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An Electronic Delphi Study to Establish Pediatric Intensive Care Nursing Research Priorities in 20 European Countries

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Objectives: To identify and to establish research priorities for pediatric intensive care nursing science across Europe.
Design: A modified three-round electronic Delphi technique was applied. Questionnaires were translated into seven different languages.
Setting: European PICUs.
Participants: The participants included pediatric intensive care clinical nurses, managers, educators, and researchers. In round 1, the qualitative responses were analyzed by content analysis and a list of research statements and domains was generated. In rounds 2 and 3, the statements were ranked on a scale of one to six (not important to most important). Mean scores and SDs were calculated for rounds 2 and 3.
Interventions: None.
Measurements and Main Results: Round 1 started with 90 participants, with round 3 completed by 64 (71%). The seven highest ranking statements (≥ 5.0 mean score) were related to end-of-life care, decision making around forgoing and sustaining treatment, prevention of pain, education and competencies for pediatric intensive care nurses, reducing healthcare-associated infections, identifying appropriate nurse staffing levels, and implementing evidence into nursing practice. Nine research domains were prioritized, and these were as follows: 1) clinical nursing care practices, 2) pain and sedation, 3) quality and safety, 4) respiratory and mechanical ventilation, 5) child- and family-centered care, 6) ethics, 7) professional issues in nursing, 8) hemodynamcis and resuscitation, and 9) trauma and neurocritical care.
Conclusions: The results of this study inform the European Society of Pediatric and Neonatal Intensive Care's nursing research agenda in the future. The results allow nurse researchers within Europe to encourage collaborative initiatives for nursing research. (*Pediatr Crit Care Med* 2014; XX:00–00)
Key Words: critically ill child; Delphi technique; evidence-based nursing; intensive care; pediatric critical care; research priorities

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Despite an increasing number of studies to establish critical care research priorities internationally, no studies have explored research priorities in pediatric intensive care (PIC) nursing within Europe (1–3). Research priorities are not static, but they change according to cultural ideologies, local challenges, and political and economic resources of individual communities. The European Society of Pediatric and Neonatal Intensive Care (ESPNIC) aims to promote the art and science of pediatric and neonatal intensive care and to develop evidence-based clinical practice (4). In view of expanding its scientific activities, the society established sections to support these activities in 2012. The nursing science section was established and one of its aims was to establish the nursing research agenda within Europe. The current problem within European PIC nursing is that although there are a number of active research groups (5–7), there are no formal collaborative links or any known consensus of research priorities to allow further development of PIC nursing science across Europe. Therefore,

it is imperative that the PIC nursing research priorities within Europe are defined. Without understanding the most important problems affecting pediatric critical care nursing, research efforts may be uncoordinated and directed in areas that are not of highest priority. Therefore, it is imperative to establish the PIC nursing research priorities within Europe.

To increase the likelihood that research impacts on nursing practice, the importance of involving key stakeholders in the identification process is crucial. The aim of this study was to identify and to prioritize nursing research topics of importance as defined by European PIC nurses.

MATERIALS AND METHODS

A modified three-round e-Delphi technique was undertaken. An e-Delphi approach is defined as the use of the modified Delphi technique via an electronic/web-based medium (8). Within healthcare research, the Delphi technique is often used to set priorities or to gain consensus about important issues (9, 10). It is a multistaged survey allowing consulting a large number of experts without bringing them physically together. Using consecutive surveys, it is possible to collect, evaluate, and tabulate the experts' opinions. The characteristics of the Delphi technique are based on anonymity, iteration, controlled feedback, and statistical group response (11). The surveys protect the anonymity and iteration takes place by presenting the discussed issues over a certain number of rounds. Controlled feedback and statistical group response take place in between rounds by informing individual experts about the opinions of the total expert group. The e-Delphi technique is performed via e-mail or online web surveys (8). The e-Delphi process used in this study is outlined in **Figure 1**. The three rounds were completed within 5 months, from the first of July to the first of December 2012. Institutional review board approval was received from University Medical Centre Utrecht (protocol number 12/147), and signed consent forms from participants were not required.

