



## An integrated undergraduate pain curriculum, based on IASP curricula, for six Health Science Faculties

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### Abstract

Pain education, especially for undergraduates, has been identified as important to changing problematic pain practices, yet, no published data were found describing an integrated, interprofessional pain curriculum for undergraduate students. Therefore, this project aimed to develop, implement, and evaluate an integrated pain curriculum, based on the International Association for the Study of Pain curricula [<http://www.iasp-pain.org/curropen.html>], for 540 students from six Health Science Faculties/Departments. Over an 18-month period, the University of Toronto Centre for the Study of Pain's Interfaculty Pain Education Committee developed a 20-h undergraduate pain curriculum to be delivered during a 1-week period. Students from Dentistry, Medicine, Nursing, Pharmacy, Physical Therapy, and Occupational Therapy participated as part of their 2nd or 3rd year program. Teaching strategies included large and small groups, Standardized Patients, and 63 facilitators. Evaluation methods included: (a) pre- and post-tests of the Pain Knowledge and Beliefs Questionnaire (PKBQ) and (b) Daily Content and Process Questionnaire (DCPQ) to obtain feedback about process, content, and format across the curriculum's 5 days. A significant improvement in pain knowledge and beliefs was demonstrated ( $t = 181.28$ ,  $P < 0.001$ ), although non-responders were problematic at the post-test. DCPQ overall ratings of 'exceeding or meeting expectations' ranged from 74 to 92%. Ratings were highest for the patient-related content and panel, and the small-group discussions with Standardized Patients. Overall evaluations were positive, and statistically significant changes were demonstrated in students' pain knowledge and beliefs. This unique and valuable learning opportunity will be repeated with some modifications next year.

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### 1. Introduction

Despite Marks and Sachar's (1973) seminal paper, inadequate pain management continues to be documented (Watt-Watson et al., 2001). Furthermore, gaps in pain knowledge and/or problematic beliefs have been reported for almost two decades for a variety of health professional groups including Medicine, Pharmacy, and Nursing (Furstenberg et al., 1998; Lebovitz et al., 1997; Simpson et al., 2002), Occupational Therapy (Strong et al., 1999;

Unruh, 1995), and Physical Therapy (Scudds and Solomon, 1995). Pain education for health professionals at all levels has been repeatedly identified as an important step to changing ineffective pain management practices (Sessle, 1999). Yet despite these deficiencies, educational programs, especially for undergraduates, have included minimal or no pain content (Graffam, 1990; Marcer and Deighton, 1988; Watt-Watson and Watson, 1989). Consequently, students lack important pain knowledge at graduation (Rochman, 1998; Simpson et al., 2002; Strong et al., 1999; Unruh, 1995).

Effective pain management can be complex, requiring approaches that exceed the expertise of one profession.

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For health professionals to collaborate in meeting patients' needs, they must understand each other's role and expertise. This understanding is the foundation for valuing and respecting others' contributions to the management of complex problems, particularly for people with persistent pain. However, students in health professional programs usually have few collaborative learning experiences (Baldwin, 2001) despite evidence that these opportunities help students to balance socialization into their own profession with learning about interprofessional collaboration (Roberston and McCroskey, 1996; Zlotik, 1998).

Interprofessional education has been defined as two or more professions learning from and about each other to improve collaboration and the quality of care (CAIPE, 1997). Its aim from the beginning has been to help professionals understand each other better and value what each brings to collaborative practice (Barr et al., 2000). Although interprofessional education predominately has involved practitioners after graduation, negative attitudes reinforced as undergraduates are more difficult to change later (Barr et al., 2000; Barrington et al., 1998; McMichael and Gilloran, 1984; Spurway, 1997; Tope, 1996). Interprofessional education is most successful when it is integrated early in the socialization and educational experience of diverse professionals (Barr et al., 2000; Slack et al., 2001).

