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Communication Skills for Pain Assessment and Management: A Pilot Undergraduated Medical Curriculum Targeting the Public Heath Problem of Suboptimal Pain Management in Current Medical Practice

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Communication Skills for Pain Assessment and Management:
A Pilot Undergraduate Medical Curriculum Targeting the Public Health Problem of Suboptimal Pain Management in Current Medical Practice

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Communication Skills for Pain Assessment and Management: A Pilot Undergraduate Medical Curriculum Targeting the Public Health Problem of Suboptimal Pain Management in Current Medical Practice

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I. Introduction

Suboptimal management of pain in current medical practice constitutes a major public health problem in this country, as evidenced by both economic and clinical consequences of this increasingly pervasive phenomenon. Recent studies posit that nation-wide inadequacies in teaching U.S. medical students how to assess and manage pain symptoms comprise a significant etiologic component of this public health crisis. Evidence for this current dearth of adequate pain medicine curricula is found in feedback from patients, residency program directors, practicing physicians, and medical students themselves. Recent actions taken by multiple state governments further confirm the gravity of this issue, as do position statements issued by the American Academy of Pain Medicine. Data from the last eight graduating classes at the University of Connecticut (UConn) School of Medicine indicate that this institution shares these nation-wide curricular inadequacies, and this was further documented in a recent curriculum review. Communication skills have been identified as one of the key aspects of pain medicine in which U.S. medical school graduates are deficient. This thesis examines a pilot undergraduate medical curriculum focusing specifically on communication skills for pain assessment and management.

The Communication Skills for Pain Assessment and Management project is an integrated, longitudinal curriculum, involving multiple instructional and evaluative components that span the four years of medical school training. This paper provides a description and appraisal of the third-year component. In August 2005, all students from the graduating class of 2007 attended a newly created three-hour evening forum designed
to improve students’ communication skills for pain assessment and management. In January 2006, approximately 5 months after this forum, all students in the class of 2007 completed a standardized patient encounter involving a patient with back pain. All members of the class of 2006 completed this same patient encounter one year prior in January 2005, without the benefit of the three-hour forum. The class of 2006 therefore represented the intervention cohort for this curriculum, and the class of 2007 constituted the comparison cohort. The standardized patient assessed each student’s performance using a checklist-style evaluation instrument, and the performance of the two cohorts was compared using two distinct statistical methodologies. The purpose of this study was to assess the effectiveness of this new curriculum for improving third-year students’ communication skills in pain assessment and pain management.

II. Background

The data on the national economic burden of various pain conditions and the financial consequences of ineffective treatment have prompted multiple researchers to define the “undertreatment of pain” as a problem of major public health importance. June Dahl, a nationally renowned pain management researcher, states that “the undertreatment of pain is a major public health problem in the nation, as studies have consistently shown poor control of all kinds of pain: post-operative trauma pain, cancer pain, and non-malignant pain” (Dahl, 2002). Similarly, W.A. Katz, who estimates that the problem of chronic pain translates into an annual national expenditure of no less than $50 billion dollars, asserts that “undertreatment of chronic pain persists despite the
availability of drugs and other therapies for effective pain management” (Katz, 2002). Without question, suboptimal pain management is not only a common problem in this country, but one of enormous public health significance.

In order to understand the public health impact of suboptimal pain management in current medical practice, it is important to examine several significant and tangible indicators of the public health costs associated with this problem. These indicators include total medical expenses of pain conditions, lost wages and lost U.S. workforce time secondary to pain, and maldistribution of healthcare dollars due to suboptimal treatment. In elderly individuals suffering from chronic pain, additional indicators include increased risk for falls and overall progression of disability. Each of these indicators is discussed. Nation-wide inadequacies regarding pain medicine curricula in American medical schools will then be presented in order to demonstrate that the curricular needs of UConn parallel national training deficiencies in this subject area, thereby further justifying the project as an appropriate and well-conceived intervention targeting the disturbing public health problem of suboptimal pain management in current medical practice. Literature supporting the project design will also be presented. Lastly, before describing the methodology, the author will outline the process by which the curricular content of this educational intervention was determined. This last section of the Background includes multiple research supporting the position that the curricular content selected for emphasis in this project is essential to adequately assess pain and communicate management principles to patients.
II.A. Estimates of the Cost of Common Pain Conditions and Suboptimal Treatment

The current literature clearly documents the magnitude of the economic impact of chronic pain conditions in the United States. First, the overall costs associated with various common pain conditions will be examined. The costs specifically associated with suboptimal management of persistent pain will then be discussed.

The three most remarkable aspects of recent research on the cost of common pain conditions are the significant prevalence of common pain conditions, the magnitude of the financial costs stemming from these conditions, and the consistency of the estimates across multiple studies employing multiple methodologies. In 2003, Stewart et al. published an article in JAMA which employed a cross-sectional study design using data from the American Productivity Audit, a national telephone survey of the U.S. workforce using the Work and Health Interview (2003). In this large random sample of 28,902 working adults conducted between August 2001 and July 2002, the authors found that 13% of the total workforce experienced a loss in productive time during a two-week period secondary to common pain conditions. The most common pain condition resulting in lost productive time was headache, followed by back pain, arthritis pain, and other musculoskeletal pain. The authors found that workers who experienced lost productive time from a pain condition lost a mean of 4.6 hours per week. Using age- and sex-specific wage data, they estimated that lost productive time from pain conditions among active workers costs $61.2 billion per year.

It is important to note that the estimate by Stewart et al. may in fact be lower than the actual cost of lost productive time due to pain for several reasons. First, as the
authors themselves point out, this estimate does not include costs from dental pain, cancer pain, gastrointestinal pain, neuropathic pain, or menstrual pain. Second, continuous absences of one week or more secondary to pain-induced disability were excluded from the analysis. Third, secondary costs such as the hiring and training of replacement workers were not measured. (The authors excluded these costs due to difficulties in standardizing their measurement.) These points must be considered because it is important to take the resultant potential for underestimation into account when comparing the Stewart study to other estimates. For example, a comprehensive 1998 National Institutes of Health (NIH) study estimated that the financial burden of pain exceeded $100 billion per year in medical expenses, lost wages, and other related costs (Dahl, 2002). While this estimate might at first glance appear inconsistent with the $61.2 billion Stewart calculation, it might be assumed that an extrapolation of the clearly conservative Stewart estimate would yield a similar projection. An international study of similar size to the Stewart study (26,000 vs. 29,000 patients), published in 1998 (WHO), estimated that one adult in five suffers from chronic pain. Again taking into account the potential for underestimation in the Stewart study, this prevalence compares reasonably with Stewart’s estimate that 13% of the U.S. workforce suffers lost productive time due to chronic pain. These comparisons are made to generally illustrate that estimates across studies yield similar conclusions regarding the overall magnitude of chronic pain as a public health problem.

Other studies have chosen to examine specific pain conditions and the economic burdens imposed by these conditions. Like the three studies that focused on general pain conditions, these studies are also notable for the sheer magnitude of the financial burden
imposed by specific pain conditions. With a study methodology similar to Stewart’s, Ricci et al. examined lost productive time among U.S. workers due to chronic arthritis and acute arthritis exacerbation (2005). Again using data from the same American Productivity Audit utilized by the Stewart group, these authors identified 329 workers aged 40-65 who met National Health and Nutrition Examination Survey (NHANES) criteria for arthritis and compared this group to 91 controls who did not meet such inclusion criteria. Several study findings support the assertion that both chronic and acute pain pose major financial burdens in this country. First, the researchers found that the prevalence of arthritis among U.S. workers aged 40-65 was 14.7% over the two-week period during which the nested case-control study was conducted. Second, the prevalence of acute exacerbations among the 329 workers meeting NHANES criteria for arthritis was 38% for this same period. Third, in comparing those afflicted with arthritis to the control group, the researchers estimated annual lost productive time due specifically to arthritis to be $7.11 billion, with a disproportionate 2/3 of this cost attributed to the 38% of workers with acute exacerbations. They conclude from these numbers that U.S. workers suffering from arthritis do not appear to be optimally managed in current medical practice, and that perhaps these workers could be better treated by stratifying them according to pain exacerbation status in order to yield a more “effective return on health care use” (Ricci et al., 2005).

Ricci et al. are certainly not alone in their conclusion that the current state of national affairs regarding pain management and related health care services are suboptimal at best. In another article examining a specific pain condition, Pai and Sundaram estimate that the total annual costs of back pain in the United States range
between $20-$50 billion. Such estimates provide justification for their statement that
“low back pain is a major public health problem in the United States” (2004).
Furthermore, they assert that “current medical practice has not had a large discernible
impact on the occurrence of back pain in the general population,” and they offer robust
support for this assertion in their illustration of how health care dollars are poorly
allocated with regard to chronic back pain.

“Approximately fifty percent of spine surgeries in the country are deemed
unnecessary and fail to relieve patients’ pain in the long term. Despite this, the
numbers of laminectomies, diskectomies, and lumbar spinal fusions performed
continue to increase steadily. This trend suggests an inefficient allocation of
scarce health care dollars. Furthermore, new and sophisticated diagnostic and
treatment options are being developed constantly, but without a proper analysis of
existing options. Although innovative diagnostic and imaging techniques are
paramount to identifying the correct diagnosis and etiology of low back pain,
focused cost-effective and cost-benefit analyses must be conducted on current,
already available technology to advance in the future.” (2004)

This quotation further demonstrates the far-reaching public health impact of suboptimal
pain management and presents a viewpoint consistent with the aims of the project
delineated in this paper. As mentioned in the Introduction, the central project of this
paper is to teach medical students how to better assess pain symptoms and more
effectively communicate management principles to patients. As a curricular intervention
aimed at undergraduate medical students, this project meets the criteria identified by Pai
and Sundaram; it is focused, cost-effective, and compatible with objective, statistical
testing regarding programmatic efficacy.

While there are many studies and review articles demonstrating the enormous
financial burden of general and specific pain conditions, further examination is required
from a public health perspective. The question is how much of this cost is preventable
and by what methods. In addition to preventing the injuries and conditions which cause
pain, another area which needs to be addressed is the significant and preventable cost of suboptimal pain management. For the purposes of this discussion, suboptimal pain management is defined as treatment of pain symptoms which fails to accomplish goals that clinicians would generally view as medically reasonable, or treatment that worsens the patient’s medical and/or psychological state. The terms “treatment of pain” and “pain management” are used synonymously here; they include not only pharmaceutical interventions, but also procedures, physical therapy, occupational therapy, counseling, patient education, and complementary and alternative medicine (CAM) modalities aimed at reducing pain symptoms.

A recent article by Goldberg et al. describes the use of integrated medical claims data to create 26 indicators of suboptimal pain management (2003). These markers, creatively named PAIN (Patient Population Assessment to Identify Need) indicators, were generated to identify patients with osteoarthritis (OA) or chronic low back pain (LBP) whose pain management might have been suboptimal. Examples of such indicators included multiple opioid trials, early opioid refills, excessive muscle relaxant use, excessive pain-related injections, undermedication, pain-related emergency-room visits, and repeated OA- and LBP-related surgical procedures. The application of these indicators to a database of approximately 3 million managed care organization (MCO) members yielded approximately 31,500 patients (2.7% of the total member pool) at risk for suboptimal pain management. (The authors do not specify how many of these patients had OA versus LBP.) Per-member per-month costs were calculated for this group of patients over a 180-day period, and the average PMPM cost was determined. A control group was then created by selecting a cross-sectional sample of comparably aged
MCO members with OA or LBP who had not been identified with one of these PAIN indicators, presumably meaning that this control group was not at risk for suboptimal pain management. Strict exclusion criteria involving pregnancy and cancer (beyond the focus of this discussion but important to note in appreciating the rigor of the study) were applied to both groups. The most significant findings relevant to this thesis were as follows: 1) Per-member per-month costs for patients with OA or LBP who were identified as receiving suboptimal pain management were nearly seven times higher than PMPM costs for OA or LBP patients not identified as being suboptimally managed ($843 vs. $121). 2) The mean for medical PMPM costs was $829 in the indicator-positive group, compared to $116 in the indicator-negative group. 3) Mean PMPM pharmacy expenses were $14 in the case group, compared to $4 in the control group. Indeed, this research is significant because of its detailed and carefully controlled analysis of the financial impact of suboptimal pain management in a specific health care system.

The magnitude of the cost of pain and ineffective pain management can be further demonstrated by examining two other indicators specific to elderly populations: fall risk and overall progression of disability. In order to answer the question of whether musculoskeletal pain increases the risk for falls in older women with disabilities, Leveille et al. (2002) conducted a prospective population-based cohort study in which they followed 1,002 women aged 65 and older over a 3-year period between 1991 and 1994. For purposes of analysis, the authors categorized musculoskeletal pain into four groups depending on severity and location. These categories were “widespread pain,” “moderate to severe lower extremity pain,” “no pain or mild pain in one site,” and “other pain” (pain that did not fit into the other three groups). Of the 1,002 women initially included in the
study, 940 participated in at least one follow-up examination. Using discrete time-survival analysis (a method in which logistic regression is used to determine the factor by which the odds of falling change with each time interval of the longitudinal analysis), the authors calculated odds ratios estimating the likelihood of a new fall during follow-up specifically due to a musculoskeletal pain at baseline. Controlling for demographic characteristics, body mass index (BMI), report of falls in the 12 months before baseline, walking disability, Mini-Mental Status Exam score, use of psychoactive medication, use of analgesic medication, history of falls, balance test score, gait speed, and confirmed diseases, the authors found statistically significant differences among the fall risks for the four pain groups. Women with widespread pain, for example, had an increased likelihood of falls during follow-up (adjusted odds ratio = 1.66; 95% confidence interval = 1.25-2.21) compared with those with no pain/mild pain. Furthermore, among women with musculoskeletal pain, risk for falls was lower in subjects taking daily analgesic medication. When one considers that 87% of fractures in elderly adults are due to falls, and that falls and fall complications cost an estimated $20.2 billion in the United States in 1994 (Leveille et al., 2002), the public health impact of musculoskeletal pain in the elderly becomes readily apparent.