Participants

The participants were clinical PIC nurses, managers, educators, and researchers from all European countries. The aim was to generate a mixture of nursing roles and to have eight nurses per country (two clinical nurses, two education nurses, two nurse managers, and two research nurses). The inclusion criteria included being a nurse currently working in PICU or in an ICU who cared for children, who identified themselves as being primarily a PIC nurse and having an e-mail address. Exclusion criteria were nurses who indicated they were neonatal or adult intensive care nurses exclusively. There are no universally agreed criteria for minimum or maximum number of experts in a Delphi method, but other similar Delphi studies (1) used eight per country, thus we took a pragmatic decision to include two nurses (if possible) from four different PIC nursing roles (clinical, education, management, and research) in each country. Contact details for participants were obtained through the ESPNIC registry and through personal contacts. Individuals were informed about the voluntary nature of the study and the need for participation in all three electronic
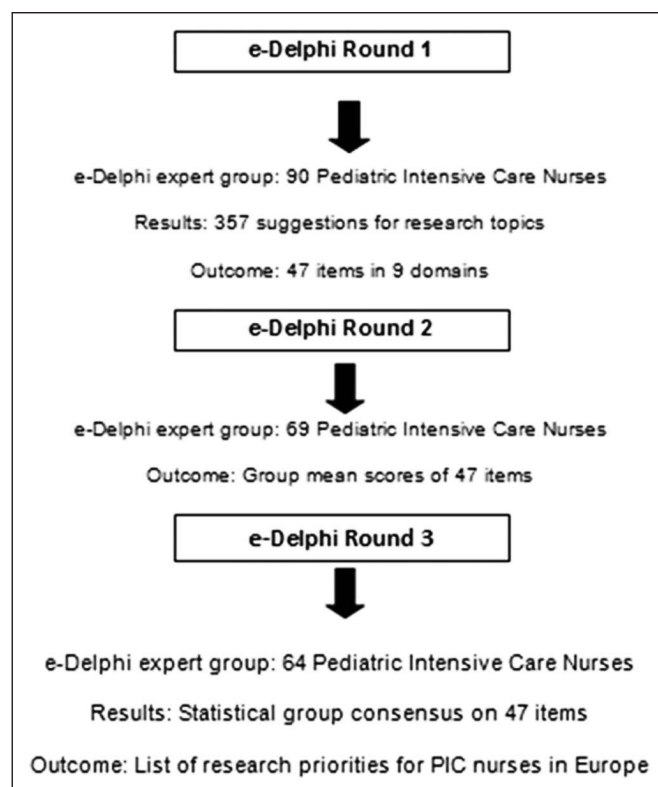

Figure 1. PICU e-Delphi study flowchart.

survey rounds. Informed consent was assumed by completing the surveys. Personal data (e-mail addresses, name, age, and job title) were kept on a secure password-protected database (Excel) accessible only to L.N.T. and J.M.L. and identifiable data on this database were deleted after study completion. Participants were informed about the need for their name for each round to determine response rates and link findings to nursing roles and countries. To maximize response rates and reduce attrition between rounds, the 90 nurses who agreed to participate received the questionnaire of all three rounds and three reminders were sent for each round. If we received more than eight responses per country, we agreed we would use all the respondents, as we did not want to exclude motivated participants who had already been contacted by the country lead.

Questionnaires

The questionnaires for the e-Delphi rounds were developed in a three-step process (**Fig. 1**). The first e-Delphi round was an electronic questionnaire inviting participants to list a minimum of three and a maximum of five important topics for PIC nursing research. Based on the results of round 1, a structured electronic questionnaire was developed with statements and domains. In round 2, participants ranked these statements and domains on a 6-point scale (1 is not important to 6 is extremely important). The same questionnaire was used for round 3 but included mean scores of the group response of round 2 per statement and domain. All surveys were forward translated only by a lead person in all countries. SurveyMonkey Gold version was used to administer the questionnaires to the study participants.