Documentation of elective shared educational courses for Canadian Health Science students was reported over 30 years ago (Szasz, 1969, 1970). However, no published data were found describing an integrated pain curriculum as a required component for undergraduate students in Health Science Faculties in Canada or elsewhere. To address this shortcoming, the Education Advisory Committee of the University of Toronto Centre for the Study of Pain (UTCSP) proposed to provide one integrated course to all undergraduate students in the Health Science Faculties. The aim was to ensure a common basic understanding of pain assessment and management principles upon which to build profession-specific pain knowledge within an interprofessional context. To this end, we developed, implemented, and evaluated a 20-h interfaculty undergraduate pain education program for 540 students, which was based on the curriculum guidelines published by the International Association for the Study of Pain.

## 2. Methods

### 2.1. Development of an integrated pain curriculum

The UTCSP is a unique partnership of four Health Science Faculties: Dentistry, Medicine, Nursing, and Pharmacy that are committed to providing leadership to bridge the gap between pain research and pain management practices. To meet its mandate, the UTCSP Education Advisory Committee was expanded to include 16 members who represented the six Faculties/Departments of Dentistry,

Medicine, Nursing, Pharmacy, Physical Therapy, and Occupational Therapy. As well, additional support came from interfaculty education consultants and university departments with expertise in information technology, e-learning, library science, and case study development. We worked with each faculty to negotiate a common date for the week-long program. Over an 18-month period, the committee developed a 20-h pain curriculum to be implemented during the week of March 18–21, 2002. Almost all the 540 students involved were 'second-entry-students' with a previous degree, and were in either their 2nd or 3rd year as outlined in Table 1.

We began by surveying all pain curricula currently being taught within the six participating professional programs to determine the baseline requirements. Our findings indicated that pain content was minimal or not clearly evident in most faculties and that a pain curriculum was needed. A literature search using Medline, Cochrane, Cinahl, Embase, and Psychlit did not yield any studies on interprofessional pain curriculum models for undergraduate students. Therefore, we used the core (Fields, 1995) and discipline-specific (IASP, 2000) pain curricula from IASP [<http://www.iasp-pain.org/curropen.html>] and the *Position Statement on Pain Relief* from the Canadian Pain Society (Watt-Watson et al., 1999) as the basis from which we formulated the objectives to guide the content development, as outlined in Table 2. Content priorities were chosen based on the minimal requirements to manage pain as perceived by each profession.

The process of developing an integrated curriculum was itself an interprofessional experience for the committee. Members required sufficient time to clarify profession-specific language and to agree on content priorities within the time frame of 20 h across the 5 days, as outlined in the course schedule (see Fig. 1). Meetings were scheduled every 3–4 weeks, with several blocks in the summer period, to insure sufficient opportunity to hear each other's language, interests, goals, content priorities, and learning environment preferences.

To ensure commitment from all six faculties involved, the chair and/or profession-specific committee members met with the curriculum committees of each faculty to present the curriculum and plan for implementation, both

Table 1  
Health Science Faculty, year, and number of students participating in pain week

	Year	Number of students (n = 540)
Dentistry	3rd	70
Medicine	2nd	190
Nursing	2nd	31
Pharmacy	3rd	128
Physical Therapy	2nd	63
Occupational Therapy	2nd	58

