

# Deconstructing Curriculum and Assessment of Knowledge and Attitudes Regarding Pain in Pre-Licensure Occupational and Physical Therapy Education

Annie Burke-Doe<sup>1</sup>, Kristen Johnson<sup>1</sup>, Steve Laslovich<sup>1</sup>,  
Kayla Smith<sup>2</sup>, Christopher Ivey<sup>1</sup>, Anna Edwards<sup>2</sup>,  
Christopher Ingstad<sup>3</sup>, Ellen Lowe<sup>2</sup>, Jim Mathews<sup>2</sup>,  
Terri Roberts<sup>2</sup>, Susan MacDermott<sup>2</sup>, Jon Warren<sup>4</sup>

<sup>1</sup>Hawai'i Pacific University – Hawaii, USA

<sup>2</sup>University of St. Augustine – Florida, USA

<sup>3</sup>Cerritos College – California, USA

<sup>4</sup>Office of the Health and Disability Commissioner – New Zealand

---

**Abstract:** *The purpose of this study was to: 1) examine existing interprofessional pain management curricula in a DPT and MOT program by mapping pain subject matter to the IASP interprofessional content to determine gaps, vertical and horizontal coherence and integration 2) evaluate pain knowledge and attitudes early and late curriculum within the current pre-licensure Doctor of Physical Therapy (DPT) and Master of Occupational Therapy (MOT) students, and 3) to define changes needed within the existing interprofessional pain management curricula to better prepare students for clinical experiences and professional practice. Pain content was mapped to the IASP core competencies to identify gaps in content and coherence. Students were evaluated on existing pain knowledge and attitudes using the City of Boston's Rehabilitation Professional's Knowledge and Attitudes Survey Regarding Pain (COBS). Two hundred and forty physical and occupational therapy students completed the study. The mean percentage of correct responses of 70.6% +/-25.6% did not significantly change across didactic terms. Curricular mapping can inform planning, design, implementation, and evaluation of the curriculum and alignment with IASP guidelines.*

**Keywords:** Pain, Interprofessional, Knowledge, Attitudes

## INTRODUCTION

The International Society for the Study of Pain (IASP) announced 2022 as the “Global Year of Translating Pain Knowledge to Practice,” and in 2018, the IASP’s annual focus was the “Global Year for Excellence in Pain Education.” The goals related to these initiatives are to help clinicians, educators, and patients in understanding the nature of pain, to communicate accumulating pain

knowledge, distribute successful translation stories, lessons learned and to bridge the gap between academic knowledge and clinical practice. Pain affects one in five people globally (Gaskin & Richard, 2012; Rice et al., 2016) and its prevalence continues to be one of the most common reasons patients seek support from healthcare professionals. In the United States approximately 100 million adults are affected by chronic pain, including joint pain and arthritis (Gaskin & Richard, 2012). Pain management exceeds the costs to treat cancer, heart disease, and diabetes combined; when including medical treatment of pain and lower work productivity due to pain, the annual total cost of pain associated care ranges from \$560 to \$635 billion dollars (Gaskin & Richard, 2012).

## LITERATURE REVIEW

In 2011, the Institute of Medicine (IOM) published “Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research,” which acknowledged a lack of consistency in pain education across medical schools, a lack of knowledge about pain management delivery in an interprofessional manner, and negative and ill-informed attitudes about people in pain (Institute of Medicine Committee on Advancing Pain Research Care and Education, 2011; Watt-Watson et al., 2017). Today, the American Medical Association Pain Task Force advocates for continuing efforts to build the healthcare workforce and enhance education and training with respect to pain, mental illness and substance use disorders for all medical professionals (Force, 2021). Significant challenges for medical professional education in pain care is not keeping pace with the accumulating advancement of pain knowledge. Today, healthcare educational institutions continue to vary in the amount of pain content, methods of delivery, assessment of learning standards and time dedicated to pain management education despite IASP and other resources which provide competencies and a foundation for curricula development (Bareiss et al., 2019; Bradshaw et al., 2017; Gadde et al., 2020; Gordon et al., 2019; Hush et al., 2018). Cohesive pain education curricula for students and clinicians would likely help advance knowledge and skills and ultimately enhance care and outcomes for patients with chronic pain (Louw, 2021).

Addressing current gaps in interprofessional pain curriculum, treatment attitudes among students, educational standards, and research agendas identified by the IOM and IASP is an individualized and ongoing process for healthcare programs. From an educational standard perspective, both the IASP and the CHANGE PAIN International Advisory Board have published pain curricula and evidenced based literature on pain management targeting medical professionals (Müller-Schwefe et al., 2011). Furthermore, the Center for Disease Control has identified interprofessional rehabilitation as a necessary “first-line” treatment for non-drug, non-opioid approach to managing chronic non-cancer pain (Dowell et al., 2016).

Physical and occupational therapy education programs struggle to identify where their current interprofessional pain curriculum lacks coherence, sequencing, integration and the level of student knowledge and attitudes regarding treatment of pain patients (Clenzos, Nirmala, Oarker, 2013; Latimer et al., 2004). In 2001, over 216 accredited pre-licensure physical therapy programs were surveyed and more than half of the respondents reported pain knowledge and attitudes of physical therapists toward pain management as less than optimal (Scudds et al.). Similar gaps in knowledge and attitudes were identified later in dentistry, medicine, nursing, pharmacy, and psychology (Briggs et al., 2011; Carr et al., 2016; Jones, 2009). Pain knowledge deficits and negative attitudes about individuals with pain among health care practitioners are well documented as a barrier to quality pain care (Ferrell, 2012; Herbert, 2000; Rochman et al., 2013). Healthcare

providers may hold negative attitudes toward people reporting pain and may regard pain as not worth serious attention (Institute of Medicine Committee on Advancing Pain Research Care and Education, 2011). Battie et al (1994) surveyed physical therapists working in various clinical settings regarding their attitudes and beliefs in caring for patients with low back pain (LBP). Only 8% of respondents felt they were well prepared to manage LBP when they first entered practice. When therapists were asked if they agreed with the statement, “I often feel frustrated by patients with LBP who want me to ‘fix’ them,” 54% agreed (Doorenbos, Gordon, Tauben, et al., 2013).