Using this same cohort, these researchers conducted additional analysis and found an association between widespread musculoskeletal pain and worsening disability (Leveille et al., 2001). They defined worsening disability as “progression from no or mild difficulty to severe difficulty or inability to perform activities of daily living, walk one-quarter mile, or lift 10 lbs.” Women with widespread pain were found to be 2.5 to 3.5 times more likely to have severe difficulty with these activities at baseline compared
to women with no or mild pain, controlling for age, race, education, BMI, comorbid conditions, and self-rated health. Furthermore, among women who initially did not have severe difficulty with performing each of the tasks, widespread pain almost doubled the risk for progression to severe difficulty with each task, even after adjusting for confounders such as age, BMI, and comorbid illness.

The evidence of the public health cost of pain and suboptimal treatment is clearly documented. As outlined below, nation-wide deficits in pain medicine education are also readily apparent. Since physicians’ capability to adequately treat pain is partly determined by the education they receive as medical students, medical school curricula are a logical target for a public health intervention.

II.B. Nation-wide Inadequacies in Pain Medicine Curricula in American Medical Schools

In a recent *Pain Medicine* editorial, Dr. Hui-Ming Lang notes that the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) established pain management standards for all hospitals in 2001. These standards required that all physicians be able to assess and manage pain for all patients. The Liaison Committee on Medical Education (LCME) did add clinical experience in end-of-life care to its accreditation standards in 2000. However, the LCME currently does not have a requirement for pain medicine curricula. Consequently, as Dr. Chang states in her
editorial “pain medicine and palliative care are not a part of the required curriculum at most of the United State’ medical schools” (2002).

Dr. Chang’s observations were substantiated by a study by Barzansky et al. in which the authors reviewed the results of 2 national surveys specific to undergraduate medical education: the LCME Annual Medical School Questionnaire and the Association of American Medical Colleges (AAMC) Graduation Questionnaire (GQ). The results highlighted by these authors indicate that the University of Connecticut is not alone when it comes to inadequacies in the training of medical students regarding issues related to pain. In the 1997-1998 LCME Annual Medical School Questionnaire, only 1 of the 125 accredited American medical schools reported a separate required course in pain management, although 105 of the 125 (84%) reported that they included the topic of pain management within required courses. Elective experiences specific to this subject area were also relatively rare among these schools, as only 34 of the 125 reported an elective course on pain management. These survey results were confirmed in the AAMC Graduation Questionnaire. The AAMC GQ is an annual national survey completed by graduating medical students and used by American medical schools as a feedback tool by which to assess curricular strengths and weaknesses. In 1998, 66% of graduates nationwide thought that their instruction in pain management was inadequate (Barzansky et al., 1999). More recent Graduation Questionnaires show that a substantial proportion of respondents continue to think their training in pain management was inadequate, and fewer than 1.3% of every national graduating class between 1998 and 2005 indicated they received “excessive” training in this subject area (see Appendix A).
Billings et al. reached similar conclusions about the lack of undergraduate medical training in pain medicine in their comprehensive review of articles on pain medicine and palliative care. The authors found that there were very specific deficiencies in teaching the *communication skills* needed to practice good pain assessment, pain management, and palliative care.

“Students, residents, and physicians in practice lack training and are often quite uncomfortable and uncertain about how to assess pain, break bad news, discuss treatment options…elicit or respond to strong affect, assess or treat a grief reaction, conduct a family meeting, or work with an interdisciplinary team.” (1997)

Billings et al. offer specific recommendations about how best to teach these communication skills.

“Communication skills are best conveyed through talking with patients, supervision by teachers and peers of patient encounters (either through direct observation or videotape review), role playing, demonstration, use of standardized patients (for both learning and evaluation), and patient-centered teaching on clinical rotations.” (1997)

These authors perceive significant inadequacies in pain medicine education, and they suggest educational interventions similar in design to the curricular approach of this thesis.

The perception that undergraduate medical schools do not adequately train their students in issues related to pain assessment and management is also shared by residency program directors, practicing physicians, the lay public, state governments, and the American Academy of Pain Medicine (AAPM). Selective examples of studies illustrating this shared perception are presented.
II.B.1. Residency Program Directors

In 2005, Gallagher et al. examined the extent of headache education received by American medical students and residents. The authors sent surveys to all allopathic and osteopathic medical schools, 200 family medicine residencies, and all 126 neurology residencies, requesting information about the perceived adequacy of headache education. While 88% of medical schools reported that their undergraduate training in headache education was adequate, only 33% of family medicine residency directors and 30% of neurology residency directors believed that new residents had adequate knowledge about headaches (Gallagher et al., 2005). Indeed, these authors report that the majority of both neurology and family medicine residency directors believe that entering residents are inadequately prepared in headache education upon entering residency.

II.B.2. Practicing Physicians

The perception that more training is needed in the areas of pain assessment and pain management appears to be commonly held by practicing physicians. In a 2004 study published in Academic Medicine, Darer et al. conducted a telephone survey of practicing U.S. physicians who had a minimum of 20 hours of patient contact per week. They examined physicians' perceptions about the adequacy of their chronic illness training in 10 specific competencies, including chronic pain. Of the 1,236 physicians who responded, 63% indicated that they received inadequate training in chronic pain management. The specialty reporting the highest percentage of inadequate pain management training was internal medicine (70%). The authors assessed where the training deficits may have occurred:
"We did not ask physicians to ascribe deficits in training to particular educational stages, but the cumulative data suggest that deficits probably exist at all levels of training. We found that recent medical school graduates, those physicians likely to have entered into practice within the last five to seven years, were more satisfied with their education in chronic care than were older graduates. This finding indicates that some change in the culture of medical education has taken place over the past decade, perhaps as attention has shifted toward ambulatory settings and competencies...However, even after adjusting for years since graduation from medical school, we still found that most physicians felt more chronic care education was needed, suggesting educators still have a long way to go toward preparing new physicians to meet the demands of current practice.” (Darer et al., 2004).

II.B.3. The Lay Public and State Governments

Frustration about physicians’ inadequate training surrounding pain management skills has been expressed in various ways by both the public and state legislatures. According to the WHO, pain is the most common reason why patients visit physicians worldwide. As already noted, 1 in 5 adults suffers from chronic pain, and of this group, 21.5% have experienced pain lasting for longer than 6 months (Katz, 2002). In 1993, Kaiser Permanente, a large, nation-wide health management organization (HMO), undertook a quality improvement activity aimed at improving the care and reducing the costs of patients with chronic pain (Donovan, 1999). Their literature review indicated that 15% of the general population suffered from some type of chronic pain syndrome, similar to the WHO’s global estimate. It is clear from these studies that a large number of patients suffer from chronic pain, and it is also evident that a significant portion of chronic pain patients believe that their pain could be better managed by their physicians. Member groups convened as part of the Kaiser project indicated that the unmet need for adequate pain relief was a recurring theme. Internal audits performed by the HMO also
revealed that inadequate pain management was one of the most common reasons for member complaints.

The large numbers of patients with chronic pain and the accompanying public frustration resulting from suboptimal treatment have spurred several state legislatures to mandate continuing medical education (CME) in pain medicine and palliative care (Dahl, 2002). In 2000, West Virginia and California passed laws requiring continuing education on these topics. California law mandates that all physicians complete a course in pain management and the treatment of terminally ill and dying patients. The more stringent West Virginia statute requires 2 hours of continuing education per CME reporting period in end-of-life care (including pain management) for physicians, nurses, and pharmacists. Michigan also passed similar CME requirements in pain management for all licensed health professionals several years ago, but the statute was never implemented due to lack of appropriations. State pain commissions have also been created in Massachusetts, Florida, and several other states as a way to study and address regulatory barriers and other obstacles to effective pain management. Another example of legislative activity targeting the issue of suboptimal pain management is the Maryland legislature’s establishment of the State Pain Management Advisory Council. Their mandate is “to evaluate all options for improving pain care statewide and report in a timely fashion to the legislature and the governor” (Dahl, 2002). An example of gubernatorial action aimed at improving pain management occurred in New Mexico, where the governor appointed a study group to create recommendations. Throughout the country, state governments have been active in responding to the public outcry surrounding suboptimal pain management.
II.B.4. The American Academy of Pain Medicine (AAPM)

The need for educational reform in pain medicine has long been recognized by the American Academy of Pain Medicine (AAPM). In fact, not only does the AAPM strongly assert that medical students are inadequately trained in issues related to pain, but the Academy also advocates for a complete overhaul of the current system of pain medicine fellowships. The position statements, actions, and recommendations of the Academy and of several of its members are presented in order to illustrate both current inadequacies in pain education and possible future directions.

The AAPM first expressed concern about shortfalls surrounding medical student education in pain in 1997, leading to the Academy’s creation of an Undergraduate Education Committee in 1998 (Gallagher, 2002). In 2000, this Committee released a position statement asserting that “a well-integrated educational program in the required curriculum, delivered by qualified multidisciplinary faculty, is needed to educate medical students in pain medicine” (Chang, 2002). As noted above, the LCME offered a partial response to this statement by adding clinical experience in end-of-life care to its accreditation standards for undergraduate education in 2000. At present, however, this consists of 1-2 days of hospice “shadowing” experience at many medical schools, and the AAPM asserts that this brief required exposure to end-of-life care is insufficient to provide medical students with the skills needed to offer adequate pain management and comprehensive palliative care in their residencies and practice. In response, the AAPM created the TOP project. This project involves the ongoing development of web-based
educational modules and model curricula designed to assist in teaching medical students about pain (Gallagher, 2002).

While the AAPM hopes that endeavors such as the TOP project will aid medical schools in the development of pain medicine educational interventions, AAPM members perceive several significant obstacles to the development of formal pain curricula in clinical medical student education. Among these impediments are political obstacles, lack of financial or institutional support for faculty wishing to pursue interests in pain medicine, and, perhaps most importantly, a poorly designed specialty training system in pain medicine, resulting in a dearth of medical school faculty well-trained in this subject area. As Dr. Rollin Gallagher (Director of the Pain Medicine and Rehabilitation Center at Tenets Hospital in Philadelphia and Editor-in-Chief of *Pain Medicine*) describes in a recent editorial, the current process through which a physician acquires specialty training in pain medicine consists of primary residency training followed by a one-year fellowship in pain management. These one-year fellowships were originally created and overseen by the American Board of Anesthesiology (ABA); hence, the prerequisite for this fellowship has historically been a residency in anesthesiology. The result of this training process, Gallagher argues, has been the proliferation of experts in regional anesthesiology, rather than true experts in the multiple aspects of pain medicine. Gallagher states that this approach to specialty training in pain medicine has “failed to address the public health problem of inadequately treated pain” for two reasons. First, until recently, the ABA did not accept non-anesthesiologists into the training program or its examination. Second, the examination almost exclusively tested the knowledge and skills of regional anesthesiology, which do not encompass the knowledge and skill sets
required to provide comprehensive treatment for patients in pain. Consequently, "the public got whatever the practitioner was trained to do, not necessarily what the patient needed, and the results were, not surprisingly, usually poor" (Gallagher, 2002).

Recognizing some of these shortfalls of this specialty training system, the ABA recently proposed adding a second year to this fellowship. This two-year specialty training experience would be available to physicians who have completed at least 3 years of residency training in anesthesiology, psychiatry, neurology, or physical medicine and rehabilitation (PM&R). While perhaps a slight improvement over the traditional training system, this proposal is also perceived by the AAPM as flawed for several significant reasons. First, it adds additional barriers of time and expense to the development of pain medicine specialists. "In this debt-burdened scenario, there would be a strong incentive for these doctors to do for the patient what makes money, rather than what is right for the patient – and in debt-burdened academic medical centers, they would be encouraged to do this as well" (Gallagher, 2002). Second, it requires what Gallagher calls "wasteful retraining" for residents who have just completed three years of psychiatry, neurology, PM&R, or anesthesiology, requiring these residents to unlearn the philosophy and biases of the medical culture from which they originated.

The AAPM's staunch opposition to both the traditional pain medicine training system and this new ABA proposal begs two questions for the astute reader: 1) What is the Academy's solution for creating well-skilled pain medicine specialists?; and, 2) Where are the qualified faculty to lead pain medicine departments in medical schools, teach essential pain medicine principles to medical students, and train the first generation of formally and comprehensively licensed pain specialists? In response to the former, the
AAPM advocates for "pain medicine residencies as the only way to both standardize training and to efficiently train practitioners and future faculty" (Gallagher, 2002). These would be regular specialty residencies, following graduation from medical school. In terms of the second question, Gallagher proposes that medical schools recruit practicing physicians in the community to teach pain medicine to medical students and to form pain medicine departments in U.S. medical schools. He points out that this idea parallels the strategy through which the first groups of family medicine faculty were recruited when that residency was in its infancy, a recruiting process which met with success in the establishment of family medicine as an independent and rigorous discipline. The underlying spirit of Gallagher's proposed recruiting approach is to attract clinicians whose skills have evolved to meet the needs of the community in which they practice.

There are many reasons for the lack of formal and adequate pain curricula in medical student education, including the political obstacles associated with curricular change, the lack of financial or institutional support for faculty wishing to pursue interests in pain medicine, a poorly designed specialty training system in pain medicine, and a lack of medical school faculty well-trained in pain management. It is clear that medical students, residency training directors, practicing physicians, the lay public, state governments, and the AAPM agree that pain medicine is inadequately taught in U.S. medical schools, and that this should be corrected. It is also clear that these inadequacies have created a major public health problem in this country, the magnitude of which can be measured both clinically and in economic terms. Hence, the project described in this thesis, a pilot undergraduate medical curriculum focusing specifically on communication
skills for pain assessment and management, has been created as an initial step toward meeting this curricular need and addressing the pervasive problem of suboptimal pain management in current medical practice.

