A Four-Tier Problem-Solving Scaffold to Teach Pain Management in Dental School


Abstract: Pain constitutes a major reason patients pursue dental treatment. This article presents a novel curriculum to provide dental students comprehensive training in the management of pain. The curriculum’s four-tier scaffold combines traditional and problem-based learning to improve students’ diagnostic, pharmacotherapeutic, and assessment skills to optimize decision making when treating pain. Tier 1 provides underpinning knowledge of pain mechanisms with traditional and contextualized instruction by integrating clinical correlations and studying worked cases that stimulate clinical thinking. Tier 2 develops critical decision making skills through self-directed learning and actively solving problem-based cases. Tier 3 exposes students to management approaches taken in allied health fields and cultivates interdisciplinary communication skills. Tier 4 provides a “knowledge and experience synthesis” by rotating students through community pain clinics to practice their assessment skills. This combined teaching approach aims to increase critical thinking and problem-solving skills to assist dental graduates in better management of pain throughout their careers. Dental curricula that have moved to comprehensive care/private practice models are well-suited for this educational approach. The goal of this article is to encourage dental schools to integrate pain management into their curricula, to develop pain management curriculum resources for dental students, and to provide leadership for change in pain management education.

Dr. Ivanoff is Associate Professor, Department of Bioscience Research, College of Dentistry, University of Tennessee Health Science Center; and Dr. Hottel is Professor, Department of Prosthodontics, and Dean, College of Dentistry, University of Tennessee Health Science Center. Direct correspondence and request for reprints to Dr. Chris S. Ivanoff, Department of Bioscience Research, College of Dentistry, University of Tennessee Health Science Center, 875 Union Avenue, Memphis, TN 38163; 901-448-1770 phone; 901-448-2744 fax; civanoff@uthsc.edu.

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Pain is a major reason patients seek the services of a dentist. Undertreatment of pain is poor dental practice and can result in many adverse effects. Unrelieved acute pain commonly elicits pathophysiologic neural alterations that can evolve into chronic pain syndromes. Chronic pain, in turn, may lead to a constellation of maladaptive physical, psychological, family, and social consequences, and can be regarded as a disease entity by itself. The barriers of health care professionals to pain relief have been outlined extensively in the literature, including misconceptions about medications, especially opioids. Although opioids are central to acute pain management, many clinicians prescribe them incorrectly, resulting in inadequate pain management and side effects. Poor opioid prescribing practices include inadequate dosing, failure to use nonsteroidal anti-inflammatory drugs for additive effect, and failure to anticipate and treat potential side effects of opioids. Among the reasons cited for poor pain management practices are outdated attitudes, a lack of knowledge about opioid pharmacology, and concerns about addiction. Clinician opiophobia is further compounded by opioidignorance as a result of insufficient training in pain management. Both dentists and dental students are aware of these problems and reverberate in the literature the need for more effective ways to teach pain management, especially in regard to chronic orofacial pain. As prescribers of 12 percent of immediate-release opioids in the United States, both dental students and clinicians have a responsibility for safe and efficient pain management, which involves a complex decision making process affected by many variables. Traditional pain management courses, however, often omit critical content and teaching strategies that may improve the implementation of information and, ultimately, the treatment of pain. Educational plans that incorporate model-based instruction in both cognitive and affective domains could more effectively achieve positive changes in practitioner behavior related to pain management than traditional teaching approaches.
Adequate management of pain is critical in today’s health care environment. When pain is managed well, patients stay on critical paths and have fewer complications. Despite this, only 3 percent of the nation’s medical schools currently have a separate course in pain management. Although there are no data in the literature tracking pain management training in predoctoral dental curricula, it has been speculated that most dental schools do not provide adequate coverage in this area either. With respect to predoctoral curricula, the American Dental Association has essentially acknowledged these shortcomings by mandating, through the Commission on Dental Accreditation, that postgraduate orofacial programs be designed to provide advanced knowledge and skills beyond those of the standard curriculum. Among the topics mandated in the curriculum are pharmacology and, specifically, pharmacotherapeutics, which is essential for proper treatment of pain that is often chronic, multifactorial, and complex.