Analysis

Results of round 1 were content analyzed by two researchers independently (L.N.T., J.M.L.). Statements were categorized into thematic areas (termed "domains") according to the content and also the number of suggestions using an analysis framework (12). J.M.L. and L.N.T. undertook the content analysis separately, and then met to discuss and agree these domains. We reached agreement over these domains by discussion and these were then checked for validity by two researchers independently (A.v.d.H., J.M.W.) (13). Any disagreement was discussed and agreement reached through discussion. In terms of any conflict of interest, although both authors' (L.N.T., J.M.L.) research fits within these broad domains, these domains were established from the responses of participants and neither researcher's specific research is represented within the research statements. Furthermore, these domains and statements along with the quantitative data responses were sent to the two independent researchers (A.v.d.H., J.M.W.) to ensure validity of these generated items.

This analysis generated a list of research statements and domains for round 2.

The mean and SDs were calculated of the round 2 responses, and the total mean scores were added to the round 3 questionnaire. Participants were asked to re-rate the statements again taking the group scores into account. In the round 3 analyses, the importance of the statements was ranked by means and SD. The paired t test was applied to calculate difference between round 2 and round 3 (significance level set at ≤ 0.05) with effect size examined by Cohen's d (standardized mean difference) between rounds 2 and 3. For Cohen's d, the effect size interpretation is as follows: 0.2, small effect; 0.5, medium effect; and more than 0.8, large effect (14). The ranking of importance of the statements was defined by the highest mean and the smallest SD. Differences between the different European regions and nursing roles categorized into 1) clinical and advanced practice ($n = 31$) and 2) education, research, and management ($n = 32$) were tested using the independent t test. The data analysis was undertaken both in Microsoft Excel software 2010 (Microsoft, Redmond, WA) and IBM SPSS (IBM Statistics for Windows, version 20.0, IBM Corp., Armork, NY) by L.N.T. and J.M.L. Respondents were categorized for analysis by European region using the definition in the End-of-life practices in intensive care units (ETHICUS) study (15).

RESULTS

The e-Delphi study started by inviting 169 PIC nurses across Europe. Of these, 90 nurses agreed to participate and completed round 1. The response rates of consecutive rounds

TABLE 1. Distribution of Pediatric Intensive Care Nursing Respondents From 20 European Countries

Country	European Region	Round 1 ($n = 90$)	Round 2 ($n = 69$)	Round 3 ($n = 64$)
Belgium	Central	3	3	2
Cyprus	Southern	4	2	3
Denmark	Northern	2	1	1
Finland	Northern	3	3	2
France	Central	3	2	2
Germany	Central	8	6	7
Greece	Southern	4	4	2
Iceland	Northern	3	0	1
Ireland	Northern	6	6	5
Italy	Southern	11	7	7
Netherlands	Northern	8	6	4
Norway	Northern	1	1	0
Portugal	Southern	6	5	6
Romania	Central	1	0	0
Serbia	Central	4	3	4
Slovenia	Central	2	2	1
Sweden	Northern	4	3	3
Switzerland	Central	4	4	4
Turkey	Southern	3	2	2
United Kingdom	Northern	10	9	8

TABLE 2. Respondent Demographics

Demographics	Round 1 ($n = 90$)	Round 2 ($n = 69$)	Round 3 ($n = 64$)
Female (%)	74	75	71
Age (yr); mean (SD)	41 (9)	41 (9)	41 (9)
PICU experience (yr); mean (SD)	14 (8)	13 (8)	13 (8)
Main nursing role (%)			
Clinical	43	45	42
Education	14	21	17
Research	10	9	10
Management	20	22	19
Advanced practice	3	3	3
Missing	10	0	9
Unit type (%)			
PICU	74	65	59
PICU-neonatal ICU combined	17	32	29
Adult ICU	4	3	4
Missing	5	0	8

were as follows: round 2, 69 of 90 (77%) and round 3, 64 of 90 (71%). The respondents were PIC clinical nurses, managers, educators, and researchers from 20 European countries (**Table 1**). A variance was observed in the number of nurses and roles per country as some countries had no education or research nurses. In two countries, Italy and United Kingdom, more than eight nurses started in round 1. The national lead contact often provided names of more than eight nurses per country. Although we did randomly select eight nurses (by role/unit variation), we did over recruit to 10–12, as we found that in most countries this only generated eight responses; however, in two countries (United Kingdom and Italy), we got more than eight responses. The characteristics of the respondents remained similar over the three rounds (**Table 2**). There were a small percentage of nurses who worked within adult ICUs but whom cared for children and identified themselves as primarily PIC nurses. This reflects the way the PIC services are delivered across some European countries and thus we included these nurses.

