophysiological) causes; or those resulting from ideas (e.g., conversion hysteria or depressive hallucination—both of which are either hard to show or particularly rare).

The actual system has served well as a guide for making a diagnosis and establishing priorities in making a diagnosis. It has served poorly as a means of exchanging information on certain cases of different sorts. Thus, I do not think that I have seen any example of a study in which pain was selected solely on the basis that it had a particular pattern on the third axis, such as *continuous* or *nearly continuous*. These features have of course been found and reported frequently in studies in which the patients were selected on the basis of other criteria (e.g., the anatomic location or the etiologic diagnosis, to take the first and the fifth axes). The system does, however, provide fairly well for individual codes to be given if they are required for a specific study of a group, mainly relying on the anatomic, systemic, and diagnostic axes (e.g., I, II, and V). The third axis (i.e., the temporal characteristics) serves well only for identifying continuous or discontinuous pain, which is often merely a feature of the diagnosis and not a feature of the selection of cases or the exchange of information. The fourth axis has also contributed relatively little in its present shape, with intensity frequently being recorded separately from the diagnosis.

The codes can serve as a means of identifying unique patterns. Each of the five axes provides a place in the code for a condition. However, Vervest and Schimmer⁸ showed that not all the codes are unique, and allowance for this is made by adding the letters a, b, c, and so forth to the five-number code when necessary.

Chronic pain was defined as pain that had been present for more than 6 months. It was thought that although many types of pain become persistent and chronic at 3 months, a 6-month division did not present difficulties in practice, was fairly characteristic, and served as a good entry to the population treated by pain specialists. The term *chronic pain* was not intended—and still is not intended—to mean a particular syndrome or pattern, and the notion of “chronic pain syndrome,” which tends to mix the physical and psychological consequences of pain, was not accepted by the Taxonomy Committee of the IASP. In its deliberations the

committee proceeded to adopt an anatomic classification as the starting point for its classification of chronic pain on a model originally developed by John Bonica.⁹

PARTICULAR DIAGNOSES

The provision of categories is particularly useful when existing knowledge of painful syndromes is weak. For example, the understanding of reflex sympathetic dystrophy, whose name was changed on the advice of a special subcommittee to *complex regional pain syndrome* (CRPS) type 1, has served as a means for identifying criteria that would provide either a clinical means for agreement between different investigators or a special sample for research purposes. In this case, the first step taken in conjunction with the classification system was to define CRPS type 1 merely by its clinical phenomena and not by its theoretical relationship to the sympathetic nervous system. The second step, taken more recently,¹⁰ proposed changes in the diagnostic criteria that provided both clinical diagnostic criteria for general use and more stringent research diagnostic criteria for specific research investigations. This seems to be a satisfactory solution to the problem of how many people may claim the label and what sort of cases should be concomitantly studied to establish convincing evidence of the research findings. Other examples in which the classification has been useful include pioneering the spread of understanding about relatively new syndromes (e.g., the syndrome of painful legs and moving toes [see Merskey and Spear³] or the syndrome of paroxysmal hemicrania). In these cases, the classification has given an appropriate place to syndromes that have not yet entered the general lexicon although they are described in the literature.

PSYCHIATRIC ASPECTS OF CHRONIC PAIN

The psychiatric aspects of chronic pain may be coded in two ways. The first recognizes that patients seen in clinical practice often have some degree of emotional difficulty in association with chronic pain. In such cases the psychological changes are most often anxiety or depression and may be attributed to the persistence of pain causing distress, loss of employment, altered marital relationships, decline in self-image, and so forth, as well as independent events that cause depression or anxiety (e.g., bereavement or illness in a close relative). In these circumstances it is important to describe the psychological status of patients, to understand why they are troubled, and to provide appropriate treatments, which first of all may consist of better analgesia but in addition may include antidepressant medication and social support. Whenever psychological help is requested, it should include assistance with emotional difficulties, whether it be supportive or cognitive therapy. Behavioral therapy usually has only a very limited role in managing the secondary effects of pain, but assistance in adjustment to pain can be of great importance and can involve rehabilitation experts.