Improved pain management education has been mandated by several organizations. Although studies have shown that pain management education programs can change self-perceptions of knowledge, skill, and comfort/confidence, as well as objective knowledge, including knowledge about the appropriate use of opioids, the current literature does not yet offer a systematic way to improve clinician practices and/or patient outcomes in pain management. For this reason, the College of Dentistry at the University of Tennessee Health Science Center introduced a comprehensive teaching plan to teach students pain management more effectively. This plan is designed to deliver content while also changing behavior and to yield more positive results than episodic teaching when painful problems are identified. The rationale is based on the premise that, if pain management education in dental school cultivates better clinical reasoning, better drug-prescribing behavior and improved pain management skills will follow. This, in turn, might enable students to make optimal clinical decisions when managing pain, particularly in cases that are mired in confusion and uncertainty.

Pain management is central in the practice of dentistry. When considering its relation to dental education, we can either view it individually or as an integral component of several subjects. Pain management can be taught as a set of facts, or alternately, as part of a curricular philosophy that aims to get students to think and act like clinicians. The curriculum model presented in this article is structured upon a four-tier scaffold that combines traditional and problem-based learning (PBL) to teach pain management in a comprehensive care-based dental clinical curriculum. The model integrates both worked and unsolved PBL case scenarios and includes multidisciplinary participation to increase critical thinking and problem-solving skills that may assist dental graduates in managing pain better throughout their careers.

### Structure of the Pain Management Teaching Model

The teaching model we developed is a blend of traditional and problem-based learning that aims to increase knowledge in pain management while also attempting to overcome the barriers to knowledge transfer into practice. This is done by challenging attitudes and encouraging students to explore their clinical practice alongside theoretical concepts. The model is carried out in four tiers.

#### Tier 1

A traditional lecture approach during students’ first and second years provides base knowledge about basic health sciences as a backdrop to pain management before advancing to the third and fourth years. The scaffolding process begins by introducing and integrating into the student’s knowledge base the anatomical and physiologic principles of pain with small-group discussions led by instructors in each of the relevant basic science courses who help the students work cases that correlate information to clinical scenarios. A comprehensive approach to pain management has been mandated by several organizations.

#### Tier 2

A PBL pain management workshop is given during summer orientation before entering the clinic in the third year. This PBL experience is student-centered learning in which small groups of students
are guided by preceptors (facilitators) to resolve problems in pain management that form the basis for organized focus and stimulus for learning and spur the development and use of problem-solving skills. New knowledge is acquired by self-directed learning. Groups of six students are paired with a preceptor and given case scenarios they have to work out together. While researching the literature, the students begin to formulate strategies to resolve the cases. Through active dialogue and group discussions led by the preceptor, the students reflect on feedback and gain new insights from the process of discovery as a stimulus to continue constructing and integrating new knowledge to further refine their strategies.

Building on basic science knowledge acquired in Tier 1, the problems require the integration of knowledge about drugs recently acquired in pharmacology. These problems are designed to simulate the treatment of pain before the students enter the clinic. Case scenarios guide the students toward a clinical understanding of the differentiation among opioids, antipyretic analgesics, anxiolytics, antidepressants and anticonvulsants, etc., as well as how and when they are used. As the case scenarios increase in difficulty, the student is called upon to continuously refer back to the knowledge acquired in Tier 1 in order to rationalize and manage dental pain associated with more complex medical profiles. The emphasis is on orofacial pain, headache, cervical pain, and musculoskeletal and myofascial pain.

**Tier 3**

A multidisciplinary problem-based pain management experience is ushered in as a series of weekly workshops after students have completed pharmacology near the beginning of the senior year. Groups of three dental students are paired with three medical students and one nursing or pharmacy student. The student groups are then given case scenarios they have to work out together. Students investigate appropriate textbooks and references to jointly come up with answers to problems in pain management cases, while sensitizing and exposing each other to the different pain management approaches that would be taken by allied health fields.