Table 2  
Learning objectives for students

1. To describe current theories of the anatomical, pathophysiological, and psychological bases of pain and pain relief:
  - Describe the evolution of pain theories.
  - Describe mechanisms involved in peripheral and central nociceptive transmission and modulation.
  - Discuss pain and suffering.
2. To describe the WHO model of consequences of chronic problems related to physical impairment, activity limitation, and social participation:
  - Describe differences between the three dimensions of functioning and disablement.
  - Discuss how pain prevention can reduce treatment complications and potential for chronic pain.
  - Identify individual rehabilitation goals that would include remediation, compensation, and prevention as appropriate for each person with chronic pain.
3. To complete a comprehensive pain assessment:
  - Identify the goals of pain assessment and management.
  - Identify common misbeliefs that limit effective assessment and management.
  - Describe various factors influencing individuals' pain expression and clinicians' responses.
  - Recognize the differences in pain assessment related to duration and complexity.
  - Outline the components of a comprehensive pain history.
  - Apply several established assessment tools with clinical utility both uni- and multidimensional.
4. To describe strategies for planning, intervention, and monitoring pain management in a manner that reflects both their collaborative and discipline-specific roles:
  - Describe available resources in Ontario and Canada.
  - Describe the integrated and distinct roles of each professional.
  - Describe methods of integrated and comprehensive delivery of pain management care.

at the program's first phase of development and later when it was completed. The program was formally approved by the curriculum committees of all faculties. As well, the University of Toronto Health Sciences Interprofessional Education Management Committee was also informed regularly of the curriculum development. A brief presentation was given to students in all faculties several weeks prior to the pain curriculum implementation to inform them of the details.

## 2.2. Curriculum overview

An overview of the week's curriculum is outlined in Fig. 1. This curriculum was not an elective, and students were expected to attend all sessions as a component of their current coursework. The 20-h curriculum was scheduled across 5 mornings of a single week. All sessions were held in one large educational facility configured with both an auditorium large enough for 600 people and 23 classrooms suitable for the small-group sessions. In the preceding week, students were given a manual which contained information about the classes, assigned groups, case study, readings, and additional references. Pre-readings were included to give students some common background for the daily sessions.

The *multiprofessional*, large-group sessions on Monday and Tuesday mornings focused on identifying common clinical challenges, the WHO classification of functioning, disability, and health, and mechanisms of nociceptive and neuropathic pain. These sessions included speakers who were chosen from the University of Toronto community because of their internationally known pain expertise as

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Monday	Tuesday	Wednesday	Thursday	Friday
<b>8:00–12:00 total gp</b>	<b>8:00–12:00 total gp</b>	<b>8:00–12:00 seminar gp</b>	<b>8:00–12:00 seminar gp</b>	<b>8:00–12:00 total gp</b>
<b>8:10–9:00</b> Pain: A Multidimensional Issue <i>Judy Watt-Watson</i>	<b>8:10–9:30</b> Mechanisms of Nociceptive and Neuropathic Pain II <i>Mike Salter</i>	<b>8:10–8:30</b> Assessment issues re. evidence, misbeliefs. Assessment components <b>8:30–9:00</b> Small-group task to prepare for Standardized Patients (SPs) <b>9:00–10:15</b> Assessment of cancer pain using SPs	<b>8:10–8:30</b> Clarify management issues <b>8:30–9:15</b> Small-group work with students' management plans. <b>9:15–10:15</b> Group discussion of plan: Pharmacological, rehabilitative, and psychosocial interventions	<b>8:10–9:45</b> Advocacy: Ethical, Legal, and Political Issues Patient Advocacy <i>Alex Jadaad</i> Ethical Issues <i>Kerry Bowman</i> Legal and Political Challenges <i>Claire Bombardier</i>
<b>9:00–9:45</b> Challenge of Pain <i>Peter Watson</i>	<b>9:30–10:00</b> WHO Framework <i>Judi Hunter</i>	<b>10:15–10:30</b> Break <b>10:30–11:30</b> Small-group work on patient problem task with opportunity for SP validation <b>11:30–12:00</b> Feedback, Thursday preparation	<b>10:15–10:30</b> Break <b>10:30–11:00</b> Discussion/Finalize Plan <b>11:00–11:30</b> Issues for selected patients and types of pain <b>11:30–12:00</b> Feedback/Summary	<b>9:45–10:15</b> Break <b>10:15–10:45</b> Panel discussion <b>10:45–11:15</b> Canadian Directions <i>Michael Salter</i> <b>11:15–12:00</b> Summary, Evaluation
<b>9:45–10:15</b> Break	<b>10:00–10:30</b> Break			
<b>10:15–11:45</b> Mechanisms of Nociceptive and Neuropathic Pain I <i>Jonathan Dostrovsky</i> <i>Karen Davis</i>	<b>10:30–11:45</b> <i>Panel: Experience of Living with Pain</i>			
<b>11:45–12:00</b> Summary	<b>11:45–12:00</b> Summary			