Physical and occupational therapy programs have a wide diversity in curricular design and models that work within an educational ecosystem. Each educational ecosystem consists of individual components such as the institution, administrators, faculty, and students that interact and collaborate to provide learning opportunities and resources. For programs to have impactful pain curriculum the ecosystem needs to be flexible in the development of pedagogical experiences and the development of resources. To change curriculum, programs must review current courses, program offerings and educational standards to determine their effectiveness and currency, both in terms of cross-cutting skills and discipline-based knowledge to identify changing workforce needs (Andrade, 2018) as it relates to pain education. Despite extensively developed and freely available resources, prelicensure interprofessional pain management curriculum falls below recommended levels, (Watt-Watson & Hogans, 2018) and critical questions remain; 1) how can interprofessional pain curricular gaps, coherence, sequencing and integration be identified? 2) how can existing pain knowledge and attitudes be recognized in students enrolled in prelicensure health care programs? 3) what methods can be used to ensure these students receive adequate interprofessional pain education and graduate as clinically ready effective team members with competence in assessing and managing pain to meet the need of those affected by pain in our global society?

There is a concern over the lack of knowledge translation into entry-level clinical practice with the current recommendations, research, continuing education, and social media related to pain management (Hoeger Bement & Sluka, 2015). Pain education, while increasingly embedded within many curricula, varies considerably across the health profession with variations of pain definitions, management principles, support of educational theories, and interprofessional collaboration (Briggs et al., 2011; Gruppen et al., 2012; Herr et al., 2015; Hoeger Bement & Sluka, 2015; Hoeger Bement et al., 2014; IASP, 2018 Update). The result of this discord has led to a broad range of pain content, pain knowledge and pain attitudes, which may contribute to inadequate pain care (Doorenbos et al., 2013), ultimately affecting a patient’s quality of life and participation in society (Ferreira et al., 2004; Jones, 2009).

Initial efforts to enhance interprofessional pain education based on the IASP findings have been reported (Bradshaw et al., 2017; Hush et al., 2018; Jones, 2009). In 2013, the Michigan State Bureau of Health Care Services created the *Model Core Curriculum on Pain Management for Michigan Medical Schools*, which emphasized much of the IASP information. In addition, Finnish medical schools have embraced IASP curriculum in their undergraduate curriculum (Pöyhiä et al., 2005). In physical therapy, Hoeger Bement et al., (2014) developed a framework for pain curricula for physical therapy prelicensure educational programs incorporating IASP guidelines. Rochman, Sheehan, and Kulich (2013) identified the IASP occupational therapy outline as the gold standard for MOT curriculum.

In 2011, the Institute of Medicine (IOM) identified deficits in pain education for health professionals in the US and promoted a national challenge to standardize knowledge and skills in an interprofessional manner. The IASP Core Curriculum was developed and further revised in 2012 and reviewed in 2017 for specific health professions and a newly created interprofessional curriculum (IASP, 2018 Update). These updated curricula are based on current educational

theories supporting the application of knowledge in clinical experiences and deemphasize the prior factual curricula based on knowledge alone (Fishman et al., 2013; Hoeger Bement et al., 2014). Furthering the original work of the IASP curricula, Fishman and colleagues (2013) conducted a two-phase process for identifying pain management competencies for pre-licensure health professionals. Phase I involved a rigorous systematic review of the literature, and Phase II called on these experts to meet and develop core competencies for pain management and provide a comprehensive basis for healthcare education programs. The IASP Core Curriculum and the interprofessional executive committee on pain management's competencies provide a guideline for knowledge of pain management for pre-licensure physical therapists. However, how these competencies take shape into individual programs was not delineated (Fishman et al., 2013; Hoeger Bement et al., 2014). Recently, the IASP provided strategies to support change in professional education with the publication of a fact sheet covering topics such as gaps in knowledge, status and challenges in pain education, incorporating curriculum design models and pain competencies and pain education assessment. While these resources are helpful, to our knowledge there is limited evidence currently on how to sequence and assess pain management education throughout pre-licensure curricula, specifically because each specific program has a unique educational ecosystem and curricular model which would require an individualized approach to identify needed changes. The implementation of pain content without understanding what is currently being taught within a specific program could lead to poor sequencing coherence of the curriculum.

Curricular mapping is a process of identifying critical elements of a curriculum and the relationships between them (Harden, 2001). Analyzing the alignment of the pain curricula within program course objectives and evaluation methods allows for the identification of content gaps and integration, as well as vertical and horizontal coherence of the content. In a program of study, vertical coherence can be defined as what students should know progressively across the curriculum linking knowledge from one year to the next year (foundational to clinical science), while horizontal coherence integrates the alignment among curriculum, instruction and assessment such as across related disciplines with a year (anatomy, physiology, and pharmacology). Understanding pain curricula's learning progression, coherence, sequencing and integration within the programs learning progression model can then lead to intentional curricular changes to improve student learning and outcomes (Allen, 2004). Physical and occupational therapy programs have been challenged to expand, design, and implement pain curriculum to improve the understanding and application of pain treatment (Hoeger Bement et al., 2014). Assessment of current curriculum and student attitudes and knowledge are the essential first steps to identify the gaps in knowledge, strengthen competencies related to pain assessment and management, and counter negative and ill-formed attitudes about individuals experiencing and living with pain.

The purpose of this study was to: 1) examine existing interprofessional pain management curricula in a DPT and MOT program by mapping pain subject matter to the IASP interprofessional content to determine gaps, vertical and horizontal coherence and integration 2) evaluate pain knowledge and attitudes early and late curriculum within the current pre-licensure Doctor of Physical Therapy (DPT) and Master of Occupational Therapy (MOT) students, and 3) to define changes needed within the existing interprofessional pain management curricula to better prepare students for clinical experiences and professional practice.

## DESIGN AND METHODS

The University's Institutional Review Board approved this study, and all participants acknowledged consent for participation. The overall methodology of the study occurred in three

phases. In phase I, MOT and DPT faculty, who identified pain learning objectives within their current coursework and expressed an interest in updating the curriculum to reflect the current IASP guidelines, were recruited by email to participate. The faculty members reviewed and assessed current pain literature, identified, and defined key terminology, assessed course-based pain learning outcomes, and examined the current curriculum using curricular mapping. A curricular map matrix was created (Table 1) to compare IASP guidelines for interdisciplinary pain curriculum against the current curriculum. All faculty in both programs were asked to complete the pain mapping based on course learning outcomes and objectives for their respective courses. Within each component of the mapping, faculty were further asked to delineate which level of vertical coherence the IASP content was taught in their coursework. Vertical coherence was to be reported as introduced, applied, and/or mastered (Table 1). Horizontal coherence was to be identified by assessments used to evaluate the depth and breadth of pain learning outcomes. The map was completed over a period of three months after which a gap analysis was performed to assess how well threaded IASP materials were in the curricula and if the IASP materials demonstrated vertical coherence.