The case scenarios require the students to distinguish the differences between acute and chronic pain; the psychosocial and cultural aspects of pain; sex and gender issues in pain; neuropathic pain due to nerve damage; complex regional pain syndromes; differentiating pain management strategies in infants, children, adolescents, and the elderly; special cases of individuals with limited ability to communicate due to cognitive impairment; pain relief in substance abusers; pain management in seriously ill patients with cancer and AIDS; and complementary therapies for pain management including nerve blocks, psychological treatments, surgical pain management, physical medicine, and rehabilitation.

Since dentists often have the opportunity to detect, screen, and intercept serious medical conditions, their role can be central to motivating and directing patients to get accurate diagnosis and appropriate treatment. Teaching dental students to interact with other health professionals adds further value to the students’ learning experience since the real-world referral process for complex cases often requires multidisciplinary treatment efforts. A PBL team built of allied health students provides the dental graduate with a basis of experience that can be transferred into practice to assist in communication with specialists in the future.

**Tier 4**

In this “knowledge and experience synthesis,” groups from Tier 3 are activated in the field during the second semester of the senior year. This is coordinated with the medical, pharmacy, and nursing schools in order to include the allied health students in the experience. The exercise engages the students outside of the school in underserved areas and community centers (such as nursing homes) as part of a clinical rotation. The rotation includes additional shadowing in a pain management center, as well as a hospital emergency trauma center or similar clinical setting. By transitioning from cases to actual experience, these multidisciplinary teams apply the PBL experience in a tangible way that directly benefits the community and will be ingrained in the students’ memory.

**Assessment Tools, Report Cards, Pain Management Index**

During actual clinical encounters with patients experiencing pain, the students use assessment tools, report cards, and Pain Management Index (PMI) scoring for accurate and comprehensive assessment of pain management. Since patients are credible judges of their pain, patient self-reports serve as the basis for planned intervention by assessing pain intensity, location, and characteristics as well as
pain-related interference with activity. Using a numerical pain rating scale of 0 (no pain) to 10 (worst pain possible), pain ratings of 4 to 7 are regarded as interfering with comfort and function, and ratings of 8 or higher adversely affecting quality of life. Report cards measure overall performance in pain management by using nine indicators significant to pain management to compare the desired target set by clinicians to the actual findings reported by the patients. The purpose of the tool is to collect information needed for immediate course correction; help students identify where goals are not being met; and allow planning at the root cause level to institute effective pain management processes. The evaluation gives instant feedback about patient satisfaction with pain management during the pain experience, thus allowing closer monitoring and earlier intervention.

The PMI measures the adequacy of pain management, using the worst pain rating and the most potent analgesic prescribed. In this methodology, the 1-10 pain intensity scale is divided into three categories: mild (1-3), moderate (4-7), and severe (8-10). Analgesics are classified on a 1-3 scale (1 = non-opioid; 2 = mild opioid; 3 = strong opioid). The pain intensity level is then subtracted from the analgesic ranking to calculate the score. For example, if the patient’s pain is a 3 after using a category 2 analgesic, the pain management index is a -1, indicating that the patient is undertreated for pain. The PMI provides the students a quick way to assess adequate treatment, while also improving their assessment skills.

**Discussion**

Many acute, chronic, and recurrent painful conditions occur in the orofacial region, including temporomandibular disorder, neuropathic trigeminal pain, burning mouth syndrome, and trigeminal neuralgia. According to prevalence studies, 22 percent of the U.S. population experiences significant orofacial pain on more than one occasion within a six-month period, while over 7 percent of the population or 13 million people have a chronic orofacial pain disorder that requires treatment. Since only 3 million people with chronic orofacial pain seek treatment per year, the remaining 10 million patients go untreated. Studies suggest further that these patients are not being treated adequately by general dentists or dental specialists and that there are not enough orofacial pain dentists to deal with the problem. The percentage of general dentists who treat any of these patients is low: 14 percent with less than 5 percent of their practice in this area. Furthermore, studies have found that these patients have seen at least five dentists before seeing an orofacial pain dentist, while having lived with the pain, on average, for at least four years.