II.C. Justification for Project Design

The current literature on pain medicine education in North American medical schools contains multiple examples of successful pilot curricula. One example is a curricular intervention introduced several years ago at the University of Kentucky College of Medicine, where clinical experts from the departments of anesthesiology, behavioral science, oncology nursing, surgical oncology, neurosurgery, pharmacy, medical oncology, pain management, hospice nursing, radiation oncology, and physical therapy collaborated to develop a Cancer Pain Structured Clinical Instruction Module (SCIM). This educational module shares many similarities with the UConn curriculum, as evident in the authors’ description of the SCIM as “a hands-on skills training course that brings together students, instructors, and standardized patients for the purpose of teaching important clinical skills” (Sloan et al., 2003). The working group of experts developed 8 topics important in the assessment and management of cancer pain (pain history, physical examination, communication of opioid myths, analgesic management, routes of opioid use, physical therapy, cancer pain syndromes, and radiotherapy for cancer pain), and each topic was presented at an individual stations manned by faculty
members and standardized patients. Total length of the course was two hours, and students rotated in groups of four through the eight fifteen-minute stations.

Four consecutive rotations of third-year medical students rotating on the combined medicine-surgery clerkship at the University of Kentucky participated in this project. The first group, which constituted the control group, was not exposed to any new instructional experiences related to cancer pain. The second group received a self-instruction module on a CD-ROM that presented basic knowledge required for the assessment and management of cancer pain. Like the CD developed for use in UConn’s course, this CD-ROM included video clips of a history (and physical examination) performed on patients. The third group received this same CD-ROM module as well as the two-hour, eight-station Cancer Pain SCIM. Finally, the fourth group completed the CD-ROM module, the Cancer Pain SCIM, and a two-hour structured home visit to hospice patients under the tutelage of a hospice nurse. Also similar to the UConn project, the effectiveness of these interventions was evaluated at 4-months post-instruction through the use of an Objective Structured Clinical Examination (OSCE). Most germane to the UConn curricular intervention, all three intervention groups performed better on the OSCE at four months post-instruction than the control group (p<0.05). Hence, this study demonstrates that educational interventions employing electronic media and standardized patients can have a durable and measurable impact on medical students’ pain assessment and pain management skills. (See Discussion for the relevance of this study to future iterations of our curriculum and potential areas for programmatic improvement).
Another recently published study lending support to the UConn project design originates from the University of Toronto, where the Interfaculty Pain Education Committee at the Centre for the Study of Pain developed a 20-hour undergraduate pain curriculum to be delivered over a one-week period to 540 students from the departments of dentistry, medicine, nursing, pharmacy, physical therapy, and occupational therapy (Watt-Watson et al., 2004). Teaching strategies were similar to those employed in the current study in that they included large and small groups, standardized patients, and facilitators. The program was favorably evaluated by participants, with overall ratings of "exceeding or meeting expectations" ranging from 74 to 92% for each day of the five-day course. Pre- and post-test evaluations of students' pain knowledge were also conducted, with a statistically significant improvement in correct responses demonstrated at post-test evaluation. Another recent study by Fletcher et al. employed lecture, small-group sessions, and standardized patients to teach students how to assess and examine patients with abdominal pain, lending further support to the UConn project design. The Fletcher study demonstrated statistically significant differences in clinical performance between the intervention group and an unexposed control group in standardized patient exams occurring 18 months after the curricular intervention (Fletcher et al, 2004). Indeed, the notion that pain curricula can have a measurable and lasting impact on students' pain medicine skills and knowledge is amply supported in the recent studies on this subject.
II.D. Determination of Curricular Content

In order to determine curricular content to be taught and tested by checklist items for specific principles of pain assessment and management, the five original authors of this project conducted several literature reviews. One review sought historical information important to the management of pain. This review highlighted five categories of historical information considered by a consensus of authors to be important in this regard: 1) parameters of symptom(s); 2) past medical history; 3) family history; 4) social history (including the impact of the symptom[s] on activities of daily living, mood, and social support); and 5) patient concerns. Using this information, the authors determined the pain assessment educational concepts to be emphasized to the first- and third-year classes and created trigger tapes and facilitator’s guides that highlighted these concepts. Similarly, in order to determine how best to teach third-year students adequate communication skills for negotiating pain management with patients, this faculty group conducted a second literature review specific to this topic. This second review highlighted the following items as crucial actions that the clinician must take in adequately negotiating pain management with patients: 1) clinician explores patient’s knowledge of treatment possibilities; 2) clinician investigates patient’s preferences; 3) clinician works with patient preferences if medically reasonable; 4) clinician explores patient’s expectations and goals; 5) clinician manages unrealistic expectations if necessary; 6) clinician addresses pain medication issues, including possible side effects and patient concerns/misunderstandings regarding addiction, tolerance, and dependency; 7) treatment plan is team-oriented, including specialists in physical conditioning,
psychological counseling, and/or complimentary and alternative medicine (CAM) as needed; and, 8) final treatment plan is mutually agreed upon between the clinician and the patient. Using this information, the authors created checklist items on the third-year and fourth-year cases (Appendices E2 and F2) specific to these pain management principles.

For the sake of clarity, it should be noted that the author of this paper did not join this academic endeavor until nearly a year after the five original project creators first met to discuss its development and implementation. Hence, the aforementioned literature reviews were conducted prior to the addition of this sixth team member. However, another recent literature review conducted independently by the author of this paper further substantiates the decisions made by the original group regarding curricular content. Examples from this review supporting the curricular content emphasized in this project are found below.

Without question, one of the central aims of this project is to emphasize to students that multiple psychological factors significantly impact the experience of chronic pain, and that a thorough and relevant social history is therefore a critical component of a complete pain assessment. To this end, the curriculum emphasizes sleep, mood, activities of daily living (ADLs), support systems, finances, and intimacy issues as important data points to obtain in conducting a pain assessment. Support for this biopsychosocial approach to pain assessment is found in a plethora of journal articles and textbooks published on the topic in recent years. Consider, for example, a study published by Alison Carr entitled, “Beyond disability: measuring the social and personal consequences of osteoarthritis.” Carr asserts that while the impact of osteoarthritis (OA) has
traditionally been measured using the indicators of functional disability, general health status, and quality of life, these traditional indicators largely neglect the wider psychosocial impact of OA. Accordingly, Carr’s study seeks to measure “the wider personal and social consequences of osteoarthritis both at a population and an individual patient level” (1998). In order to objectively measure handicap resulting from osteoarthritis, the author utilizes the Disease Repercussion Profile, a disease-specific measure of handicap originally designed for rheumatoid arthritis, which has since been validated for OA as well. Through the use of this tool, Carr discovered that OA patients report significant handicap in six dimensions of their lives: functional activities, social activities, relationships, socio-economic status, emotional well-being, and body image. Without question, Carr’s study substantiates the assertion that clinicians must go beyond physical disability indicators in order to fully assess and appreciate the extensive impact of disease processes involving chronic pain.

Further support for the importance of this biopsychosocial approach to pain assessment can be found in a recent article on low back pain by Pai and Sundaram. Though the focus of this article is on direct economic costs associated with low back pain, the authors recognize that low back pain also often imposes “less tangible costs,” such as problems in “functional and social activities, relationships, emotional well-being, body image, and socioeconomic status” (Pai and Sundaram, 2004). They also state that “it is integral to recognize this psychosocial impact as another significant cost of the condition.”

With regard to specific elements of the biopsychosocial approach that this project endorses, there exists a substantial amount of literature supporting the position taken by
the authors of this project that screening for depressive symptoms is an essential part of
any pain assessment. (Note that items related to mood are found on all three examination
checklists in Appendices D2, E2, and F2.) Consider, for example, a 12-month
prospective cohort study conducted by Reid et al. involving 276 community-dwelling
residents in the greater New Haven region, aged 70 and older, with a history of clinically
evident musculoskeletal pain. The authors measured levels of depressive symptoms at
baseline using the Center for Epidemiologic Studies-Depression (CES-D) scale. They
then stratified the participants’ into four quartiles based on these numerical results. This
comprehensive baseline assessment also included the collection of information regarding
participants’ demographic, medical, physical, and cognitive status. The authors then
conducted monthly interviews over the course of one year to ascertain the occurrence of
disabling musculoskeletal pain (defined as remaining bedridden for at least one-half day
or limiting one’s usual activities due to joint or back pain) for each participant.
Controlling for sex, age, race, years of education, marital status, body mass index,
number of chronic conditions other than musculoskeletal pain, nonaspirin pain
medication, rapid gait speed, Mini-Mental State Examination, and a history of restricted
activity at baseline, they reported a statistically significant difference in the mean number
of months of disabling musculoskeletal pain between the highest and lowest depressive
quartiles (Reid et al., 2003). Indeed, these results substantiate the claim that there is a
significant association between depressive symptoms and pain, particularly among older
persons.

Not only is there literature supporting the teaching point that screening for
depression is relevant in patients with pain symptoms, but there is also considerable
evidence that treating depression can improve pain and functional outcomes for these patients as well. In 2003, Lin et al. published a large randomized controlled trial in JAMA in which they stratified 1,801 depressed older adults into 2 groups. The intervention group received the year-long IMPACT (Improving Mood-Promoting Access to Collaborative Treatment) intervention, a collaborative care approach in which patients received depression care management by a nurse or psychologist working in conjunction with the patient and primary care physician. Treatment options in this intervention group included antidepressant medications and a 6- to 8-session psychotherapy program designed for primary care and delivered by a depression care manager. The use of antidepressant medications was governed by a stepped-care pharmacotherapy algorithm, and the depression care nurse met weekly with a supervising psychiatrist and an expert primary care physician to monitor clinical progress and modify treatment plans accordingly. Follow-up visits took place every 2 weeks during the acute phase of treatment and every month during the continuation and maintenance phases. Patients in the usual care group received routine primary care management of depression, commonly including antidepressant medications and referrals to specialty mental health services as considered necessary by the attending physician or patient. Although the intervention group specifically did not receive routine assessment or treatment of arthritis, statistically significant differences in pain intensity among participants with baseline arthritis were found at 3 months and 12 months follow-up. In addition, differences in mean patient scores regarding the interference of pain with daily activities were also statistically significant at 3, 6, and 12 months (Lin et al., 2003). Nickel et al. reach similar conclusions regarding the treatment of depression and improvement of disability and
health-related quality of life in a recent study published in the *Archives of Gerontology and Geriatrics* (2005). Indeed, there is ample evidence supporting the relevance of exploring mood symptoms in assessing pain, as treating these symptoms appears to be an essential component of adequate pain management.

With regard to the inclusion of sleep as an important data point to ascertain in patients with pain symptoms, a 2005 study by Power et al. supports this association and its relevance to this project. In their large cross-sectional analysis (n=118,336), these authors discovered that the prevalence of insomnia symptoms in persons with arthritis was 24.8%, while the prevalence of unrefreshing sleep in this same group was 11.9%. Both prevalence rates were approximately double those for subjects without arthritis, and these differences were significant. Furthermore, the prevalence of both insomnia symptoms and unrefreshing sleep rose with increasing pain severity in subjects with and without arthritis, suggesting that “pain mediates a substantial amount of the relationship between arthritis and sleep problems” (Power et al., 2005). This study suggests that the association between pain and sleep is both statistically significant and clinically relevant.

With regard to pain management principles, this project places considerable emphasis on a multidisciplinary approach, teaching students that while traditional pharmacotherapy is certainly an important component of treatment, appropriate pain management also frequently involves input from and intervention by surgical specialists, physical therapists, CAM practitioners, mental health professionals, and various other providers and treatment modalities. This multidisciplinary approach is reflected in the pain management checklist items found in Appendices E2 and F2. One of many
examples of support for teaching this approach is found in a 2002 article by W.A. Katz on musculoskeletal pain.

"An optimal strategy for the management of chronic nonmalignant pain (CNMP) must adopt a multidisciplinary approach. While accepting the unquestioned importance of medications, pain centres [sic] must also provide access to patient education, physical medicine, and a variety of alternative medicines (e.g., chondroitin sulphate [sic], glucosamine sulphate, herbal medicines, and acupuncture). The armamentarium will further include a variety of specialist injection techniques. Surgery is also important because some CNMP patients will be unable to benefit from any of the above modalities and will require a total joint replacement. Finally, the simple psychosocial counseling aspects of pain management, such as listening, reassurance, and touch, are critical to making medications work better." (Katz, 2002).

Indeed, multiple position statements similar to this one by Katz are found in the literature, and quotations like the one above provide backing for the multidisciplinary approach to pain management emphasized in this project.

In addition to the concept that collaboration with other providers and exploration of multiple treatment modalities are often integral components in adequately treating pain symptoms, another central pain management principle taught in the UConn curriculum is that shared decision-making facilitates optimization of clinical outcomes. Accordingly, the curriculum teaches students how to fully engage their patients in treatment decisions and subsequently tests students on their ability to do this in the third-year back pain case (Appendix E2) and in the fourth-year spinal stenosis case (Appendix F2). Support for the utility of this shared decision-making model is pervasive in the current literature. Consider, for example, a literature review conducted by Judith Hibbard in which she explored the current available evidence regarding the potential of patients to contribute to improved health outcomes.

"The evidence suggests that, when patients engage in collaborative care, shared decision-making, and self-management, they have improved health outcomes.

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For example, training patients with chronic diseases to self-manage their disease is effective in increasing functioning, reducing pain, and reducing health care costs. When patients have a greater sense of self efficacy and confidence in their knowledge and ability to perform self-care management tasks, they are more likely to engage in those behaviors...[Additionally], just by exerting more control in the doctor-patient interaction, patients have been shown to have better health outcomes. Coaching patients to be more involved and to have more control in the medical encounter has been shown to produce better health and functioning in patients.” (Hibbard, 2003)

Hibbard cites no less than 12 articles substantiating the association between shared-decision making and improved health outcomes. Indeed, the emphasis placed on this model in the UConn curriculum is well-placed.

III. Methodology

The overall pilot curriculum has three main components. These components target the first, third, and fourth years of the University of Connecticut School of Medicine curriculum. The third-year component of this pilot curriculum has been completed, and the data from this completed component are the focus of the Results and Discussion sections below. The data from several other elements of this larger project are still being collected. Hence, the statistical analyses which will eventually stem from this ambitious curricular endeavor are quite rich.