**Table 1**  
*Curricular Mapping Matrix Example for IASP Multidimensional Nature of Pain Guidelines*

Interdisciplinary curriculum Domain Core Competency	Trimester 1	Trimester 2	Trimester 3	Trimester 4	Trimester 5	Trimester 6/7
Curricular Vertical Coherence Key						
Introduced						
Applied						
Mastered						
<b>Multidimensional Nature of Pain</b>						
Epidemiology						
1. Pain as a public health problem with social, ethical, legal, and economic consequences	Foundations of OT	PT MSK I OT Evaluation and Assessment	PT MSK II		PT MSK III PT Pediatrics	PT MSK IV
2. Epidemiology with overview of statistics related to acute, recurrent and/or persistent (chronic) and cancer pain				PT Prosthetics	PT Pediatrics	
3. Barriers to effective pain assessment and management: individual, family, health professional, society, political institutions			OT Biomechanics	OT Modalities	PT Ethics PT Pediatrics OT Orthotics	
Development of pain theories						
1. Historical development of pain theories and basis for current understanding of pain		PT Modalities		PT Prosthetics		PT Myofascial 1
2. Definition of pain and pain terms		PT Modalities PT MSK I	PT Neuroscience		PT Ethics	PT Myofascial 1
3. Classification systems of pain		PT MSK I				
4. Differences between nociception, pain, suffering and harm		PT Modalities PT MSK I			PT Ethics	PT Myofascial 1
5. Pain and behavior		PT Modalities PT MSK I			PT Ethics PT Pediatrics	PT Myofascial 1

*Note. OT—Occupational Therapy; PT—Physical Therapy; MSK—Musculoskeletal.*

In phase II students in two cohorts of the DPT or MOT program were recruited by email to participate. Participants were surveyed using a modified version of the City of Boston’s Rehabilitation Professional’s Knowledge and Attitudes Survey Regarding Pain (COBS) to assess

students' existing pain knowledge and attitudes towards patients with pain based on the where they were in the programs pain learning pathway; early curriculum cohort, or late curriculum cohort. This commonly used survey tool, developed originally as a result of the American Pain Society's (APS) initiatives to improve training and education of pain clinicians in the late 1990s, has established reliability and validity (Herr et al., 2015). Early curriculum surveys were used to determine how students were understanding and feeling about pain patients as they entered the program, and late curriculum surveys were used to identify any changes in knowledge and attitudes during the learning progression as they leave the program. Interpretation of the scoring of the COBS was based on similar standards in the literature as well as the consensus of four clinical educators considered experts in the field (Carr et al., 2016). A minimum score of 83.3% (30 or greater correct of the 36 questions) was considered adequate, a score of 91.6 % was (33 or greater correct of the 36 questions) was considered good, a score below 83.3 % (less than 30 correct answers) was considered inadequate, and a score of less than 75% (less than 27 correct answers) was considered poor (IASP, 2018 Update).

In phase III, OT and PT faculty from phase I utilized the results from the curricular mapping and COBS survey to develop specific changes within their curricula to improve student competency in pain management.

The faculty reviewed data from the curriculum mapping matrix, meeting minutes, course syllabi, and communications from the faculty at large. Analysis of the map revealed multiple gaps, redundancies, misalignment, and a lack of vertical coherence within the existing pain curriculum. Horizontal coherence was limited as noted by lack of coordination by faculty related to instruction and assessment to evaluate student progress across the pain curriculum.

**Table 2**  
*Descriptive Statistics*

Total N = 240			
<b>Gender</b>			
Male	94	39.2%	
Female	146	60.8 %	
<b>Age</b>			
20-29	196	81.7 %	
30-39	38	15.8 %	
40-49	5	2.1 %	
50-59	0	0.0 %	
60-69	1	0.4 %	
<b>Discipline</b>			
DPT	182	75.8 %	
MOT	58	24.2 %	



## **DATA ANALYSIS**

Percentages developed for student participants' demographic characteristics were analyzed using conventional descriptive statistics (Table 2). Student pain knowledge and attitudes data as gathered on the COBS, was analyzed using IBM® SPSS® Statistics for Windows® v.23 Armonk, NY: IBM Corp. For the COBS, total scores, means, and standard deviations were determined for each pain knowledge and attitude survey item. To test the hypothesis that OT and PT students in their first didactic terms and final didactic terms were associated with statistically different mean COBS scores nonparametric and parametric tests were performed.

## **RESULTS**

### **CURRICULAR MAPPING**

Significant threading gaps existed in each of the four IASP interprofessional curricular domains of: 1) the multidimensional nature of pain, 2) pain assessment and management, 3) the measurement of pain, and 4) clinical conditions.

### **CURRICULAR MAPPING GAPS**

Regarding the first IASP domain, (the multidimensional nature of pain), differences in pain definitions, and terminology were found across and between the OT and PT curricula. For example, there were variations in the definitions of acute, chronic, and subacute pain as well as a complete gap of the biopsychosocial model being taught across courses as it relates to pain. Gaps in pain ethics were identified in 1) ethical standards and guidelines related to the use of analgesics, 2) political and societal issues related to access to pain management and attitudes of marginalized populations, and 3) experimental pain issues related to appropriate and meaningful measures and methods.

Within the second IASP domain, (pain assessment and management), a threading gap of interprofessional collaboration via the development of an interdisciplinary team approach on complex patients was identified. Additionally, there was a gap in teaching how to utilize quantitative pain tools for measuring pain such as pain drawing, special population tools, psychological status tools, and functional measures.

Threading gaps in the third IASP domain, (the measurement of pain), included treatment considerations such as: 1) types of pain, 2) other forms of treatment (pharmacological and non-pharmacological), 3) external factors such as patient motivation, cultural limitations, societal expectations, and 4) caregiver issues of false beliefs and anxieties. There were also gaps identified in political issues such as patients' access to clinics, medication availability, and interventions approved for use/reimbursement. Furthermore, equianalgesic dosing was absent, as well as evaluation of outcomes such as pain monitoring, coordination of care with an interprofessional team, and inclusion of perspectives on barriers to care.

The fourth IASP domain, (clinical conditions), demonstrated threading gaps related to managing pain with clinical conditions presenting with the addition of psychiatric disorders, substance abuse histories, and special needs populations.

