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Consensus Building on the Content of a Pediatric Pain Educational Program for Healthcare Professionals in a Low-Resource Setting: A Modified e-Delphi Study

Abigail Kusi Amponsah^{1,2} | Daniel Ba-Eebu Badengo^{1,3} | Charles Kumi Hammond^{4,5} | Victoria Bam¹ | Joana Kyei-Dompim¹ | Dorothy Wilson¹  | Jerry Armah⁶ | Evans Oduro⁷  | Faith Nawagi⁸ | Snigdha Mukherjee⁹ | Anna Axelin²

¹School of Nursing and Midwifery, College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana | ²Department of Nursing Science, Faculty of Medicine, University of Turku, Turku, Finland | ³Elysium Healthcare, Brighton, UK | ⁴Department of Child Health, School of Medical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana | ⁵Directorate of Child Health, Komfo Anokye Teaching Hospital, Kumasi, Ghana | ⁶College of Nursing, University of Florida, Gainesville, Florida, USA | ⁷Nyinahin Government Hospital, Atwima Mponua District, Nyinahin, Ghana | ⁸GEMx Africa Service of Educational Commission for Foreign Medical Graduates, Kampala, Uganda | ⁹Foundation for Advancement of International Medical Education and Research, Philadelphia, USA

Correspondence: Abigail Kusi Amponsah (akamponsah.fahs@knust.edu.gh)

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ABSTRACT

Healthcare professionals (HCPs) play a key role in improving pain outcomes in hospitalized children. Knowledge gaps can significantly hinder the ability of HCPs to provide optimal pain care. Developing targeted educational interventions to address these gaps requires a clear understanding of priority areas for training on essential pain-related topics. Against this background, this study aimed to establish consensus on topics for a pediatric pain educational program (PPEP) for continuing professional education among HCPs. A two-stage modified e-Delphi study was conducted among experts in pediatric care, health education, and pain research. The researchers developed 35 topics by reviewing the Core Content of the Pediatric Pain PRN Curriculum. In the first and second rounds, experts rated the topics and suggested additional topics. Ratings were done on a four-point Likert scale with options ranging from 1 (not important at all) to 4 (very important). The outcomes from both rounds were analyzed based on the level of consensus. Consensus on a topic was set at a threshold of ≥ 70 . A response rate of 88% ($n = 22/25$) and 100% ($n = 22/22$) was achieved for the first and second rounds, respectively. Experts rated 35 topics and 5 topics (the topic that failed to achieve consensus in the first round and four new ones generated from expert comments) in the first and second rounds, respectively. In the first round, experts agreed on 34 of the 35 topics (72.7%–90.9%) while all five topics achieved consensus (90.9%–100%) in the second round. Thus, 39 topics under the domains of pain theories, pediatric chronic pain, pain assessment, opioid risk evaluation and mitigation strategies (REMS), biobehavioural strategies, procedural pain, acute pain management and reorientation were agreed on for inclusion in the PPEP. A high level of consensus was achieved among a multidisciplinary panel of experts on the content of the PPEP. This can serve as a valuable resource for interprofessional pain continuing education in low-resource settings. The topics can also be integrated into curricula for preregistration healthcare professionals in such settings.

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1 | Introduction

Healthcare professionals (HCPs) play a key role in ensuring that children's pain experiences are recognized, assessed, and managed effectively. This role requires HCPs to possess adequate knowledge and skills in pain management. However, evidence from the literature shows knowledge gaps about pediatric pain assessment and management among HCPs [1–4]. Additionally, the United States (US) Institute of Medicine (IOM) acknowledged the insufficient attention given to pain in the education of healthcare professionals [5].

In Ghana, studies have identified inadequate knowledge and insufficient training on pediatric pain assessment and management as barriers to pediatric pain management among other factors [6, 7]. An educational needs assessment study further revealed the desire of HCPs to learn more about pediatric pain assessment, pharmacological, and non-pharmacological pain relief methods [6]. This supports the need to develop interventions that will improve the competencies of HCPs for pain management in children.

Interdisciplinary collaboration, need-based and well-designed programs have been identified as key ingredients in the success of pediatric pain educational programs [8]. Thus, in developing a pediatric pain educational program (PPEP) for HCPs in Ghana, the content must be tailored to the needs of healthcare professionals and reflect the Ghanaian healthcare context. This can be achieved by building consensus among local experts on the required content of a PPEP for HCPs in Ghana. Consensus building among local health professionals and scholars integrates diverse expertise and perspectives to achieve standardization and has the potential to improve an intervention's effectiveness.