The second option in regard to psychiatry and pain would be to see the psychological illness as a cause of the pain. This is thought to be much less common as a sustained cause of pain than was originally suggested. Headache from emotional problems and precordial pain from anxiety are fairly

typical examples of situations in which some pain, but less often chronic pain, may be due to depression or anxiety disorders. In such cases, psychiatric methods of care are appropriate after physical examination. However, these situations hardly ever account for the great majority of patients with chronic pain and emotional disturbance. One explanation that was formerly favored suggests that the pain solves a problem, but this explanation seems to be less and less realistic as time goes by, and psychiatry has failed to prove by systematic methods that sustained pain results from a chronic emotional disorder. We provided psychological categories notwithstanding; thus, the IASP system laid down the following categories: pain of psychological origin: muscle tension; delusional hallucinatory; hysterical conversion or hypochondriacal; and associated with depression. It appears that these categories are not used much. Factitious illness and malingering were not included as disorders as they were thought appropriate to describe as part of the psychiatric condition.

INTERNATIONAL PSYCHIATRIC CLASSIFICATIONS

The classification of mental and behavioral disorders recommended by the World Health Organization¹¹ is a part of the overall international classification. Categories have been established with an eye to agreement with the layout of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV), of the American Psychiatric Association (APA),¹² which is well known in many countries. The ICD-10 classification of mental and behavioral disorders preserves categories parallel to those used in DSM-IV, although the descriptions are often different. However, the ICD-10 classification does not use the “checklist approach” but rather gives a general description and the major criteria required. The APA DSM-IV and DSM-IV TR (in which the explanatory text changed but not the codes) retain the same criteria as each other.

With respect to pain, the options in both systems are as follows: First, any particular diagnosis such as schizophrenia or depression of some sort may be made and indicated as a cause of the patient’s pain in cases in which it is understood that the diagnosis applies and pain may be accepted as resulting from such conditions. Then, the ICD-10 classification provides a category of Pain Disorder, Somatoform Persistent (F45.44). This category in essence corresponds to what the DSM-IV now calls Persistent Somatoform Pain Disorder. In the ICD-10 classification, the predominant complaint is persistent, severe, and distressing pain that cannot be explained fully by a physiologic process or a physical disorder. It is presumed to be of psychological origin, but pain occurring during the course of a depressive disorder or schizophrenia is not included. Pain that is due to known or inferred psychophysiologic mechanisms such as muscle tension pain or migraine but is still believed to have a psychogenic cause is coded under Psychological or Behavioral Factors Associated with Disorders or Diseases Classified Elsewhere (e.g., muscle tension pain or migraine). In ICD-10, the most common problem is to differentiate this disorder from the histrionic elaboration of organically caused pain. Thus, this category is essentially meant to deal with pain that serves an unconscious motive. For a number of practical reasons this is an extremely difficult proposition to prove clinically.

Under DSM-IV the criteria are similarly stringent but the diagnosis is made much more frequently, both in the United States and in Canada. According to the description of chronic pain disorder in DSM-IV, the word *somatoform* was dropped from the title. Pain disorder is the predominant focus of the clinical manifestation, and it must cause significant stress or impairment in social, occupational, or other important areas of functioning. Psychological factors must be judged to have an important role in the onset, severity, exacerbation, or maintenance of the pain, and the symptom or deficit must not be intentionally produced. This condition is not to be diagnosed if the pain is better accounted for by a mood, anxiety, or psychotic disorder or if it meets the criteria for dyspareunia.

These criteria have the effect of limiting the condition to one that is not associated with significant depression or anxiety or that results from a physical illness. Within DSM-IV, two versions of pain disorder were allowed. One is “pain disorder associated with psychological factors,” wherein the necessary criteria are met as above but psychological illness is not present. The other is “pain disorder associated with both psychological factors and a general medical condition.” In this case the same rules apply as for pain disorder on its own, but it is thought that a physical condition may be present but not sufficient to account for a large part of the syndrome. It is stated as follows: “Both psychological factors and a general medical condition are judged to have important roles in the onset, severity, exacerbation, or maintenance of the pain.” The associated general medical condition or anatomic site of the pain is coded separately.