### **VERTICAL COHERENCE GAPS**

There were limited identified instances of IASP material being vertically coherent, i.e., introduced, applied, and mastered, in the curriculum. Most IASP subject matter when provided occurred at the level of introduced, whereas a few IASP topics demonstrated application, without

proper introduction or mastery. Additionally, mastery was at times noted but did not represent knowledge development across the lifespan or across clinical disciplines.

### HORIZONTAL COHERENCE GAPS

Only one instance of true horizontal coherence was demonstrated within the anatomy course (trimester 1) and the physiology course (trimester 2) covering neural mechanisms of pain as described within the first IASP domain (multidimensional nature of pain) was noted. The scope of pain content while covered in multiple individual courses such as physiology, pathology and pharmacology lacked alignment and assessment of a learning pathway to assist the student to the ultimate goals and expectation of clinical treatment of pain patients. The courses failed to assess and link prior material to assist student in making connections that should be built overtime.

### SUBJECT DEMOGRAPHICS

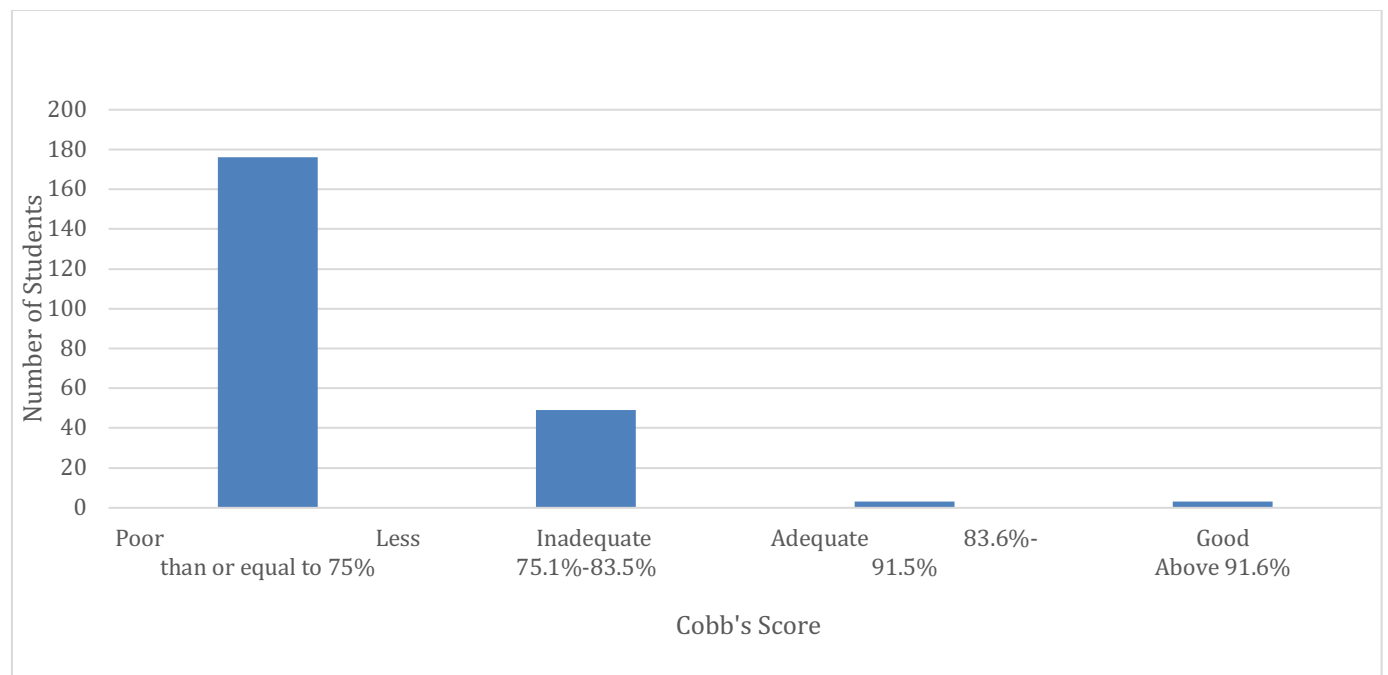
Two hundred and forty students were surveyed. Participants included 146 (60.8%) females and 94 (39.2%) males, 81% were between 20-29 years of age, 15.8 % were between 30-39 years of age, and 2.5 % were older than age 39. One hundred and eighty-two participants (75.8%) were DPT students and 58 (24.2%) were MOT students (Table 2). Faculty who participated in the study were course developers/coordinators and taught content three times per year.

### ACHIEVEMENT OF ADEQUATE SCORES ON COBS

The mean number of correct responses for all students related to pain knowledge and attitudes was 25.4 out of 36 questions (70.6% +/- 25.6%) reflecting an outcome of poor, well below the established minimum score of 30/36 reported by references (PA, 200; Rochman et al., 2013) Figure 1 displays the scores for all students as categorized by COBS scoring.