The Pediatric Pain PRN Curriculum is a curriculum developed for interprofessional pain continuing education (IPPCE) [9, 10]. This curriculum recognizes the role of direct care providers in ensuring that patients receive adequate pain care and promotes interprofessional collaboration, evidence-based practice and patient-centered care [9]. It aligns with the US Institute of Medicine's recommendation to offer evidence-based guidelines for overcoming barriers to effective pain management, tailoring pain care to individual needs, and enhancing healthcare professionals' education on pain [5]. The current study aimed to build consensus on topics developed from the Core Content of the Pediatric Pain PRN Curriculum for inclusion in a PPEP tailored to the Ghanaian healthcare context and applicable in similar healthcare settings. This study is the first step in developing a PPEP that can be used for continuing professional education among HCPs in resource-limited settings like Ghana.

2 | Methods

2.1 | Study Design

To develop the content of a PPEP for HCPs in Ghana, we used a modified two-round e-Delphi technique. The Delphi technique is an anonymous, iterative process used to gather and refine the opinions of an expert panel on a specific issue, to reach a consensus [11, 12]. The classical Delphi approach involves four

rounds, with the first round often beginning with open-ended questions. In contrast, in the modified approach used in this study, a predefined set of topics derived from the Core Content of the Pediatric Pain PRN Curriculum was presented to experts in the first round, and the process was limited to two iterative rounds [13].

In this study, two rounds were used to achieve consensus among experts on topics to be included in a PPEP. Responses from the first round were collected and analyzed, and feedback was provided to the expert panel in the second round. After the second round, a consensus among experts was reached. The stages involved in the study are illustrated in Figure 1.

2.2 | Topic Identification

A literature search was conducted to identify resources on pediatric pain assessment and management for an educational program among an interprofessional group of HCPs. A literature search was conducted in PubMed and CINAHL to identify educational resources related to pediatric pain assessment and management. Search terms included combinations of keywords related to pediatric pain (e.g., pain, pediatric pain, pediatric pain), education (e.g., curriculum, training, continuing professional education), and healthcare professionals or interprofessional education. Boolean operators (AND/OR) were used to combine search terms. In addition, relevant professional organization websites, including the International Association for the Study of Pain (IASP), were manually searched to identify pain curricula. The final set of search terms is available in Table S1.

Although we came across other educational materials such as the International Association for the Study of Pain (IASP) Interprofessional Pain Curriculum [14] and the University of Toronto Centre for the Study of Pain-Interfaculty Pain Curriculum (UTCSP-IPC) [15], the Pediatric Pain PRN Curriculum [9, 16] was selected as a suitable blueprint. This curriculum was chosen because, unlike the others, it specifically focuses on pediatric healthcare professionals as the target audience. The Pediatric Pain PRN Curriculum promotes interprofessional collaboration and evidence-based practice to improve pediatric pain care [9].

The curriculum has three components namely Core Content, Specialty Subjects, and the PRN Role Implementation Content. Core Content focuses on pain assessment and management for acute, chronic, and procedural pain [9]. The Specialty Subjects focus on pain in special pediatric populations such as neonates, children receiving special care (critical care and palliative care), and children with conditions such as cancer, sickle cell, abdominal pain, and headache. The PRN Role Implementation content centers on preparing healthcare professionals as leaders and enabling them to initiate, promote, and evaluate interventions aimed at improving pain management.

We chose the topics in the Core Content as they provide basic knowledge of pediatric pain assessment and management [9]. The Core Content includes t subject areas or domains, such as pain theories, assessment, analgesics, opioid risk evaluation and mitigation strategies (REMS), biobehavioural strategies,