Fig. 1. Undergraduate Pain Curriculum.

clinical or basic scientists. In the final Tuesday session, a Patient Panel of adults with pain related to cancer, multiple sclerosis, and trauma, and a teenager with complex regional pain syndrome shared their stories and responded to students' questions. The final multiprofessional session at the end of the week focused on patient advocacy, including ethical, legal, and political issues, and Canadian directions for pain research.

The *interprofessional* small-group sessions on Wednesday and Thursday focused on developing assessment and management plans for a cancer patient case as communicated using Standardized Patients (SPs). The SPs, one per group, were actors who were trained to play a scripted cancer patient with pain to help students work through assessment and management issues with as realistic a context as possible. The case developed by the committee was based on a real patient with metastases to the jaw secondary to lung cancer. For these sessions, students were assigned to 23 interprofessional groups of about 25 students each, within which smaller interprofessional groups of about 8 worked on assigned tasks. Assigning students to these groups ensured that the six faculties were represented as the students collaborated on pain assessment and management plans.

Clinicians ( $n = 63$ ), representing all the professions involved, were chosen to facilitate the 23 small-group sessions based on their expertise in pain management and skill in working with groups. As well, these facilitators were required to attend a 2-h workshop that focused on an overview of the program and strategies for working with SPs. To standardize the group component, all facilitators received a manual that included baseline content, probes for discussion, and timetables for process. Facilitators were also given suggested questions to stimulate thinking related to both shared and profession-specific areas necessary for interprofessional collaboration. Most groups had three facilitators, each representing a different profession, and one of these was designated as the lead facilitator based on his or her pain experience and communication/group skills.

### 2.3. Evaluation methods

Ethical approval for all evaluative methods was obtained from the University of Toronto Office of Research Services. Students were given an information letter and consent form that guaranteed anonymity in completing the questionnaires. The first two levels of Barr et al.'s (2000) modified typology of education outcomes were used, that is, the learners' view of the program and changes in their knowledge and beliefs (Barr et al., 1999). We hypothesized that student participation in the integrated curriculum would result in students' gains in pain knowledge and an enhanced interprofessional understanding. Therefore, methods to evaluate the educational effectiveness of the curriculum included (a) the Pain Knowledge and Beliefs Questionnaire (PKBQ) pre- and post-tests and (b) the Daily Content and

Process Questionnaire (DCPQ) to evaluate process and content across the 5 days. Students were also evaluated on their learning in their faculty-specific examinations; however, these requirements were not the responsibility of the committee and will not be discussed here.

The PKBQ pre-test for baseline data was administered at the beginning of the first morning; the PKBQ post-test was administered at the conclusion of the fifth day. The PKBQ, developed by a sub-committee, was based on previous work (Watt-Watson, 1987; Watt-Watson, 1992; Watt-Watson et al., 2001). All members of the curriculum committee examined the questions for face and content validity. The measure was piloted with four students and five clinicians representing the different professions to determine the feasibility and content validity of the PKBQ. No changes were required. The PKBQ contained 40 items that asked about students' pain knowledge and beliefs and the interprofessional role in pain management. Two parallel forms of the PKBQ were developed for the pre- and post-test; the items on the two forms were similar, with the direction of the correct answer reversed on the post-test (see Fig. 2). Students were given approximately 15 min to respond and indicate whether the items were true/false or if they did not know.