There were 357 suggestions for research topics provided by 90 nurses in round 1, and content analysis produced 47 research statements in nine research domains. Some research statements did fit into different domains; however, if there were a large number of statements related to one topic area (e.g., pain and sedation), then we agreed this was important to make this a domain of its own. Of the 47 statements, they ranged from the lowest mean score of 3.91 (SD, 1.70) to 5.40 (SD, 1.01) in both rounds (**Table 3**). The nine priority research domains identified were as follows: 1) clinical nursing care practices (mean, 5.17; SD, 1.05), 2) pain and sedation (mean, 5.11; SD, 1.04), 3) quality and safety (mean, 4.85; SD, 1.06), 4) respiratory and mechanical ventilation (mean, 4.79; SD, 1.07), 5) child- and family-centered care (mean, 4.68; SD, 1.16), 6) ethics (mean, 4.57; SD, 1.02), 7) professional issues in nursing (mean, 4.54; SD, 1.11), 8) hemodynamics and resuscitation (mean, 4.37; SD, 1.13), and 9) trauma and neurocritical care (mean, 4.09; SD, 1.27). The mean scores did not change significantly between rounds 2 and 3.

TABLE 3. Results of Domains and Statements of Round 2 and Round 3

Domains and Statements	Round 2 Mean (SD)	Round 3 Mean (SD)	Cohen's d	p
1. Clinical nursing care practices	4.98 (1.20)	5.17 (1.05)	−0.16	0.25
Identifying and implementing strategies to improve evidence-based nursing practice	5.05 (1.15)	5.03 (1.07)	0.01	0.36
Evaluating the impact of noise and light on the critically ill child	4.77 (1.05)	4.61 (1.13)	0.14	0.44
Interventions to improve skin and wound care	4.40 (1.03)	4.25 (0.93)	0.15	0.68
Interventions to prevent pressure ulcers	4.30 (1.08)	4.18 (0.92)	0.11	0.57
Interventions to optimize the developmental care of neonates	4.16 (1.34)	4.16 (1.20)	0.00	0.53
Interventions to improve oral care in PICU	4.20 (1.18)	4.06 (1.15)	0.12	0.65
Optimizing nutritional and metabolic requirements in critically ill children	4.13 (1.14)	4.06 (1.12)	0.06	0.08
Identifying best practices in enteral feeding	4.13 (1.16)	3.96 (1.24)	0.14	0.21
Nursing management of the postoperative patient	4.17 (1.14)	3.91 (1.70)	0.17	0.93
2. Pain and sedation	5.05 (1.10)	5.11 (1.04)	−0.05	0.81
Effective interventions to prevent or reduce pain	5.29 (0.84)	5.15 (1.04)	0.14	0.45
Identifying best practices for preventing analgesia and sedation withdrawal	5.07 (0.99)	4.96 (1.18)	0.10	0.48
Identifying best practices for sedation assessment	5.13 (1.02)	4.95 (1.04)	0.17	0.26
Effectiveness of sedation strategies	4.88 (1.08)	4.82 (1.01)	0.05	0.50
Identifying best practices for pain assessment	4.95 (1.37)	4.53 (1.24)	0.32	0.10
Assessment scales for delirium	4.63 (1.47)	4.23 (1.33)	0.28	0.05
3. Quality and safety	4.88 (1.03)	4.85 (1.06)	0.02	0.92
Interventions to reduce healthcare-associated infections	5.02 (1.10)	5.11 (1.04)	−0.08	0.58
Improving healthcare team communication and collaboration	5.02 (1.11)	4.96 (1.02)	0.05	0.87
Identifying and improving the quality indicators for PICU nursing	5.05 (1.05)	4.95 (1.07)	0.09	0.80
Improving safety, preventing harm, and managing adverse events	4.85 (1.06)	4.62 (1.11)	0.21	0.14