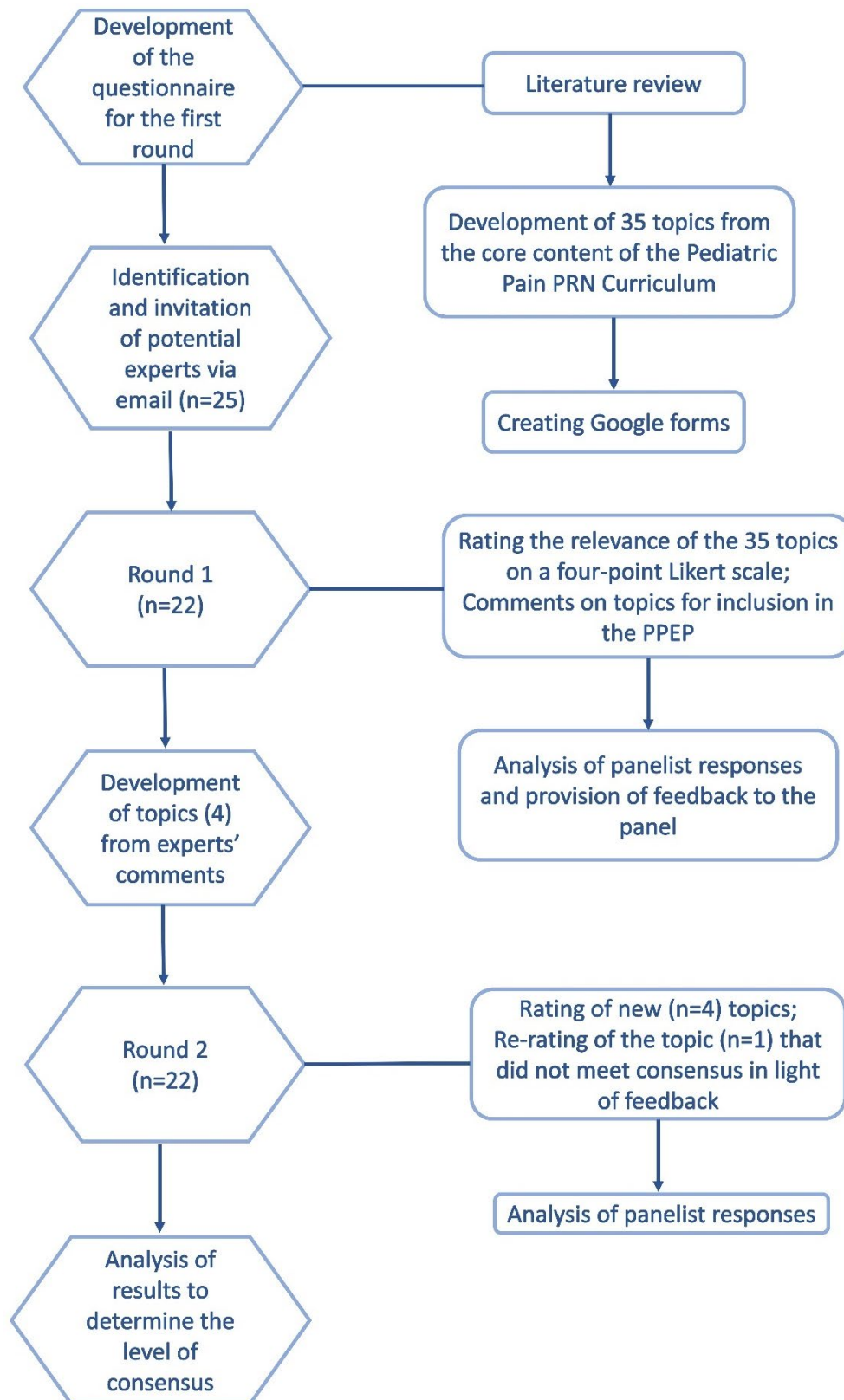


FIGURE 1 | Flowchart for modified e-Delphi study.

procedural pain, acute pain, and chronic pain. Biobehavioural strategies encompass non-pharmacological approaches targeting the psychological, behavioral, and physical aspects of pain, including relaxation and guided imagery, distraction techniques, positioning for comfort, physical modalities (e.g., cutaneous

simulation using cold heat and vibration, transcutaneous electronic nerve stimulation), and environmental modification.

Through a review of the course slides for each subject area, the researchers identified 34 topics for consideration by the expert

panel. In addition, the Course Director Guide includes a reorientation component, which involves reviewing pain education and pain care policies provided to new healthcare professionals during organizational orientation. In this study, reorientation was operationalized as a recommendation to incorporate structured orientation of new healthcare professionals on pediatric pain assessment and management. Therefore, a total of 35 topics were identified for the Delphi process (refer to Table 1).

2.3 | Expert Panel

The authors identified potential experts for the panel by reviewing Ghanaian literature on pediatric pain management and health education. From the publications reviewed, we invited authors to participate as expert panelists and asked them to nominate other potential experts. The panel comprised health educators and practitioners with expertise in pediatric care, anesthesia, pharmacy, pain research, and curriculum development. They included anesthetists, medical doctors, nurses, healthcare professional educators, and a pharmacist.

2.4 | Delphi Procedure

Invitations to participate in the study were sent to potential panelists via email. A questionnaire containing the 35 topics identified from the Pediatric PRN curriculum was created using Google Forms and emailed to experts. The participants accessed the questionnaire using hyperlinks to Google Forms.