Although acute dental and periodontal pain is the most common complaint in dental practice, other nonodontogenic causes of orofacial pain must be considered in a differential diagnosis. Neuropathic orofacial pain is relatively common, and graduates, at a minimum, should be able to provide a basic diagnosis and palliative measures, with referral to a specialist if they cannot provide further help. Early intervention is important in these patients’ treatment, and dental education must bridge the gap in students’ understanding to ensure a basic level of care.

The curriculum presented in this article is a multidisciplinary pain curriculum, addressing topics such as the ethical, behavioral, and sociocultural aspects of pain, along with clinical issues and the neurochemistry of pain. Multidisciplinary and problem-based learning elements of the curriculum are inspired by Tufts University School of Medicine’s two-semester Capstone Project. This is “A Knowledge and Experience Synthesis” experience offering students the opportunity to integrate and apply the knowledge and skills they have learned in the classroom to comprehensively address clinical, public health, and/or social problems pertaining to pain. Since the ultimate goal of dental education is improved patient care, this model may lead to improved dental student knowledge, attitudes, and self-perception (confidence/comfort/skill) that are prerequisites for good prescribing practices and pain management skills. Although better knowledge and self-perception make improvements in clinical practice possible, reinforcement of the principles taught in the classroom also needs to occur in the clinical setting for this change to be sustained. These principles are reinforced by clinical preceptors in the private practice comprehensive care model, who mentor the students and conduct chart reviews to monitor their progress and intervene preemptively when necessary. This method has been shown to result in better opioid prescribing practices of medical students. Other studies have found that good role models for medical students and residents may be critical to the process. It would be logical to assume, therefore, that the preceptor in the private practice clinical model would be critical in this process also.
Chart reviews used to measure changes in the prescribing practices of the dental students provide an inexpensive way to monitor continuous quality assurance efforts. Chart reviews are also used by the preceptors to give positive feedback to their students who improve their practices and to provide encouragement or further education to those who do not. Feedback about practice patterns and quality of care measures, when combined with education, has been shown to change physician behaviors,7,38 as well as to improve dental students’ confidence and skills.27

Pain management is central to emergency dental treatment and can be taught by traditional means in a pain management or emergency dental care course. A pain management module could theoretically also be incorporated into a private practice preceptor program as a series of lectures given by the preceptors to their group. Six to twelve hours of lectures devoted to pain management, after pharmacology, concurrent with the third- and fourth-year clinical experience would perhaps be one model. Of course, the approach would have to be standardized so that all preceptor groups are exposed to the same learning experience. It could also be taught as a constituent module as part of one or several major health science courses such as pathology, pharmacology, neurobiology, or physiology during the preclinical years of dental education. If taught as a separate dental emergency course during the third or fourth year, all the information students have learned in the basic health sciences will have a chance to come together in a timely manner pertinent to their concurrent clinical activities.

Traditional teaching requires students to learn a large number of facts, and retention of information is a potential problem.20 Often the set of facts students are required to memorize are chosen by the instructor based on what he or she is familiar with and may not be relevant to dental practice.13,14,20 Furthermore, the student, a passive recipient in the traditional approach, may or may not learn the facts in a way that is suitable or useful in future practice.14-22 Problem-based learning, however, overcomes these challenges by developing scientific thinking about patients’ problems and providing both basic science and clinical information in a manner that promotes retention and transfer to the real-life task of the clinician.20 Unlike traditional instruction, this model actively engages the student in constructing knowledge about pain management. The content learned is related to the task of resolving problems and made useful to the student by the active and ongoing integration of information from many disciplines (neurobiology, pharmacology, anatomy, etc.) all integrated in one focused area.20,22 The principles the student learns after solving early problems then help to transfer skills and information to the student’s work with subsequent problems.20,22