(*Continued*)

TABLE 3. (*Continued*). Results of Domains and Statements of Round 2 and Round 3

Domains and Statements	Round 2 Mean (SD)	Round 3 Mean (SD)	Cohen's *d*	*p*
4. Respiratory and mechanical ventilation	4.85 (1.01)	4.79 (1.07)	0.05	0.56
Identifying best practices in weaning from mechanical ventilation	4.88 (1.16)	4.91 (1.04)	−0.02	0.75
Identifying best practices in delivering noninvasive ventilation	4.89 (1.22)	4.77 (0.98)	0.10	0.28
Interventions to improve mechanical ventilation	4.64 (1.09)	4.64 (1.02)	0.00	0.55
5. Child- and family-centered care	4.72 (1.18)	4.68 (1.16)	0.03	1.00
Strategies to support parents and siblings of critically ill children	5.19 (0.85)	4.90 (0.92)	0.32	0.10
The role and involvement of parents in the care of their child on PICU	4.85 (1.22)	4.85 (1.04)	0.00	0.81
Psychosocial outcome and quality of life of the child and family after PICU admission	4.77 (1.17)	4.79 (1.06)	−0.01	0.87
Therapeutic communication between PICU nurses and PIC children	4.93 (1.02)	4.71 (1.08)	0.20	0.39
Identifying best practices to improve family-centered care	4.61 (1.27)	4.61 (1.19)	0.00	0.82
Improving the physical outcomes of the child after PICU admission	4.56 (1.25)	4.58 (1.19)	−0.01	0.90
Improving parental presence and visitation on the PICU	4.59 (1.23)	4.58 (1.23)	0.01	1.00
Identifying the needs and experiences of the child, parents, and family	4.73 (1.13)	4.53 (0.99)	0.18	0.15
Identifying the needs of the chronically ill child on PICU	4.80 (1.18)	4.52 (1.14)	0.24	0.11
6. Ethics	4.53 (1.29)	4.57 (1.02)	−0.03	0.62
Improving end-of-life and palliative care for children and their family	5.23 (0.93)	5.26 (1.01)	−0.03	0.93
Communication and decision making in forgoing or sustaining treatment	5.17 (0.96)	5.20 (0.98)	−0.03	0.85
Ethical dilemmas related to cost and quality-of-life issues	4.74 (1.25)	4.56 (1.19)	0.14	0.68
7. Professional issues in PIC nursing	4.62 (1.28)	4.54 (1.11)	0.06	0.89
The effect of continuous education and training methods on nursing competence and knowledge	5.40 (1.00)	5.12 (0.96)	0.02	0.61
Identifying appropriate nurse staffing levels and recruitment strategies	4.98 (1.13)	5.03 (0.90)	−0.04	0.71
Education and training to prepare new nurses to work in PIC	4.91 (1.22)	4.91 (1.12)	0.00	0.08
Reducing stress and burnout in PIC nurses	4.85 (1.25)	4.88 (1.14)	−0.02	0.26
Identifying the scope of the PIC nursing role and responsibilities	4.80 (1.14)	4.59 (1.15)	0.18	0.81
The impact of the changing workforce (e.g., advanced nurse practitioner roles) on patient outcomes	4.71 (1.11)	4.54 (0.96)	0.16	0.32
8. Hemodynamics and resuscitation	4.60 (1.26)	4.37 (1.13)	0.19	0.15
Advanced life support practices to improve patient outcomes	4.91 (1.08)	4.77 (1.12)	0.12	0.33
The effect of nurse-driven protocols to wean inotropes	4.46 (1.44)	4.62 (1.05)	−0.12	0.65
Interventions to optimize the care of invasive catheters	4.52 (1.21)	4.54 (0.89)	−0.01	0.73
Improving the nursing care of the child on extracorporeal life support	4.37 (1.36)	4.30 (1.33)	0.05	0.36
9. Trauma and neurocritical care	4.24 (1.20)	4.09 (1.27)	0.12	0.34
Interventions to optimize the nursing care of the child with traumatic brain injury	4.78 (1.01)	4.60 (1.08)	0.17	0.22
Nursing care to ensure effective therapeutic hypothermia to improve patient outcomes	4.76 (1.12)	4.51 (0.95)	0.24	0.14
Preparing for major incidents and optimizing trauma care	4.32 (1.33)	4.29 (1.17)	0.02	0.40

PIC = pediatric intensive care.