The DCPQ was developed to obtain formative feedback about the program's process, content, and format (i.e. lecture, small groups, and use of SPs). The DCPQ included 15 questions using a Likert scale, with 9 questions about content and 6 about format. As well, 3 open-ended questions were included that asked students for comments related to what was liked best and least and to suggestions for changes. Table 3 provides a sample of the daily feedback survey. Members of the curriculum committee examined the DCPQ for face and content validity. The questionnaire took about 5 min to complete and was administered to students at the end of each day's session. In addition, students were asked to complete an online survey to evaluate the effectiveness of the Pain Week website and the library resource (MyLibrary®).

Committee members were asked for feedback in the 2 weeks following the curriculum implementation through a confidential online survey. The questionnaire, which was similar to the DCPQ used for students, asked for an evaluation of the curriculum content and implementation process. These data and any additional feedback were discussed at the debriefing session 1 month later in order to plan for the next year.

### 2.4. Analyses

All analyses were performed using SPSS and Excel software. Data were analyzed by total response. For the PKBQ, paired Student *t*-tests were used to compare matched pre- and post-test scores and unpaired *t*-tests were used to compare unmatched pre- and post-test scores. Descriptive analyses were completed for the DCPQ. Qualitative analysis

**Pre-test Version**

1A. Patient's perceived pain is directly proportional to tissue damage.

2A. Patients regularly taking opioids do not become tolerant to constipation and require medication for this.

**Post-test Version**

1B. Patient's perceived pain is not directly proportional to tissue damage.

2B. Patients regularly taking opioids become tolerant to constipation and do not require medication for this.

Fig. 2. Example of two parallel versions from the Pain Knowledge and Beliefs Questionnaire.

by categorization of data was done for the open-ended questions on the DCPQ.

### 3. Results

#### 3.1. Pain knowledge and beliefs

Positive outcomes were demonstrated related to students' knowledge and beliefs about pain, with a statistically significant change on correct responses from 66 to 83%. Pedagogically, the 17% change in scores from the satisfactory level to an excellent level was significant. However, student completion of course evaluations is always voluntary, and non-responders were problematic for the post-test. Unmatched data were available for 374 students who completed the pre-test PKBQ and for 173 who completed the post-test PKBQs. Since some students did not include a unique identifier to be matched, the paired

pre- and post-test data were available for only 131 students. The descriptive and inferential statistics for the matched and unmatched analyses were very similar, so only the unmatched data were presented in order to represent as many subjects as possible. The mean scores and SDs for correct responses were 26.5 (4.56) for the pre-test (i.e. 66% correct) and 33.0 (3.36) for the post-test (i.e. 83% correct), with a statistically mean difference using a pooled SD of 6.53 (4.22);  $t = 181.28$ ,  $P < 0.001$ ). Several items had greater than 40% change in correct responses including those about opioid use with elders and people with chronic non-cancer pain, constipation management with opioids, physiological mechanisms related to analgesia, and placebo use.

#### 3.2. Daily content and process

The overall student evaluations of content and format on the DCPQ were positive. The daily summary ratings of

Table 3  
Summary of Student Daily Content and Format Questionnaires (DCFQ)

Daily Content and Format Questionnaires					
Question rating: met/exceeded expectations	MON	TUES	WED	THUR	FRI
Overall rating (%) (response rate, %) <sup>a</sup>	74 (49)	85 (48)	92 (71)	91 (64)	82 (35)
q.3 Relevant (%)	83.4	82.7	93.5	90.2	90.2
q.4 Informative (%)	80.3	83.8	87.5	91.2	91.2
q.5 Well organized (%)	93.5	92.7	96.6	94.8	95.2
q.6 Interesting/engaging (%)	44.7	81.9	84.5	84.6	80.1
q.7 Encouraged thinking/reflection (%)	50.0	81.8	91.7	89.6	83.5
q.8 Increased knowledge of pain issues (%)	76.2	81.8	77.8	88.1	73.1
q.9 Increased awareness of IP <sup>b</sup> roles (%)	31.3	60.4	80.4	86.2	54
q.10 Visual aids effective (%)	72.0	46.5	N/A	N/A <sup>c</sup>	91.3
q.11 Time for questions was sufficient (%)	85.2	93.4	90.7	90.9	89.7
q.12 Final summary helpful (%)	73.6	76.3	78.6	80.7	76.7
q.13 Small-group facilitation effective (%)	N/A	N/A	90	92.3	N/A
q.14 SPs used effectively (%)	N/A	N/A	96.3	N/A	N/A

<sup>a</sup> Total number of students 540.

