

Q3 Evidence Profile

Recommendation Question 3: Should interactive education on pain assessment, prevention and management for health providers be recommended or not?

Recommendation: The expert panel suggests that health service organizations implement opportunities for interactive education for all health providers on pain prevention, assessment and management.

Population: Interprofessional health providers

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 or usual resources available)

Outcomes: Health provider competence (or the knowledge and skills that contribute to those competencies) [critical], Practice behaviour: Pain interventions delivered by health providers (including documentation of pain interventions delivered) [critical], Practice behaviour: Health provider completion of pain assessment (including documentation of pain assessment) [critical], Health provider confidence or attitude [critical], Health provider satisfaction [important]

Setting: All practice settings where health providers 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			
Health provider competence (knowledge) (measured at baseline and following the completion of the intervention delivery)											
6 ^a	RCTs	Serious ^b	Serious ^c	Not serious	Serious ^d	Undetected	Online education on pain assessment and/or management (N=220 participants)	Education/training on assessment and management of pain as usual/alternative training (N=344 participants)	After meta-analysis, the pooled effect size demonstrated a large improvement in provider knowledge of pain in favor of online pain education interventions compared to usual education (didactic) or alternative education. ^e SMD: 0.80 (95% CI 0.12 to 1.49)	⊕⊕○○ Low	(1)
Health provider confidence											
2 ^f	RCTs	Serious ^g	Serious ^h	Not serious	Very serious ⁱ	Undetected	Online education on pain assessment and/or management (N=103 participants)	Education/training on assessment and management of pain as usual/alternative training (N=101 participants)	After meta-analysis, the pooled effect size demonstrated a small improvement in provider confidence in favor of online pain education interventions compared to usual education (didactic) or alternative education. ^j SMD: 0.02 (95% CI: -0.79 to 0.84)	⊕○○○ Very low	(1)

Quality assessment							No. of participants		Effect	Certainty	Reference
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control			
Health provider attitude											
2 ^k	RCTs	Very serious ^l	Not serious	Not serious	Very serious ^m	Undetected	Online pain education interventions including pain assessment and/or management N=67	Education/training on assessment and management of pain as usual/alternative training N=58	After meta-analysis, the pooled effect size demonstrated little to no improvement in provider attitude following online pain education interventions compared to usual education (didactic or alternative education.). SMD: 0.16 (95% CI: -0.48 to 0.79)	⊕○○○ Very low	(1)
Health provider completion of pain assessment and documentation of the assessment (after receiving interactive pain assessment and/or management education)											
2	Non-RCTs	Very serious ⁿ	Not serious	Not serious	Not serious	Undetected	Online and interactive pain education interventions including pain assessment and/or management 345 events (N=1374 participants)	NA	After receiving the interactive education on pain assessment and management, the number of completed pain assessments conducted by health providers increased. The frequency of documentation of the completed pain assessments by health providers also increased in both studies ^o . Whether this is an important change is unclear.	⊕○○○ Very low	(2,3)
Health provider pain interventions delivered after receiving interactive pain management education intervention (measured immediately after and one study measured multiple time points after intervention delivery)											

Quality assessment							No. of participants		Effect	Certainty	Reference
No of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Publication bias	Intervention	Control			
4	Non-RCTs	Very serious ^p	Not serious	Not serious	Serious ^q	Undetected	Online and interactive pain education interventions including pain assessment and/or management N=348	One study used a comparator group of primary care physicians not selected to participate in the intervention group. Pre-intervention and post intervention evaluations were completed by these providers who did not receive the interactive pain education intervention. There was no control group in the other three studies. N=11	All studies demonstrated that after receiving the interactive education on pain assessment and management, the delivery of pharmacologic [opioid and non-opioid adjuvants] and non-pharmacologic pain interventions by health providers increased. One study intervention (4) to reduce opioid prescribing, reported a decrease in opioid prescribing for post-operative surgical pain in some types of surgery and an increase in prescribing in others (colorectal surgery) ^r .	⊕○○○ Very low	(3–6)
Health provider satisfaction with interactive education (measured after receiving the interactive pain education intervention)											
3	Non-RCTs	Serious ^s	Not serious	Not serious	Serious ^t	Not detected	Online and interactive pain education interventions including pain assessment and/or management N=403	One non-RCT study had a comparator group that received classroom-based pain management education and a case study activity. N=98	After receiving online/interactive pain assessment and/or management education, health providers reported high rates of satisfaction with the interactive pain education intervention ^u .	⊕○○○ Very low	(7–9)

