Q2 Evidence Profile

Recommendation Question 2: Should interactive education on pain assessment, prevention and management for students entering health professions be recommended or not?

Recommendation: The expert panel suggests that academic institutions implement interactive education for all students entering health professions on pain prevention, assessment and management.

Population: Students entering health professions (i.e., pre-registration or pre-licensure)
Intervention: Interactive education on pain assessment, prevention and management (e.g., e-learning/web-based learning, virtual reality, simulation, practical/hands-on learning, case studies, discussion groups)
Comparison: Standard education on pain assessment, prevention and management (e.g., didactic learning)
Outcomes: Student competence (or the knowledge and skills that contribute to those competencies) [critical], Practice behaviour: Pain interventions delivered by students (including documentation of pain interventions delivered) [critical; not measured], Practice behaviour: Student completion of pain assessment (including documentation of pain assessment) [critical; not measured], Student confidence or attitude [important]

Setting: All practice settings where students entering health professions assess, prevent and manage pain

	Quality assessment						No. of participants		Effect	Certainty	Reference
Nº of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control			
Student competence (knowledge and skills that contribute to those competencies) *(measured at baseline and following the completion of the intervention delivery)*											
6[a]	RCTs	Serious [b]	Not serious [c]	Not serious	Serious [d]	Undetected	Interactive education (pain e-learning modules; online case studies & virtual patients; web-based shared decision-making training) N=134 Interactive education (e-learning & experiential learning; didactic with case studies and discussion; case-based e-learning program	Traditional education, no education, or attentional control N=269 Attentional control; red flags control group; no intervention N=154	In all 3 studies in the systematic review (1), knowledge scores improved. Meta-analysis showed a large effect size in favour of interactive education over standard education. SMD (95% CI): 1.28 (0.31 to 2.24) The additional 3 recently published RCT studies (2–4) found higher knowledge scores for participants that received interactive education compared to those who received standard education.	⊕⊕○○ Low	(1–4)

№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control	Effect	Certainty	Reference
	Quality assessment						**No. of participants**		**Effect**	**Certainty**	**Reference**
							with or without simulation) N=208				

Student confidence or attitude[e] *(measured at baseline and following the completion of the intervention delivery)*											
3	RCTs	Serious [f]	Not serious	Not serious	Serious [g]	Undetected	Interactive education (e-learning & experiential learning; didactic with case studies and discussion; case-based e-learning program with or without simulation) N=208	Attentional control; red flags control group; no intervention N=154	All three studies showed greater student confidence and/or attitude scores after the education intervention. Two out of three studies (2,3) reported an improvement in attitudes towards pain management following the pain education intervention, compared to traditional education or no education. Two out of the three studies (2,4) reported an improvement in confidence towards pain management following the pain education intervention, compared to traditional education or no education	⊕⊕○○ Low	(2–4)

Student completion of pain assessment (including documentation of pain assessment)
Not measured

Pain interventions delivered by students (including documentation of pain interventions delivered)
Not measured

Acronyms
C = Control
CI = confidence interval
CM = Control Module
DM = Dementia Module
HC-PAIRS = Health Care Providers' Pain and Impairment Relationship Scale
IQR = interquartile range
MCQ = median multiple-choice questionnaire
NKASRP= Nurses' Knowledge and Attitude Survey Regarding Pain
PNE = Pain Neurophysiology Education
RCT= randomized controlled trial
SD = standard deviation
SMD = standardized mean difference

Tools used to measure outcomes:
- Nurses' Knowledge and Attitude Survey Regarding Pain (NKASRP); Multiple Choice Questionnaire, Mapped Examination Questions (1)
- 10-item knowledge assessment on pain and dementia, 3-iteam confidence assessment (2)
- The Pain Neurophysiology Quiz, HC-PAIRS (3)
- Multiple Choice Questionnaire (4)

Explanations:

[a] Three RCT studies were included from a systematic review and meta-analysis (1)

[b] The review was assessed using the ROBIS tool for systematic reviews and had a low risk of bias. Studies included in the review were assessed by the authors using the Cochrane ROB 2.0 tool for RCTs. Three primary studies had some concerns for risk of bias. We downgraded by 1.