In my observation, many diagnosticians who are sincerely interested in the patient’s welfare welcome this category as a means of diagnosing a distressing psychological state for which they do not see an adequate physiologic or general medical explanation. In my view, however, this is not the way it should be used. It would only logically be justifiable with respect to the criteria for cognate diagnoses if it could be demonstrated that there was some psychological cause that was unconsciously producing the symptom at the same time as producing anxiety or depression—in other words, what used to be called *hysteria*. For reasons discussed elsewhere,¹³ the diagnosis of pain as “a conversion disorder” can rarely be made adequately. Persons with doubts should try to imagine whether they could produce, by thinking about it, a physical symptom such as paralysis that they would maintain consciously and whether they could produce a state of feeling of chronic pain in themselves by reflecting on it and then ask how is it possible that pain could be produced unconsciously if it cannot even be produced consciously? Overall then, psychological diagnoses as causes of pain are not favored by this writer except in very limited situations. Occasionally, patients with classic depressive illness suffer from severe headaches that go away when the depression is better. Occasionally, patients with post-herpetic neuralgia have much worse pain when they become depressed and much less pain when the depression is treated, but this situation is relatively rare and does not reflect the bulk of either general medical, neurologic, or psychiatric practice.

The diagnosis of chronic pain related to psychiatry is, at present, a controversial issue with respect to DSM-V, which has the category Pain Disorder. The current proposal of the APA is that there will be substantial changes in the pain disorder criteria involving both Pain Disorder and other so-called

“Somatoform Disorders.” It appears that the “Somatic Symptom Disorder Work Group” is proposing radical changes in this category and will (or may) rename the Somatoform Disorders section as “Somatic Symptom Disorders,” eliminate four existing DSM-IV categories (Somatization Disorder, Hypochondriasis, Pain Disorder, and Undifferentiated Somatoform Disorder), replace these discrete categories and their criteria with a single new category (“[Complex] Somatoform Symptom Disorder”), and apply new criteria.

To receive a diagnosis of complex somatic symptom disorder, patients must complain of at least one somatic symptom that is distressing or disruptive of their daily lives. Also, patients must have at least one of the following from the E type criteria: “emotional/cognitive/behavioural disturbances: high levels of health anxiety, disproportionate and persistent concerns about the medical seriousness of the ‘symptoms,’ and an excessive amount of time and energy devoted to the symptoms and health concerns. Finally, the symptoms and later concerns must have lasted for at least six months.” There are some further qualifications, and the development of the system has been vigorously criticized by Dr. Allen Frances, the principal architect and editor in chief of DSM-IV, which has been widely used and officially adopted by various bodies.

The diagnosis of “Pain Disorder” in DSM-IV was not entirely satisfactory in this author’s view, and reasons have been given for not using it. Nonetheless (for reasons connected with funding the diagnosis on insurance claims from either side of the fence), many expert witnesses have tended to rely on the DSM-IV diagnoses. Some have also relied on the DSM-IV grading systems with respect to functional abilities. Others, like myself, who have treated pain—entirely—as a physical disorder for medicolegal purposes have made use of whichever version of the American Medical Association Guides to the Evaluation of Impairment was relevant in their particular jurisdiction. For psychiatric purposes in evaluating the disability caused by pain, one can reasonably apply the criteria for disability of the Somatoform Disorders Scale as published in DSM-IV by reference to the Global Assessment of Functioning scale. In jurisdictions outside the United States the same scale can also reasonably be used for both physical and psychological illness. Thus, rather than the questionable diagnosis of “Pain Disorder,” the Global Assessment of Functioning scale may be used independent of the diagnosis simply on the basis of what the patient can and cannot do—without necessarily applying a psychiatric diagnosis.

In my experience to date, similar situations have been interpreted in the medicolegal situation more often to the benefit of the defense than to the benefit of the injured party in compensation disputes. However, on a fair presentation it should work equally well for both sides of the argument and better than any arbitrary scaling unrelated to the life experience of the individual.

CONCLUSION

Classification is required in medical practice to identify like phenomena observed by practitioners. There is no absolute rule of what a syndrome or classification should be. The basis for the use of different classification systems is outlined in this chapter.