Acronyms

CI = confidence interval
LMS = least mean squares
NA = not applicable
RCT= randomized controlled trial
SD = standard deviation
SMD = standardized mean difference

Tools used to measure outcomes:

Health provider competence (knowledge):

- A variety of tools were used in the six studies reporting this outcome (1).
- 40-item (20 knowledge points and 20 skill points) test used (10).
- The KnowPain-12 survey used. KnowPain-12 is a 12-item questionnaire that uses a six category Likert-type scale. Responses to the statements range from 'strongly agree' to 'strongly disagree' (11).
- The Watt-Watson and Donovan questionnaire (1992) was used and modified for the Korean context. This is a 65-item questionnaire with six sub-domains to measure general knowledge of pain. Each item was either a yes/no or multiple-choice question and a correct item was worth 1 point (12).
- A 10-question survey was used to assess provider knowledge, based on questions contained in the education intervention tool (13).
- Knowledge and Attitudes Survey Regarding Pain (KASRP) tool used. This tool consists of 39 questions; 22 true/false, 15 multiple choice questions, and two scenarios (14).
- Pain Management Principles Assessment Tool (PMPAT) used. 31 multiple choice questions. The right answer gains 1 and the wrong answer or unanswered question gain 0 (15).

Health provider confidence:

- A variety of tools were used reporting this outcome (1).
- Questionnaire used from author's (2015) prior study. Six items in this questions that were presented with answer choices on a 5-point scale (12).
- Nurses' Attitude Survey (NAS) questionnaire used. NAS has 25 questions and was in the form of a 4-point Likert scale. Scoring range was 25–100 (15).

Health provider attitude:

- A variety of tools were used in the two studies reporting this outcome (1).

Health provider completion of pain assessment and documentation of the assessment

- This outcome is dichotomously reported; the number of completed pain assessments and the frequency of those assessments were measured (2).
- This outcome is dichotomously reported; the number of completed pain assessments and the frequency of those assessments were measured (3).

Health provider pain interventions delivered after receiving interactive pain management education intervention

- Provider practice behaviors measured dichotomously; retrospective chart review of provider documentation of pain interventions delivered (pharmacologic and non-pharmacologic) (3).
- Provider practice behavior reported continuously; measured via retrospective review of charts and calculation of the Morphine equivalent daily dosing (MEDD) delivered (4).
- Provider practice behavior reported dichotomously; measured via documentation identified through a retrospective chart review (5).
- Provider practice behavior measured via a retrospective electronic record review (6).

Health provider satisfaction with interactive education

- Nurse satisfaction survey consisted of a 27-item questionnaire, using a 5-point Likert-type scale (7).
- New Nurse Pain Care Satisfaction Questionnaire. This tool included 7 items concerning participants' self-assessed satisfaction that were scored using a 5-point Likert scale (8).
- Learning Satisfaction Scale. This is a 34-item questionnaire with four dimensions and responses are rated on a 5-point Likert scale (9).

Explanations:

^a Six RCTs 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 tool for RCTs. There was a low risk of bias (2 studies), some concerns for risk of bias (2 studies) and high risk of bias (2 studies). There were concerns noted around the lack of description and detail regarding the randomization process used, and allocation concealment. We downgraded by 1.

^c Five of the six studies demonstrated a positive direction of effect, however, there was high heterogeneity across the six studies ($I^2 = 91\%$). We downgraded by 0.5.

^d The total number of participants was below the optimal 800 participants (N=564). We downgraded by 1.

^e Six additional RCTs were reviewed (10–15). Five of the six studies reported an improvement in health provider knowledge after receiving interactive education on pain assessment and/or management. A further analysis of the data in 3 studies revealed a large magnitude of effect on health provider competence (Hedges g [95% CI]): 1.28 [.76-1.76] (15); .94 [.31-1.56] (12) and a medium effect size (Hedges g): .57 [.17-.98] (14).

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^f Two RCTs were included from a systematic review and meta-analysis (1)

^g 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 tool for RCTs. There were some concerns for risk of bias in the included studies. We downgraded by 1

^h Two studies demonstrated a positive direction of effect, however, there was high heterogeneity in the two studies ($I^2 = 78\%$). We downgraded by 1.

