

Twenty-five years of pain education research—what have we learned? Findings from a comprehensive scoping review of research into pre-registration pain education for health professionals

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Abstract

The International Association for the Study of Pain (IASP) has designated 2018 as the global year for excellence in pain education. Despite advances in pain research, there remains an inadequate understanding and implementation of pain education that health professionals obtain in training before professional registration, licensure, or certification. This article reports on a synthesis of pain education research that has been conducted in this period of health professionals' training. A scoping review framework by Arksey and O'Malley was used to guide a search of medical and education databases for records that have examined or evaluated pain education. Fifty-six reports were identified representing 16 professions across 29 countries, published between 1992 and 2017. A descriptive account of the reports is provided, which includes a timeline, geography, methods of evaluating, and main purpose of the research. A narrative synthesis was undertaken to summarise and explain the results and main findings from reports of studies included in this review. Further to this, a concept analysis was conducted to identify and map key concepts that can be used by stakeholders to develop or evaluate future pain education. Future directions for research are proposed, which includes factors that are repeatedly reported to be important in advancing pain education and should underpin the campaign for environments that promote excellence in pain practice as the norm in health care.

Keywords: Pain education, Pre-registration, Pre-licensure, Pre-certification, Health professionals, Physiotherapy, Occupational therapy, Nursing, Medicine, Allied health professionals

1. Introduction

The International Association for the Study of Pain (IASP) Council has designated 2018 as the global year for excellence in pain education. Pain is recognised as a global health problem with significant impact on health and social care systems.^{8,23,37,56,75} In response to this global crisis, a number of countries produced national pain strategies or action plans that IASP analysed to produce "Desirable Characteristics of National Pain Strategies: Recommendations by the International Association for the Study of Pain."³⁵ Access to pain education for health professionals is one of the key recommendations to improve pain care, specifically that trainees are equipped with both the knowledge

and skills to address all types of pain at an early stage of training. This is consistent with the Declaration of Montreal, which states that one of the reasons that pain management is inadequate in most of the world is because there are major deficits in knowledge of health care professionals about the mechanisms and management of pain.³⁴

Advancing pain education is complex because the range of knowledge and skills that a practitioner requires to be competent in pain management is broad and varied, and the subject may be taught and evaluated from both a theoretical and practical aspect. Hence, pain education needs to include a variety of pedagogic approaches to facilitate learning including comprehension, interpretation, analysis and evaluation of knowledge, and competence of practical skills. Despite the challenges, there has been an increase in pain education research over recent years; however, it remains unclear how pain education has progressed in terms of improving patient care.

Problems with pain education identified by surveys of multiple health science courses in higher education institutions across the United States, Canada, and Europe include a lack of dedicated curriculum time, and that pedagogic approaches are not always thought to be effective in improving students' pain knowledge and skills. Pedagogic approaches tend to be didactic and biomedically focussed, which may not be optimal for developing knowledge and skills relevant to a pain practitioner.^{10,16,42,78} The Institute of Medicine (IOM) Report Relieving Pain in America identifies problems in pain education, but also provides a list of

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recommendations to improve curriculum and education for health care professionals.³²

We conducted a rapid scope of medical and education databases that revealed a large number of published reports of evaluations of pain education using a range of research methodologies. However, we did not find any reviews or syntheses of this research literature. The aim of this review is to scope the nature and synthesise the findings of research that has evaluated pain education for pre-registration/pre-licensure/pre-certification health professionals. A timeline of published reports will be provided, along with a synthesis of results and main findings, and an analysis of concepts that are key to the development and evaluation of pain education.

The findings presented in this article formed part of a larger scoping review that examined both research and policy for pain education. The format of the review was informed by a conceptual framework, which is available in the published protocol.⁷⁰ The methodology to identify reports from medical and education databases, and findings from the review of research are presented in this article. The findings from the review of policy are published elsewhere.⁶⁹

2. Methods

A scoping review methodology was used to determine the breadth and depth of pain education literature that is briefly described in sections 2.1 to 2.5 of this article.⁶

2.1. Stage 1: identifying the research question

One researcher (K.T.) conducted preliminary searches in Medline to pilot the search terms relevant to pain education research. A number of references were retrieved relevant to the examination or evaluation of pain education. These were subsequently discussed among the review team at which point the research question and search strategy were refined. Broad search terms were used to capture a wide variety of records and maintain breadth of coverage. Search terms were narrowed once a sense had been gained of the volume and scope of the literature.

2.2. Stage 2: identifying relevant studies

An iterative approach was taken where the search strategy was revised with increasing familiarity with the literature and feedback from peer review. To locate reports that have examined or evaluated pain education, search terms were combined using Boolean operators, eg, [pain] AND [curriculum OR education] AND [allied health occupations OR medicine OR nursing] in the following medical and education databases: MEDLINE, CINAHL, HMIC, AMED, EBM reviews, and ERIC. Exploded MeSH or thesaurus search terms were used where possible along with keyword searches [pain education] OR [pain curriculum]. Subsequently, reference lists of key papers were hand searched to identify any further relevant papers.

2.3. Stage 3: study selection

The search strategy revealed a large number of citations (>3500) that were independently screened for eligibility by 2 authors (K.T. and J.M.). A third reviewer (M.B.) acted as arbiter where agreement could not be reached. The initial eligibility criteria were purposely broad to determine breadth of coverage. The eligibility criteria were: (1) published in the English language, (2) directly relevant to the pre-registration/pre-licensure/pre-certification pain curriculum (ie, nursing, medicine, and allied health professions), (3) human participants, (4) extractable data, and (5) no date restriction.