By learning about pain management in the context of complex, multifaceted, and realistic problems, the dental students develop flexible knowledge, effective problem-solving skills, self-directed learning, effective collaboration skills, and intrinsic motivation.39 Working in groups, the students identify what they already know, what they need to know, and how to resolve the problem. The preceptor facilitates their learning and provides appropriate scaffolding, support, and modeling of the process,40 while also stretching their understanding41 with problems that can be solved in many different ways and have more than one solution.42 The assigned problems are authentic, meet the students’ level of prior knowledge, engage the students in discussion, and are interesting.40,41 The aim, of course, is to train practitioners to become skillful in decision making for sustainable and responsible development and, ultimately, to think like clinicians.20

The rationale for presenting worked cases44 (Table 1) versus unsolved pain management problems45,45 (Table 2 and Table 3) during Tier 1 is that active problem-solving is not as effective in early learning due to cognitive load or a guidance-fading effect.46 Processing a large amount of information in a short amount of time is difficult for students.14,20 Thus, studying worked examples early in the learning process followed by a gradual introduction into active problem-solving is a more effective approach.45-49

In summation, PBL teaches students how to analyze pain problems, identify relevant facts and generate hypotheses, identify necessary information/knowledge for solving the problems, and make reasonable judgments about solving the problems.14,20,22,39-43,46 The PBL experience also helps students build better communication, teamwork, respect, and collaboration skills.20,39,43,47 By being exposed to the interdisciplinary aspects of pain management as members of a PBL team that consists of students from multiple allied health fields, the dental students are acquiring a broader and fuller approach to managing pain.11,12 Thus, when they go into practice, they will have a more comprehensive understanding of their patients to more effectively manage the complex medical profiles they will be treating.

Research has shown that many dental students find PBL to be more effective than traditional teach-
Table 1. Sample worked case scenario for students

Case: Atypically Presenting Irreversible Pulpitis vs. Atypical Odontalgia

A 39-year-old woman had been given a tentative diagnosis of atypical odontalgia before presenting for a second opinion. The patient described her pain as pounding, stabbing, radiating, and awful. Her dentist had previously removed two fillings (teeth 6 and 7) without any change in the pain. Standard radiographs did not disclose any pathology, and the pain could not be induced by thermal tests or percussion. The pain worsened during the night and radiated to the temple and ear. The pain persisted for several weeks, and at the time of examination, she was medicated extensively to control the pain. She took 4 g paracetamol, 1800 mg ibuprofen (non-steroid anti-inflammatory drug), 100 mg tramadol (opioid), 150 mg pregabalin (anticonvulsant), and acetylic salicylic acid as a supplement. The pain was severe, and the patient was crying and asking for stronger analgesic drugs.

Clinical Impact: The diagnosis was an atypically presenting irreversible pulpitis of tooth 7 and not AO. Usually, pulpitis pain can be easily provoked by changes in temperature, but this was not the case for this patient.

Table 2. Sample unsolved pain management problem for students

Case: Trigeminal Neuralgia

A 52-year-old man presents with pain associated with the upper right canine (#6). Stimulation of the tooth elicits sharp-shooting, lancinating pain. Prior to being examined, he reports having experienced several episodes of severe, electrical shock-like pain followed by a hot sensation in the same area. One of these episodes was triggered by a light touch on his face, and the other occurred while shaving. Radiographic assessment revealed a periapical osseous lesion resulting in a diagnosis of acute apical periodontitis. Root canal therapy was performed with no undue effects. Approximately two months later, the patient began experiencing a relapse of paroxysmal sharp, shooting pain with a marked increase in frequency of these episodes. The pain was triggered by light touch on the right cheek. Each episode lasted 1 to 2 seconds; however, he occasionally had 5 to 10 repetitive bursts. Clinical evaluation resulted in a diagnosis of trigeminal neuralgia of the right maxillary division.