In the first round, experts were to indicate their decision on the topics' relevance by choosing options presented on a four-point Likert scale with options from 1 (not important at all) to 4 (very important). Topics that received ratings of 1 (not important at all) and 2 (slightly important) were regarded as irrelevant, whereas those that received ratings of 3 (important) and 4 (very important) were considered to be relevant. Experts were also required to provide comments on topics and suggest additional topics they deemed relevant for inclusion in the PPEP. After analysis of the responses from the first round, feedback was sent to experts, comprising a list of their suggestions and statistical reports on their ratings.

In the subsequent rounds, experts were required to rerate topics that did not achieve consensus in the previous rounds in addition to the new topics suggested until consensus was achieved.

2.5 | Data Analysis

Descriptive statistics, including frequencies, percentages, medians, and interquartile ranges were used to present data on participants' sociodemographic characteristics and responses. Consensus on a topic was achieved when $\geq 70\%$ of the experts rated it as either "important" [3] or "very important" [4]. The consensus level of $\geq 70\%$ set for this study aligns with the threshold used in a previous study, which described the required competency levels for a core curriculum for undergraduate health professionals based on the IASP interprofessional curriculum [17]. Topics that had $< 70\%$ agreement level after analyzing the responses were forwarded to the subsequent rounds for re-rating. Any topic that did not achieve

TABLE 1 | Topics developed by authors.

Domain	Topics
Pain theories	Theories that inform our understanding of pain Biopsychosocial model of pain
Pediatric chronic pain	Prevalence of pediatric pain Effects of unrelieved pain experienced by children Differences between acute and chronic pain management plans Unique challenges of managing chronic pain in children Goals of treating pediatric pain
Assessment	Reliability of pain assessment tools Validity of pain assessment tools Feasibility of pain assessment tools Utility of pain assessment tools Protocols for pain assessment
Analgesics	Principles for treating children's pain with pharmacologic therapies Influence of children's developmental stage on the choices of drugs used in treating pain Multimodal pain treatment plans for children
Opioid REMS (risk, evaluation, mitigation and strategies)	Plan of care for children requiring opioids for pain treatment Definition of substance misuse Definition of substance abuse Definition of drug addiction Definition of pseudo-addiction Definition of substance tolerance Definition of physical dependence Methods of securing opioids Methods of monitoring patients on opioids Methods of opioids disposal
Biobehavioural strategies	Examples of biobehavioural strategies Mechanism of action of biobehavioural strategies used in managing children's pain Potential outcomes of biobehavioural strategies used in managing children's pain Factors to consider in the selection of biobehavioural strategies for managing children's pain

(Continues)

TABLE 1 | (Continued)

Domain	Topics
Procedural pain	Evidence-based strategies for easing procedural pain in children Protocols for pain management
Acute pain management	Efficacy of methods used in managing acute pediatric pain. For example, controlled analgesia, epidural analgesia, continuous nerve blocks and regional analgesia Risks of methods used in managing acute pediatric pain Role of healthcare professionals in children's pain-care
Reorientation	Orientation of new healthcare professionals on pediatric pain assessment and management

the agreement level of $\geq 70\%$ at the end of the subsequent round was withdrawn from the list, and no further rating was required.

2.6 | Ethical Considerations

This study was part of a larger research project which focused on using a participatory action research approach to improve pain relief for pediatric patients and their families. Ethical approval was obtained for the project from the Committee on Human Research, Publication and Ethics (CHRPE) of the School of Medical Sciences, Kwame Nkrumah University of Science and Technology (KNUST). All participants provided written informed consent before the commencement of the survey.

3 | Results

3.1 | Participants' Demographic Data

Out of the 25 experts invited to participate in the study, 22 accepted the invitation, representing a response rate of 88%. Most of the participants were males ($n=16$, 72.7%) and had professional experience of at least 10 years ($n=14$, 63.64%). They had a median (interquartile range) age of 36.5 (7.75) years. A little over half of the participants were health educators ($n=12$, 54.55), and about 45% ($n=10$) had attained a bachelor's degree. The participants were from seven out of the 16 regions in Ghana, namely, Western, Greater Accra, Ashanti, Eastern, Northern, Bono East, and Upper West (see Table 2).

3.2 | Results for the First Round of Expert Consultation

At the end of the first round, 34 [18] out of the 35 [19] topics from the Pediatric Pain PRN Curriculum achieved consensus levels of 70% or higher (72.7% to 90.9%). As presented in Table 2, the only topic that could not attain the required level of consensus was

TABLE 2 | Demographics of external panel ($n=22$).