Following the iterative nature of the methodology, additional exclusion criteria were added after the first round of screening. Reports were excluded if (1) they were not categorised as research in its broadest sense, eg, editorials/commentaries/opinion papers/letters to editors were excluded, (2) reports focussed on one specific health condition, eg, surgical/cardiac/cancer pain, (3) paediatric pain, and (4) published more than 25 years ago. Reports that focussed on pain located to one area of the body, eg, chronic low back pain were included under the umbrella musculoskeletal pain. These exclusions were applied to maintain a broad approach to pain education that was not focussed to one patient group, and therefore, the results would be applicable across the professions.

The full text of all papers deemed eligible on title and abstract screening was put through to stage 4 of the review.

2.4. Stage 4: charting the data

Author, year of publication, report location, type of report, health profession, purpose, methods of evaluating pain education, and main findings were extracted and charted by one author (K.T.). Any papers where data charting or eligibility was unclear were reviewed by another review team member (J.M.).

2.5. Stage 5: collating, summarising, and reporting the data

Results were collated and analysed in the following way.

1. A descriptive account providing the type, number, year of publication, location, methods of evaluating, and the main purpose of pain education research.
2. A narrative synthesis of key findings by research reports.
3. An analysis of key concepts central to the design and evaluation of pain education.

3. Results

3.1. Outcome of the search and subsequent screening

The number of records identified by the search strategy, subsequent screening, eligibility, and inclusion in the review is demonstrated in **Figure 1**.

3.2. Descriptive account

Fifty-six reports of studies were located across 29 countries ranging from 1992 to 2017, with just over 40% (23/56) located in the United States (**Table 1**).

Participants identified in reports included health students, higher education faculty staff (eg, lecturers, program directors, and board members), and clinical staff (including new graduates). Only 1 out of 56 reports included patients as participants. Sixteen health professions were referred to with the majority of research conducted in medicine, nursing, physiotherapy, and occupational therapy.

The use of a scoping review methodology purposefully allows for a range of literature to be included in the review; therefore, the type of research in the reports identified and methods used to evaluate or examine pain education were varied and in some cases difficult to categorise where mixed methodology had been used.

Survey methodology was the most frequent approach to examine or evaluate pain education followed by observational/cohort studies, experimental designs, course evaluations, qualitative approaches, and document analysis. The main

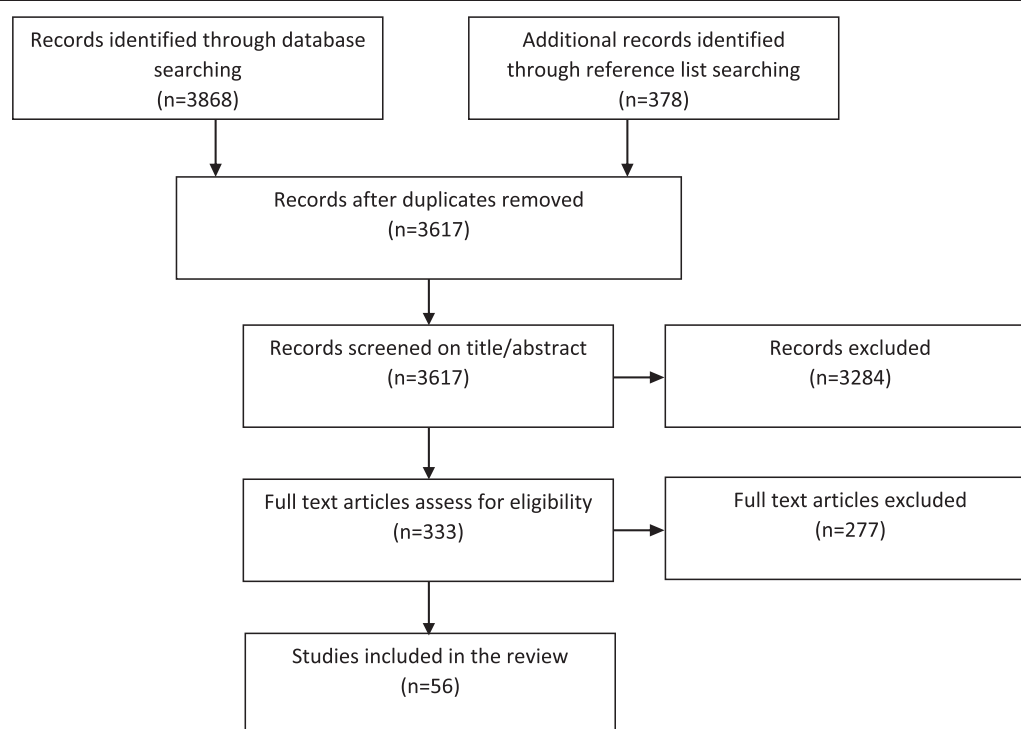


Figure 1. Search strategy.

purpose of each report was documented and coded by one author (K.T.), with 5 major categories emerging:

1. Analysis of student knowledge, skills, attitudes, and beliefs regarding pain;
2. Analysis of course curricula;
3. Development of curricula;
4. Evaluation and perception of education by faculty educators or students; and
5. Other factors reported to be relevant to pain education.

Figure 2 demonstrates the timeline, geography, health profession, and main purpose of reports identified in each of these categories.