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Organizing an Inpatient Acute Pain Service

Jennifer M. Lee | Alex Cahana | Gregory W. Terman

THE RATIONALE

An estimated 48 million inpatient surgical procedures are performed annually in the United States (National Center for Health Statistics, National Hospital Discharge Survey: 2009, cdcinfo@cdc.gov). Although it is to be expected that surgical treatment results in some degree of patient discomfort, acute postsurgical pain has been widely undertreated. In one survey, 80% of patients reported experiencing moderate to extreme pain after surgery.¹ Ineffective postoperative pain management is associated with economic and medical implications, including extended lengths of treatment, readmissions, and patient dissatisfaction with medical care.^{2,3}

Consequently, in 2001 the American Pain Society (APS) declared the start of a “Decade of Pain Control and Research” and urged health professionals to treat pain as “the fifth vital sign.” Thereafter, a flood of practice guidelines emerged in the literature in an attempt to emphasize and provide instructions for realization of this proposal. Nonetheless, a decade later, the parent organization of the APS, the International Association for the Study of Pain (IASP), designated 2011 the *Global Year Against Acute Pain*. This campaign sought to highlight “the persistent problem of acute pain...the most commonly experienced pain (e.g., surgery, childbirth, trauma)...treatable with currently available medications and techniques [but with] a large gap between evidence and practice—resulting in widespread under-treatment” (<http://www.iasp-pain.org/Content/NavigationMenu/GlobalYearAgainstPain/GlobalYearAgainstAcutePain/default.htm>).

It turns out that achieving satisfactory acute pain management is quite challenging. It is often difficult to estimate what a patient’s postoperative analgesic requirements will be.

The following factors, for example, may influence postoperative opioid requirements:

- Preoperative pain sensitivity⁴
- Coexisting medical conditions and associated multiple drug administration
- Presurgical opioid tolerance or a history of drug abuse
- Psychological factors, including catastrophizing and anxiety^{5,6}
- Age⁷
- Type of surgery⁸

Great care must be applied to consider all the aforementioned characteristics when deriving an analgesic plan for managing an individual’s response to a surgical insult.

The sequelae associated with surgical procedures result from various components of the stress response and include cardiopulmonary, infectious, and thromboembolic complications; cerebral dysfunction; nausea and gastrointestinal paresis; fatigue; and prolonged convalescence. Throughout the process of organizing an acute pain program, it is helpful to keep the following statements in mind:

- The postoperative pain management regimen should be designed with attention to providing patient comfort and also inhibiting nociceptive impulses sufficient to allow a patient to participate fully in active rehabilitation when appropriate.
- A time-, energy-, and cost-effective acute pain program should optimally provide multimodal and multidisciplinary interventions, including systemic and regional pharmacological treatments, stress reduction, transcutaneous electrical nerve stimulation, music therapy, and acupuncture.⁹⁻¹¹
- Surgical stress responses are inhibited mostly by the neuraxial administration of local anesthetics; the administration of other agents—systemically, neuraxially, or perineurally—appears to contribute little additional reduction of the endocrine (metabolic and catabolic) stress response following operative procedures.^{12,13}
- Parenteral opioids exaggerate the perioperative immune system depression already triggered by the neuroendocrine response to surgery, although the clinical relevance of this observation is controversial.¹⁴ Opioids administered into the epidural space have minor suppressive effects on surgically induced proinflammatory cytokines.¹⁵
- Effective analgesia can reduce postoperative morbidity. As an example, thoracic epidural analgesia has been shown to improve postoperative spirometry and reduce pulmonary infections and atelectasis.^{16,17} In many settings the routine and “gold standard” of care involves such facilitation of the patient’s recovery of pulmonary function.

The experience of a skilled anesthesiologist easily lends itself to providing leadership within an acute pain service. Anesthesiologists are proficient in the use of systemic and regional analgesic techniques, including peripheral and neuraxial blockade. They also often have an understanding of the surgical techniques and consequent insults that they impose. Additionally, anesthesiologists are well equipped with leadership skills for working within a multidisciplinary team; these are also vital skills within the operating theater. Nonetheless, an anesthesiologist-based team is not the only service model.

Nurse-based, anesthesiologist-supervised inpatient acute pain services have also been demonstrated to provide safe

and effective postoperative pain management.^{18,19} Regardless of the service model, nursing involvement in an acute pain service is essential. Bedside nurses' impression of a patient's analgesic needs and recovery is an invaluable element in the decision-making process for any given patient, and because it is the nurse who will ultimately be delivering the care, it is vital that the nurse understand the analgesic plan and goals.