**Figure 1**

*Overall Correct COB Scores Questions 1-36*



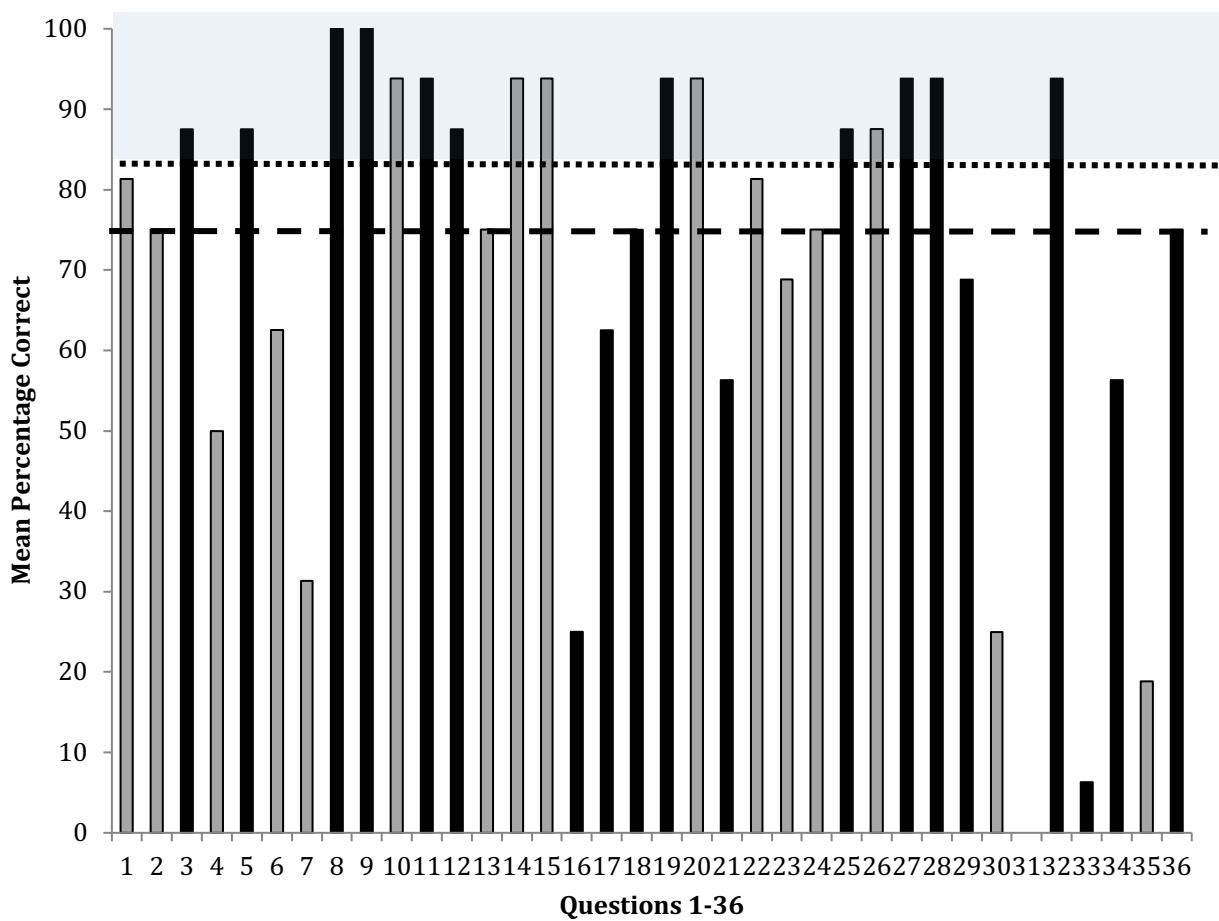


**THE RELATIONSHIP BETWEEN STUDENTS BETWEEN THE INITIAL DIDACTIC AND FINAL DIDACTIC TERMS AND COB’S SCORES**

Comparison of all students’ initial term COBS scores (71.7 SD = 24.0) versus final (72.7 SD = 25.8) didactic terms revealed essentially no statistical or meaningful difference ( $p = .86$ ). A non-significant mean decrease in overall COBS scores of -0.4 ( $p = .47$ ) and a non-significant increase of 1.2 ( $p = .95$ ) was observed in OT students and PT students respectively when comparing initial and final didactic terms Figure 2. Mean scores across the 36 questions for OT and for PT students in their final didactic terms are observed in Figures 3 and 4 respectively. Analysis of COBS scores for OT students surveyed in their final didactic term demonstrated that only 16 of the 36 questions scored above the adequate level of 83%. Fourteen of the questions were scored at the poor level (75% and below). Results for mean COBS scores in PT students surveyed in their final didactic term demonstrated that 19 of the 36 questions scored above the adequate level of 83%. Fifteen of the questions were scored at the poor level (75% and below).

**Figure 3**

*Mean Scores Across the 36 Questions for OT Students in Their Final Didactic Term*

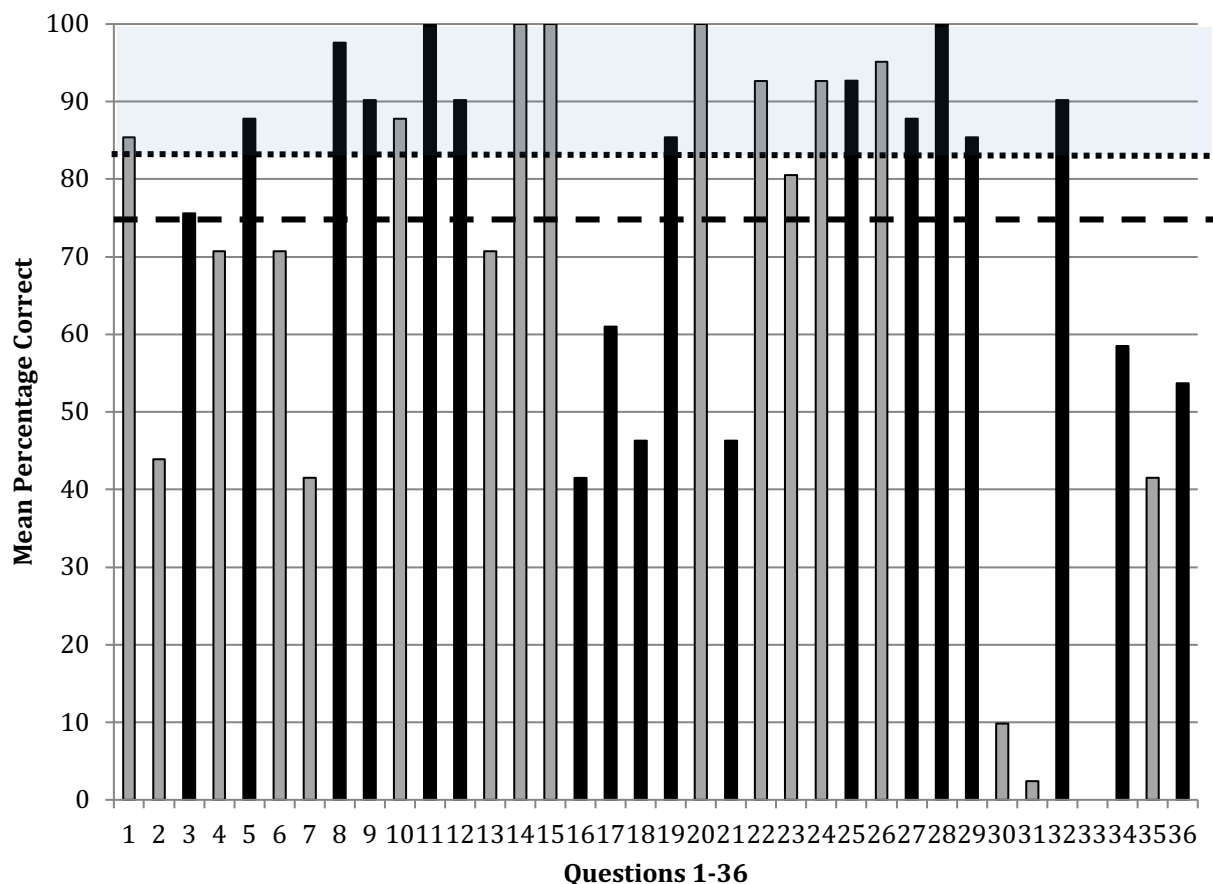


Note. Mean scoring by question for OT students in their final didactic term. Black columns represent questions related to attitudes about pain. Gray columns represent questions related to

pain knowledge. Dashed line signifies level considered poor and dotted line represents level of adequate COB's survey score.