In round 3, seven statements achieved a mean score of greater than or equal to 5.0. These related to end-of-life care, communication and decision making around forgoing and sustaining treatment, interventions to reduce pain, education and competencies, reducing healthcare-associated infections, nurse staffing levels, and implementing evidence-based practice (**Table 4**). The top 20 research statements are presented in Table 4. In only one domain, pain and sedation, there was a statistically significant difference in the ranking of round 3 research domains between different nursing roles ($p = 0.03$) with research/education and management nurses ranking this higher (mean score, 5.4 vs 4.8) than clinical nurses. In this domain, one of the research statements, "effectiveness of sedation strategies," was significantly different ($p = 0.04$) with research/education and management nurses rating this statement higher than clinical nurses (mean score, 5.09 vs 4.55). There were no statistically significant differences between the three European regions (**Table 5**).

DISCUSSION

This is the first study to identify PIC nursing research priorities within Europe. European PIC nurses have prioritized fundamental clinical nursing care issues for critically ill children and in supporting their families within and beyond the PICU. Organizational and professional issues were also identified as priority research areas. These priorities are not dissimilar to many of the research priorities previously identified in intensive care nursing (1, 2, 16–19). Studies on research priorities in intensive care have been conducted by several critical care nursing organizations around the world.

Most studies have used a form of expert consensus method to identify and generate the research priorities. Most recently, a study in adult critical care across Europe identified research priorities relating to organizational aspects of clinical practice and organ-system support (1). In 2011, the Australian College of Critical Care Nurses conducted a Delphi study on research PIC nursing priorities in Australia and New Zealand (18). They found that the top priorities included patient issues related to neurological care, pain/sedation/comfort, best practice at the end of life, and ventilation strategies, as well as two priorities related to professional issues about nurses' stress/burnout and professional development needs. In a Delphi study undertaken with nurses from the Hong Kong Critical Care Nursing Association in 2003, priorities were mostly related to patient and family issues such as the use of therapeutic touch to relieve pain and anxiety, reducing fatigue in weaning, reducing family stress, and family participation in patient care (17).

TABLE 4. Top 20 Ranking Pediatric Intensive Care Nursing Research Statements

	Research Statement	Mean (sd)
1	Improving end-of-life and palliative care for children and their families	5.26 (1.01)
2	Communicating and decision making around forgoing and sustaining treatment	5.20 (0.98)
3	Effective interventions to reduce and prevent pain	5.15 (1.04)
4	The effect of continuous education and training methods on nursing competence and knowledge	5.12 (0.96)
5	Interventions to reduce healthcare-associated infections	5.11 (1.04)
6	Identifying appropriate nurse staffing levels and recruitment strategies	5.03 (0.90)
7	Identifying and implementing strategies to improve evidence-based nursing practice	5.03 (1.07)
8	Improving healthcare team communication	4.96 (1.04)
9	Identifying best practices for preventing analgesia and sedation withdrawal	4.96 (1.18)
10	Identifying best practices in sedation assessment	4.95 (1.04)
11	Identifying and improving quality indicators for PIC nursing	4.95 (1.07)
12	Identifying best practices in weaning mechanical ventilation	4.91 (1.04)
13	Education and training to prepare new nurses to work in PIC	4.91 (1.12)
14	Strategies to support parents and siblings of critically ill children	4.90 (0.92)
15	Reducing stress and burnout in PIC nurses	4.88 (1.14)
16	The role and involvement of parents in the care of the critically ill child	4.85 (1.04)
17	Identifying effective sedation strategies	4.82 (1.01)
18	Psychosocial outcome and quality of life of the child and family after PIC	4.79 (1.06)
19	Identifying best practices in noninvasive ventilation	4.77 (0.98)
20	Advanced life support practices to improve patient outcomes	4.77 (1.12)

PIC = pediatric intensive care.