Detailed practice guidelines and protocols can help streamline the ordering and implementation of patient care. Well-established protocols have been shown to reduce errors in realms outside pain management²⁰ and decrease

the cost associated with prescribing choices.²¹ At the University of Washington Medical Center, for example, we have instituted multiple protocols, including order sets for patient-controlled analgesia (PCA), continuous and patient-administered epidural analgesia, ketamine infusions, and continuous perineural catheter infusions (Figs. 3.1 to 3.4; we have recently switched to electronic order sets mirroring these past paper protocols). The PCA and epidural analgesia protocols must include titration and bolus instructions to treat breakthrough or incident pain. The order sets should also include routine and specific monitoring orders, as well as treatment options for common or dangerous side

PAIN SERVICE: Parenteral (IV/SQ) Patient Controlled Analgesia (PCA) Orders Page 1 of 2

1. Discontinue current opioids and/or benzodiazepines except: _____
2. Call pain service regarding any new orders for opioids or benzodiazepines not ordered by the pain service.
3. Call pain service for orders to manage nausea/vomiting, itching, anxiety, or inability to sleep if PRN medications ordered below (see #7 and #8) are not effective.

4. PCA Orders: Standard Concentration (standard) OR Non Standard Concentration

DRUG: (check one)	<input type="checkbox"/> MORPHINE	<input type="checkbox"/> HYDROMORPHONE	<input type="checkbox"/> FENTANYL	<input type="checkbox"/> MEPERIDINE	<input type="checkbox"/> OTHER
Standard Concentration	5 mg/mL	1 mg/mL	50 mcg/mL	10 mg/mL	Concentration
PCA Dose	_____mg	_____mg	10 mcg (standard) or _____mcg	10 mg (standard) or _____mg	_____mg/mcg
PCA Lockout	6 minutes	6 minutes	6 minutes	6 minutes	6 minutes
4 Hour Limit	30 mg (standard)	6 mg (standard)	300 mcg (standard)	150 mg (standard)	_____
	or <input type="checkbox"/> _____mg or <input type="checkbox"/> turn off	or <input type="checkbox"/> _____mg or <input type="checkbox"/> turn off	or <input type="checkbox"/> _____mcg or <input type="checkbox"/> turn off		or <input type="checkbox"/> turn off
Volume (25 mL IV bag is standard)	25 mL IV bag <input type="checkbox"/> 100 mL IV bag	25 mL IV bag <input type="checkbox"/> 100 mL IV bag	25 mL IV bag <input type="checkbox"/> 100 mL IV bag	25 mL IV bag	25 mL IV bag <input type="checkbox"/> 100 mL IV bag

OPTIONAL CLINICIAN BOLUS DOSES AT START OF THERAPY &/OR FOR INCIDENT/BREAKTHROUGH PAIN

2X the current PCA dose every 5 minutes up to a maximum of 5 doses (standard) or _____mg/mcg (circle one) every 5 minutes up to a maximum of 5 doses.

- > Limit clinician bolus doses to every 4 hour interval. (If needed more often than every 4 hours, call Pain Service.)
- > Series of clinician bolus doses should be given from pump (except in PACU) and completed within one hour.
- > **Monitor and document SpO2, respiratory rate, sedation score, and pain score every 15 min x 4.**

USE IV PCA optional clinician bolus dose orders to treat incident/breakthrough pain if patient has **both** neuraxial route (epidural or intrathecal) pain management **AND** IV PCA pain management.

CONTINUOUS INFUSION MODE : None (standard)

Start continuous infusion at the time(s) and dose(s) below.
 0600 – 2200 hours daily AND/OR 2200 – 0600 hours nightly OR Continuous
 _____mg/mcg/hr (circle one) _____mg/mcg/hr (circle one) _____mg/mcg/hr (circle one)

RN Independent Double Check:

Check patient identifiers, drug, drug concentration, pump settings, and PCA connection to compatible IV line. Check with PCA initiation, change in drug, change in concentration.

Initiated by: _____ Date: _____ Time: _____

Verified by: _____ Date: _____ Time: _____

PROVIDER SIGNATURE	PRINT NAME	<input type="checkbox"/> ACUTE PAIN SVC	NPI	DATE	TIME
		<input type="checkbox"/> CHRONIC PAIN SVC			

PT.NO

NAME

DOB

UW Medicine Health System
 Harborview Medical Center – UW Medical Center
 Northwest Hospital & Medical Center – University of Washington Physicians
 Seattle, Washington

PAIN SERVICE IV PCA ORDERS
PAGE 1 OF 2



WHITE - MEDICAL RECORD

UH0840 REV NOV 10

A

Figure 3.1 A and B, University of Washington Medical Center parenteral (intravenous/subcutaneous) patient-controlled analgesia standardized order set. Courtesy of University of Washington Medical Center, Seattle, Washington.