ⁱ The total number of participants was well below the optimal 800 participants (N=203). We downgraded by 2.

^j Two additional RCTs found that after receiving online/interactive education on pain assessment and/or management, health providers showed improvement in provider confidence over time (Farshbaf-Khalili et al, 2021; Yoo et al., 2019).

^k Two RCTs were included from a systematic review and meta-analysis (1).

^l 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 tool for RCTs. There was high risk of bias in the included studies. We downgraded by 2.

^m The total number of participants was well below the optimal 800 participants (N=125). We downgraded by 2.

ⁿ Two studies were assessed using the ROBINS-I tool for non-RCT studies, and there was critical risk of bias related to confounding variables and measurement of outcomes. We downgraded by 2.

^o Given the heterogeneity in reporting of the dichotomous outcome, an appropriate statistical analysis of the results was not possible.

^p Four studies were assessed using the ROBINS-I tool for non-RCT studies, and there was serious risk of bias related to confounding variables and measurement of outcomes. We downgraded by 2

^q The total number of participants was well below the optimal 800 participants (N=359). We downgraded by 1.

^r Given the heterogeneity of the how the outcome was measured and the outcome measurement tools used, a pooled statistical analysis of the results was not possible.

^s Three studies were assessed using the ROBINS-I tool for non-RCT studies, and there was serious risk of bias in two studies and moderate risk of bias in the remaining study. We downgraded by 1.

^t The total number of participants was below the optimal 800 participants (N=501). We downgraded by 1.

^u Given the heterogeneity of the outcome measurement tools, a pooled statistical analysis of the results was not possible.

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Additional study details:

Reference	Study Design	Country	Intervention Group Details	Control Group Details	Reported Effects/Outcomes	Risk of bias
Provider competence (knowledge of pain assessment and/or management)						
(1) *6 studies included (16–21)	Systematic review and meta-analysis of RCTs	International US; UK; and Hong Kong	Online education/training on assessment and management of pain N=220	Education/training on assessment and management of pain as usual/alternative training N=344	Six studies in the sub meta-analysis demonstrated a large effect in favour of online pain education over other learning strategies or usual education 6 studies : SMD: 0.80 (95% CI 0.12 to 1.49)	Systematic review: Low Individual studies: High
Provider competence (knowledge of pain assessment and/or management)						
(10)	Non-blinded RCT	Japan	Online <u>e-learning on pain assessment and pain assessment tools for certified NICU nurses</u> : The program consists of four modules [presented online in PowerPoint slide presentations and video demonstrations]: (1) What is pain? (2) Pain measurement and assessment; (3) Face Scale for Pain Assessment of Preterm Infants; and (4) the Japanese version of the Premature Infant Pain Profile (PIPP). Each module takes approximately 15 min to complete. Post intervention knowledge was measured immediately after receiving the intervention. N=21 Knowledge score change (LMS, 95% CI): 5.38 (4.46, 6.30)	No comparator intervention was delivered to the control group. N=22 Knowledge score change (LMS, 95% CI): 0.72 (-0.18, 1.62)	There was improvement in the NICU nurses' knowledge scores in the intervention group compared to the control group. Intervention group: knowledge scores (LMS, 95% CI) increased by 4.66 (3.37, 5.95) compared to the control group	Some concerns
(11)	Cluster RCT	US	For 12-week study period, primary care providers (PCPs) attached to a regional network of primary care clinics participated in TelePain (videoconference technology); a <u>chronic pain education intervention</u> that included weekly 90-minute TelePain sessions to the PCPs in the intervention group. The first 30 min of each session consisted of a didactic presentation followed by one-hour tele-mentoring sessions for the review of specific patient cases by a panel of pain specialists from the disciplines of pain medicine, internal medicine, anesthesiology, rehabilitation medicine, psychiatry, addiction medicine, nursing and complementary and integrative pain management. Post intervention	PCPs in the control group were asked to refrain from attending TelePain sessions during the study period. N=18	There was no improvement in the median primary care provider knowledge scores in the intervention group compared to the control group. Wilcoxon Rank Sum: Knowledge and Attitudes Survey Regarding Pain median score: difference in change z= -0.34 KnowPain-12 median score: difference in change z= 0.49	Some concerns