Variable	Frequency	Percentage	Median (IQR)
Age (years)	—	—	36.5 (7.75)
Sex			
Male	16	72.73	—
Female	6	27.27	—
Level of education			
Bachelor's degree	10	45.45	—
Master's degree	5	22.73	—
Postgraduate Medical	3	13.64	—
Doctorate (PhD)	4	18.18	—
Job title			
Anesthetist	4	18.18	—
General nurse	1	4.55	—
Medical doctor	2	9.09	—
Healthcare professional educator	12	54.55	—
Pediatric nurse	2	9.09	—
Pharmacist	1	4.55	—
Years of experience			
≤ 10	14	63.64	—
11–20	5	22.73	—
21–30	3	13.64	—
Location of workplace			
Ashanti Region	5	22.73	—
Bono East Region	8	36.36	—
Eastern Region	1	4.55	—
Greater Accra Region	1	4.55	—
Western Region	1	4.55	—
Northern Region	4	18.18	—
Upper West Region	2	9.09	—

“Definition of substance tolerance” under the “Opioid REMS” domain, with a consensus level of 68.2% (refer to Table 3).

3.3 | Results for the Second Round of Expert Consultation

Table 4 presents information on participants' decisions to change or maintain their initial response to the topic that could not achieve consensus in the first round. Upon participants'

TABLE 3 | Results for the first round of expert consultation.

Pediatric pain-related topics and domains	Responses				Irrelevant (1 or 2) n (%)	Relevant (3 or 4) n (%)	Conclusion on consensus
	1	2	3	4			
<i>Pain theories</i>							
Theories that inform our understanding of pain	0.0	9.1	31.8	59.1	9.1	90.9	≥ 70% consensus achieved; No refinement required
Biopsychosocial model of pain	0.0	9.1	45.5	45.5	9.1	90.9	≥ 70% consensus achieved; No refinement required
<i>Pediatric chronic pain</i>							
Prevalence of pediatric pain	0.0	13.6	36.4	50.0	13.6	86.4	≥ 70% consensus achieved; No refinement required
Effects of unrelieved pain experienced by children	0.0	9.1	27.3	63.6	9.1	90.9	≥ 70% consensus achieved; No refinement required
Differences between acute and chronic pain management plans	0.0	9.1	22.7	68.2	9.1	90.9	≥ 70% consensus achieved; No refinement required
Unique challenges of managing chronic pain in children	0.0	13.6	18.2	68.2	13.6	86.4	≥ 70% consensus achieved; No refinement required
Goals of treating pediatric pain	0.0	9.1	27.3	63.6	9.1	90.9	≥ 70% consensus achieved; No refinement required
<i>Assessment</i>							
Reliability of pain assessment tools	0.0	9.1	22.7	68.2	9.1	90.9	≥ 70% consensus achieved; No refinement required
Validity of pain assessment tools	0.0	22.7	18.2	59.1	22.7	77.3	≥ 70% consensus achieved; No refinement required
Feasibility of pain assessment tools	0.0	9.1	40.9	50.0	9.1	90.9	≥ 70% consensus achieved; No refinement required
Utility of pain assessment tools	0.0	18.2	40.9	40.9	18.2	81.8	≥ 70% consensus achieved; No refinement required
Protocols for pain assessment	0.0	13.6	31.8	54.5	13.6	86.4	≥ 70% consensus achieved; No refinement required
<i>Analgesics</i>							
Principles for treating children's pain with pharmacologic therapies	0.0	9.1	18.2	72.7	9.1	90.9	≥ 70% consensus achieved; No refinement required
Influence of children's developmental stage on the choices of drugs used in treating pain	4.5	13.6	22.7	59.1	18.2	81.8	≥ 70% consensus achieved; No refinement required
Multimodal pain treatment plans for children	0.0	9.1	31.8	59.1	9.1	90.9	≥ 70% consensus achieved; No refinement required
<i>Opioid REMS (risk, evaluation, and mitigation)</i>							
Plan of care for children requiring opioids for pain treatment	4.5	9.1	27.3	59.1	9.1	90.9	≥ 70% consensus achieved; No refinement required
Definition of substance misuse	4.5	22.7	50.0	22.7	27.3	72.7	≥ 70% consensus achieved; No refinement required
Definition of substance abuse	0.0	22.7	50.0	27.3	22.7	77.3	≥ 70% consensus achieved; No refinement required

(Continues)

TABLE 3 | (Continued)