3.3. Narrative synthesis

Understanding the results of large bodies of evidence is challenging when research uses a range of methods such as those described in this scoping review. Hence, an approach to narrative synthesis described by the Cochrane Consumers and Communication Review Group was used to make sense of the results that summarise and explain findings primarily on the use of words rather than numerical results.⁶¹

To provide initial structure to the narrative synthesis, the results were analysed in the 5 categories described earlier by way of the main focus/purpose of the report. One author (K.T.) read the results of each study in their respective categories several times to identify key characteristics, similarities, and differences between the results. These were reviewed and discussed until agreement was gained by all team members.

3.3.1. Analysis of student knowledge, skills, attitudes, and beliefs regarding pain

This review found that student knowledge, skills, attitudes, and beliefs regarding pain have been investigated for over 25 years. These studies seem to have been conducted for 1 of 2 reasons:

1. To examine or evaluate student knowledge, skill, attitude, or beliefs regarding pain as a result of normal health curricula. In these reports, students may have experienced pain education as part of their usual health training, but it was not reported as a focus within curricula.
2. To examine or evaluate student knowledge, skill, attitude, or beliefs regarding pain as a result of curricula that overtly incorporates or identifies pain into education. This is often referred to in the literature as dedicated pain education.

Studies that analysed student knowledge, skills, attitudes, or beliefs regarding pain as a result of normal curricula were found across medicine,^{1,4,12,43,47,51} nursing,^{2,3,14,15,17,24,25,52,54,63} physiotherapy,^{1,4,19,60} and occupational therapy.^{58,66} These studies frequently found that students lacked knowledge and skills, and that many had negative attitudes and beliefs regarding pain as a result of normal health curricula. Of those who did demonstrate some improvement throughout the educational process, pain knowledge was still often reported to be suboptimal.

Studies that analysed student knowledge, skills, attitudes, or beliefs regarding pain as a result of curricula that overtly identified or incorporated pain into education were found across medicine,^{5,50,53,64,77,80,81} nursing,^{39,77} physiotherapy,^{41,65,77} dentistry,⁷⁷ occupational therapy,^{57,65,74,77} and pharmacy.⁷⁷ Contrary to the results of the studies that evaluated normal curricula, these reports frequently found that pain knowledge, skill, attitudes, and beliefs regarding pain significantly improved when students were exposed to this type of pain education.

Approaches to dedicated pain education were varied. They included: an elective chronic pain course,⁵ e-learning,^{39,53,80} a 4-day pain course,⁵⁰ brief clinical and pain science seminars,⁸¹ a curriculum based on IASP core curricula outlines,^{65,77} other pain curricula,^{57,64,74} and a teaching module on chronic pain.⁴¹

A large number of studies included the use of tools used to evaluate pain knowledge, skill, attitude, or belief regarding pain, such as the Neurophysiology of Pain Questionnaire,¹ the

Table 1**Table of included reports.**

Adillón C, Lozano È, Salvat I. Comparison of pain neurophysiology knowledge among health sciences students: a cross-sectional study. <i>BMC Res Notes</i> 2015;8:592.
Al Khalailieh M, Al Qadire M. Pain management in Jordan: nursing students' knowledge and attitude. <i>Br J Nurs</i> 2013;22:1234–40.
Ali N, Thomson D. A comparison of the knowledge of chronic pain and its management between final year physiotherapy and medical students. <i>Eur J Pain</i> 2009;13:38–50.
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Argyra E, Siafaka I, Moutzouri A, Papadopoulos V, Rekatsina M, Vadalouca A, Theodoraki K. How does an undergraduate pain course influence future physicians' awareness of chronic pain concepts? A comparative study. <i>Pain Med</i> 2015;16:301–11.
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Chan JCY, Hamamura T. Emotional intelligence, pain knowledge, and attitudes of nursing students in Hong Kong. <i>Pain Manag Nurs</i> 2016;17:159–68.
Chiu LH, Trinca J, Lim LM, Tuazon JA. A study to evaluate the pain knowledge of two sub-populations of final year nursing students: Australia and Philippines. <i>J Adv Nurs</i> 2003;41:99–108.
Doorenbos AZ, Gordon DB, Tauben D, Palisoc J, Drangsholt M, Lindhorst T, Danielson J, Spector J, Ballweg R, Vorvick L, Loeser JD. A blueprint of pain curriculum across prelicensure health sciences programs: one NIH Pain Consortium Center of Excellence in Pain Education (CoEPE) experience. <i>J Pain</i> 2013;14:1533–8.
Duke G, Haas BK, Yarbrough S, Northam S. Pain management knowledge and attitudes of baccalaureate nursing students and faculty. <i>Pain Manag Nurs</i> 2013;14:11–9.
Ferreira PH, Ferreira ML, Latimer J, Maher CG, Refshaug K, Sakamoto A, Garofalo R. Attitudes and beliefs of Brazilian and Australian physiotherapy students towards chronic back pain: a cross-cultural comparison. <i>Physiother Res Int</i> 2004;9:13–23.
Ferrell BR, McGuire DB, Donovan MI. Knowledge and beliefs regarding pain in a sample of nursing faculty. <i>J Prof Nurs</i> 1993;9:79–88.
Fishman SM, Young HM, Lucas Arwood E, Chou R, Herr K, Murinson BB, Watt-Watson J, Carr DB, Gordon DB, Stevens BJ, Bakerjian D, Ballantyne JC, Courtenay M, Djukic M, Koebner IJ, Mongoven JM, Paice JA, Prasad R, Singh N, Sluka KA, St Marie B, Strassels SA. Core competencies for pain management: results of an interprofessional consensus summit. <i>Pain Med</i> 2013;14:971–81.
Goodrich C. Students' and faculty members' knowledge and attitudes regarding pain management: a descriptive survey. <i>The J Nurs Educ</i> 2006;45:140–2.
Greenberger C, Reches H, Riba S. Levels and predictors of knowledge and attitudes regarding pain among Israeli baccalaureate nursing students and nurses pursuing specialty certification. <i>Int J Nurs Educ Scholarsh</i> 2006;3:Article 8.
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Hoeger Bement MK, Sluka KA. The current state of physical therapy pain curricula in the United States: a faculty survey. <i>J Pain</i> 2015;16:144–52.
Hollingshead NA, Matthias MS, Bair MJ, Hirsh AT. Impact of race and sex on pain management by medical trainees: a mixed methods pilot study of decision making and awareness of influence. <i>Pain Med</i> 2015;16:280–90.
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Jones MP. Teaching nursing students about chronic pain: the lived experience perspective of nurse educators. <i>J Nurs Educ Prac</i> 2015;5:19–31.
Keefe G, Wharrad HJ. Using e-learning to enhance nursing students' pain management education. <i>Nurse Educ Today</i> 2012;32:e66–e72.
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Mackintosh-Franklin C. Pain: A content review of undergraduate pre-registration nurse education in the United Kingdom. <i>Nurse Educ Today</i> 2017;48:84–9.
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Table 1 (continued)