			knowledge was measured immediately after receiving the intervention. N=23			
(12)	RCT	South Korea	The pain education intervention is a web-based acute pain management education program for nurses. The program consisted of a total duration of 400 min with eight modules and 29 topics in pain management. N=23	The compactor group did not receive any intervention N=23	There was improvement in the nurses' knowledge scores in the intervention group compared to the control group. Total knowledge score (mean ± SD) Intervention group Baseline: 50.91 ± 5.14 Post intervention: 56.04 ± 6.47 Control group: Baseline: 49.57 ± 5.29 Post intervention: 50.87 ± 4.99	Some concerns
(13)	RCT	US	Pediatric Opioid Analgesia Self-Instruction System (PedOASIS): an interactive, case-based education intervention tool designed for independent learning. The goal of this study was to evaluate its efficacy in increasing pediatric, hematology and oncology (PHO) physician fellows' knowledge with using opioids to manage pain. Those in the intervention group received access to the web-based education tool and were asked to complete the cases in the tool and then complete an immediate post intervention assessment. Six months after study initiation (Timepoint 3), all participants were asked to complete a follow-up survey. N=32	Participants randomized to the control group received an email thanking them for their participation and asking them to complete the same evaluation assessments. The intervention was available to any control group participants at the end of the intervention study N=32	There was improvement in the pediatric, hematology, oncology physician fellows' knowledge scores in the intervention group compared to the control group. Objective knowledge was measured based on a test score out of 10. Total knowledge score (mean ± SD) Intervention group Baseline: 5 +/- 2 Post intervention: 9 +/- 1 6 months post intervention: 7 +/- 2 Control group Baseline: 6 +/- 2 Post intervention: 5 +/- 1 6-months post intervention: 5 +/- 2	Some concerns
(14)	RCT (4 group Solomon)	UAE	The 4-hour pain management program (PMP) education for nurses included: (1) introduction to pain management, which covered pain definitions, pathophysiology, and current trends in pain management; (2) pain assessment; and (3) pharmacological and nonpharmacological pain interventions. The PMP included group discussion, and individual instruction. Several interactive educational activities were employed such as practicing pain assessment and management as role play and working through case-based scenarios.	Participants in control group C did not receive any formal pain management intervention N=50	There was improvement in the nurses' knowledge scores in intervention group A after receiving the interactive education on pain assessment and management in comparison to the control group. These results were sustained across multiple time points. Experimental Group A (N = 50) Pre-test 56.98 ± 8.88 Post-test 71.69 ± 7.5 1 Month 72.57 ± 12.79 2 Month 70.30 ± 7.30 3 Month 71.12 ± 7.40 Control Group C (N=50)	High

			Post intervention knowledge was measured immediately following the intervention and then one month, two months and 3 months after receiving the intervention N=50		Pre-test 59.36 ± 15.21 Post-test 58.81 ± 15.29 1 Month 60.21 ± 11.30 2 Month 60.16 ± 11.17 3 Month 59.87 ± 10.76	
(15)	RCT	Iran	<p><u>E-learning group</u>: teaching tools: The educational materials were taught to the <u>nurses</u> by educational software and consisted of separate pages with <u>video, audio and animation</u>. It provided, based on authoritative sources, guidelines, and articles. Duration of training: The software was given to the nurses of this group for 4 weeks. The nurses were asked to read the content of training package in an onsite computer room and in case of any question they were allowed to ask. The facilities of computer room only allowed the presence of at most 6 participants in a single time and then nurses were instructed to study the educational CD at home in this group for 4 weeks. They received weekly phone call to remind reading educational CD by researcher. The questionnaires and checklist were collected and analyzed at baseline and 4 weeks after training.</p> <p>Post intervention knowledge was measured 4 weeks after the intervention was delivered</p> <p>Knowledge scores in intervention (e-learning group): Baseline score [mean ± SD]: 35.4 ± 9 4 weeks after receiving the e-learning intervention score: 49 ± 8.8 N=39</p>	<p><u>Lecture group</u>: teaching tools: The educational materials were taught to the nurses by the researcher using an educational booklet based on authoritative sources, guidelines, and articles by using power point slides and whiteboard. Duration of training: Four 1-hour sessions. The questionnaires and checklist were collected and analyzed at baseline and 4 weeks after training.</p> <p>Knowledge scores in lecture (control) group: Baseline score [mean ± SD]: 36.6 ± 12.5 4 weeks after receiving the lecture group (control) score: 44.6 ± 3.9 N=39</p>	The nurses' mean knowledge scores 4 weeks following the e-learning intervention improved in both the intervention and comparator groups; however, this increase in knowledge was greater in e-learning group compared to the lecture group.	Some concerns
Provider confidence/competence						
(1) *2 studies included (17,21)	Systematic review and meta-analyses of RCTs	England & US	Online education/training on assessment and management of pain N=103	Education/training on assessment and management of pain as usual/alternative training N=101	Both RCTs reported a very small improvement in confidence scores post online pain assessment and/or management education intervention. Heterogeneity was 78%. SMD: 0.02 (95% CI: -0.79 to 0.84)	Systematic review: Low Individual studies: Unclear
Provider attitude/beliefs						