<sup>b</sup> Interprofessional.

<sup>c</sup> Not applicable.

exceeding or meeting expectations ranged from 74 to 92%, as documented in Table 3. The highest daily ratings were for the Wednesday and Thursday small-group sessions, which were scored highly on most items. Response rates for these days also were higher than for the other days. Students' qualitative statements reflected these findings and supported the effective use of SPs, interprofessional small-group discussions, and facilitators. Negative comments from a minority of students identified: (a) the lack of relevance of the cancer patient focus for them, particularly in Dentistry; (b) too much of a focus in some groups on interviewing skills, which had already been covered in their core curriculum; and (c) negative attitudes that restricted some participants from listening to those from other professions.

The diversity in students' backgrounds was most evident in responses to the 3 h of lectures on basic pain neurophysiology that were part of the initial multiprofessional sessions. This content was rated by students as 'very relevant,' 'repetitive,' or 'overwhelming,' and this variability in ratings was evident even with students from the same faculty. Students suggested that a more clinically applied learning experience was required for the neurophysiology content. In contrast, the initial multiprofessional sessions that included clinical applications were well received. Students from all faculties rated the Patient Panel highly and indicated that the range of pain problems discussed by these patients gave them insight into management issues and aspects of their interprofessional roles. Although attendance was noticeably less for the Friday session on legal, ethical, and social issues, evaluations were positive from those present (see Table 3).

Overall, response rates for the DCPQ were in the expected usual range of 48–75%, excluding the low rate of 35% on Friday. Students were not required to complete questionnaires, and data are not available to distinguish those who did not respond and/or did not attend the sessions. For example, the questionnaire response rate for Monday sessions was only 49% even though the 600-seat auditorium was full. Although facilitators were asked to take attendance in the small-group sessions, no formal mechanism was in place to do this (e.g. attendance sheet, contact for reporting). Faculties have requested that in future they be given the names of students not present in the small sessions, because this time is considered as 'clinical,' when attendance is required. Reasons given for the poor attendance on the final day were 'the content was not relevant' or they had 'other course commitments.'

### 3.3. Committee feedback

Overall, the feedback from committee members was positive, and recommendations reflected students' responses. Issues mainly concerned (a) the depth and/or relevance of some content and (b) the need for greater clinical application with interprofessional modeling. With regard to depth and relevance, the committee unanimously

agreed that a decrease in lectures, particularly in neurophysiology, and an increase in clinical integration throughout all sessions were needed. All members stated that a greater focus on management issues was needed, including pharmacology. The latter would include the appropriate therapeutic use and abuse of opioids and related issues of addiction assessment and management. Some committee members, particularly from Dentistry, reported that the use of a cancer pain patient case was not seen as relevant by some of their students. A suggestion was made to use a different patient case with a chronic non-cancer neuropathic pain focus next year. Some choice in sessions was suggested to address the diverse needs and interests of these six student groups. For example, students would sign up for one of several concurrent sessions that would involve an interprofessional focus but may not be inclusive of all six groups.