**Figure 4**

*Mean Scores Across the 36 questions for PT Students in Their Final Didactic Term*



Note. Mean scoring by question for PT students in their final didactic term. Black columns represent questions related to attitudes about pain. Gray columns represent questions related to pain knowledge. Dashed line signifies level considered poor and dotted line represents level of adequate COB's survey score.

### DISCUSSION

While pain content was delivered across several courses within the respective programs, overall competency in student pain knowledge and pain attitudes were observed as poor when assessed at the end of the didactic portions. The results from the scoring of the COBS also revealed no overall change in pain knowledge and attitudes when comparing both PT and OT students' initial and final didactic terms indicating curricular content overtime was not leading to adequate attitudes and knowledge.

Interestingly, analysis of the COBS scoring revealed several themes related to pervasive perceptions, biases and concepts of theoretical versus practical implications in the treatment of

pain. Specifically, a significant number of students were incorrect on items addressing malingering, patient dishonesty, and clinical intuition especially at the end of didactic preparation. For example, although 98% of the students answered, “the patient is the most accurate judge of pain,” 65% also answered that practitioner intuition can determine when a patient is lying, and 32% believed the cause of chronic pain was psychological.

As found in a prior study (Rochman et al., 2013), theoretical (gate control theory) versus practical (case) themes within the COBS allowed identification of concepts suggesting some students presented with limited ability to translate and apply their pain knowledge. For example, although most students answered correctly that self-report is the most reliable and valid means to measure pain, when presented with a clinical vignette testing the same, 90% of students mistakenly used observation and interpretation of a patient’s behavior (as opposed to self-report) when deciding on the patient’s pain level. Students knew the right answers to the theoretical question but fell back on their personal beliefs and intuition when called upon to apply that knowledge in relevant situations. Further, less than 41% recognized non-drug interventions such as heat, ice massage, relaxation methods were effective for moderate and severe pain.

While the curriculum mapping process was an intense and time-consuming undertaking, it did successfully identify areas in the curriculum for revision. According to Briggs et al., this is the first and most important step to proceed and is supported by the IOM recommendation to improve curriculum and education for health care professionals (Briggs et al., 2015; Carr et al., 2016).

Use of instruments such as the COBS within and across the curriculum to assess pain knowledge and pain attitudes in pre-licensure rehabilitation programs can support the need for ongoing curricular mapping with pain content. The COBS assessment provided detailed information of students’ knowledge gaps as well as some attitudes that do not support quality pain management. Curricular mapping tools can aid pre-licensure rehabilitation programs in assessing current curricular pain knowledge and pain attitude threading. While neither program assessed in this study provided a stand-alone pain course within their curricula, Strong and Wilson (Wilson et al., 1992) provided evidence that stand-alone pain courses can be effective in changing pain knowledge and attitude.

The strategies to improve student curriculum regarding pain as seen in this study utilized a step-by-step sequence to address what students were currently learning as compared to best practice supported by the IASP. The sequence of specific curricular mapping of current pain content, assessment of student pain knowledge and attitudes, followed by identification of gaps and recommendations led to changes to support better curricular management. It is recommended that the assessment cycle continues as pain knowledge expands.

## PRACTICAL APPLICATION

Based on our results and in association with input from current faculty across both pre-licensure rehabilitation programs, the following specific revisions were recommended for implementation to enhance student competency in pain knowledge and pain attitude.

- I. Identification of areas across both programs requiring additional research and planning.
- II. Planning for the implementation and a timetable of resolution for revisions and implementation. This included changes/additions:
  1. Biopsychosocial model: Updated pain definitions. For example, when looking at multidimensional nature of pain the definition of pain terms varied significantly in courses throughout the curriculum.

- A. Burke-Doe, K. Johnson, S. Laslovich, K. Smith, C. Ivey, A. Edwards, C. Ingstad, E. Lowe, J. Mathews, T. Roberts, S. MacDermott & J. Warren
2. Current pain science: Topics on pain management IASP domain level B2-Pain definition/terms was deemed an immediate academic concern by the faculty, and preliminary corrective action was taken.
    - a. Central sensitization and pharmacology
    - b. Clinical Practice Guidelines from Ortho Section of APTA (based on body part)
  3. Focused faculty collaboration to align learning activities and assessment with pain curricular goals.
  4. Pain breadcrumb: The development by the faculty of a unanimous branding of pain content was designed to include a uniform visual aide and IASP terminologies on pain for course handouts and presentations. This branding became known as the “breadcrumb” and was adopted early into some courses and is planned for expansion into all pain management coursework.
  5. Address pain for IASP defined special populations.
  6. Devoted more teaching time for pain science.
  7. Case based interprofessional collaboration between DPT and MOT students to enhance pain education as recommended by Tauben and Loser (Tauben & Loeser, 2013) and demonstrated to be effective in previous work (Watt-Watson et al., 2004).
  8. Develop core competencies for pain curriculum.
  9. Consider the development of a stand-alone course.
- III. Resurvey students on COBS once implemented changes made and continue cycle of improvement.
- IV.

#### **LIMITATIONS**

A limitation of this study was the use of a convenience sample of MOT and DPT students enrolled in a single University. Despite participation being voluntary, there was a high response rate and completed surveys. Although this is a positive trend, the results may be biased given student’s perception of faculty oversight and involvement. In addition, the results may not have external validity given one program being sampled. Another limitation of the study was the use of results from group means. While the study design included students’ views and knowledge of pain at differing points along the curriculum, the study did not specifically analyze changes in attitudes and knowledge of the same individuals over time. Finally, deconstructing the existing program’s curricula and student pain competencies can provide evidence for change. However, this preliminary study was not designed to examine long term outcomes both in student pain competency and curricular mapping value. While future longitudinal studies across multiple sites are needed to address the identified limitations, this provides a platform for future prospective longitudinal studies for the advancement of pain curricula in pre-licensure rehabilitation programs.