<p>(1) *2 studies included (22,23)</p>	<p>Systematic review and meta-analyses</p>	<p>Canada (B.C.) & Finland</p>	<p>Chan: Public health nurses (PHNs) at intervention sites received a multifaceted knowledge translation intervention (including in-person and online support) about new pain management guidelines incorporated in the British Columbia Immunization Program N = 27</p> <p>Hinkka: Online interactive education/raining for physicians on treating terminally ill cancer patients N = 40</p> <p>Total N = 67 (for both studies)</p>	<p>Education/training on assessment and management of pain as usual/alternative training</p> <p>Chan: N = 16</p> <p>Hinka N = 42</p> <p>Total N = 58 (for both studies)</p>	<p>Both studies reported a positive direction of effect. Heterogeneity across the 2 studies was $I^2 = 64\%$ SMD: 0.16 (95% CI: -0.48 to 0.79)</p>	<p>Systematic review: Low</p> <p>Individual studies: High</p>
<p>(12)</p>	<p>RCT</p>	<p>South Korea</p>	<p>The pain education intervention is a web-based acute pain management education program for nurses. The program consisted of a total duration of 400 min with eight modules and 29 topics in pain management.</p> <p>N=23</p>	<p>The comparator group did not receive any intervention.</p> <p>N=23</p>	<p>There was no significant difference in provider attitude scores between the two groups pre- and post-intervention.</p> <p>Experimental group Pre-test: 5.17 +/- 1.53 Post-test: 5.22 +/- 1.2</p> <p>Control group Pre-test: 4.48 +/- 1.41 Post-test: 5.04 +/- 1.22</p>	<p>Some concerns</p>
<p>(15)</p>	<p>RCT</p>	<p>Iran</p>	<p>E-learning group: teaching tools: The educational materials were taught to the nurses by educational software and consisted of separate pages with video, audio and animation. It provided, based on authoritative sources, guidelines, and articles. Duration of training: The software was given to the nurses of this group for 4 weeks. The nurses were asked to read the content of training package in an onsite computer room and in case of any question they were allowed to ask. The facilities of computer room only allowed the presence of at most 6 participants in a single time and then nurses were instructed to study the educational CD at home in this group for 4 weeks. They received weekly phone call to remind reading educational CD by researcher. The questionnaires and checklist were collected and analyzed at baseline and 4 weeks after training.</p> <p>N=39</p>	<p>Lecture group: teaching tools: The educational materials were taught to the nurses by the researcher using an educational booklet based on authoritative sources, guidelines, and articles by using power point slides and whiteboard. Duration of training: Four 1-hour sessions. The questionnaires and checklist were collected and analyzed at baseline and 4 weeks after training</p> <p>N=39</p>	<p>There were significant improvements in provider attitude scores post-intervention in both the experimental and control groups. There were no significant differences between the groups.</p> <p>Experimental Group (received e-learning intervention) Pre-intervention: 64.28 +/- 4.8 Post-intervention: 76.89 +/-4.72</p> <p>Control group (received standard education) Pre-intervention: 66.56 +/- 4.56 Post-intervention: 73.20 +/- 4.74</p>	<p>Some concerns</p>
<p>Provider completion of pain assessment AND documentation of the pain assessment</p>						