Pediatric pain-related topics and domains	Responses				Irrelevant (1 or 2) n (%)	Relevant (3 or 4) n (%)	Conclusion on consensus
	1	2	3	4			
Definition of drug addiction	0.0	13.6	45.5	40.9	13.6	86.4	≥ 70% consensus achieved; No refinement required
Definition of pseudo-addiction	4.5	22.7	54.5	18.2	27.3	72.7	≥ 70% consensus achieved; No refinement required
Definition of substance tolerance*	0.0	31.8	36.4	31.8	31.8	68.2	< 70% consensus; This topic requires further validation
Definition of physical dependence	0.0	22.7	45.5	31.8	18.2	81.8	≥ 70% consensus achieved; No refinement required
Methods of securing opioids	4.5	18.2	27.3	50.0	22.7	77.3	≥ 70% consensus achieved; No refinement required
Methods of monitoring patients on opioids	0.0	13.6	22.7	63.6	13.6	86.4	≥ 70% consensus achieved; No refinement required
Methods of opioids disposal	0.0	22.7	36.4	40.9	18.2	81.8	≥ 70% consensus achieved; No refinement required
<i>Biobehavioural strategies</i>							
Examples of biobehavioural strategies	0.0	22.7	45.5	31.8	22.7	77.3	≥ 70% consensus achieved; No refinement required
Mechanism of action of biobehavioural strategies used in managing children's pain	0.0	27.3	31.8	40.9	22.7	77.3	≥ 70% consensus achieved; No refinement required
Potential outcomes of biobehavioural strategies used in managing children's pain	0.0	22.7	40.9	36.4	22.7	77.3	≥ 70% consensus achieved; No refinement required
Factors to consider in the selection of biobehavioural strategies for managing children's pain	0.0	22.7	40.9	36.4	22.7	77.3	≥ 70% consensus achieved; No refinement required
<i>Procedural pain</i>							
Evidence-based strategies for easing procedural pain in children	0.0	9.1	36.4	54.5	9.1	90.9	≥ 70% consensus achieved; No refinement required
Protocols for pain management	0.0	13.6	22.7	63.6	13.6	86.4	≥ 70% consensus achieved; No refinement required
<i>Acute pain management</i>							
Efficacy of methods used in managing acute pediatric pain. For example, controlled analgesia, epidural analgesia, continuous nerve blocks and regional analgesia	0.0	18.2	18.2	63.6	18.2	81.8	≥ 70% consensus achieved; No refinement required
Risks of methods used in managing acute pediatric pain	0.0	18.2	22.7	59.1	18.2	81.8	≥ 70% consensus achieved; No refinement required
The role of the healthcare professional in children's pain-care	0.0	9.1	13.6	77.3	9.1	90.9	≥ 70% consensus achieved; No refinement required
<i>Reorientation</i>							
Orientation of new healthcare professionals on pediatric pain assessment and management	0.0	9.1	9.1	81.8	9.1	90.1	≥ 70% consensus achieved; No refinement required

Note: (1) Not important at all, (2) Slightly important, (3) Important, (4) Very important. Asterisk (*)—topic that did not achieve consensus (≤ 70%).

review of the summary report (feedback) from the initial round, 77.3% ($n = 17$) of the participants indicated that they wanted to change their initial response to this topic by choosing the option “yes = 1”.

In the second round, all 22 experts responded, for a response rate of 100%. The questionnaire had five topics which included the topic (Definition of substance tolerance) that could not achieve consensus in the first round and the four new ones (Social support for children in pain and their families, Pain assessment in children who cannot verbally communicate, Mechanisms of action of drugs used for pediatric pain management and Pediatric dose calculation for pain medication) that emerged from experts' feedback in the first round. All five topics achieved the required level of agreement, with levels of agreement ranging from 90.9 to 100. The topics, “Pain assessment in children who cannot verbally communicate” and “Paediatric dose calculation for pain medication” achieved a consensus level of 100% (see Table 5). Overall, 39 topics met the $\geq 70\%$ agreement level by the end of the final round. These 39 topics include the 35 initially developed by the researchers by reviewing the Pediatric PRN Curriculum and the four new ones from the experts' comments.

TABLE 4 | Results of participants' responses to Delphi first-round feedback.

Responses to feedback on the topic that could not achieve consensus in the first round	Frequency (%)	
	Yes (1)	No (2)
Do you wish to change your initial decision on the topic “Definition of substance tolerance”?	17 (77.3)	5 (22.7)

TABLE 5 | Results for the second round of expert consultation.