The process by which the project designers assessed curricular needs specific to the University of Connecticut School of Medicine will be presented. Next, the multiple components of this project are described to place the third-year curriculum in its proper context as one part of a longitudinal, integrated educational program in pain assessment
III.A. Needs Assessment at the University of Connecticut School of Medicine

Pain medicine was originally identified as an area of curricular need at the University of Connecticut (UConn) as a result of data compiled from multiple years of the AAMC Graduation Questionnaire. Data specific to the University of Connecticut between 1998 and 2005 are displayed in Appendix C. As shown in the figure, at least 49.3% of University of Connecticut from any given graduating class believed that time devoted to pain management was inadequate. In 1998, 79% of students felt that their instruction was inadequate; 7 years later, a similar proportion of the 2005 graduates (72%) believed that this was the case. Also of note is the fact that in 7 out of 8 of these graduating UConn classes, none of the graduates believed that time devoted to pain management was excessive. Without question, these data highlight an area of significant curricular need at UConn.

In response to these numbers, several UConn faculty members initiated an inquiry into the current amount of time devoted to pain assessment and management in the various phases of the four-year curriculum. UConn’s preclinical (first and second year) curriculum is divided into four main sections: Basic Medical Sciences (BMS), Principles of Clinical Medicine (PCM), Problem-Based Learning (PBL), and Human Development and Health (HDH). The relative lack of instruction in these four preclinical sections was
noteworthy. The BMS curriculum is 17 hours per week throughout the first and second years. In this curriculum, there were only 4 lecture hours in the second year devoted to pain assessment or management. The PBL curriculum, which includes approximately 15 cases over the first two years of training, contains only two cases ("Gout" and "Phantom Limb") in which issues related to pain medicine play a prominent role. The PCM curriculum is one four-hour session per week over the first two years. PCM did not have any instructional time devoted to pain assessment or management prior to this project's implementation. The HDH course is 17 hours per week over two months of the second year. HDH contained 3 hours on the management of chronic benign pain and 0.5 hours on pain behavior. Similar deficiencies were noted in the clinical phases of the curriculum (years 3 and 4), in which only three didactic sessions (headache, arthritic pain, and back pain) were found. The needs assessment therefore substantiated the Graduation Questionnaire in identifying pain medicine as an area of major curricular need at the University of Connecticut School of Medicine.

III.B. Overall Project Design

In response to these findings, five faculty members from the University of Connecticut began meeting in the summer of 2004 to develop a multi-part longitudinal curriculum in pain assessment and management (Appendix B). The group decided to develop two major educational interventions, and protected time was carved out for the implementation of these interventions at two specific points in the four-year curriculum:
January of year 1 and July of year 3. The first-year intervention centered on teaching
students how to conduct a thorough pain assessment. The third year component focused
on improving students’ communication skills regarding both pain assessment and
management.

For both of these interventions, electronic media were created to demonstrate
principles and communication skills relevant to pain assessment and management, and as
prompts for small-group discussions. The first-year intervention involved the creation of
a DVD in which a student takes a history from a patient with headache. (The patient
portrayed in this DVD is a patient instructor employed by the UConn Clinical Skills
Assessment Program [CSAP]; this author plays the role of the medical student.) This
DVD, accompanied by a “Facilitator’s Guide” developed by this author (Appendix G),
was introduced to preceptors of the Principles of Clinical Medicine I (PCM I) course at a
faculty development seminar held in September 2005, approximately 4 months before the
first-year didactic session was held. The DVD was used in the first-year module, held in
January 2006. The module conveyed basic pain assessment principles to first-year
medical students and engaged them in small-group discussions regarding the relevant
components of a medical history for assessing patients with pain. The third-year
intervention also involved the creation of a DVD, this time of a student taking a history
from a patient presenting with severe osteoarthritis. Following the history-taking, the
student in this DVD then models four different approaches to discussing treatment plans
with the patient. This DVD was introduced to approximately 15 UConn faculty members
in a faculty development seminar held in July 2005. Like the first-year DVD, a separate
“Facilitator’s Guide” (Appendix H) was also provided. In August 2005, these faculty
members used this DVD as an instructional tool and a discussion prompt in small-group sessions attended by third-year medical students. These small-group discussions were part of a required evening forum for third-year students. A lecture on principles of pain assessment and management preceded these small “break-out” groups.

In order to measure the efficacy of each of these educational interventions, the group developed several standardized patient cases testing students’ competencies in various categories related to pain assessment and management. UConn students are required to complete Clinical Skills Assessment (CSA) examinations in each of their four years of medical school training. These examinations are generally composed of 7 focused cases per year; the subject matter and difficulty level of these cases corresponds to the students’ training experience, and the exam is completed in a half-day. One new case per year was developed for the first-, third-, and fourth-year examinations. Each of these three cases was a patient with chronic pain. The first-year case was a patient with migraines; the third-year scenario was a patient with chronic back pain secondary to compression fractures; and the patient in the fourth-year case suffered from spinal stenosis. (Checklists and student instructions for each case are found in Appendices D, E, and F.) Each of these cases was developed to compare the relative competencies of two cohorts of students, thereby providing intervention and comparison data by which to evaluate the efficacy of each of the curricular interventions described in the preceding paragraph.

For example, the new migraine case developed for the first-year examination was implemented with the current medical school class of 2008; this class, which took the exam in May 2005, constitutes the control (or comparison) group for the first-year
curricular intervention. The second cohort of students to take this exam, the class of 2009, was exposed to the new first-year curriculum in January 2006. Hence, this second class, which will take the migraine clinical exam in May 2006, is the experimental (or comparison) group. Students are scored on each checklist item by the standardized patient, and the percentage of completed checklist items is calculated for each class. (These calculations have been completed for the comparison cohort; the same data will be collected for the intervention cohort upon this second group’s completion of the exam in May 2006.) Once the data from the intervention cohort is collected, t-tests will be used to determine statistically significant differences between these two classes. Other statistical operations, such as logistic regression analyses, will be performed to examine any covariance that might be useful in the development of future iterations of this curriculum.

The efficacy of the third-year curriculum is being evaluated in the same way as the method described above for the first-year intervention. The experimental design consists of two cohorts of students. The current class of 2006, which was not exposed to the new third-year curriculum, constitutes the comparison group; the class of 2007, which attended the new third-year forum held for the first time in August of 2005, makes up the intervention group. There are two components to the statistical evaluation of the third-year curriculum. The first component is the evaluation of the new third-year CSA case involving a patient with chronic back pain. Both the class of 2006 and the class of 2007 completed this clinical case as part of their third-year CSA examinations in January 2005 and January 2006. The performance of each student was assessed by the standardized patient using the checklist. Checklist items 1-30 pertain to historical items essential to an
adequate pain assessment, while items 31-35 relate to communication skills relevant to developing and negotiating treatment plans with patients (Appendix E2). The evaluation of the performances of the comparison and intervention cohorts on this clinical case forms the basis of the statistical analyses, discussion, and conclusions of this paper.

The second part to the evaluation of the third-year curriculum consists of a fourth-year CSA case of a patient with spinal stenosis. This case was developed in order to provide further objective information regarding the efficacy of the third-year curriculum. The class of 2006, which completed this case in the summer of 2005, again constitutes the comparison group. The class of 2007, which will complete the same case in the summer of 2006, represents the intervention cohort. The instrument to measure the performance of each student on this fourth-year case is shown in Appendix F2. Of note, the section of the checklist involving pain management skills has been considerably expanded in comparison to the third-year checklist (shown in Appendix E2). The expectation is that the fourth-year case will provide a more extensive and sophisticated measurement of pain management skills than the third-year case may be able to provide. An additional reason for the creation of this fourth-year case is to measure whether the integrated, longitudinal curriculum has a lasting impact on students’ abilities to assess and manage pain. For example, the eventual comparison of the current classes of 2006 and 2009 on the fourth-year case will provide valuable information regarding the overall impact of the entire curriculum.
III.C. Implementation and Evaluation of Third-Year Curriculum

As explained above, the statistical analyses, discussion, and conclusions presented in this paper relate to the third-year curriculum and its corresponding CSA case (the component of this curriculum for which both comparison and intervention cohort data are available at this time). The curriculum, which took place in August 2005, was a 3-hour evening forum aimed at improving students’ communication skills surrounding pain assessment and management. All students in the medical school class of 2007 were required to attend. (The Content Outline for the evening forum is shown in Appendix I.)

In the first hour of the evening, students attended three 20-minute “mini-lectures” given by a surgeon, an internist, and a hematologist/oncologist. The surgeon’s talk on “The Undertreatment of Pain” highlighted the suboptimal treatment of pain and sequelae in current medical practice. The internist presented the basic principles of pain assessment, including the aspects of the medical interview that are most relevant to assessing pain. The hematologist/oncologist outlined basic principles of adequate pain management. The students were then divided into 6 groups to view and discuss a DVD in which a student conducts a pain assessment with a patient suffering from severe osteoarthritis. The student in the DVD also models 4 different approaches to discussing treatment plans with this patient. The groups were composed of 10-15 students and were precepted by 2-3 UConn faculty members. These preceptors were prepared for the session by attending a faculty development seminar approximately one month before the forum in which they were introduced to the new curriculum, shown relevant segments of the DVD, and issued a “Facilitator’s Guide” designed to be used with the DVD (Appendix H). At the
conclusion of the forum, all students and preceptors completed an evaluation instrument in which they responded to questions using a 5-point Likert scale (Appendix J).

In January 2006, approximately 5 months after this forum, all students in the class of 2007 completed a standardized patient encounter involving a patient with back pain. All members of the class of 2006 completed this same patient encounter one year earlier (January 2005) without the benefit of the evening-long pain forum. Hence, the class of 2006 represented the comparison cohort for this curriculum, and the class of 2007 constituted the intervention group. Instructions for the patient encounter were posted on the door outside of the exam room indicating that students were to take a relevant history from the patient and counsel her about treatment options (see Appendix E1). Students had 20 minutes to complete these tasks. Immediately following the encounter, the performance of each student was scored by the standardized patient using the evaluation instrument shown in Appendix E2. The instrument consists of 30 historical data points relevant to pain assessment (1-30) and 5 items (31-35) testing proficiency in communicating with patients regarding pain management. For each of the 35 items, students received a checkmark if they addressed the item at some point over the course of the 20-minute encounter. (Two students were dropped from the statistical analysis due to incomplete data sets. Both of these subjects were female students from the class of 2006.)

The percentage of students who obtained each checklist item was calculated for each of the 2 classes, and differences in these class percentages were evaluated for statistical significance using two-tailed t-tests. (The decision to utilize two-tailed tests rather than one-tailed tests was based on not assuming directionality in differences
between the intervention and comparison group scores. Since the efficacy of this curriculum had never been tested, and because it was very possible that the comparison group could have actually out-performed the intervention group in certain areas, the two-tailed test was determined to be the preferred computational modality.) Various items were also grouped by content areas (parameters of illness, past medical history, social history, support network, and pain management communication skills), and mean performances in each of these content areas were compared. In addition, a cumulative performance for each student was determined by summing the number of checklist items completed and dividing by the total of 35. Mean cumulative performance scores for each class were then calculated, and the difference in the mean performance between these classes was also evaluated for statistical significance. The software package employed to conduct all statistical testing was Stata Intercooled Version 9.0.

The statistical testing outlined above was repeated after stratifying for gender in order to determine whether the impact of the new curriculum varied. All significant and nearly significant differences from the t-tests described above were then re-analyzed via permutation testing, another statistical methodology that employs random re-sampling of data in order to determine whether or not differences in mean values from two groups are statistically significant. In permutation testing, the software program computes sums of random data points from two groups N number of times and determines how many of these random sums exceed the sum from the group with the greater mean. If less than 5 out of 100 [or 500 out of 10000] of these random sums exceed the sum from the group with the greater mean, then the difference in the means of these two groups is statistically significant. Permutation tests are favored over t-tests by some statisticians due to the fact
that assumptions about equal variance and random sampling need not be made in the former method. (Appendix S summarizes how the two cohorts were compared). Lastly, logistic regression analyses were conducted in order to inspect for potential covariance in any of the 35 outcome variables measured.

IV. Results

Appendix J displays students’ mean response scores regarding the usefulness of the forum and its specific components. Overall, students rated all components of the forum at 3.33 or higher on a 1-5 scale, indicating that collectively the class viewed the forum as a useful curricular intervention. Of note, students rated the small group discussions on pain assessment and pain management as the two most useful segments of the evening. Responses were also favorable with regard to the use of video clips as prompts for these discussions.

Appendix K shows the percentage of students from each class who obtained each of the 35 checklist items. For each of these individual checklist items, the percentages from the comparison and intervention groups were compared using two-tailed t-tests; the resulting p-values are shown in the table. Of note, a significantly greater percentage of the class of 2007 inquired about alleviating factors (item 8) and family support (item 21) than did the class of 2006. However, the class of 2006 exhibited significantly better performance than the class of 2007 with regard to inquiring about previous medication trials (item 10) and vitamins/supplements (item 14). None of the other 31 individual
checklist items demonstrated statistically significant differences between the comparison and intervention cohorts upon two-tailed t-testing.

As shown in Appendix L, checklist items were also grouped by content area, and mean percentages of items obtained in these content areas were calculated for both classes. Differences in these mean percentages were tested for statistical significance using two-tailed t-tests. The class of 2007 scored higher than the class of 2006 in the content area of pain management communication skills (items 31-35), and this improvement from the comparison to the intervention cohort was statistically significant (p=0.0263). There was no significant difference in the mean cumulative scores of the two classes (items 1-35), nor were there any differences in performance between the two groups in the content areas of history of present illness (items 1-8), past medical history (items 9-18), social history (items 19-30), or support network (items 21-24). Appendix M summarizes the individual and aggregate checklist items for which two-tailed t-tests indicated statistically significant differences between the two classes.