[c] Three RCTs demonstrated a positive direction and greater than moderate effect.

[d] The total number of participants was below the optimal 800 participants (N=403). We downgraded by 1.

[e] For health provider confidence and provider attitude, Moehl et al. (2020) reported on both of the outcomes separately, whereas. Colleary et al. (3) only reported attitude and Poulsen et al. (4) only reported confidence. Due to this, the confidence and attitude outcomes have been combined for this recommendation question.

[f] Three studies were assessed using the Cochrane ROB 2.0 tool for RCTs. There were some concerns regarding risk of bias in all three studies. We downgraded by 1.

[g] The total number of participants was below the optimal 800 participants (N= 320). We downgraded by 1.

References:

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2. Moehl K, Wright RM, Shega J, Malec M, Kelley Fitzgerald G, Robbins-Welty G, et al. How to Teach Medical Students About Pain and Dementia: E-Learning, Experiential Learning, or Both?. Pain Med Malden Mass. 2020 Oct;21((Moehl) University of Pittsburgh School of Medicine, Pittsburgh, PA, United States):2117–22.

3. Colleary G, O'Sullivan K, Griffin D, Ryan CG, Martin DJ. Effect of pain neurophysiology education on physiotherapy students' understanding of chronic pain, clinical recommendations and attitudes towards people with chronic pain: a randomised controlled trial. Physiother U K. 2017 Dec;103(4):423–9.

4. Poulsen[a] M, Friesgaard KD, Seidenfaden S, Paltved C, Nikolajsen L. Educational interventions to improve medical students' knowledge of acute pain management: a randomized study. Scand J Pain. 2019;19(3):619–22.

5. Keefe G, Wharrad HJ. Using e-learning to enhance nursing students' pain management education. Nurse Educ Today. 2012 Nov;32(8):e66–72.

6. Leung JYC, Critchley LAH, Yung ALK, Kumta SM. Evidence of virtual patients as a facilitative learning tool on an anesthesia course. Adv Health Sci Educ. 2015 Oct;20(4):885–901.

7. Sullivan MD, Gaster B, Russo J, Bowlby L, Rocco N, Sinex N, et al. Randomized Trial of Web-based Training About Opioid Therapy for Chronic Pain. Clin J Pain. 2010 Jul;26(6):512–7.

Additional study details:

Reference	Study Design	Country	Intervention Group Details	Control Group Details	Reported Effects/Outcomes	Risk of bias
Student competence (knowledge and skills that contribute to those competencies)						
(1) *3 studies included (5–7)	Systematic review and meta-analysis of RCT & non-RCT	International: UK, Hong Kong, United States	Online e-learning: Online video vignettes of physician-patient interactions, teaches shared decision-making communication skills, and shows how to negotiate treatment goals and decisions with patients both at low-risk and high-risk for opioid therapy.	Traditional learning materials or no training	In all 3 studies, knowledge scores improved. Meta-analysis showed a large effect size: 3 Studies: 46, 51, 87 SMD (95% CI): 1.28 (0.31 to 2.24)	Systematic review: LOW Individual studies: Serious
(2)	RCT	USA	C+DM (N=65) 5-day geriatrics course + chronic knee pain in older adult with dementia C+CM (N=39) 5-day geriatrics course + chronic low back pain in cognitively intact older adult	DM (N=29) Dementia module only CM (N=29) 1hr pain management module	Knowledge scores improved in all 4 groups after receiving the assigned intervention; however the greatest increase was in the C+DM block who received education on evaluating and managing chronic knee pain in an older adult with mild to moderate dementia. Knowledge scores were measured on a 10-point scale. Block DM: Pre-intervention: 4.07 +/- 1.10 Post-intervention: 5.03 +/- 1.88 Block CM: Pre-intervention: 4.21 +/- 1.64 Post-intervention: 4.61 +/- 1.40	Some concerns
(3)	RCT	UK/Ireland	(N=36) Pain neurophysiology education (i.e., 70 mins didactic group-lecture style + case study). Material was based on the first four chapters of the Explain Pain manual. Activities included free-hand drawings, stories and metaphors were used to convey messages about pain physiology and theory. The session explained that the nervous system can become overprotective, and that nociceptive transmission can be influenced by the sensitivity of the central nervous system as well as an individual's thoughts, beliefs and contextual environment	(N=36) Education session on red flags. (i.e., 70 mins didactic). They did not discuss pain neurophysiology; instead, it dealt exclusively with tissue pathology and the detection of this pathology	Positive effect as knowledge scores increased after the intervention. Revised Pain Neurophysiology Quiz; Mean (SD): PNE: 4.4 (2.1) Control: 0.1 (1.9) Mean difference (95% CI): 4.0 (3.2 to 4.7)	Some concerns
(4)	RCT	Denmark	e-learning (N=64) The e-learning program used an interactive case-based format and took approximately	No intervention (N=60)	Positive effect as knowledge scores increased post intervention	Some concerns