(2)	Non-RCT	US	<p><u>e-learning module on chronic low backpain (CLBP) in an older adult.</u> The e-learning module was developed at the University of Pittsburgh CoEPE by a panel of experts in pain management. It is comprised of a series of brief video clips featuring a standardized patient with a common presentation of CLBP and is divided into the following four sections: health history, physical exam, treatment, and evaluating response. This intervention was delivered to <u>Internal Medicine (IM) physician residents.</u> A retrospective chart review was conducted before and after the intervention was delivered.</p> <p>142 events</p>	NA	<p>Documentation by IM physician residents of advanced pain assessment increased after receiving the e-learning education. Whether this reflects an important change is unclear. Documentation rate in the control group did not improve (14% to 12%).</p> <p>Baseline: Documentation events= 13% [17 events/142]</p> <p>Following intervention: Documentation events= 32% [45 events/142]</p>	Serious
(3)	Non-RCT	China	<p>An 8-hour education program focused on pain management core competencies for nurses in surgical units, and developed by a multi-disciplinary pain management team. Multimodal teaching approaches such as didactic teaching and vignettes of cases for nurses to discuss were utilized. A retrospective chart review was conducted before and after the intervention was delivered</p> <p>203 events</p>	NA	<p>Nurses' practice behaviors of postoperative pain assessment and management improved, with the proportion of pain assessment documented increasing following the pain management education intervention.</p> <p>Baseline pain assessments documented: Number of events= 59.6 % (121 events/203)</p> <p>Following intervention: Number of events= 74.9% (152 events/203)</p>	Serious
<p>Health provider pain interventions delivered after receiving interactive pain management education intervention <i>(measured immediately after and one study measured multiple time points after intervention delivery)</i></p>						
(5)	Non-RCT	Jordan	<p>The pain assessment training program for NICU nurses consisted of two parts: theoretical and practicum. Face-to-face lectures were used to deliver the theoretical part of the training about pain physiology, negative consequences of unmanaged pain, pain indicators, Neonatal Infant Pain Scale (NIPS). Additionally, nurses were oriented on pain care documentation in the electronic medical record (EMR) used in the NICUs. For the practicum part of training, nurses were divided into small groups and trained on assessments of pain using the NIPS and, on their performance, in providing non-pharmacological pain techniques. Charts (N = 80 neonates) were audited before and after the intervention (twice) to measure this outcome.</p>	NA	<p>The frequency of non-pharmacological pain management techniques performed by the nurses was significantly higher at one month (M = 3.3875, SD = 0.84933) than that at baseline, t (79) = - 35.674. Similarly, the documented frequency of non-pharmacological pain management techniques by nurses increased significantly at the three month point after the intervention (M = 5.3875, SD = 1.29745) compared to the documented frequency at one month, t (79) = -14.63.</p>	Serious

(3)	Non-RCT	China	<p>An 8-hour education program focused on pain management core competencies for nurses in surgical units, and developed by a multi-disciplinary pain management team. Multimodal teaching approaches such as didactic teaching and vignettes of cases for nurses to discuss were utilized.</p> <p>A retrospective chart review of 203 patient records was conducted before and after the intervention was delivered</p>	NA	<p>The nurse administered use of:</p> <p>patient-controlled analgesia (PCA): Use before intervention 41.9% Use after intervention 44.8%</p> <p>opioids: Use before intervention 25.6% Use after intervention 30.0%</p> <p>intramuscular injections on non-opioids: Proportion of: Use before intervention: 12.6% (13/103) Use after the intervention: 2.7% (3/111)</p> <p>analgesic types that include non-opioids: Use before intervention 50.7% Use after intervention 54.7%</p> <p>and other non-opioid adjuvants Use before intervention 8.4% Use after intervention 9.4%</p> <p>All increased following the interactive pain assessment/education intervention. There was no raw scoring reported by the authors to assess the increase in the use of non-pharmacological interventions for pain.</p>	Serious
(4)	Non-RCT	US	<p>The interactive pain education intervention consisted of three main components: (a) a pre-training survey assessing perceptions, practice patterns and opioid knowledge; (b) opioid education and training using morphine equivalent daily dosing (MEDD) and a MEDD calculator in the EMR; and (c) a post-training survey. The opioid education and training consisted of a 20-min PowerPoint presentation which included an explanation of how to calculate MEDD, current CDC guidelines, and the role of providers and nurses in safe opioid prescribing and administration. The education and training for the surgical trainees, APPs and nurses were conducted in person over the span of 3 weeks during the month of November 2019.</p> <p>N=59 providers</p>	NA	<p>After receiving the interactive pain education, health providers (physicians) showed a modest decrease in the average MEDD at discharge across all services as well as in general and transplant surgery patients.</p> <p>The intervention was associated with an average of 1.7 MEDD per month decrease in opioids prescribed at discharge across all services. General and transplant surgery patients were prescribed an average of 3.1 and 3.9 MEDD per month fewer opioids at discharge, respectively.</p> <p>However, opioid prescriptions increased by 3.0 MEDD per month for colorectal surgery patients.</p>	Serious