Permutation tests were also performed to look for significant differences between the classes with regard to both individual and aggregate checklist items. The individual and aggregate items for which this second statistical method indicated significant differences are shown in Appendix N. This table is quite similar to Appendix M, with the exception that permutation testing revealed two new findings that the class of 2006 scored significantly better than the class of 2007 in past medical history (items 9-18) and quality of pain (item 6).

In order to determine whether the impact of the new curriculum varied significantly with respect to gender, two-tailed t-tests and permutation tests were done
stratifying for gender, looking at both individual checklist items and items grouped by content area. As shown in Appendix O, males from the intervention cohort (class of 2007) performed significantly better than males from the comparison cohort (class of 2006) in the areas of social history (items 19-30), social network (items 21-24), pain management communication skills (items 31-35), and church/community support (item 22). Among male students, there were no individual or aggregate items for which the class of 2006 out-performed the class of 2007. A significantly greater percentage of females from the intervention cohort inquired about alleviating factors (item 8) than did females from the comparison cohort. However, a greater percentage of women from the comparison cohort addressed the issues of vitamins and supplements (item 14), finances (item 24) and diet (item 25) than did women from the intervention group. (All differences between classes that were detected upon stratification by gender were confirmed by both two-tailed t-tests and permutation tests.)

All male students were also compared to all female students to look for any potential patterns with regard to performance differences. As illustrated in Appendix Q, two-tailed t-tests and permutation tests indicated one individual checklist item (finances) for which female performance exceeded male performance, and three individual items (location of pain, past surgical history, and family history) for which males out-performed females. Overall, however, there was no significant difference in the mean cumulative performance scores of men and women, nor were there any significant gender differences in any of the aggregate item content areas (history of present illness, past medical history, social history, support network, or pain management communication skills).
In order to determine whether students who addressed certain issues with the standardized patient were more or less likely to discuss other specific topics over the course of the interaction, logistic regression analyses were conducted. Statistically significant results are shown in Appendix R. With regard to social history questions, students who inquired about smoking were 47 times more likely to ask about alcohol than students who did not address smoking. Another statistically significant association was found between the social history items of friends/confidants and finances, wherein students who inquired about the former were 48 times more likely to address the patient’s financial situation than students who did not pursue the issue of friends and confidants. With regard to symptom parameters, students who asked the patient about the location of her pain were over 6 times more likely to ask about the quality of that pain. Similarly, students who asked the patient to quantify her pain were 2 times more likely to ask about its quality and almost 4 times more likely to inquire about its location.

V. Discussion

Abundant evidence suggests that suboptimal management of pain in current medical practice constitutes a major public health problem in this country. Furthermore, recent studies posit that nation-wide inadequacies in teaching U.S. medical students how to assess and manage pain symptoms collectively comprise a significant etiologic component of this crisis. Evidence for the lack of adequate pain medicine curricula is found in feedback from patients, residency program directors, practicing physicians, and
medical students themselves. Recent actions taken by multiple state governments further confirm the gravity of this issue, as do position statements issued by the American Academy of Pain Medicine. Data from the last eight graduating classes at the University of Connecticut School of Medicine indicate that this institution shares these nation-wide curricular inadequacies, and a recent inquiry into the amount of time currently devoted to pain assessment and management in the various phases of UConn’s four-year curriculum indicated that more must be done to meet these needs. Among those aspects of pain medicine which current authors identify as significantly lacking among U.S. medical school graduates, communication skills represent a frequently cited area for improvements. Hence, this project, a pilot undergraduate medical curriculum focusing specifically on communication skills for pain assessment and management, was created as an initial step toward meeting these curricular needs. The efficacy of the third-year component of this integrated curriculum was tested using a clinical skills assessment examination involving a patient with chronic back pain. Two cohorts of students, one exposed to the curricular intervention and one which was not, completed this clinical exam, and the collective performance of these two classes was compared using two statistical modalities.

The main findings of this educational study were:

1) The cohort of students that received the new curriculum performed better on the CSA Back Pain exam in the content area of pain management communication skills than the comparison cohort (p<0.05).

2) The class that attended the forum viewed it as a useful curricular intervention. In particular, the small group discussions on pain assessment
and management and the use of video clips as prompts for these discussions were the most favorably evaluated components of the evening.

3) Male students from the intervention cohort significantly out-performed their male counterparts from the comparison group in the content areas of social history, support network, pain management communication skills, and church/community support. There were no individual or aggregate areas in which comparison males significantly out-performed intervention males. This pattern of consistent improvement from the comparison to the intervention cohort was not evident among female students.

4) This new third-year curriculum, comprised of mini-lectures, electronic media prompts, and small-group discussions, has the potential to significantly improve students’ communication skills in the areas of pain assessment and pain management, especially among male students. Furthermore, the impact of this curricular intervention exhibits durability, as evidenced by conducting the assessment five-months post-instruction.

With regard to statistical comparisons between the two classes, the most significant finding from this study was that the intervention cohort out-performed the comparison cohort in the content area of pain management communication skills. This finding was confirmed by both a two-tailed t-test and a permutation test. Both the Facilitator’s Guide and the Content Outline emphasized this content area, making it reasonable to assume that the superior performance of the intervention group resulted at least in part from our educational intervention. This suggests that this curriculum should be continued. However, one major limitation which potentially threatens the reliability of
this finding is that instrument utilized to measure pain management communication skills in the third-year exam is composed of just five checklist items (Appendix E2). The fourth-year CSA instrument (Appendix F2), on the other hand, includes 12 items specific to this content area, and will therefore provide a more rigorous and extensive measurement of students’ skills in this area. It is anticipated that with this more extensive measurement, the data from the fourth-year exam will provide more reliable data supporting significant improvement in pain management communication skills from the comparison cohort to the intervention group. The fourth-year exam will be essential in assessing the assertion that this curriculum significantly improves communication skills relevant to pain management.

There were two individual checklist items (alleviating factors and family support) on which the intervention cohort scored higher than the comparison group. The import of these findings is lessened, however, by the fact that there were two other individual checklist items (vitamins/supplements and past medication trials) for which the opposite was true. Indeed, when each checklist item was tested individually, no noteworthy patterns arose with regard to the content of those items that demonstrated significant differences between the groups, nor was there a pattern of directionality for the four differences. With regard to the analysis of future intervention and comparison data (e.g., the first-year migraine case and the fourth-year spinal stenosis case), this indicates that it is probably not worthwhile to test individual checklist items for statistically significant differences. Rather, future analyses should focus on comparing cohorts according to aggregate checklist items grouped by content areas.
Permutation tests also revealed one additional individual item (quality of pain) and one aggregate content area (past medical history) for which the performance of the comparison cohort exceeded that of the group that received the curriculum. One possible explanation for this finding is that, since the new curriculum focused primarily on social history and pain management communication skills, the curriculum may have inadvertently predisposed students from the intervention group to neglect past medical history items. It should be noted however, that this finding was not confirmed by the two-tailed t-test, thus calling into question the practical relevance of this permutation test finding.

When the intervention and comparison cohorts were stratified according to gender, both t-tests and permutation tests revealed that male students who received the new curriculum out-performed pre-test males in multiple content areas (Appendix O). Furthermore, those aggregate content areas in which males demonstrated significant comparison cohort to intervention cohort improvement (social history, social network, and pain management communication skills) were among the primary emphases of the forum, as shown in the Facilitator’s Guide. These findings imply that the new curriculum improved male students’ communication skills in these content areas. However, this curricular impact was not detected among female students. This suggests that gender played a role in mediating the ability of this curriculum to positively impact students’ communication skills for assessing and managing pain. If comparison group women out-performed comparison group men in these particular content areas, this could explain the gender specific effects in that male students had more “room for improvement.” However, as shown in Appendix P, the only content area in which women from the pre-
test cohort significantly outperformed their male classmates was in support network (items 21-24). This implies that the gender-specific curricular effects in the realms of social history and pain management communication skills are more than mere statistical artifacts of the study. Indeed, it seems quite possible that these gender-specific results possess practical relevance.

In recent years, an abundance of studies have been published on various associations between gender and learning styles, as well as between gender and educational outcomes. For example, using the Kolb Learning Style Inventory, Severiens and Ten Dam found that males tend to excel in learning situations that emphasize objective theory and systematic analysis (1994). Women, on the other hand, tend to seek out personal relevance with the learning material as a primary means by which to master a given subject (Meyer et al., 1994). With regard to our project, one of our conscious aims was to teach communication skills that are essential to pain assessment and pain management in a way that employed multiple instructional modalities to accommodate the diverse learning styles of the students. The large group “mini-lectures,” for example, were intended to present the learning material in a clear and systematic manner, whereas the video prompts and small group discussions were intended to impart this material in a manner that fostered personal relevance for the learners. It was anticipated that the video clips would achieve this desired effect by prompting students to recall real patients with pain symptoms whom they had encountered over the course of their clinical work, and that small groups would foster discussions about these personal experiences. However, it is very possible that the small group component of the evening did not enable students to find personal relevance with the subject material to the degree anticipated, thereby failing
to fully accommodate the learning styles of many of female students. Further research would need to be done to assess this hypothesis. For example, it would be necessary to apply the Kolb Learning Style Inventory to determine whether the aforementioned generalizations about learning style and gender apply to the students in this study. Other variables (e.g., age of student, previous clinical skills assessment scores of student, gender of standardized patient) would need to be examined to rule out any confounders to the apparent association between male gender and improved post-instruction outcomes.

Assuming that this new curriculum does disadvantage those students who seek personal relevance with the learning material as their primary strategy by which to internalize it, there are several modifications that could be made to better accommodate these students in future iterations of the curriculum. For example, preceptors could be directed to elicit personal clinical experiences from students as an “ice-breaker” for the small group sessions. In addition, Sivan et al. suggest that role-play exercises may facilitate a personal connection with subject material (2000). Further support for the use of role-playing exercises, specifically with regard to teaching medical students how to interview patients with pain, is found in a recent study by Mavis et al. In their study involving fifty-two pairs of second year medical students, one student from each pair portrayed a patient presenting with cancer pain while the other student conducted the medical interview. These authors found that “medical students represent a readily accessible resource as patients for clinical simulations,” and that “acting as a standardized patient had educational value, and can be used to extend simulated patient encounters within the curriculum” (Mavis et al, 2002). As Mavis et al. explain, one of the keys to a successful role-play activity involves structured training of the students who are the
standardized patients. In the Mavis study, students who drew the role of patient were trained in a 30-minute session by faculty members immediately prior to the role-play activity. After the training, each student-patient was interviewed by a medical student who had up to 30 minutes to evaluate the student-patient’s pain. The student-patient then rated the interview using a checklist that was based on the curriculum content related to pain assessment. As the UConn curriculum moves forward, a role-play exercise similar in format to the one described by Mavis et al should be considered. The success of this exercise will depend on both the adequate training of the student-patients and the use of structured feedback instruments.

While logistic regression analyses did reveal some statistically significant associations between various checklist items (Appendix R), most of these associations were fairly predictable and deserve little more than brief mention. It is not surprising, for example, that students who inquired about smoking were 47 times more likely to ask about alcohol, as it is well known that students tend to address these two components of the social history together. Nor is it particularly surprising that the symptom parameters of intensity, quality, and location were significantly associated with one another, as again previous research demonstrates that the seven basic parameters of a given illness tend to be addressed as a cluster. However, one interesting association found in this study was between the social history topics of friends/confidants and finances, wherein students who inquired about the former were 48 times more likely to ask about the latter as well. There is no obvious explanation for why students would tend to address these two particular topics together. One possible reason could be that students tend to mentally store and retrieve questions related to a patient’s support network as an aggregate entity.
If this is true, then training students to remember to inquire about one particular topic related to a patient’s support network could suffice in prompting them to address other relevant topics in this content area.

Overall, the students viewed the forum as a useful educational experience. Since the post-instruction assessment was conducted 5 months after the intervention itself, the results indicate that the forum had a durable impact on students’ communication skills in the realm of pain management. Based on the additional impact seen among male students in the realm of social history, there is reason to believe that the curriculum has the potential to improve all students’ communication skills in this content area as well, particularly if modifications are made to more fully accommodate the different learning styles of the participants. This pilot curriculum should be viewed as a successful intervention. That being said, several potential areas for programmatic improvement are worth noting here. One particular aspect of pain assessment and management that, in hindsight, did not receive appropriate emphasis was the delineation among the concepts of tolerance, dependence, addiction, and pseudoaddiction. As June Dahl points out, confusion regarding the meaning and incidence of each of these terms strongly contributes to the undertreatment of pain in current medical practice (Dahl, 2002). While the intention was to have the preceptors touch on these topics in the small group sessions, narrative feedback from students indicated that there were inconsistencies in whether or not this actually occurred. These inconsistencies could be reduced in future years by fully preparing the preceptors for this discussion at the faculty development seminar prior to the forum. In addition, the difference between each of these concepts needs to be
clearly and uniformly delineated for the students in at least one of the mini-lectures that precede the small-group sessions.

The results of the Sloan et al. study (involving their Cancer Pain Structured Clinical Instruction Module) provide guidance to additional modifications that could be made to the UConn curriculum. Sloan et al. found that the students who scored highest on the post-instruction assessment were those who received the Cancer Pain SCIM, the CD-ROM self-instruction module, and the structured home hospice patient visit. These results would support the addition of a clinical skills instructional module (similar to the Cancer Pain SCIM) in which students interact with real patients with pain syndromes at some point in the course of UConn’s longitudinal pain curriculum. (This proposed module would be similar in format to those that presently occur with immunology, neurology, and communication-impaired patients during the UConn “Homeweeks.”) In addition, the results from the Sloan study suggest that it also might be worthwhile to add a structured home visit to the UConn curriculum. This home visit could be incorporated into the home hospice day that is already required in the UConn Family Medicine clerkship, in which students are taken by a hospice nurse to the homes of several hospice patients. One of these hospice patients would be an alert patient with a history of chronic pain. Similar to the structured visit developed by Sloan et al., the student would be given a brief summary of the patient’s diagnosis and history prior to arriving at the patient’s home. Specific objectives of the visit, also adopted from Sloan et al., would be to: 1) observe the patient in their home; 2) obtain a history of the patient’s pain; 3) perform a focused physical exam; and, 4) discuss the current treatment plan with the patient. The student would then receive feedback from the hospice nurse regarding the pain history,
the physical exam, and the treatment discussion. The feasibility of these two potential modifications should be addressed as the project authors look to improve this curriculum for future students.