On the issue of interprofessional modeling, committee members suggested that a greater emphasis be placed on interprofessional roles within the pain management context to increase the clinical relevance of sessions. For example, students could be given more time and guidance in developing the assessment and management plans for the patient case, in order to learn more about both the profession-specific and interprofessional components of their roles. This suggestion would also permit more reflection and discussion of evidence-based clinical decision-making towards our goal of interprofessional collaboration. Everyone reported that involving clinicians as presenters, including those from their own profession, was valued by students and that representation should be increased if possible. Although the use of interprofessional facilitators was rated as excellent, we agreed that the facilitators' orientation needed to include more guidelines on working with diversity in groups. It was also strongly recommended that facilitators be given an example of an 'ideal' management plan to help them increase synthesis in the final session. Committee members evaluated the use of SPs as effective but observed that the student guidelines for the SP interview needed to be less structured and that some facilitators needed to be less focused on the interview process.

## 4. Discussion

Overall, we were successful in developing and implementing an integrated pain curriculum for undergraduate students from six health professions in this seminal initiative. As no previous models were found as a template, the IASP curricula were essential to give direction to content priorities. As well, the development of committee consensus on content priorities to meet profession-specific needs was critical. Students' overall ratings of the curriculum indicated that we accomplished our aim of integrating profession-specific learning goals concerning pain into an interfaculty curriculum. Statistically significant

changes were demonstrated in students' pain knowledge and beliefs.

Barr et al. (2000) have emphasized that motivation and collaboration are key factors for interprofessional initiatives to work. They suggested that flexibility in people's approaches to working and learning together is essential. In this initiative, all committee members donated considerable time and effort to this project. As well, they worked diligently to involve their own faculties as much as was possible, with greater success for some than for others. More involvement of course coordinators from those faculties not as committed will be sought for next year. It is noteworthy that all 63 facilitators participated voluntarily to help further better pain management in a collaborative environment with undergraduate students.

#### 4.1. Implementation of an interprofessional pain curriculum

Although we successfully involved each profession in the development of the curriculum, the implementation phase generated additional challenges. In a systematic review of interprofessional education studies, Cooper et al. (2001) identified several obstacles to success including (a) a lack of time; (b) varying educational schedules, assignments, and interests specific to each professional group; and (c) scarce financial resources. This review also revealed that students' perceptions of a course's usefulness were a reflection of their faculty's perceptions and support for the initiative. Several of these challenges were relevant to our initiative, particularly those regarding faculty support for scheduling and timetables, the need for profession-specific content and the relevance of common pain-related content, and funding for teaching strategies, which included manuals for students and the use of SPs.

Faculty schedules are complex, and we were fortunate to negotiate a common 20-h period. Although the afternoons of this week were to be cleared for student reading in preparation for sessions, not all faculties were able or willing to comply. Ongoing faculty scheduling in the afternoons, including exams and clinical responsibilities, was problematic for some students and affected their involvement in some sessions, particularly Friday. Further negotiation will be required for next year. We concluded that it is essential to increase communication with the curriculum committees of each professional program in order to increase the integration of this initiative into each faculty's curriculum.

#### 4.2. Challenges of meeting the learning needs of six health professions

Student and committee feedback about the content and process of this project have clearly determined the components to be retained next year. In particular, student feedback indicated the small, interprofessional sessions gave them the opportunity to not only work through

assessment and management plans for a pain patient but also to work collaboratively with other professionals in the process. Students also reported that the use of the SPs helped to make these sessions as close to a realistic experience as possible.

However, students' responses to the multiprofessional sessions were mixed, particularly related to their varying backgrounds in neurophysiology. This variability may reflect students' diverse backgrounds from their first degree, or the trend in all six participating faculties towards case-based rather than lecture-based learning. Students asked for greater clinical application in all sessions, including more discussion and modeling of interprofessional roles in the context of pain management. Therefore, changes considered for next year will include a greater clinical focus for all sessions, including the basic science components, more evidence to support management strategies, including pharmacology, and some choice to accommodate the variety of student interests. This challenge of diverse interests was also evident in the choice of focus for the case study. Not all students found the cancer patient case relevant to their current experience or their perceived future practice, particularly those from Dentistry and Rehabilitation Sciences (i.e. Occupational and Physical Therapy). Therefore, the case study for next year will focus on a person with chronic non-cancer pain.