Pediatric pain-related topics and domains	Responses				Irrelevant (1 or 2) n (%)	Relevant (3 or 4) n (%)	Conclusion on consensus
	1	2	3	4			
<i>Opioid REMS</i>							
Definition of substance tolerance	4.5	0.0	54.5	40.9	4.5	95.5	$\geq 70\%$ consensus achieved; No further validation required
<i>Biobehavioural Strategies</i>							
Social support for children in pain and their families	0.0	9.1	13.6	77.3	9.1	90.9	$\geq 70\%$ consensus achieved; No further validation required
<i>Assessment</i>							
Pain assessment in children who cannot verbally communicate	0.0	0.0	9.1	90.9	0.0	100	$\geq 70\%$ consensus achieved; No further validation required
<i>Analgesics</i>							
Mechanisms of action of drugs used for pediatric pain management	0.0	4.5	22.7	72.7	4.5	95.5	$\geq 70\%$ consensus achieved; No further validation required
Pediatric dose calculation for pain medication	0.0	0.0	0.0	100	0.0	100	$\geq 70\%$ consensus achieved; No further validation required

Note: (1) Not important at all, (2) Slightly important, (3) Important, (4) Very important.

4 | Discussion

This study utilized a modified two-round e-Delphi technique to build expert consensus on topics that should be included in a PPEP for continuing professional education of HCPs in Ghana. We achieved a high response rate, which indicates sufficient attention and concern for improvement in pediatric pain management by the experts.

At the end of the two rounds, the experts agreed on 39 essential topics for inclusion in the PPEP. These included all 35 initially developed by authors and four new topics suggested by experts. Although these topics are universally important and not exclusive to low-resource settings, their prioritization by local experts reflects training needs in Ghana. Previous studies among healthcare professionals in Ghana have identified several gaps in pediatric pain assessment and management which align with these topics, including low prioritization of pain, skepticism about children's self-reported pain, reliance on vital signs as primary indicators of pain, concerns about opioid side effects that contribute to under-prescribing or reluctance to administer these medications when clinically indicated, limited knowledge of opioid use in pediatric pain management, poor documentation of pain assessment and treatment outcomes, insufficient understanding of procedural pain, and infrequent assessment of procedural pain [20–23]. These challenges are consistent with patterns reported in other low- and middle-income countries [24–26].

These topics are not intended to be delivered as a single educational program. They represent a comprehensive list of priority areas from which modules can be developed and delivered in phases or integrated into continuous professional development programs based on institutional needs. Phased educational interventions delivered over time have been associated with improved learning and knowledge retention among healthcare professionals [27, 28].

The results of the Delphi process demonstrate high levels of agreement among the expert panel on the relevance of these topics for pain education among HCPs. It is worth noting that the experts were from different professional fields with a diverse range of experiences. Therefore, such a high level of agreement validates these topics as essential for interprofessional pain education (IPPE) in resource-limited settings like Ghana and also supports the Pediatric Pain PRN Curriculum as a good tool for interprofessional pain education (IPPE). Pain is best managed using interprofessional collaboration; hence, competencies agreed on by a diverse group of healthcare professionals are required to facilitate collaboration [29, 30].

At the end of the first round, all topics in the various domains achieved the required consensus level except “Definition of substance tolerance” under the domain of Opioid REMS. However, after reconsidering the topic in the second round, experts validated it for inclusion in the PPEP, achieving a consensus level of 95.5%. The initial lack of consensus may be related to the placement of the topic under the Opioid REMS domain. Experts may have questioned its relevance to the pediatric context, where opioid use is carefully scrutinized and often avoided unless necessary [18]. The opportunity to reconsider their ratings and the feedback mechanism used in the second round may have allowed experts to review responses from their peers and clarify divergent opinions, leading to a shared understanding of the topic’s relevance in educating healthcare professionals on safe opioid use in children. The high consensus level achieved in the second round highlights the effectiveness of the Delphi method in addressing controversial issues.

Twelve topics under the domains of Pain theories, Pediatric Chronic Pain, Assessment, Analgesics, Opioid REMS, Procedural Pain and Acute Pain Management achieved a high consensus level of 90.9%. The prioritization of these domains appears consistent with the documented knowledge and practice gaps in pediatric pain management in Ghana discussed earlier [20–23]. In contrast, topics in the domain of Biobehavioural Strategies achieved a relatively lower consensus level (77.3%). This result was unexpected, given that biobehavioural strategies have shown promise in improving pain outcomes, particularly in children with chronic pain [19, 31]. In some instances, these strategies help reduce the reliance on pain medications, thereby minimizing associated side effects [32]. The lower level of agreement on biobehavioural strategies may reflect the dominant biomedical framing of pain in Ghana and similar low-resource settings [33–36]. For example a study on the culture and context of pediatric pain management in Ghana reported that some healthcare professionals were more likely to perceive children as being in pain when traditional vital signs were abnormal, illustrating reliance on physiological indicators and a biomedical orientation [21]. The same study found that pharmacological interventions were the primary strategy for managing pediatric pain, while non-pharmacological approaches were largely limited to comfort measures such as cuddling, stroking, consoling, positioning, breastfeeding, and environmental modifications (e.g., toys or colorful wall decorations) [21]. Similarly, research on low back pain management in Ghana indicates that pain care remains largely biomedical [37], with biopsychosocial approaches more commonly implemented in high-income settings [38, 39].