PAIN SERVICE: Parenteral (IV/SQ) Patient Controlled Analgesia (PCA) Orders

Page 2 of 2

5. MONITORING & DOCUMENTATION:**STANDARD MONITORING:**

Respiratory rate, pain score, and sedation score – every 2 hours for 8 hours.
Then, respiratory rate, pain score, and sedation score every 4 hours while patient is on PCA.

CHECK BOX if Special Monitoring is required:

SPECIAL MONITORING:

For first 12 hours, monitor SpO₂ via continuous pulse oximetry, respiratory rate, sedation score and pain score every 1 hour. Administer oxygen per MD order to keep SpO₂ > 92%.

If patient has **both** neuraxial route (*epidural or intrathecal*) pain management **AND** IV PCA route pain management, **USE neuraxial monitoring orders to monitor the patient.**

DOCUMENTATION:

Clear pump and document the total dose delivered every 8 hours (e.g., 0600, 1400, 2200) in the clinical record.

6. TREATMENT OF SIDE EFFECTS:

A. **Call Pain Service for sedation score = 2, RR < 8/ minute, or pCO₂ > 50 mmHg or SpO₂ < 92%**

B. SEDATION SCORE = 3 **and/or** RR < 8/minute:

Administer **Naloxone** 0.08 mg IV STAT every 2 minutes PRN. (See Naloxone Kit instructions).

Call Pain Service.

C. NAUSEA/VOMITING:

Metoclopramide 10 mg IV every 6 hours PRN.

IF NOT EFFECTIVE, GIVE: **Ondansetron** 4 mg IV every 8 hours PRN X 24 hours.

Call pain service if Ondansetron is ineffective and/or continued unrelieved nausea/vomiting.

In addition, if age < 60 years, **Transdermal Scopolamine** patch to either mastoid area PRN.

Change scopolamine patch every 72 hours.

D. ITCHING:

Diphenhydramine 25 mg IV every 6 hours PRN severe itching.

IF NOT EFFECTIVE, discontinue Diphenhydramine AND GIVE:

Nalbuphine 2.5 – 5 mg IV every 4 hours PRN.

E. URINARY RETENTION:

If patient unable to void or symptoms of urinary retention, check bladder volume with Bladder Scan.

If volume > 400 mL & unable to void, "in and out" bladder catheter, PRN.

7. If age < 60 years, **Zolpidem** 5 mg PO at bedtime PRN for sleep. Call Pain Service if not effective.

8. **FOR INADEQUATE PAIN RELIEF OR OTHER PROBLEMS RELATED TO PCA:**

Call Pain Service physician at pager 986-3334.


PROVIDER SIGNATURE	PRINT NAME	<input type="checkbox"/> ACUTE PAIN SVC <input type="checkbox"/> CHRONIC PAIN SVC	NPI	DATE	TIME
PT.NO	UW Medicine Health System Harborview Medical Center – UW Medical Center Northwest Hospital & Medical Center – University of Washington Physicians Seattle, Washington PAIN SERVICE IV PCA ORDERS PAGE 2 OF 2				
NAME	 *U0840*				
DOB	WHITE - MEDICAL RECORD				
B	UH0840 REV NOV 10				

Figure 3.1, cont'd.

effects (e.g., antiemetics or antipruritics and opioid receptor antagonists to reverse respiratory depression). Ketamine and perineural anesthetics are most frequently ordered as adjuncts to other analgesic therapies (e.g., PCA). Recovery room, intensive care unit, and medical/surgical floor nurses must be trained to be familiar with the order set parameters. In most cases, nurses are able to assess the patient and implement changes that successfully achieve adequate analgesia with minimal side effects autonomously.

An emerging area of concern for any anesthesiology-based pain service is the increasing complexity of invasive pain management techniques in an era of ever-increasing

numbers of anticoagulants given as treatment or prophylaxis for an ever-increasing number of medical and surgical indications (including, for example, treatment of cardiac arrhythmias or valve disease and deep vein thrombosis prophylaxis). To aid in treating such patients with the least risk, the University of Washington Medical Center has designed institutional guidelines (based on national guidelines such as those of the American Society of Regional Anesthesia, for instance) for the management of indwelling neuraxial and peripheral nerve catheters in patients treated concomitantly with anticoagulants (Table 3.1). The document was designed to address placement, maintenance, and removal

of the catheter in several common anticoagulation scenarios. The intention of such guidelines is to distill the existing scientific evidence and opinion into a format that is easily accessible and simple to apply to patient care.