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Niemi-Murola L, Nieminen JT, Kalso E, Poyhia R. Medical undergraduate students' beliefs and attitudes toward pain: how do they mature? <i>Eur J Pain</i> 2007;11:700–6.
Plaisance L, Logan C. Nursing students' knowledge and attitudes regarding pain. <i>Pain Manag Nurs</i> 2006;7:167–75.
Puljak L, Sapunar D. Web-based elective courses for medical students: an example in pain. <i>Pain Med</i> 2011;12:854–63.
Rahimi-Madiseh M, Tavakol M, Dennick R. A quantitative study of Iranian nursing students' knowledge and attitudes towards pain: implication for education. <i>Int J Nurs Pract</i> 2010;16:478–83.
Rochman DL. Students' knowledge of pain: a survey of four schools. <i>Occup Ther Int</i> 1998;5:140–54.
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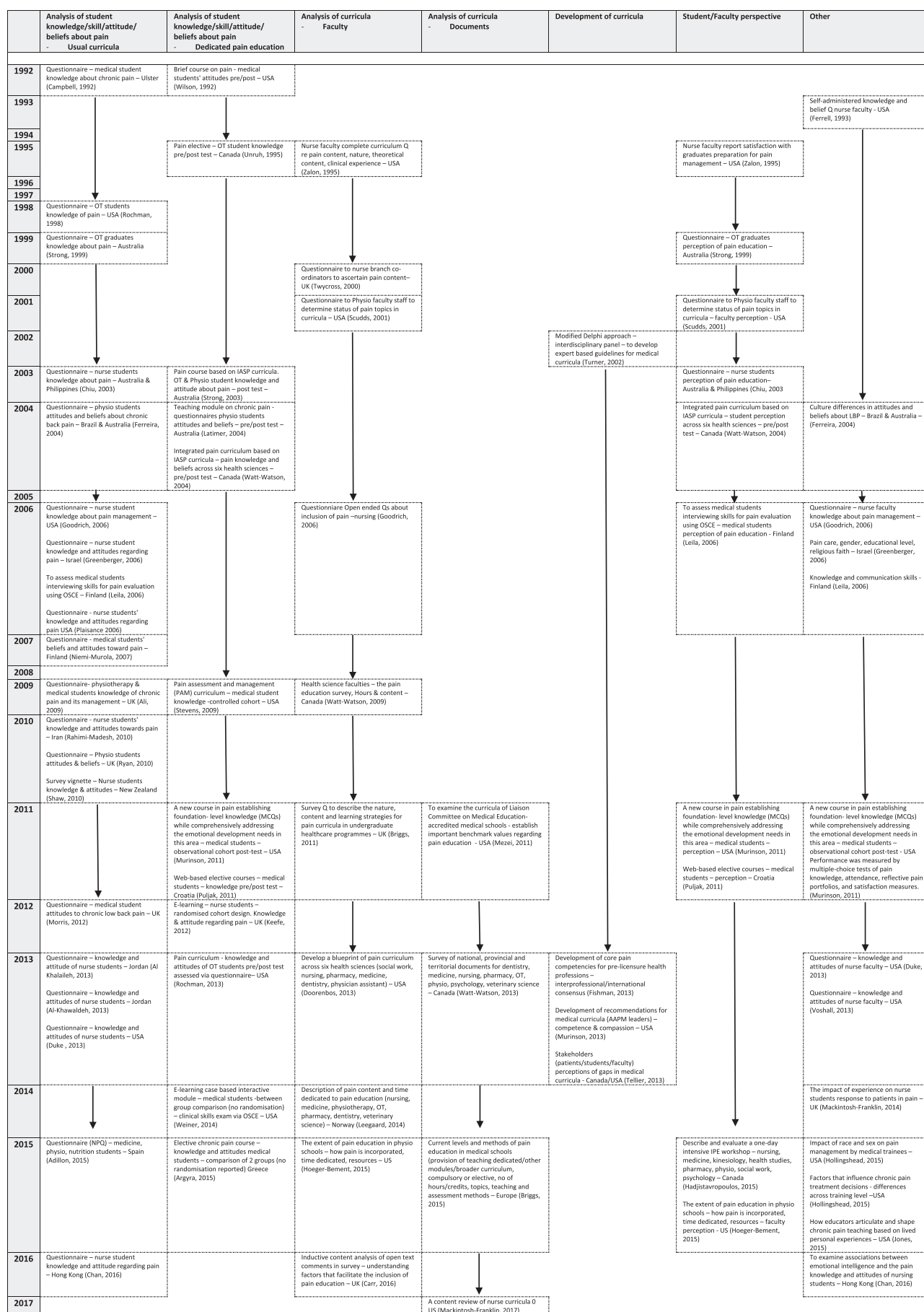