In addition to the limitations already discussed, this study was limited by class size (comparison and intervention cohorts of 67 and 74 students respectively). Increased numbers of comparison and intervention students would lend added power to the study. While the intervention cohort will continue to grow as subsequent classes of third-year students receive the new curriculum, there is currently no plan to withhold this curriculum from a sub-set of third-year students (nor to administer the curriculum in alternating academic years) in order to expand the comparison cohort.

In conclusion, this controlled educational study demonstrated that the third-year forum is an overall effective modality for teaching medical students how to better communicate with patients regarding their treatment options for pain symptoms. The data indicate that the curriculum has the potential to improve students’ communication skills for pain assessment as well, particularly in the content area of social history. This may require several modifications in the small-group component of the forum. While the development of this curriculum certainly cannot be considered complete, this third-year intervention represents a substantial initial step toward improving students’ communication skills for the assessment and management of pain. Thus, the curriculum constitutes an effective means by which to reduce the public health costs of suboptimal pain management.
Appendix A

AAMC Graduation Questionnaire Results (1998-2005)
All United States Medical Schools

Question: Do you believe that the time devoted to your instruction in pain management was inadequate, appropriate, or excessive?

Source: Association of American Medical Colleges, 1998-2005 Medical School Graduation Questionnaires.
### Appendix B

**University of Connecticut School of Medicine**  
**Communication Skills for Pain Assessment and Management**  
**Diagrammatic Representation of Project Design**

**Timeline for Development, Implementation, and Evaluation of First Year Curriculum**

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<td>Faculty convenes to plan development of a multi-component longitudinal curriculum in pain assessment and management</td>
<td>Class of 2008 (comparison cohort) completes CSA pain assessment exam (&quot;Migraine&quot; case)</td>
<td>DVD and accompanying &quot;Facilitator’s Guide&quot; created for first year curriculum</td>
<td>Faculty development seminar held in preparation for first year curricular intervention (DVD and &quot;Facilitator’s Guide&quot; introduced)</td>
<td>Class of 2009 (intervention cohort) exposed to new first year curriculum in pain assessment</td>
<td>Class of 2009 will complete CSA pain assessment exam (&quot;Migraine&quot; case)</td>
<td>Data analyses will be conducted in order to compare the performance of the comparison and intervention groups</td>
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CSA = Clinical Skills Assessment
**Appendix B (continued)**

**Timeline for Development, Implementation, and Evaluation of Third Year Curriculum**

|-------------|--------------|-------------|-----------|-------------|--------------|-------------|

**Timeline for Development and Implementation, and Utilization of New Fourth Year CSA “Spinal Stenosis” Case**

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<tr>
<td>Fourth Year CSA “Spinal Stenosis” case developed and patient instructor trained</td>
<td>Class of 2006 (comparison cohort) completes Fourth Year CSA “Spinal Stenosis” case</td>
<td>Class of 2007 (intervention cohort) completes Fourth Year CSA “Spinal Stenosis” case</td>
<td>Data analyses to be conducted comparing collective performance of classes of 2006 and 2007</td>
<td>Class of 2009 completes Fourth Year CSA “Spinal Stenosis” case. (This class will have been exposed to all components of the new curriculum.)</td>
<td>Data analyses to be conductive comparing performance of classes of 2006 (comparison cohort) and 2009 (intervention cohort)</td>
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CSA = Clinical Skills Assessment
Appendix C

AAMC Graduation Questionnaire Results (1998-2005)
University of Connecticut School of Medicine

Question: "Do you believe that the time devoted to your instruction in pain management was inadequate, appropriate, or excessive?"

![Bar Chart]

Source: Association of American Medical Colleges, 1998-2005 Medical School Graduation Questionnaires.
Appendix D1

University of Connecticut Clinical Skills Assessment
First Year Migraine Case
Student Instructions

Opening Scenario

Ms. Callahan, age 44, comes to the office with a chief complaint of migraine headaches.

Student Tasks

Your task is to do a focused history of her chief complaint and pertinent parts of her medical history. You have 20 minutes with the patient. When you are finished, complete the PEN (Patient Encounter Note) outside the room.
Appendix D2

University of Connecticut Clinical Skills Assessment
First Year Migraine Headache Checklist

1. **CC:** severe migraine headaches that I really need to get rid of
2. **HPI:** onset: as a teen about the time I got my period; tied to periods then
3. oral contraceptives which I took in college meant more headaches; never again
4. better when I was pregnant with my son and for several years thereafter
5. progression: frequency began to increase a couple of years ago
6. frequency: now they happen 1-2 times per week and are not tied to my periods
7. duration: usually 4-8 hrs; can last for 24
8. location: left sided usually (rarely on right)
9. quality: throbbing pain
10. intensity: severe 8 on a 1 to 10 scale
11. agg: light and noise really bothers them
12. allev: if I take medication early they can be they get better sooner
13. assoc. symp: preceded by flashing lights; nausea always and vomiting at times
14. OB/Gyn suggested a neurologist; said it was migraines, very rude
15. **PMH:** no other ongoing problems
16. hospitalizations: ER for worst of migraines; Demerol helps
17. **OB:** P1, G1, vaginal delivery, no problem with periods
18. psych hx: not depressed but very distressed about pain; angry as well
19. meds: feverfew to prevent headaches
20. Imitrex, Excedrin Migraine, Fioricet, Tylenol/codeine; Reglan for nausea
21. allergies: none
22. **FH:** mother and sister have migraines, but they are not as severe
23. **SH:** married lives at home with husband and one son
24. headaches are causing strain in both relationships
25. no violence
26. works as a manager; increased responsibility at work and for child’s sports
27. support: my mother and sister are sympathetic; not much social or work supp.
28. smoking: none
29. caffeine: 2-4 cups of caffeinated coffee per day
30. alcohol: 1 drink per week
31. no street drugs
32. sexual hx: one partner; activity limited by headaches; a frustration
33. exercise: none
34. sleep: a lot when I have a headache; stay up late catching up on housework when I don’t

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Appendix E1

University of Connecticut Clinical Skills Assessment
Third Year Back Pain Case
Student Instructions

Opening Scenario

Ms. Gothers, age 64, comes to the office with a chief complaint “I really need some help with my back pain”.

Student Tasks

Your tasks are to:

- Do a history of her problem.
- Assume the physical exam is unremarkable.
- Summarize with the patient what you will discuss with your preceptor about her management.

You have 20 minutes with the patient. When you are finished please complete the PEN (Patient Encounter Note) outside the room.
Appendix E2

University of Connecticut Clinical Skills Assessment
Third Year Back Pain Checklist

**History of Present Illness**

1) Chief Complaint: I really need some help with my back pain
2) Intensified 3 weeks ago after lifting husband
3) Then it was 9 on a 1-10 scale; prior to that it was a 2 on the scale
4) Now even with some medications it is a 5
5) Location: back pain at waist level
6) Quality: Aching
7) Aggravating: lifting or moving husband; sitting or standing for a long time
8) Alleviating: rest, lying down with knees bent, and medications (some relief)

**Past Medical History and Family History**

9) History of osteoporosis and spinal fractures for one year
10) Used naprosyn (2 per day), which helped pain until 3 weeks ago
11) Surgeries: Hysterectomy at age 29; took estrogen until age 42
12) Given Tylenol #3 in ER 3 weeks ago; relieved pain somewhat
13) Side effects of Tylenol #3: constipation; no confusion
14) Vitamins/supplements: calcium 600mg and vitamin D 200mg twice per day
15) Fosamax 70mg weekly
16) Over the counter meds: stool softener and Milk of Magnesia as needed
17) Allergies: sulfa causes a rash
18) Family History: mother had osteoporosis; broke her hip

**Social History**

19) Live with husband and I am his caretaker; he has advanced Alzheimer’s
20) He needs help with all ADLs and I have to be mentally sharp to care for him
21) Children are supportive but reside out of state and are busy
22) Have not sought help from church or community members
23) Most of our friends are out of the picture; no real confidant
24) Finances are OK, but no resources to pay for care for husband
25) Diet: not much time for cooking, may have lost weight; husband uses Ensure
26) Sleep: bothered by back pain and husband’s restlessness
27) Mood: I am OK but concerned about care of husband
28) Exercise: none other than housework and caring for husband
29) Smoking: smoked for 40 years; quit 10 years ago
30) Alcohol: currently 3 drinks/week (used to drink martinis with husband)

**Pain Management Communication Skills / Negotiation of Treatment**

31) Asks about patient’s concerns: narcotics (possible addiction and side effects)
32) Inquires about other modalities: daughter suggested magnets or acupuncture
33) Offers medicine for pain management and addresses possible constipation
34) Address issue of husband’s care and finances
35) Suggests non-pharmacologic therapies (e.g., physical therapy, CAM)
Appendix F1

University of Connecticut Clinical Skills Assessment
Fourth Year Spinal Stenosis Case
Student Instructions

Opening Scenario

Mr. Nocera, age 62, comes to your office with a chief complaint of severe back pain secondary to spinal stenosis.

The patient has been living with lumbar spinal stenosis (L3-L4) for approximately 4 years. The diagnosis was established by a previous PCP in 2001 both clinically and by way of MRI. Currently, he describes the pain as a “shooting” pain which radiates to his lower legs, is worse with walking and standing for long periods, and is partially alleviated with sitting and stooping forward. It is better at times, but he is basically always aware of it. At its worst, the pain is a 9/10. Taking Percocet reduces it to a 3.

He has tried multiple modalities of medical treatment over the course of the past 4 years, including Tylenol (acetaminophen), gabapentin, NSAIDS, Percocet (oxycodone/acetaminophen), physical therapy, heat, and exercises to strengthen his abdominal muscles. He was originally on ibuprofen immediately following the diagnosis, but developed a stomach ulcer presumably secondary to the medication. Ultimately, he has discovered that only the Percocet seems to have worked in significantly alleviating his pain without side effects. His last PCP agreed to prescribe Percocet; however, he refused to write for more than sixty 5 mg tablets per month. Recently, the patient has found that he would use up these sixty tablets over a 2 week period, leaving him in severe pain for two weeks every month while he awaited his next refill. He is frustrated about his previous PCP’s refusal to prescribe adequate amounts of the only medication which seems to have had any noticeable effect on his pain. Last month, out of a professed concern for abuse potential, this previous PCP refused to prescribe any more narcotic pain medication. It was at this time that the patient left his PCP and sought care at this office. Currently, he treats his pain with 6-8 acetaminophen per day, without any noticeable relief. He also has an appointment to see an aquatherapist next week, as he read on the Internet that this has been shown to help spinal stenosis patients.

PMH: appendectomy in mid-40s; stomach ulcer secondary to chronic ibuprofen use
Meds: as above, currently acetaminophen; two tablets 3-4X/day; Protonix (pantaprazole) 40 mg po qd
FH: uncle with spinal stenosis; similar presentation; chronically in pain throughout last 10 years of life.

The patient’s medical records have been reviewed and substantiate the above history.

Student tasks:

Your tasks are to:

• Take a social history relevant to his problem.
• Negotiate a plan for managing his pain.
Appendix F2

University of Connecticut Clinical Skills Assessment
Fourth Year Spinal Stenosis Checklist

Social History Items
1. SH: living situation: married, lives in (local town) with wife
2. employment: retired 3 yrs ago from The Hartford, worked as an insurance salesman
3. support/family: has 4 daughters, 4 sons-in-law, and 3 grandkids who live close by
4. activity restrictions: caring for grandkids due to pain/immobility issues
5. marital relationship strained especially over past month due to irritability in dealing with pain
6. sexual hx: one partner (wife), but not currently active due to pain issues
7. mood: not depressed, but frustrated that he has to live with the pain
8. alcohol: h/o abuse for about 10 yrs in 40s & 50s; 3-4 drinks a night
9. entered AA and has remained alcohol free for 5 years
10. smoking: none
11. recreational drugs: none
12. no exercise
13. sleep: disrupted due to pain - rarely sleeps for more than 1-2 hours without waking up
14. appetite really reduced lost 5 pounds
15. finances not a problem; health insurance is good

Pain Management Communication Skills / Negotiation of Treatment
16. student explores patient expectations/goals: get rid of the pain!
17. student expresses empathy with that goal; names concerns; understands, respects, supports patient
18. student negotiates realistic pain reduction goals: care for grandkids, restore intimacy with wife
19. student explores patient preference for treatment (Percocet, aquatherapy, no surgery)
20. student acknowledges addiction risks associated w/narcotic meds as well as risks associated with poor pain control
21. student acknowledges that history of alcohol abuse puts patient at increased risk
22. student expresses openness to non-pharmacologic Rx (aquatherapy)/CAM therapies
23. student suggests that a narcotic medication should be prescribed
24. student suggests a bowel stimulant (e.g., Senakot) for potential constipation side effect
25. plan addresses psychosocial issues (need to talk openly w/-wife about recent irritability)
26. final plan is mutual: student checks Pt's acceptance of final plan
27. student emphasizes his accessibility to Pt-e.g., suggests regular follow-ups to discuss progress
Appendix G

Facilitator’s Guide for PCM I Pain Assessment Session
University of Connecticut School of Medicine
UMass Josiah Macy, Jr. Mentorship Program
Communication Skills for Pain Assessment and Management
Project Director: Carol Pfeiffer
Team Members: Robert Bona, Karen Harrington, Dan Henry, Lynn Kosowicz, Carol Pfeiffer, Matt Willis

Pain Assessment Goals for this Session:

1) To improve students’ communication skills in thoughtfully and comprehensively assessing pain.
2) To increase students’ comfort and familiarity with the use of various pain scales (faces, visual analog, anchored) as an assessment tool in evaluating patients with pain.
3) To review those aspects of the social history which are most significant with regard to a chief complaint involving pain, including the impact of pain on activities of daily living (ADLs), sleep, mood, work, and coping abilities.