Initial treatment included 100 mg carbamazepine bid, which was gradually increased to a maximum dose of 600 mg bid. Medication yielded modest relief; unfortunately, cognitive changes necessitated a reduction in the dose. Gabapentin was introduced at a bedtime dosage of 100 mg. This provided a marked reduction in pain for approximately 1 week. A gradual titration of gabapentin to 300 mg tid was efficacious for approximately 1 month. Neurosurgical consultation and MRI of the brain revealed no intracranial pathology and confirmed a diagnosis of trigeminal neuralgia. Surgical intervention is being considered.

Clinical Impact: This case highlights that trigeminal neuropathic pain may exist in many forms and may easily be mistaken to represent an odontogenic source. The pitfall for the practicing dentist is to focus on the odontogenic pain component while the physician focuses on the trigeminal neuropathic pain component. Failure to identify the source of the patient’s entire problem may lead to erroneous and ineffective treatment. Therefore, it is important to consider all sources of pain in trying to delineate the etiology and ultimately recommend treatment.
their educational needs to keep their skills and information contemporary and care properly for problems they encounter. \cite{14,15,18,20,22,26,27}

With respect to the traditional aspects of this curriculum, clinical thinking begins as early as the basic sciences by integrating clinical correlations which, in turn, assist the students in learning about pain management. \cite{30} Integrating biomedical science and clinical teaching along with contextualized \cite{19,51} and interdisciplinary \cite{49} learning presents additional opportunities for deeper levels of learning. Teaching the diagnosis and management of acute dental pain alongside the underpinning oral physiology has been shown to help dental students understand the topic better than teaching them acute dental pain as a separate topic. \cite{51}

### Table 3. Additional unsolved pain management problems given to students

Students were instructed to read through the cases presented and answer the questions about each case.

#### Case 1: Temporomandibular Pain

A 40-year-old male presents with a two-year history of preauricular pain. The pain began gradually, but there have been periods of weeks when the pain disappears. The rest of the time, the patient has pain which fluctuates in severity from mild to severe, with an average score of 4. He describes the pain as piercing, pressing, annoying, and nagging. The pain begins preauricularly and then radiates behind and into the ear as well as partially down the muscles of the face. It is bilateral but worse on the left side. It is worse when eating hard things or biting into food and is helped by rest and analgesics. It is associated with some limitation in opening, a clenching habit, and clicking of the left joint. He suffers from headaches, has occasional tinnitus and back pain, and does not sleep well. He has a history of mild depression and anxiety. PMI assessment shows mild impact of the pain on quality of life. He was recently divorced and is now bringing up a 16-year-old son on his own. His sister helps him out while he goes out to work as a security guard. He thinks the pain is caused by a disease of the joint and would like some surgery for it. On examination there is some limitation in opening and an audible click on opening wide is heard. The muscles of mastication are tender on palpation. Intraorally, there are signs of frictional keratosis (white lines) in the buccal mucosa in line with the occlusal plane.

#### Case 2: Trigeminal Neuralgia

A 57-year-old male presents complaining of a sharp, shooting pain on the left side of his face. The pain began two months ago, but he had a similar episode one and a half years ago when it lasted for six weeks and disappeared completely until recently. Each bout of pain lasts for a few seconds, but the bouts seem to merge together and so it can seem like several minutes of pain. He may be free of pain for several hours. The pain begins in the left nasolabial fold and then spreads across the whole cheek up to the ear. He grades his pain an average 7/10 with PMI 4. He describes his pain as shooting, stabbing, sharp, stinging, tender, exhausting, terrifying, grueling, wretched, unbearable, and torturing. It appears to be made worse when eating, shaving, and talking. He is terrified of brushing his teeth. He has lost weight and has stopped going out, as he cannot get through a meal. Sleep brings him relief. He has a history of mild anxiety and severe depression. The patient has had time off work as he works as an actuary. He is married and has three adult children. He thinks he has a nerve pain and wants his nerve cut. Examination shows that touching the skin in the area of the infraorbital nerve provokes pain. There are no other abnormalities.