Figure 2. Timeline of reports that have examined or evaluated pain education. LBP, low back pain; MCQ, multiple choice question.

Table 2
Proposed problems and suggested solutions to improve pain education.

	Proposed problems	Suggested solutions
Design	<p>There is a lack of time spent on pain education. It is not always visible in health curricula or explicit where pain is being taught.</p> <p>There is often poor stakeholder engagement in curricula design with a lack of standards from policymakers and health regulators.</p> <p>The psychosocial aspect of the biopsychosocial model is not as well covered as the bio-aspect. Student attitudes and beliefs about pain, and “other” factors such as previous experience with pain are often not considered or incorporated into pain education.</p>	<p>Redesign curricula with increased focus on pain. Make it explicit where pain education features in curricula. Use profession-specific or interprofessional curricula outlines.</p> <p>Where possible include patients, students, and educators in the design of pain education. Ask health regulators to mandate pain education.</p> <p>Challenge student attitudes and beliefs. Consider incorporating education on values, empathy, and ethics. Include education on interpersonal skills such as listening and communication when educating students about pain.</p>
Delivery	<p>Traditional pedagogic approaches such as lectures may not be effective in improving pain knowledge and skills, or influencing attitudes and beliefs about pain.</p> <p>Knowledge, skills, attitudes, and beliefs about pain in faculty educators are not always considered.</p>	<p>Use pedagogic approaches that have demonstrated improved outcomes, eg, interprofessional, e-learning, and short courses. Locate pain education in real clinical practice settings.</p> <p>Challenge attitudes and beliefs. Educate the educators. Identify local pain champions.</p>
Outcome	<p>Translating pain education into pain practice is challenging. Health professionals are not always believed to be competent or confident in pain practice on graduation.</p> <p>There is lack of research that incorporates patients or focusses on patient outcomes.</p>	<p>Increase the uptake of competency-based outcomes and frameworks at both the pre-registration/pre-licensure/pre-certification stage of training, and in continuing professional development.</p> <p>Expand methodologies to advance pain education research. Where possible include patients, students, and educators in the evaluation of pain education.</p>

Knowledge and Attitudes Survey Regarding Pain,^{3,14,24,39,52,54} the Revised Knowledge and Attitudes Survey Regarding Pain,^{2,17} the Schutte Emotional Intelligence Scale,¹⁴ Health Care Providers' Pain and Impairment Relationship Scale,^{19,41,47,58,60} Pain Attitudes and Beliefs Scale for Physiotherapists,⁴ 23-item Pain Knowledge Questionnaire,^{4,15} City of Boston's Rehabilitation Professionals' Knowledge and Attitude Survey Regarding Pain,⁵⁷ Pain Knowledge and Attitude Questionnaire,⁷⁴ Revised Pain Knowledge and Attitude Questionnaire,^{65,66} and the Pain Knowledge and Beliefs Questionnaire.⁷⁷

Other methods of evaluating pain knowledge, skill, attitude, or belief included clinical vignettes,⁶³ interviews,^{47,66} multiple choice questions,⁵³ clinical skills examinations or checklists,^{43,64} computer simulated or virtual patients,^{30,31} and written assessment portfolios or assignments.⁵⁰

3.3.2. Analysis of curricula

This review also located studies that reported an analysis of the pain curricula across health professional courses by 2 distinct methodologies: (1) faculty educators that were questioned about content and approaches, and (2) course curricula documents that had been evaluated (**Table 1**).

Analysis of pain curricula by surveys of faculty educators was found across nursing,^{10,13,16,24,42,73,78,82} dentistry,^{10,13,16,42,78} medicine,^{10,13,16,42} midwifery,^{10,13} occupational therapy,^{10,13,42,78} pharmacy,^{10,13,16,42,78} physiotherapy,^{10,13,28,42,62,78} veterinary science,^{10,78} and social work.¹⁶

Analysis of curricula by evaluation of written course curricula documents was found across medicine,^{9,46,79} dentistry,⁷⁹ nursing,^{45,79} pharmacy,⁷⁹ occupational therapy,⁷⁹ physiotherapy,⁷⁹ psychology,⁷⁹ and veterinary medicine.⁷⁹

Analysis of the pain curricula within and across the health professions indicated that there were only minimal standards relating to pain education from health regulators and quality assurance documents.¹⁰ Traditional teaching methods such as lectures were most frequently used to teach pain,^{10,16} yet pain education was lacking in total number of taught hours and was variable within and across the health professions in the United Kingdom,¹⁰ United States,¹⁶ Canada,^{78,79} and Norway.⁴² IASP curricula were poorly integrated,^{10,16} and there was a lack of entry to practice pain competencies.⁷⁹