(6)	Non-RCT	US	<p>All primary care providers (PCPs) in the intervention group joined weekly two-hour Project ECHO Pain education videoconference sessions between January and December of 2013. PCPs briefly presented their cases, along with their behavioral health colleague, when appropriate. Three to four patient cases were scheduled for discussion each week. In addition to case presentations, a 20- to 30-minute didactic presentation was given each session by one of the ECHO faculty. Outcome measured by review of electronic health records of the treatment data for all patients with chronic pain who received care from primary care providers in the intervention and the control groups for the one-year period prior to starting ECHO (January through December 2012) and for the one-year period following the intervention.</p> <p>N=12</p>	<p>Comparator group: All primary care providers not chosen to participate in the intervention were asked to serve in a control group.</p> <p>N=11</p>	<p>PCPs in the intervention group had a greater reduction in the percentage of patients with chronic pain treated with an opioid medication compared with providers in the control group (from 56.2% to 50.5% compared with 50.1% to 50.3%).</p> <p>The average number of opioid prescriptions written per patient with pain increased less for providers in the intervention compared with their colleagues in the control group (from 4.89 to 5.00 compared with 3.05 to 3.97).</p>	Serious
Health Provider Satisfaction						
(7)	Non-RCT	Canada	<p>Online educational intervention for nurses on complex cancer pain management Advanced Pain Assessment and Management (APAM).</p> <p>The online APAM course was delivered on 19 occasions from 2012 to 2017 to nurses working with oncology patients in various settings. The course was facilitated by an experienced clinical nurse specialist, with expertise in complex pain management in cancer populations. Nurse learners were given 24/7 access to the online modules and were required to participate in weekly discussion forums. Nurses were also required to complete an opioids calculation and conversion assignment and present a final case study within a small virtual group of 3 to 5 learners. All components were designed with the following effective online pedagogy principles: (1) self-directed learning (online modules), (2) interactive activities (case study, group assignment), and (3) online community of learning with facilitated discussion (collaborative forum).</p> <p>N=306</p>	N/A	<p>Overall, participants reported that the course was highly satisfactory; positive ratings ranged from 77% to 97%. The top-rated aspects of the APAM course included information being logically ordered (97%), well-defined definitions of terminologies (96%), clear sessions and activity objectives (96%), and its covering of critical areas (95%).</p>	Moderate

(8)	Non-RCT	Taiwan	<p>A multimedia instructional program of junior nurses Classroom instruction (35mins) + Case study section (15mins) -with multimedia pain scenarios and interactive discussion on pain assessment</p> <p>N=47</p>	<p>Ordinary class pain instruction of junior nurses Classroom instruction (35 mins) + Case study section (15mins) -PowerPoint lecture slides of patient condition and recommendation for pain assessment</p> <p>N=39</p>	<p>Positive, as satisfaction scores were higher in the experimental than control group (mean \pm SD)</p> <p>Exp: 31.36 \pm 3.42 Control: 27.67 \pm 3.76</p>	Serious
(9)	Non-RCT	China	<p>Simulation group: Newly hired oncology nurses engaged in: 3 sessions on palliative theories 3 scenarios in palliative care: pain mtg, communication, comfort care +4-week clinical practice</p> <p>Palliative care simulation program, based on INACSL Nurses should be able to: 1) assess and manage physical and psychological pain in cancer patients; and 2) use communication skills effectively, particularly the empathy of cancer patients; and 3) provide comfort care such as turnover that would make cancer patients comfortable</p> <p>N=50</p>	<p>Control group: Newly hired oncology nurses followed the usual nursing curriculum: 9 sessions on palliative care theories and skill training +4-week clinical practice</p> <p>N=59</p>	<p>Learning satisfaction (mean \pm SD) of the simulation group (153.33 \pm 11.85) was higher overall than that of the control group (142.90 \pm 14.22).</p>	Serious