Outline for the Session:

1) Show HPI/ROS with summary. Please pause after summary.

2) Prompt: What were some of the strengths of this particular student’s HPI and ROS? Parameters of pain explored included: location/radiation, quality, quantity, alleviating factors, associated symptoms. Thorough ROS, comprehensive summary, establishment of good rapport.

3) Were there any notable omissions in the HPI?
   *Frequency, duration, precipitating factors. (Note that the student asked about symptoms associated with the headache but did not explore factors which precipitate it - nausea, vomiting, and photophobia are not precipitating symptoms.)
   *Lack of documentation: student did not explore which specific medications the patient has used and which ones have worked. Please also emphasize with students what is meant by “documentation” in CSAP, as there has been some student confusion regarding this term in the past.
   *Severity: in addition to asking the patient to quantify the pain, it would also be helpful to know whether or not the patient has sought treatment in the ER or from specialists for the headaches.

4) If this patient was a child or was limited verbally or cognitively, what are some alternative scales that the student could use? What have you seen used at your SCP offices? Multiple variations of visual scales will be provided, with corresponding ages/intellectual aptitudes for each.
Appendix G (continued)

5) Show PMH/FH. Please pause after FH. Notes for discussion:
*Pt’s use of Demerol and visits to the ED would most appropriately be placed in the HPI rather than the PMH, as they relate to severity and alleviating factors (2 of the 7 parameters).
*With combination medications (Percocet, Vicodin, Tylenol with codeine), the clinician must inquire about the dosage of each component. Not sufficient to simply say that the patient takes 500 mg of Tylenol with codeine - need to know the opioid dosage.
*Efficiency issue: Are vaccinations truly relevant to migraine headaches?
*Psychiatric history: very relevant here - why? Important not to shy away from this topic and to ask in a non-judgmental, matter-of-fact, and seamless manner (as the student did).

6) Social History prompt: What specific components of a social history would be relevant for this patient?
Sleep, mood, screen for depression (SIGECAPS), ADL impairment, work, relationships (including intimacy/impact on sexual activity), coping, appetite, exercise, support systems.

7) Show Social History. Please pause after “Thanks very much for talking with me.”
What are some strengths of the student’s performance?
Open-ended questions (“Walk me through a typical day.”), exploration of sleep patterns, caffeine intake, smoking (documentation and “mini” smoking cessation counseling with recognition that patient is in the pre-contemplative stage at this point), alcohol intake, recreational drug use, exercise, impact on relationship with husband and son.

8) Why is substance abuse relevant here?
Potential for addiction; previous addictive behaviors may predict future addiction to opioid medications; importance of close follow-up and care in structuring and monitoring of treatment with opioids in persons in recovery from addiction.

9) Discussion about assumptions: Student assumed that less sexual activity between the patient and her husband was a source of stress for this patient. In this example, this assumption turned out to be correct, but is this always the case? Student also assumed that patient’s support system included her husband and son. Better strategy = don’t build assumptions into questions. Simply: “Tell me about your support system.”

10) Show completion of history (student coming back into room to reinvestigate details of the HPI and PMH). The reason for showing this segment to the students is two fold: 1) the segment serves to re-emphasize those components of a pain assessment which are frequently omitted, and 2) it highlights the acceptability in returning to a patient’s room to obtain more details about a given history.

11) Wrap-up/Concluding remarks
Appendix H

Facilitator’s Guide for Break-Out Sessions
3rd Year Medical Student Forum

University of Connecticut School of Medicine
UMass Macy Membership Program
Communication Skills for Pain Assessment and Management
Project Director: Carol Pfeiffer
Team Members: Robert Bona, Karen Harrington, Dan Henry, Lynn Kosowicz, Carol Pfeiffer, Matt Willis

A) Pain Assessment

1) Show HPI/PMH summary (Video: “Pain Assessment with Summary”). Press Pause immediately before Sara introduces the visual pain scale to the patient.

2) Prompt: What additional questions need to be asked?
   Pain scale, pertinent family history, relevant social history

   What specific components of a social history would be relevant for this patient?
   Sleep, mood, screen for depression (anhedonia? Feel sad or depressed?), ADL impairment, work, relationships (including intimacy/impact on sexual activity), coping, support systems (friends, family, home aid?), financial situation (can he afford medications and/or professional help for his wife?), appetite, exercise (previous activity compared to present)

3) Show social history (resume video by pressing pause again and play through the end of this segment).
   Consider pausing video at zoom-in on patient’s hand to note arthritic changes.

4) Discussion, to include the following points/topics:
   a) Importance of open-ended inquiries before specific questions
   b) Utility of various pain scales
      faces (especially for those with low literacy skills, those who are challenged numerically ie children), visual analog, anchored – handouts to be discussed
   c) Importance of good documentation
      Strong documentation: “What do you mean by sad?”
Appendix H (continued)

Weak documentation: Failure to explore specific responsibilities involved in taking care of wife.
Unanswered questions: What is the nature of his relationship with her right now? What are his specific care-taking responsibilities? How specifically does his pain create barriers with regard to this relationship and his care-taking responsibilities? Also: What is he doing when he wakes up in the middle of the night?

d) Why is substance abuse history relevant in this scenario?
Potential for addiction; previous addictive behaviors predict future addictions

From the AMA Pain Management Online Series:

“Although some proponents of long-term opioid therapy for persistent nonmalignant pain view a history of addiction as a relative contraindication, opioids may be an effective and realistic treatment option. When opioids are required as a component of persistent pain treatment in persons in recovery from addiction, care in structuring and monitoring of treatment is essential for safety, and co-management by an addiction professional is beneficial. Patients who are actively abusing drugs or alcohol are generally not good candidates for opioid therapy for persistent nonmalignant pain until they can be actively engaged in addiction treatment.”

Also from the AMA Website:

“Individuals with addictive disorders or substance abuse problems are at increased risk of receiving inadequate pain management.”

Factors contributing to this under treatment include:

*physicians' inadequate training in pain management and addiction medicine
*fear of contributing to addiction through the use of opioid medications
*lack of knowledge (i.e., confusion between addiction, physical dependence and tolerance)
*societal prejudices against persons with addictive disorders
*fear of regulatory sanctions


e) Expressing Empathy
NURS – Patient Emotions: Name, Understand, Respect, Support

B) Pain Management Negotiation

1) Prompts:
   a) How will the information obtained above influence decisions regarding management?
Appendix H (continued)

Responsibilities to wife may preclude surgery due to length of rehab and lack of finances to pay for home aid during rehab process. Also, if you decide that opioids are indicated, patient will require much counseling and reassurance regarding addictive potential of such meds.

b) What are the treatment options for this patient?
Surgery, opioids, non-opioids, acupuncture, other CAM modalities

c) How would you proceed at this point? Specifically, how would you initiate the conversation regarding treatment?
Important first step = Find out patient’s goals for treatment?

1) Trigger Tapes
a) “Model” tape, Part I
   i) What are the patient’s goals? Did the clinician elicit all of them? Are they reasonable? If they had not been reasonable, how would you have negotiated in order to agree upon more realistic aims?
   ii) Knowing these goals, how would you proceed with treatment recommendations?

b) “You Don’t Want Surgery”
   i) How did the student do with her approach to treatment?
      Student respected patient autonomy but did not explore how or why patient came to his decision that surgery was not for him. Therefore, not certain that this is truly an informed decision on his part. Automatically discounted what could be a good option for him.
   ii) Why doesn’t the patient want surgery?
      We don’t know.

c) “You Should Have Surgery”
   i) Discussion regarding the significance of nonverbal communication cues

d) “Tylenol with Codeine”
   i) What was good about the student’s approach?
      Student listened to concerns about addiction and attempted to re-assure the patient.
   ii) What specifically was lacking?
      Reassurance regarding addiction was superficial and brief
      No significant exploration of patient’s concerns
      Safety/Home Assessment
      Possible involvement of social worker for him and his wife
   iii) Adherence issues: How likely is the patient to take his meds?
      Very unlikely.

e) “Model” tape, Part II
   Did clinician elicit all of the treatment options that the patient was considering
Appendix H (continued)

Yes; everything else was asked and all relevant information was Obtained.

i) Discussion surrounding skills/stylistic techniques employed by the student, to include the following:
   · Possible need to give information in shorter chunks than demonstrated in the video; tendency of third year medical students to tell the patient all they know about given topic → usefulness of pt handouts and writing out patient instructions regarding treatment.
   · Acknowledging vs. Endorsing pt’s concern about addiction → fine line
   · Exploration of patient goals and preferences regarding treatment
   · Management of expectations
   · Patient education
   · Openness to CAM
   · Explicit recognition of and support for patient emotions
   · Pain medication issues (including side effects and addiction issues)
   · Patient-centered approach
   · Final plan is mutual
   · Follow-up is clearly delineated
Appendix I

3rd Year Medical Student Forum Outline and Objectives

University of Connecticut School of Medicine
UMass Macy Membership Program
Communication Skills for Pain Assessment and Management
Project Director: Carol Pfeiffer
Team Members: Robert Bona, Karen Harrington, Dan Henry, Lynn Kosowicz, Carol Pfeiffer, Matt Willis

***3rd Year Medical Student Pain Forum: Tuesday, August 2, 2005, 5:45-8:30pm, Blue Auditorium and MDL Conference Rooms

Outline:

Part I: Large Group Meeting, Blue Auditorium (5:45-7:00pm)
Goals for this session:
Pain Assessment and Management Goals

1) To introduce students to the Forum and to present goals for the evening (Carol Pfeiffer, Ph.D, and Karen Harrington, MSW)
2) To familiarize students with the degree to which pain is under/inadequately treated across multiple specialties in current medical practice. (Joseph Civetta, MD)
3) To raise students' awareness of the detrimental health effects of such undertreatment, including the issue of pseudo-addiction. [Clinical differences between addiction and pseudo-addiction will also be highlighted here.] (Joseph Civetta, MD)
4) To review the components of a complete pain assessment, including the following: (Lynn Kosowicz, MD)
   a) HPI (7 parameters, pain scales, prior treatment and efficacy, all previous and current providers)
   b) PMH
   c) Relevant FH
   d) Relevant SH (ADL impairment, sleep, mood, work, relationships, coping, etc.)
   e) Potential relevance of cultural issues in patient perceptions of pain
   f) Potential relevance of pediatric issues in patient perceptions of pain
5) To familiarize students with the WHO ladder and its utility in pain assessment and management. (Robert Bona, MD)
6) To review basic issues of pain management (Robert Bona, MD)
   a) Types of pain and treatment implications thereof
   b) Pharmacologic treatment (in particular, narcotic/opioid meds)
   c) Non-pharmacologic treatment (PT, CAM, etc.)
Appendix I (continued)

d) Side effects of pain medications (especially narcotic side effects and addiction potential)
e) Negotiating principles related to pain management

Part II: Small “Break-out” Group meetings, MDL Conference Rooms
(7:10-8:30pm)

Students will meet in 6 small groups of 12-13 students to discuss and critique video clips of a student conducting a pain assessment and negotiating a treatment plan with a patient suffering from osteoarthritis (see Facilitator’s Guide for specific topics to be discussed).

Goals for this session:

Pain Assessment Goals
1) To increase students’ comfort and familiarity with the use of various pain scales (faces, visual analog, anchored) as an assessment tool in evaluating patients with pain.
2) To review those aspects of the social history which are most significant with regard to a chief complaint involving pain, including the impact of the pain on activities of daily living (ADLs), sleep, mood, work, and coping abilities.

Pain Management Goals
1) To emphasize the importance of active patient participation in the process of developing treatment plans for patients with pain, as well as the impact of such participation on adherence to/compliance with treatment.
2) To highlight the beneficial therapeutic effect(s) of explicitly identifying and supporting patient emotions, especially those surrounding past history of under-treated or inadequately treated pain.
3) To encourage students to demonstrate openness to complementary and alternative medicine (CAM) interventions for patients with refractory pain.
   4) To encourage students to explore patient views regarding goals and treatment preferences as an important first step in eventually developing a treatment plan.
5) To provide students with strategies for managing patient expectations which may not be realistic.
6) To emphasize the importance of fully addressing pain medication issues, particularly issues surrounding side effects and potential addiction.
7) To emphasize the importance of a patient-centered, mutual plan with clearly delineated follow-up.
Appendix I

Third-Year Forum: Communication Skills for Pain Assessment and Management
Post-Forum Student Survey Results

Mean Score for Each Survey Question (5-Point Likert Scale)

Survey Question (See Key Below)

Question Key:
How useful were the following components of this forum to you as a medical student:
  1) Blackboard (online) assignment regarding pain medications?
  2) Didactic session regarding the undertreatment of pain in current medical practice?
  3) Didactic session on pain assessment?
  4) Didactic session on pain management?
  5) Video clips of student conducting a pain assessment on an osteoarthritis patient?
  6) Video clips of student negotiating a treatment plan with an osteoarthritis patient?
  7) Small group discussion on pain assessment?
  8) Small group discussion on pain management and negotiation of pain treatment?
  9) Overall forum?