Based on expert comments in the first round, four new topics were added in the second round: “Pain assessment in children who cannot verbally communicate”, “Mechanisms of action of drugs used for paediatric pain management”, “Paediatric dose calculation for pain medication”, and “Social support for children in pain and their families”. The topic of “Pain assessment in children who cannot communicate verbally” received unanimous approval from the experts. Assessing pain in non-verbal children is usually challenging because HCPs experience difficulties in discerning which behaviors are indicative of the presence of pain [40]. HCPs must be well-educated to assess pain in this population to prevent delayed or ineffective pain assessment and management which can lead to increased morbidity and decreased quality of life [40, 41]. Similarly, “Pediatric dose calculation for pain medication” attained unanimous approval, reflecting the importance experts place on this topic. HCPs must possess adequate knowledge of medication dose calculation to ensure safe medication administration in children and reduce the risk of adverse events. Additionally, the topic “Mechanisms of action of drugs used for pediatric pain management” highlights the relevance of such knowledge in selecting appropriate drugs for effective pain relief while minimizing the risk of adverse effects.

Finally, the inclusion of the topic “Social support for children in pain and their families” is important in pediatric pain management, particularly for children with chronic pain. Pediatric chronic pain significantly reduces a child’s quality of life and disrupts various aspects of both the child’s and their parent’s lives, such as education, work, and social activities [42, 43]. Moreover, mental health challenges like anxiety and depression are common among children and adolescents with chronic pain [44]. Additionally, research indicates that a significant number of parents of children with chronic pain experience clinically relevant levels of psychological distress, which adversely affects the child’s pain outcomes [45]. Studies show that social support is linked to reduced pain-related disability and reduced psychological distress [46–48]. The inclusion of this topic will enable healthcare professionals to better understand and address the complex needs of children in pain and their families, ultimately promoting more holistic, family-centered care and improving their overall health and well-being.

The results of this study provide an outline of relevant topics that can be included in the development of PPEP for HCPs to improve their capacity to assess and manage pain in pediatric populations, ultimately resulting in improved health outcomes in this population. The authors recommend that these topics should also be integrated into curricula for preregistration healthcare professionals. In addition, health educators should adopt an interprofessional approach when teaching pain assessment and management to both preregistration and practising healthcare professionals.

5 | Strengths and Limitations

The study involved experts from different professional backgrounds with diverse expertise, each contributing unique perspectives and knowledge. This diversity ensured that the content

of the PPEP was enriched and reflected the interdisciplinary nature of pediatric pain management.

However, the study has some limitations. The subjective nature of the process may have introduced biases in the experts' views. Furthermore, using a qualitative approach could have provided more in-depth insights into the experts' perspectives on the topics.

Despite these limitations, this study provides a starting point for developing contextually relevant pediatric pain topics for pain educational programs in resource-limited settings. Future studies should explore expert opinions on the relevance of these topics within the Ghanaian cultural context.

6 | Conclusion

Through a two-round expert consultation process, a list of topics for a PPEP for practicing HCPs has been developed, focusing on foundational knowledge in pediatric pain assessment and management. Our findings contribute to the literature by presenting expert consensus on curriculum content appropriate for a resource-constrained setting.

The next steps include the development and implementation of a PPEP using the identified domains and topics. Rather than delivering all topics as a single intensive program, modules may be introduced in phases and integrated into existing continuing professional development activities within healthcare institutions. Implementation may be led by hospital management, professional regulatory bodies, training institutions, and governmental health agencies responsible for workforce development. Health educators may also use the findings of this study as a guide for developing pain-related curriculum content for preregistration HCPs.

Researchers are encouraged to develop programs based on these topics and conduct evaluations during and after implementation to assess effectiveness, feasibility, and sustainability. Such evaluations will provide further evidence to inform the establishment and scaling of similar educational programs in comparable settings.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Data S1:** pne270031-sup-0001-DataS1.xlsx. **Data S2:** pne270031-sup-0002-Supinfo1.pdf. **Table S1:** Detailed search terms.