#### Case 3: Chronic Idiopathic Pain/Atypical Facial Pain

A 30-year-old female has had facial pain for two years. The pain began in her left maxillary teeth, and she had extensive dental treatment leading to root canal therapy and finally extraction of her upper left molar (14). She had limited pain relief after each of the procedures. There have been periods of no pain after dental treatment, but since treatment was completed a year ago, the pain has been continuous. She scores her pain 3 (mild-moderate) with an average of 4 out of 10. It does fluctuate in intensity, and she may not be aware of it during the day, but it is worse in the evenings. She describes her pain as sharp, aching, miserable, and radiating. The pain is now located both externally and intraorally on the left maxilla and radiates as far as the forehead and down to the neck. Nothing seems to help, and she has stopped using all analgesics as they do not relieve the pain. She reports headaches and neck and back pains, as well as occasional pruritus. She shows pronounced anxiety, but no history of depression. The quality of life assessment measures 5. She is married and has two children. She reported an unhappy childhood. She had an authoritarian father who was an alcoholic. She dropped out of school, but later got her high school equivalency and went on to college to become a school teacher. She enjoys her job but finds it stressful at times. The lack of diagnosis has been very frustrating, and she is concerned that she may have a brain tumor. Examination reveals no abnormalities and cranial nerve testing is normal.

Questions for each case:
1. What are the main characteristics of each of the pains?
2. What measurements and assessments have been presented, and how useful are they?
3. What other factors may help in the management of each case?
4. What is the differential diagnosis for each case?
5. Are there any diagnostic tests you could perform that would help?
6. What details in the history will help you determine the prognosis of treatment and patient compliance?
7. How would you start managing the patient?
Since a good understanding of the differences between musculoskeletal and neuropathic pain is important for successful management of chronic, complex, facial pain, teaching neuroscience with this approach can also provide students with a better understanding of how the nervous system works in the care and management of dental pain. When students acquire information that is both clinically useful and relevant, the knowledge acquired early in their anatomical, neurological, and pharmacological studies is then further amplified and reinforced with useful PBL correlations to enhance understanding during the clinical years. Furthermore, pharmacology alone is not always appropriate management and can even be hazardous to patients. Chronic pain disorders often require a multidisciplinary approach with a strong focus on psychological factors. Teaching behavioral sciences, including interpersonal and communication skills, is therefore integrated with the teaching of pharmacologic methods of pain control to improve prescribing behavior, patient safety, and control of pain.

This curricular undertaking will raise a number of issues that must be addressed in future studies, including 1) the relationships between changes in objective knowledge, self-perceptions, and attitudes and changes in practice; 2) the specific components of the curriculum (content, role modeling, instructional strategies, etc.) that were most responsible for the improved practice; and 3) whether and how improved practice patterns translate into improved patient outcomes. Research is needed to better understand the relevant factors in how pain management practices and patient outcomes can be improved.

Conclusion

The practice of dentistry is a lifelong learning process that does not end in dental school. With regard to the management of pain, an avalanche of information in the way of new drugs and medical knowledge will require graduates to continually engage in cognitive learning throughout their careers. The four-tier scaffolding learning model presented in this article blends traditional teaching with a methodology that can effectively develop critical thinking skills to help students overcome the obstacles to lifelong learning, as well as the challenges of managing pain. PBL is a tool that promotes an attitude towards learning and a desire for self-study that can, subsequently, help students resolve problems effectively throughout their careers.

As a key facilitator, the preceptor in the private practice clinical model provides additional value to the student’s learning experience. The preceptor pulls together everything the student has learned during the preclinical years, translating it in a way that is both clinically pertinent and useable. The preceptor in this model plays a critical role in cultivating cognitive skills that will pass on logic, reason, and good judgment to the students that will help them to manage pain better and ultimately care for their patients more humanely. Though the curriculum’s effectiveness is not yet assessed, we speculate that, with continual refinement, better management of pain will likely be one of the positive outcomes.

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