Reports that analysed curricula from professions on an individual basis were found across medical curricula in Europe⁹ and the United States,⁴⁶ nurse curricula in the United Kingdom^{44,73} and United States,⁸² and physiotherapy curricula in the United States.^{28,62} Again, substantial variation was found^{9,28,44} often with investigators concluding that there was minimal pain content,^{44,62,73} and IASP core curriculum received little or no coverage.⁴⁶

Qualitative methodology has been used to report the barriers and successes to implementing pain education with 2 major themes of successes and challenges emerging from the data. Successes included expanding pain education with a multidimensional curricula and teaching methods. Challenges include difficulties in identifying pain in the curricula, biomedical vs biopsychosocial definitions of pain, perceived importance, time, resources and staff knowledge, and responsibility for pain education.¹³

3.3.3. Development of curricula

A number of reports were identified by this review that described studies that aimed to advance curricula by developing interdisciplinary outcomes or competencies for pain education.^{22,48,67,72} These reports focussed on how curricula could or should be developed to improve graduates competence to practice pain management on graduation (**Table 1**).

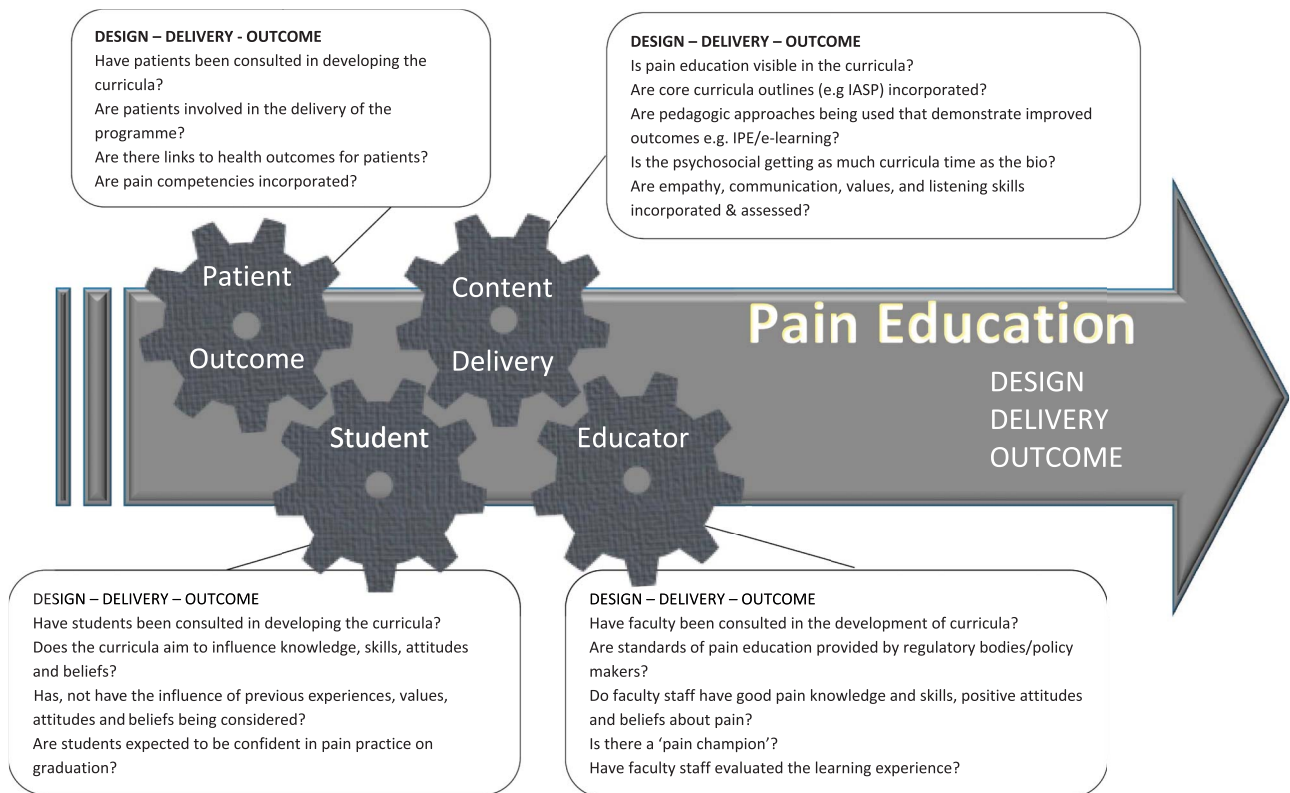


Figure 3. Conceptual model.

Recommendations for medical pain curricula were reported,⁴⁸ along with curriculum content guidelines for educating medical students about the evaluation and management of chronic pain in older adults.⁷² A comprehensive list of outcome-based pain assessment and management competencies determined by interprofessional and international consensus building are available.²²

Only one study identified by this review included patients as participants. This report included an analysis of qualitative data from patients, students, and educators to identify gaps in pain management knowledge with 5 emergent themes confirming recommendations for informing medical curricula.⁶⁷

3.3.4. Faculty staff and student perspective on pain education

Faculty staff were reported to have variable satisfaction in relation to pain management in their courses.^{28,62,82}

Student evaluation of pain education was reported to be varied. Findings included reports of perceived gaps in knowledge and skills regarding pain in normal curriculum designs with some students reporting their pain education to be minimal.¹⁵ Students also advocated the inclusion of additional pain teaching⁶⁶ and rated pain education highly in studies that report curricula with overt pain education.^{26,50,53,77}