#### 4.3. Multiprofessional versus interprofessional learning

Clarke (1993) defined interprofessional versus multiprofessional education as being further on a continuum of increasing complex knowledge and appreciation of professions other than one's own. Our students reported that they gained a greater awareness of interprofessional roles through the interactive, smaller groups on Wednesday and Thursday than they did in the multiprofessional large sessions on the other days. Collaborative competencies suggested by Barr (1998) include recognizing and respecting the roles, responsibilities, and competence of others in relation to one's own, and knowing when, where, and how to involve these other professionals. Students' qualitative responses reflected beginning ability in this area through comments such as 'the interprofessional approach helped us to learn about differences in roles,' 'helped us to know when to refer for different therapies,' and 'allowed us to discuss issues relevant to all professions.'

#### 4.4. Cost-benefit

As collaborative education had been criticized as being expensive (Baldwin, 2001), we aimed to keep costs minimal. The committee discussed the best teaching methods that would meet our goals and also stimulate and retain the interest of students from diverse health science backgrounds. The manual was developed as a current and future resource for students, but it also functioned as a tool

to help us consolidate our own thinking about objectives and priority content. The manual's costs related to printing and copyright requirements were supported by unrestricted grants from the UTCSP and industry. Although these costs were not great, more online references will be used in future to minimize these further. A simulated practice setting with SPs was helpful in facilitating students' relating to and sharing in as realistic a context as we could manage. However, writing the script for these actors was time consuming, and the facilitators required guidance in their orientation session about the best approaches to working with them. A simulation with an SP and two committee members was videoed for future use should funding not be available for SPs.

#### 4.5. Other limitations

It was not possible to implement a randomized controlled trial (RCT) because all students in these six faculties were expected to attend this part of their ongoing curriculum. It is noteworthy that the use of RCTs has not been documented in a Cochrane systematic review of interprofessional education (Zwarenstein et al., 2003). Similarly to our study, systematic reviews have reported positive changes in attitude and knowledge with interprofessional undergraduate students using a pre- and post-test design (Barr, 1996; Cooper et al., 2001).

Anonymity and confidentiality issues made it impossible to know who was present in the large sessions or to follow through with those missing from the small ones. While response rates were good for most days, the drop in attendance for the Friday session resulted in only about one-third of students completing the post-test questionnaire. While those students attending rated the session highly, their responses may have reflected an overall satisfaction with the pain curriculum. As students who did not respond and/or attend sessions might have different views, later feedback sessions were held in all faculties. These data supported students' qualitative comments about strengths and areas for change from the DPCQ that have been included throughout this paper. The PKBQ in future will be given to students in their individual faculties (pre-test) and in the final small-group session to encourage completion.

Evaluating retention of knowledge and belief changes over a longer period was not possible at this time and will be considered next year. Moreover, the future impact of this curriculum on clinical practice is not known. Slack et al. (2001) suggested that evaluation of education programs should focus on process rather than outcomes because patients' responses are dependent on multiple factors not always under the educators control. Nevertheless, evaluating the retention of knowledge and belief changes over at least a 3-month period will be considered for the coming year. As well, the PKBQ is a new measure whose reliability and validity require examination, and this is in progress.

#### 4.6. Conclusion

The IASP curricula were essential in facilitating the successful development of this interfaculty undergraduate pain curriculum. The overall evaluations were positive, and statistically significant changes were demonstrated in students' pain knowledge and beliefs. Interprofessional collaboration will not happen without an understanding of each other's roles and expertise. This seminal initiative provided such an opportunity for 540 students from six Health Science Faculties to learn about and from each other in the context of pain management. This was a unique and valuable learning opportunity that will be repeated with some modifications next year. This template may be useful to others wishing to develop a similar initiative.

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