Answer Key: 1 = Not Useful; 3 = Useful; 5 = Very Useful
## Appendix K

### University of Connecticut Third-Year Assessment: Back Pain Case
Comparison of Individual Checklist Items Using Two-tailed t-tests

<table>
<thead>
<tr>
<th>Percentage of Students Who Obtained Item</th>
<th>Checklist Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>History of Present Illness / Symptom Parameters</td>
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<tr>
<td>Class of 2006 (Comparison Group)</td>
<td>Class of 2007 (Intervention Group)</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>61.2</td>
<td>58.1</td>
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<tr>
<td>68.7</td>
<td>64.9</td>
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<td>100</td>
<td>95.9</td>
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<tr>
<td>61.2</td>
<td>97.3</td>
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<table>
<thead>
<tr>
<th>Past Medical History and Family History</th>
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<tr>
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<td>62.7</td>
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<td>65.7</td>
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</table>

<table>
<thead>
<tr>
<th>Social History</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
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<tr>
<td>100</td>
</tr>
<tr>
<td>85.1</td>
</tr>
</tbody>
</table>

* denotes a statistically significant difference between the comparison and intervention groups
## Appendix K (continued)

University of Connecticut Third-Year Assessment: Back Pain Case
Comparison of Individual Checklist Items Using Two-tailed t-tests

<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value (derived from 2-tailed t-test)</th>
<th>Percentage of Students Who Obtained Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>28) Exercise: none other than housework and caring for husband</td>
<td>100</td>
<td>98.6</td>
<td>0.3432</td>
<td></td>
</tr>
<tr>
<td>29) Smoking: smoked for 40 years; quit 10 years ago</td>
<td>59.7</td>
<td>44.6</td>
<td>0.0739</td>
<td></td>
</tr>
<tr>
<td>30) Alcohol: currently 3 drinks/week (used to drink martinis with husband)</td>
<td>49.3</td>
<td>56.8</td>
<td>0.3762</td>
<td></td>
</tr>
</tbody>
</table>

### Communication with Patient Regarding Treatment Options

<table>
<thead>
<tr>
<th>Checklist Item</th>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value (derived from 2-tailed t-test)</th>
<th>Percentage of Students Who Obtained Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>31) Asks about patient’s concerns: narcotics (possible addiction and side effects)</td>
<td>98.5</td>
<td>98.6</td>
<td>0.9441</td>
<td></td>
</tr>
<tr>
<td>32) Inquires about other modalities: daughter suggested magnets or acupuncture</td>
<td>38.8</td>
<td>54.1</td>
<td>0.0708</td>
<td></td>
</tr>
<tr>
<td>33) Offers medicine for pain management and addresses possible constipation</td>
<td>92.6</td>
<td>98.6</td>
<td>0.0735</td>
<td></td>
</tr>
<tr>
<td>34) Addresses issue of husband’s care and finances</td>
<td>100</td>
<td>98.6</td>
<td>0.3432</td>
<td></td>
</tr>
<tr>
<td>35) Suggests non-pharmacologic therapies (e.g., physical therapy, CAM)</td>
<td>85.1</td>
<td>91.9</td>
<td>0.2052</td>
<td></td>
</tr>
</tbody>
</table>

* denotes a statistically significant difference between the comparison and intervention groups
Appendix L
Comparison of Checklist Items Grouped by Content Area using Two-tailed t-tests

Mean Percentage of Items Obtained in Each Content Area

<table>
<thead>
<tr>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value (derived from 2-tailed t-test)</th>
<th>Grouped Checklist Items by Content Area</th>
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</thead>
<tbody>
<tr>
<td>76.3</td>
<td>75.6</td>
<td>0.6254</td>
<td>Cumulative Performance (Items 1-35)</td>
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<td>80.2</td>
<td>80.1</td>
<td>0.9605</td>
<td>History of Present Illness (Items 1-8)</td>
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<td>83.1</td>
<td>78.1</td>
<td>0.0713</td>
<td>Past Medical History (Items 9-18)</td>
</tr>
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<td>65.3</td>
<td>65.1</td>
<td>0.9317</td>
<td>Social History (Items 19-30)</td>
</tr>
<tr>
<td>64.6</td>
<td>67.2</td>
<td>0.5799</td>
<td>Support Network (Items 21-24)</td>
</tr>
<tr>
<td>83.0</td>
<td>88.4</td>
<td>0.0263*</td>
<td>Pain Management Communication Skills (Items 31-35)</td>
</tr>
</tbody>
</table>

* denotes a statistically significant difference between the comparison and intervention groups
**Appendix M**

Individual and Aggregate Checklist Items for Which Two-tailed t-tests Indicate Statistically Significant Differences Between Classes

Percentage of Students Who Obtained Item (or Mean % of Items Obtained for Aggregate Items)

<table>
<thead>
<tr>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value (derived from 2-tailed t-test)</th>
<th>Individual and Aggregate Checklist Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>83.0</td>
<td>88.4</td>
<td>0.0263</td>
<td><strong>Items for Which Intervention Cohort was Superior to Comparison Cohort:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Aggregate Items:</strong></td>
</tr>
<tr>
<td>Pain Management Communication Skills (Items 31-35)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61.2</td>
<td>97.3</td>
<td>0.0000</td>
<td><strong>Individual Items:</strong></td>
</tr>
<tr>
<td>85.1</td>
<td>95.9</td>
<td>0.0259</td>
<td>8) Alleviating: rest, lying down with knees bent, and medications (some relief)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>21) Children are supportive but reside out of state and are busy</td>
</tr>
<tr>
<td>100</td>
<td>81.1</td>
<td>0.0001</td>
<td><strong>Items for Which Comparison Cohort was Superior to Intervention Cohort:</strong></td>
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<td><strong>Aggregate Items:</strong></td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Individual Items:</strong></td>
</tr>
<tr>
<td>92.5</td>
<td>78.4</td>
<td>0.0182</td>
<td>10) Used naprosyn (2 per day), which helped pain until 3 weeks ago</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>14) Vitamins/supplements: calcium 600mg and vitamin D 200mg twice per day</td>
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Appendix N
Individual and Aggregate Checklist Items for Which Permutation Tests Indicate Statistically Significant Differences Between Classes

<table>
<thead>
<tr>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value (derived from Permutation Test)</th>
<th>Individual and Aggregate Checklist Items</th>
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<tbody>
<tr>
<td>83.0</td>
<td>88.4</td>
<td>0.0052</td>
<td><strong>Items for Intervention Cohort was Superior to Comparison Cohort:</strong></td>
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<td><strong>Aggregate Items:</strong></td>
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<td>Pain Management Communication Skills</td>
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<td>(Items 31-35)</td>
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<td></td>
<td><strong>Individual Items:</strong></td>
</tr>
<tr>
<td>61.2</td>
<td>97.3</td>
<td>0.0000</td>
<td>8) Alleviating: rest, lying down with knees bent, and medications (some relief)</td>
</tr>
<tr>
<td>85.1</td>
<td>95.9</td>
<td>0.0284</td>
<td>21) Children are supportive but reside out of state and are busy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Items for Which Comparison Cohort was Superior to Intervention Cohort:</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Aggregate Items:</strong></td>
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<td>83.1</td>
<td>78.1</td>
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<td>Past Medical History (Items 9-18)</td>
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<td></td>
<td></td>
<td></td>
<td><strong>Individual Items:</strong></td>
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<td>64.2</td>
<td>48.6</td>
<td>0.0474</td>
<td>6) Quality: Aching</td>
</tr>
<tr>
<td>100</td>
<td>81.1</td>
<td>0.0000</td>
<td>10) Used naprosyn (2 per day), which helped pain until 3 weeks ago</td>
</tr>
<tr>
<td>92.5</td>
<td>78.4</td>
<td>0.0128</td>
<td>14) Vitamins/supplements: calcium 600mg and vitamin D 200mg twice per day</td>
</tr>
</tbody>
</table>

Percentage of Students Who Obtained Item (or Mean % of Items Obtained for Aggregate Items)
Appendix O
Statistically Significant Differences Between Classes Upon Stratification of Subjects by Gender
(Confirmed by Two-tailed t-test and Permutation Test)

Percentage of Students Who Obtained Item (or Mean % of Items Obtained by Students for Aggregate Items)

**Male Students:**

<table>
<thead>
<tr>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value from two-tailed t-test</th>
<th>p-value from permutation test</th>
<th>Checklist Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intervention Group Improvement:</td>
</tr>
<tr>
<td>61.5</td>
<td>69.1</td>
<td>0.0321</td>
<td>0.0182</td>
<td>Social History (Items 19-30)</td>
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<tr>
<td>51.9</td>
<td>72.9</td>
<td>0.0094</td>
<td>0.0054</td>
<td>Social Network (Items 21-24)</td>
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<tr>
<td>80.0</td>
<td>90.8</td>
<td>0.0156</td>
<td>0.0120</td>
<td>Pain Management Communication Skills (Items 31-35)</td>
</tr>
<tr>
<td>42.3</td>
<td>70.8</td>
<td>0.0432</td>
<td>0.0416</td>
<td>22) Church/Community Support</td>
</tr>
</tbody>
</table>

**Female Students**

<table>
<thead>
<tr>
<th>Class of 2006 (Comparison Group)</th>
<th>Class of 2007 (Intervention Group)</th>
<th>p-value from two-tailed t-test</th>
<th>p-value from permutation test</th>
<th>Checklist Items</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Intervention Group Improvement:</td>
</tr>
<tr>
<td>51.2</td>
<td>100</td>
<td>0.0000</td>
<td>0.0000</td>
<td>8) Alleviating Factors</td>
</tr>
</tbody>
</table>

**Intervention Group Decline:**

|                                  |                                   |                             |                             | Intervention Group Decline: |
| 92.7                             | 74.0                              | 0.0197                      | 0.0193                      | 14) Vitamins/supplements |
| 87.8                             | 70.0                              | 0.0417                      | 0.0348                      | 24) Finances |
| 46.3                             | 22.0                              | 0.0137                      | 0.0128                      | 25) Diet |
### Appendix P

Class of 2006 (Comparison Cohort)
Performance Comparison by Gender:

Mean % of Items Obtained in Each Content Area

<table>
<thead>
<tr>
<th>Content Area</th>
<th>Male Students</th>
<th>Female Students</th>
<th>p-value from two-tailed t-test</th>
<th>p-value from permutation test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Performance (Items 31-35)</td>
<td>77.0</td>
<td>75.9</td>
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<tr>
<td>History of Present Illness (Items 1-8)</td>
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<td>Past Medical History (Items 9-18)</td>
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<td>82.0</td>
<td>0.4086</td>
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<td>Social History (Items 19-30)</td>
<td>61.5</td>
<td>67.7</td>
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<tr>
<td>Support Network (Items 21-24)</td>
<td>51.9</td>
<td>72.6</td>
<td>0.0072*</td>
<td>0.0048*</td>
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<tr>
<td>Pain Management Communication Skills (Items 31-35)</td>
<td>80.0</td>
<td>84.9</td>
<td>0.2169</td>
<td>0.1406</td>
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</tbody>
</table>

*denotes a statistically significant difference between male and female students from the comparison cohort.
### Appendix Q

**Checklist Items for Which Two-tailed t-tests and Permutation Tests Demonstrate Statistically Significant Differences between Male and Female Students**

Percentage of Students Who Obtained Item (or Mean % of Items Obtained by Students for Aggregate Items)

<table>
<thead>
<tr>
<th>Males</th>
<th>Females</th>
<th>p-value from two-tailed t-test</th>
<th>p-value from permutation test</th>
<th>Checklist Items</th>
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</thead>
<tbody>
<tr>
<td>58.0</td>
<td>78.0</td>
<td>0.0121</td>
<td>0.0019</td>
<td><strong>Female Performance &gt; Male Performance</strong></td>
</tr>
<tr>
<td>94.0</td>
<td>73.6</td>
<td>0.0031</td>
<td>0.0017</td>
<td><strong>Male Performance &gt; Female Performance</strong></td>
</tr>
<tr>
<td>62.0</td>
<td>38.5</td>
<td>0.0071</td>
<td>0.0057</td>
<td><strong>11) Past Surgical History</strong></td>
</tr>
<tr>
<td>72.0</td>
<td>53.8</td>
<td>0.0432</td>
<td>0.0281</td>
<td><strong>18) Family History</strong></td>
</tr>
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Appendix R

Statistically Significant Associations Ascertained from Logistic Regression Analyses

<table>
<thead>
<tr>
<th>Item #</th>
<th>Factors</th>
<th>Odds Ratio</th>
<th>p-value</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item #29</td>
<td>Smoking</td>
<td>47.125</td>
<td>0.000</td>
<td>17.426 - 127.437</td>
</tr>
<tr>
<td>Item #30</td>
<td>Alcohol</td>
<td></td>
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<tr>
<td>Item #22</td>
<td>Friends/Confidants</td>
<td>47.884</td>
<td>0.000</td>
<td>13.617 - 168.384</td>
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<tr>
<td>Item #23</td>
<td>Finances</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Item #5</td>
<td>Location of Pain</td>
<td>6.232</td>
<td>0.000</td>
<td>2.328 - 16.681</td>
</tr>
<tr>
<td>Item #6</td>
<td>Quality of Pain</td>
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<tr>
<td>Item #3</td>
<td>Pain Score</td>
<td>2.038</td>
<td>0.041</td>
<td>1.028 - 4.040</td>
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<tr>
<td>Item #5</td>
<td>Location of Pain</td>
<td>3.846</td>
<td>0.003</td>
<td>1.581 - 9.355</td>
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## Appendix S

### Study Methodology
Comparing the Intervention and Comparison Cohorts

<table>
<thead>
<tr>
<th>Areas of Comparison</th>
<th>Methods of Comparison</th>
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<tbody>
<tr>
<td>• Individual Checklist Items (1-35)</td>
<td>• Two-tailed t-tests</td>
</tr>
<tr>
<td>• Aggregate Checklist Items grouped by content area</td>
<td>• Permutation tests</td>
</tr>
<tr>
<td>- History of Present Illness</td>
<td>(Stata Intercooled Version 9.0)</td>
</tr>
<tr>
<td>- Past Medical History</td>
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<tr>
<td>- Social History</td>
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<td>- Support Network</td>
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<td>- Family History</td>
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<td>- Pain Management Communication Skills</td>
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<tr>
<td>• Cumulative Performance</td>
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References

Association of American Medical Colleges. 1998-2005 Medical School Graduation Questionnaires, All Schools Reports.


Billings JA, Block S. Palliative Care in Undergraduate Medical Education: Status Report and Future Directions. *JAMA.* 1997;278:733-736.


Mavis BE, Ogle KS, Lovell KL, Madden LM. Medical students as standardized patients to assess interviewing skills for pain evaluation. *Medical Education.* 2002;36:135-140.