An electronic IASP questionnaire was used by medical students to evaluate how the IASP pain curriculum had been covered during their studies.⁴³

3.3.5. Other factors reported to be relevant in pain education

The knowledge and attitudes, and previous experiences of nursing faculty were reported to be relevant and influential in pain

education.^{17,20,24,38,76} Other factors that were reported in the findings of studies that have examined or evaluated pain education include cultural differences in attitudes and beliefs about pain,¹⁹ emotional intelligence,¹⁴ emotional development needs,⁵⁰ communication skills,⁴³ frequency of pain care, sex, and interaction between educational level and religious faith,²⁵ previous experiences and personal factors,³¹ sex and race.³⁰ These studies are heterogeneous in their purpose and findings; therefore, it is not possible to summarise the results. They do however provide concepts to be considered for pain education that are broader than the more frequently reported knowledge, skills, attitudes, and beliefs about pain.

The results of studies included in this review identify many problems with pain education, but also provide models, approaches, and tools for suggested improvements. A summary of the problems and solutions identified is provided in **Table 2**.

3.4. Concept analysis

The results of this scoping review have provided a timeline, geography, inventory of included health professions, and synthesis of key findings in pain education research for pre-registration/pre-licensure/pre-certification health professionals.

Further to this, a conceptual analysis was undertaken to identify and map key concepts relevant to the development or evaluation of pain education. The purpose of this was to develop a model that can be used as a reference tool to evaluate existing pain education or to plan and develop future pain education for health professionals. Concepts, notions, and ideas were identified by reading all reports included in the scoping review several times to make sense of and gain understanding of the full data set. Characteristics relevant to the design and evaluation of pain education along with key stakeholders in pain education were

extracted and coded. Four overall key components of the educational process emerged relevant to the development or evaluation of pain education:

1. Student characteristics: Student knowledge, skill, attitudes, and beliefs were measurable by a range of quantitative and qualitative methodologies. The “success” of pain education was commonly determined by these outcomes. Personal characteristics and previous experiences that students have encountered were also identified, and are possibly relevant in the design and evaluation of pain education. Students have provided useful insight when asked to evaluate their learning experience.
2. Educator characteristics: Knowledge, skill, attitudes, and beliefs of educators and leaders in pain education were reported as part of the educational process. Similar to students, individual characteristics and experiences of educators are possibly relevant and influential in the design and evaluation of pain education. Educators and pain leaders were used as experts regarding the design, content, and delivery of pain education, and provided insight when asked to evaluate education. Educators can take on the role of pain champion in an educational setting.
3. Content and Delivery—when, how, and what to teach about pain: Dedicating increased hours of pain education in curricula structured with core guidelines such as IASP pain curricula were recommended. Increasing the number of taught hours using pedagogic approaches shown to improve pain education was recommended (eg, dedicated pain education such as e-learning modules/interprofessional education). Providing and locating pain education in curricula to facilitate graduates who are confident to practice, and bridging the gap into competent clinical practice is advised.
4. Outcomes: patient and education: The outcome of education (eg, what has been learned) and the effect in clinical practice (eg, patient outcome) was increasingly reported as being critical in pain education. Pain competencies are published and endorsed by IASP. Recipients of health care are key stakeholders who have provided significant contribution when they have been included in research.

A conceptual model has been developed to aid stakeholders in the evaluation or development of pain education and is provided in **Figure 3**.

4. Discussion

This scoping review demonstrates the considerable amount of research that has been conducted to evaluate pain education for health professionals. There has been an increase in the number of published reports over recent years that have not only identified the problems leading to inadequate pain education but have also provided practical solutions.

Unfortunately, in practice, the implementation of these solutions seems to be poor. Explanations for this are discussed in the literature. They include the need for greater implementation of core competencies for pain education and for organisations that accredit/regulate health professions to take more responsibility for mandating and ensuring standards of pain education with health education programmes.²¹ This review supports these findings and furthers the discussion by providing the context of problems and solutions to pain education based on 25 years of research.

This review located a large body of evidence indicating that student knowledge, skill, attitudes, or beliefs about pain are

mostly inadequate across the health professions. The problems with pain education were clearly articulated and consistent that pain often lacks attention in health curricula, and that pedagogic approaches do not necessarily facilitate the knowledge and skills that health professionals require to manage patients in pain. Delivering pain education within a biopsychosocial model was repeatedly reported as a critical approach to the assessment and management of pain; however, education models often focus on educating health professionals in the biology and physiology of pain with the psychosocial aspects of pain gaining less attention. This is inadequate when patients living with chronic pain as a long-term condition report that the psychosocial aspects of pain are what they struggle with the most.⁷¹ The importance of managing the human side of illness and patient care has been reported in the literature for decades, and although this probably does feature in health professionals' education, in many cases it still does not seem to be explicitly part of pain education.¹⁸

There are resources available to improve the design of pain education. The IASP Education Initiatives Working Group developed interprofessional and uniprofessional pain curriculum outlines to be implemented in pre-registration/pre-licensure/pre-certification health courses. The curricula, which were updated in 2017, are based on the 4 components of the IASP Core Curricula: (1) multidimensional nature of pain, (2) pain assessment and measurement, (3) management of pain, and (4) clinical conditions, and are intended to instil the knowledge and skills necessary to advance the science and management of pain.³⁶ The increased uptake of these curricula in health courses is a foundation to building a biopsychosocial approach to pain education that meets the needs of patients living with pain.