If the need and desire for an acute pain service exist within a hospital facility, one must first elicit the support of the department chairperson. Although multiple design models for an acute pain management service are possible, most will require that an anesthesiologist be made available for some level of participation in the service. Unless resources allow an anesthesiologist to be easily released from operating room obligations, the staffing conflict will present a certain challenge. An agreeable arrangement of service responsibilities must allow the anesthesiologist to be available to provide safe and consistent care to whomever he or she is responsible.

PERSONAL INVENTORY

It is important to recognize at the outset that establishing a pain service is a major endeavor. Planning, design, and implementation of a successful service will require substantial human and material resources.

PAIN SERVICE EPIDURAL INFUSION ORDERS Page 1 of 2

1. Discontinue current opioids and/or benzodiazepines except: _____
2. Epidural Catheter: **(check one)**
 Thoracic placement Lumbar placement Other: _____
3. Infusion: **(check one)**
 Continuous + Patient Controlled Epidural Analgesia (PCEA)
 Continuous rate: 6 mL (standard) _____ mL/hr (Maximum infusion rate is 14 mL/hr)
 PCEA dose: 2 mL (standard) or _____ mL
 PCEA dose lockout: 10 min (standard) or _____ min
OR
 Continuous Infusion ONLY
 Continuous rate = _____ mL/hr
4. Drug(s): **(check one)**
 FENTANYL 2 mcg/mL + BUPIVACAINE 1/16% (0.625 mg/mL)
 FENTANYL 2 mcg/mL + BUPIVACAINE 1/10% (1 mg/mL)
 FENTANYL 2 mcg/mL + BUPIVACAINE 1/8% (1.25 mg/mL)
 BUPIVACAINE 1/16% (0.625mg/mL)
 BUPIVACAINE 1/10% (1 mg/mL)
 BUPIVACAINE 1/8% (1.25 mg/mL)
 BUPIVACAINE _____% (_____/mg/mL)
 Opioid (specify) _____ mcg/mL or mg/mL + BUPIVACAINE _____% (_____/mg/mL)
5. VOLUME OF EPIDURAL SOLUTION = 250 mL in normal saline (standard)
6. BREAKTHROUGH PAIN MANAGEMENT **(check one)**
 A. **Continuous + Patient Controlled Epidural Analgesia (PCEA) (check box)**
 Give clinician bolus equal to continuous hourly infusion rate or _____ mL into epidural catheter and increase continuous hourly rate by 2 mL/hrs every 2 hours PRN
MAXIMUM RECOMENDED INFUSION RATE is 14 mL/hr.
 B. **Continuous infusion only (NO PCEA – no patient controlled settings): (check box)**
 Fentanyl 50 mcg (1 mL) into epidural catheter every 2 hours PRN. (check box)
 Use IV PCA clinician bolus dose orders to treat incident/breakthrough pain if patient has **both** epidural pain management **AND** IV PCA pain management. (check box)
 C. Other: _____

RN Independent Double Check:	
Check patient identifiers, drug, drug concentration, pump settings, and PCA connection to compatible IV line. Check with PCA initiation, change in drug, and change in concentration.	
Initiated by: _____	Date: _____ Time: _____
Verified by: _____	Date: _____ Time: _____

PROVIDER SIGNATURE	PRINT NAME	<input type="checkbox"/> ACUTE PAIN SVC <input type="checkbox"/> CHRONIC PAIN SVC	NPI	DATE	TIME
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PT.NO _____


NAME _____

DOB _____

A

UW Medicine Health System
 Harborview Medical Center – UW Medical Center
 Northwest Hospital & Medical Center – University of Washington Physicians
 Seattle, Washington

PAIN SERVICE EPIDURAL INFUSION ORDERS
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WHITE - MEDICAL RECORD

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Figure 3.2 A and B, University of Washington Medical Center epidural infusion standardized order set. Courtesy of University of Washington Medical Center, Seattle, Washington.