#### **CONCLUSION**

The results of this study suggest proper assessment and ongoing curricular mapping (deconstructing the existing pain curriculum as described) is feasible and can provide a basis for curricular decisions when aiming to improve pre-licensure OT and PT student competency in the specific areas of pain attitudes and pain knowledge within IASP guidelines.

#### **References**

- Allen, M. J. (2004). *Assessing academic programs in higher education*. Anker Pub. Co.
- Andrade, M. S. (2018). A Responsive Higher Education Curriculum: Change and Disruptive Innovation. . In D. In: Parrish, Joyce-McCoach, J. (Ed.), *Innovations in Higher Education - Cases on Transforming and Advancing Practice*. London: Intech Open. <https://doi.org/10.5772/intechopen.80443>
- Bareiss, S. K., Nare, L., & McBee, K. (2019). Evaluation of pain knowledge and attitudes and beliefs from a pre-licensure physical therapy curriculum and a stand-alone pain elective. *BMC Med Educ*, 19(1), 375. <https://doi.org/10.1186/s12909-019-1820-7>
- Battié, M. C., Cherkin, D. C., Dunn, R., Ciol, M. A., & Wheeler, K. J. (1994). Managing low back pain: attitudes and treatment preferences of physical therapists. *Phys Ther*, 74(3), 219-226. <https://doi.org/10.1093/ptj/74.3.219>
- Bradshaw, Y. S., Patel Wacks, N., Perez-Tamayo, A., Myers, B., Obionwu, C., Lee, R. A., & Carr, D. B. (2017). Deconstructing One Medical School's Pain Curriculum: II. Partnering with Medical Students on an Evidence-Guided Redesign. *Pain Med*, 18(4), 664-679. <https://doi.org/10.1093/pm/pnw340>
- Briggs, E. V., Battelli, D., Gordon, D., Kopf, A., Ribeiro, S., Puig, M. M., & Kress, H. G. (2015). Current pain education within undergraduate medical studies across Europe: Advancing the Provision of Pain Education and Learning (APPEAL) study. *BMJ Open*, 5(8), e006984. <https://doi.org/10.1136/bmjopen-2014-006984>
- Briggs, E. V., Carr, E. C., & Whittaker, M. S. (2011). Survey of undergraduate pain curricula for healthcare professionals in the United Kingdom. *Eur J Pain*, 15(8), 789-795. <https://doi.org/10.1016/j.ejpain.2011.01.006>
- Carr, E. C., Briggs, E. V., Briggs, M., Allcock, N., Black, P., & Jones, D. (2016). Understanding factors that facilitate the inclusion of pain education in undergraduate curricula: Perspectives from a UK survey. *Br J Pain*, 10(2), 100-107. <https://doi.org/10.1177/20494637166634377>
- Clenzos N, Nirmala N., & Romey P. (2013). Physiotherapists' knowledge of pain: a cross-sectional correlational study of members of the South African Sports and Orthopaedic Manipulative Special Interest Groups: original research. In (pp. 95-100): *South African Journal of Sports Medicine*.
- Doorenbos, A. Z., Gordon, D. B., Tauben, D., Palisoc, J., Drangsholt, M., Lindhorst, T., . . . Loeser, J. D. (2013). A blueprint of pain curriculum across prelicensure health sciences programs: one NIH Pain Consortium Center of Excellence in Pain Education (CoEPE) experience. *J Pain*, 14(12), 1533-1538. <https://doi.org/10.1016/j.jpain.2013.07.006>
- Dowell, D., Haegerich, T. M., & Chou, R. (2016). CDC Guideline for Prescribing Opioids for Chronic Pain - United States, 2016. *MMWR Recomm Rep*, 65(1), 1-49. <https://doi.org/10.15585/mmwr.rr6501e1>
- Ferreira, P. H., Ferreira, M. L., Latimer, J., Maher, C. G., Refshauge, K., Sakamoto, A., & Garofalo, R. (2004). Attitudes and beliefs of Brazilian and Australian physiotherapy students towards chronic back pain: a cross-cultural comparison. *Physiother Res Int*, 9(1), 13-23. <https://doi.org/10.1002/pri.296>
- Ferrell B, M. M. (2012). Knowledge and Attitudes Survey Regarding Pain. In [https://prc.coh.org/Knowledge%20%20&%20Attitude%20Survey%207-14%20\(1\).pdf](https://prc.coh.org/Knowledge%20%20&%20Attitude%20Survey%207-14%20(1).pdf)
- Fishman, S. M., Young, H. M., Lucas Arwood, E., Chou, R., Herr, K., Murinson, B. B., . . . Strassels, S. A. (2013). Core competencies for pain management: results of an

A. Burke-Doe, K. Johnson, S. Laslovich, K. Smith, C. Ivey, A. Edwards, C. Ingstad,  
E. Lowe, J. Mathews, T. Roberts, S. MacDermott & J. Warren