Reports identified in this review demonstrated a variety of pedagogic approaches that can be used to improve outcomes for students and are therefore suggested as options for the design of pain education in health professional courses. These include interprofessional workshops, e-learning modules, and short courses on pain that demonstrated improved outcomes for students.^{5,39,41,50,53,57,64,65,74,77,80,81} This is supported by a qualitative analysis of faculty educators' comments regarding pain education where successes were attributed to expansion of pain content in the curricula, explicitly integrating pain into curricula, and diversity of teaching methods where an innovative array of teaching approaches was used, eg, including service users in education, incorporating e-learning, and problem-based learning.¹³ In particular, interprofessional education has been advocated, often featuring as a major recommendation in reports on pain education across the health professions.^{10,55}

Further to this, this review highlighted other factors, (such as cultural beliefs, previous experiences, emotional intelligence, and the impact of sex and race), that may be influential in pain education. Again, some of these factors may feature in health professionals' education, but there is little evidence that they form part of education specifically about pain. These potentially influential factors may be important in the design and development of pain education as part of the concept of patient-centred care.⁴⁰ A blueprint for integrating cognitive and affective dimensions of pain experience into health professionals' education is provided in the literature that incorporates the emotional development of clinical trainees.⁴⁹ A description of the framework is provided, which has been applied to the development and implementation of 2 new courses in pain.

The role of faculty educators in pain education was identified by several reports in this review. In addition to knowledge and skill, the concept of attitudes and beliefs about pain and the influence

this can have on the success and outcome of pain education is discussed. Having a team of people involved in teaching and a local champion, team or network of people influencing curriculum change has been proposed as way of improving successful delivery of pain education for health professionals.¹³

The outcome of pain education has gained more attention in recent literature by the development of pain competencies and outcomes for health care students. In these reports, the focus has shifted from what students have been taught, to what they have learned in order for them to become competent and confident health practitioners in pain practice.^{22,27,29} Following the consensus on the development of core competencies, a group of interprofessional faculty provided a follow-up of how to implement learning tools within teaching and curricula in pre-licensure health care. Suggestions and exemplars in applying core competencies for pain management are provided, which include providing multiple opportunities for learners to overlap concepts for better depth of understanding, and to include learning concepts through visual metacognition where visual concepts create improved mental thinking or “metacognition.”⁷ The focus is to improve the application of knowledge and skills in “practice settings,” ie, real-client situations. Profession-specific recommendations to incorporate, apply, and assess core competencies are provided for nurse²⁷ and physical therapy curricula in the United States.²⁹

In the United Kingdom, the Royal College of Nurses (RCN) and the Physiotherapy Pain Association (PPA) have developed profession-specific pain knowledge and skills frameworks for different staff grades working with people in pain. The RCN pain knowledge and skills framework is designed to guide and support the demonstration of competence by nurses when caring for people with pain.⁵⁹ The content of this document is split to meet the different needs of unregistered and registered nurses; therefore, each group has its framework summary based on Benner’s 1982 novice to expert levels of practice. The PPA framework entry-level graduate to expert physiotherapists describes the values, behaviours, knowledge, and skills of physiotherapists working with people in pain.⁶⁸ This document describes domains at 4 levels on a continuum from graduate entry level (newly qualified physiotherapist) to expert. It is described as a resource that will be used to develop descriptors of competence. The British Pain Society has recently published “A Practical Guide to Incorporating Pain Education into Pre-registration Curricula for Health care Professionals in the UK,”¹¹ which includes a comprehensive section on core curriculum outcomes for pain education.

It is well documented that there is a gap between knowledge and practice in pain.³³ Wider uptake of pain competencies from the pre-registration/pre-licensure/pre-certification stage of training through to registered clinical staff aims to bridge the gap between knowledge and practice with greater focus on producing health care staff who are competent in pain practice. This model of education also facilitates a more natural step into continuing education that graduates have to undertake as part of a clinical career.

This review identified a variety of methodologies used to examine or evaluate pain education. The most significant advancement in research methodologies in pain education research are those that have shifted the focus towards educational outcomes; however, there is still a lack of research that has been conducted to evaluate how effective pain education is in influencing patient outcomes. There is also a significant lack of patient involvement in pain education

research: incorporating patients in the design and evaluation of pain education, and pain education research is necessary to further develop curricula and to advance research methodologies so that meaningful outcomes for patients are evaluated.

To achieve better pain care, a conceptual shift needs to occur where graduates are expected to have excellent pain knowledge and skills that they can communicate with and listen to the needs of patients experiencing pain, and that they are confident in their pain practice.

5. Future recommendations

To develop methodologies in pain education research that map the causal pathways from pain education to patient outcomes.

To incorporate patients in developing the design, delivery, and outcome of pain education curricula and research.

To advance pain education by shifting the delivery from a theory dense to a clinical environment where contextual decision-making in practice is encouraged.

6. Limitations of the review

It is not within the scope of this review to report on the methodological quality of included reports, but rather to provide a timeline, synthesis of, and map concepts within pain education research.

This review identified many reports across the health professions. Others may exist that were not identified by the search strategy used in this review. The health professions identified in the reports are bias to medicine, nursing, and the allied health professions, as these were the professions that formed part of the initial search strategy. Other professions such as veterinary science and dentistry were identified when they featured in larger studies that investigated pain education across the health sciences.

Conflict of interest statement

The authors have no conflict of interest to declare.

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