			45 min to complete. It contained an introduction covering important aspects of pain and the e-learning program used an interactive case-based format and took approximately 45 min to complete. It contained an introduction covering important aspects of pain and in-depth answers. e-learning + simulation (N=69) The simulation scenario included a patient with severe acute pain caused by an open tibial fracture. The first part focused on treatment of the patient's pain; the second part focused on treatment of morphine-induced respiratory depression with antidote administration.		The median multiple-choice questionnaire (MCQ) test score; interquartile range (IQR) Intervention 1 (e-learning): Pre: 50 (40–55) Post: 75 (62.5–80) Intervention 2 (e-learning + sim): Pre 50 (40–60) Post: 80 (75–85) Control group; Pre:45 (40–60) Post: 50 (45–55)	
Student confidence or attitude						
(2)	RCT	USA	C+DM (N=65) 5-day geriatrics course + chronic knee pain in older adult with dementia C+CM (N=39) 5-day geriatrics course + chronic low back pain in cognitively intact older adult	DM (N=29) Dementia module only CM (N=29) 1hr pain management module	Pre-test scores did not differ across groups (F [3,157] = 0.68). Post-test confidence scores differed among the groups (F [3,156] = 8.45) and revealed a significant module course interaction (t [156] = 2.32), with CM students having lower post-test scores than the DM students by 2.22 points.	Serious
(3)	RCT	UK/Ireland	(N=36) Pain neurophysiology education (i.e., 70 mins didactic group-lecture style + case study). Material was based on the first four chapters of the Explain Pain manual. Activities included free-hand drawings, stories and metaphors were used to convey messages about pain physiology and theory. The session explained that the nervous system can become overprotective, and that nociceptive transmission can be influenced by the sensitivity of the central nervous system as well as an individual's thoughts, beliefs and contextual environment	(N=36) Education session on red flags. (i.e., 70 mins didactic). They did not discuss pain neurophysiology; instead, it dealt exclusively with tissue pathology and the detection of this pathology	HC-PAIRS (13 to 91; lower scores indicate more positive attitudes) scores: PNE, mean (SD) −18.6 (11.9) Control, Mean (SD) 0.3 (8.4) Mean difference −17.5 (−22.1 to −12.9), *p* <0.01	Critical
(4)	RCT	Denmark	e-learning (N=64) The e-learning program used an interactive case-based format and took approximately 45 min to complete. It contained an introduction covering important aspects of pain and the e-learning program used an interactive case-based format and took approximately 45 min to complete. It contained an introduction covering important aspects of pain and in-depth answers.	No intervention (N=60)	Question 1: To assess their confidence in the handling of acute pain (three questions on a 5-level Likert scale) Before the educational intervention there was no significant difference in the answers to each question between the groups. After completed intervention there was an overall significant difference between the groups. By pairwise comparison, the number of "strongly agree" and	Serious

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<td>e-learning + simulation (n=69)
The simulation scenario included a patient with severe acute pain caused by an open tibial fracture. The first part focused on treatment of the patient's pain; the second part focused on treatment of morphine-induced respiratory depression with antidote administration.</td>
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<td>"agree" answers were higher in the combined group than in the e-learning group.

Q1   Control   e-learning   e-learning+sim
Pre   5/66   7/74   5/70
Post   10/60   40/63   57/69

Q2
Pre   8/66   9/74   5/70
Post   9/60   46/64   57/69

Q3
Pre   8/66   11/74   7/70
Post   23/60   34/64   59/69</td>
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