- interprofessional consensus summit. *Pain Med*, 14(7), 971-981.  
<https://doi.org/10.1111/pme.12107>
- Force, A. M. A. P. C. T. (2021). *AMA Substance Use and Pain Care Task Force*. AMA. Retrieved March 11 from <https://end-overdose-epidemic.org/wp-content/uploads/2021/09/AMA-Substance-Use-and-Pain-Care-Task-Force-recommendations-for-microsite-FINAL-updated.pdf>
- Gadde, U., Matthew, P., Kumar, R., Aggarwal, R., Piazza, M. D., & Lamba, S. (2020). Implementing an Interactive Introduction to Complementary Medicine for Chronic Pain Management Into the Medical School Curriculum. *MedEdPORTAL*, 16, 11056.  
[https://doi.org/10.15766/mep\\_2374-8265.11056](https://doi.org/10.15766/mep_2374-8265.11056)
- Gaskin, D. J., & Richard, P. (2012). The economic costs of pain in the United States. *J Pain*, 13(8), 715-724. <https://doi.org/10.1016/j.jpain.2012.03.009>
- Gordon, D. B., Watt-Watson, J., & Hogans, B. B. (2019). [Interprofessional pain education-with, from, and about competent, collaborative practice teams to transform pain care]. *Schmerz*, 33(1), 66-72. <https://doi.org/10.1007/s00482-018-0352-0>
- Gruppen, L. D., Mangrulkar, R. S., & Kolars, J. C. (2012). The promise of competency-based education in the health professions for improving global health. *Hum Resour Health*, 10, 43. <https://doi.org/10.1186/1478-4491-10-43>
- Harden, R. M. (2001). AMEE Guide No. 21: Curriculum mapping: a tool for transparent and authentic teaching and learning. *Med Teach*, 23(2), 123-137.  
<https://doi.org/10.1080/01421590120036547>
- Herr, K., Marie, B. S., Gordon, D. B., Paice, J. A., Watt-Watson, J., Stevens, B. J., . . . Young, H. M. (2015). An interprofessional consensus of core competencies for prelicensure education in pain management: curriculum application for nursing. *J Nurs Educ*, 54(6), 317-327.  
<https://doi.org/10.3928/01484834-20150515-02>
- Hoeger Bement, M. K., & Sluka, K. A. (2015). The current state of physical therapy pain curricula in the United States: a faculty survey. *J Pain*, 16(2), 144-152.  
<https://doi.org/10.1016/j.jpain.2014.11.001>
- Hoeger Bement, M. K., St Marie, B. J., Nordstrom, T. M., Christensen, N., Mongoven, J. M., Koebner, I. J., . . . Sluka, K. A. (2014). An interprofessional consensus of core competencies for prelicensure education in pain management: curriculum application for physical therapy. *Phys Ther*, 94(4), 451-465. <https://doi.org/10.2522/ptj.20130346>
- Hunter, J., Watt-Watson, J., McGillion, M., Raman-Wilms, L., Cockburn, L., Lax, L., . . . Salter, M. (2008). An interfaculty pain curriculum: lessons learned from six years experience. *Pain*, 140(1), 74-86. <https://doi.org/10.1016/j.pain.2008.07.010>
- Hush, J. M., Nicholas, M., & Dean, C. M. (2018). Embedding the IASP pain curriculum into a 3-year pre-licensure physical therapy program: redesigning pain education for future clinicians. *Pain Rep*, 3(2), e645. <https://doi.org/10.1097/PR9.0000000000000645>
- IASP. (2018 Update). International Association for the Study of Pain Interprofessional Pain Curriculum Outline. In. IASP Website.
- Institute of Medicine (U.S.). Committee on Advancing Pain Research Care and Education. (2011). *Relieving pain in America : a blueprint for transforming prevention, care, education, and research*. National Academies Press.
- Jones, L. (2009). Implications of IASP Core Curriculum for Pre-Registration Physiotherapy Education. *Rev Pain*, 3(1), 11-15. <https://doi.org/10.1177/204946370900300104>



- Latimer, J., Maher, C., & Refshauge, K. (2004). The attitudes and beliefs of physiotherapy students to chronic back pain. *Clin J Pain*, 20(1), 45-50. <https://doi.org/10.1097/00002508-200401000-00009>
- Louw A, Sulka K., Nus J, Ccourtney CA, Zimney K. (2021). Revisiting the Provision of Pain Neuroscience Education: An Adjunct Intervention for Patients but a Primary Focus of Clinician Education. *Journal of Orthopaedic & Sports Physical Therapy*, 51(2), 57-59. Retrieved Accessed November 5, 2021. <https://search.ebscohost.com/login.aspx?direct=true&db=s3h&AN=148808773&site=eds-live>
- Michigan, S. (2013). Model Ccore Curriclum On Pain Management For Michigan Medical Schools. In [https://www.michigan.gov/documents/lara/Curriculum\\_MODEL\\_CORE\\_FINAL\\_APRIL\\_2013\\_MAILING\\_424376\\_7.pdf](https://www.michigan.gov/documents/lara/Curriculum_MODEL_CORE_FINAL_APRIL_2013_MAILING_424376_7.pdf).
- Müller-Schwefe, G., Jaksch, W., Morlion, B., Kalso, E., Schäfer, M., Coluzzi, F., . . . Varrassi, G. (2011). Make a CHANGE: optimising communication and pain management decisions. *Curr Med Res Opin*, 27(2), 481-488. <https://doi.org/10.1185/03007995.2010.545377>
- Herbert, P. A. (1999). *Rehabilitation professional's knowledge and attitude survey regarding pain*. MGH Institute of Health Professions.
- Pöyhiä, R., Niemi-Murola, L., & Kalso, E. (2005). The outcome of pain related undergraduate teaching in Finnish medical faculties. *Pain*, 115(3), 234-237. <https://doi.org/10.1016/j.pain.2005.02.033>
- Rice, A. S. C., Smith, B. H., & Blyth, F. M. (2016). Pain and the global burden of disease. *Pain*, 157(4), 791-796. <https://doi.org/10.1097/j.pain.0000000000000454>
- Rochman, D. L., Sheehan, M. J., & Kulich, R. J. (2013). Evaluation of a pain curriculum for occupational therapists: experiences from a master's-level graduate program over six years. *Disabil Rehabil*, 35(22), 1933-1940. <https://doi.org/10.3109/09638288.2013.766273>
- Scudds, R. J., Scudds, R. A., & Simmonds, M. J. (2001). Pain in the physical therapy (pt) curriculum: a faculty survey. *Physiotherapy Theory and Practice*, 17(4), 239-256. <https://doi.org/10.1080/095939801753385744>
- Tauben, D. J., & Loeser, J. D. (2013). Pain education at the University of Washington School of Medicine. *J Pain*, 14(5), 431-437. <https://doi.org/10.1016/j.jpain.2013.01.005>
- Watt-Watson, J., & Hogans, B. (2018). Current Status of Pain Education and Implementation Challenges. In *Fact Sheet No. 2* (pp. 6). International Association for the Study of Pain Website: International Association for the Study of Pain.
- Watt-Watson, J., Hunter, J., Pennefather, P., Librach, L., Raman-Wilms, L., Schreiber, M., Salter, M. (2004). An integrated undergraduate pain curriculum, based on IASP curricula, for six health science faculties. *Pain*, 110(1-2), 140-148. <https://doi.org/10.1016/j.pain.2004.03.019>
- Watt-Watson, J., Lax, L., Davies, R., Langlois, S., Oskarsson, J., & Raman-Wilms, L. (2017). The Pain Interprofessional Curriculum Design Model. *Pain Med*, 18(6), 1040-1048. <https://doi.org/10.1093/pm/pnw337>
- Wilson, J. F., Brockopp, G. W., Kryst, S., Steger, H., & Witt, W. O. (1992). Medical students' attitudes toward pain before and after a brief course on pain. *Pain*, 50(3), 251-256. [https://doi.org/10.1016/0304-3959\(92\)90028-A](https://doi.org/10.1016/0304-3959(92)90028-A)