TABLE 5. Comparison of Research Domains per European Region, Round 3

Research Domain	Overall Mean (SD) n = 64	Northern Europe Mean (SD) n = 25	Central Europe Mean (SD) n = 19	Southern Europe Mean (SD) n = 20
Clinical nursing care practices	5.17 (1.05)	5.00 (1.25)	5.12 (1.02)	5.44 (0.85)
Pain and sedation	5.11 (1.04)	4.84 (1.40)	5.37 (0.62)	5.16 (0.78)
Quality and safety	4.85 (1.06)	5.00 (1.22)	4.93 (1.06)	4.61 (0.84)
Respiratory and mechanical ventilation	4.79 (1.07)	4.72 (1.10)	4.93 (1.10)	5.05 (0.93)
Child- and family-centered care	4.68 (1.16)	4.24 (1.20)	4.68 (1.35)	5.05 (0.80)
Ethics	4.57 (1.02)	4.60 (1.22)	4.68 (1.01)	4.61 (0.77)
Professional issues in pediatric intensive care nursing	4.54 (1.11)	4.44 (1.04)	4.43 (1.03)	4.94 (0.99)
Hemodynamics and resuscitation	4.37 (1.13)	4.44 (1.15)	4.68 (1.07)	4.33 (1.08)
Trauma and neurocritical care	4.09 (1.27)	4.04 (1.30)	4.12 (1.20)	4.27 (1.36)

The top research priorities as identified in our study are related to end-of-life practices, pain management, nursing education and competencies, reducing healthcare-associated infections, staffing levels, and improving evidence-based nursing practice. Most of these areas have already been under investigation by several PIC nurse researchers. These researchers operate in a PIC research group or even work on international level with other PICUs. A multicenter study on end-of-life practices has been active previously by the support of ESPNIC and identified the decision-making practices to forgo life-sustaining treatments (20–22). Another group of nurse researchers is active in pain and sedation management. They developed several scales to assess pain and sedation (23–25). This may explain the higher ranking of pain and sedation, by the nonclinical group of nurses, possibly the influence of the nurse researchers. Other nurse researchers have started to work on staffing levels and education (26, 27). The detailed statements and their priority listing of our study might motivate these nurse researchers to continue their work and provide in-depth information for future research. To maximize the efficiency and effectiveness of the PIC nursing research, it might be advocated to establish more links with other PIC centers and collaboratively work on several areas of PIC nursing to increase the body of knowledge on a scientific level. Therefore, the development of European PIC nursing research priorities may facilitate the process of clinical research and assist in developing an agenda for PIC nursing research. Some, however, have argued that Delphi studies identifying research priorities have had little or no impact on actual outputs in these areas, thus need to only be undertaken within the context of their intended use (28). The setting of research priorities is however widely advocated for assisting researchers and aligning funding with European evidence needs (8). Our study was undertaken in conjunction with the society of ESPNIC and within this, the nurse science section. The results of this study are intended to drive the nursing research agenda of this society, producing a future roadmap for this section (29). As with all research priority studies, however, these results reflect the social, political, and economic culture of the European healthcare environment in 2012 and may change. Future research should examine patient's and parent's perspectives on research priorities.

This study has limitations that warrant acknowledgment. There were a variable number of nurses per country and some European countries were not represented, whereas others were overrepresented. Every effort was made to have a convenience sample representing all European countries. In comparison, an adult critical care Delphi study only managed to cover 20 European countries (1). This was, despite the involvement of the European federation of Critical Care Nursing association, a network of 25 national critical care societies. In our study, we had to rely on individual members as ESPNIC does not yet have established a network of societies. A bias within this study is also that, given the variation in how pediatric and neonatal intensive care is delivered within Europe, some PICUs are combined with neonatal intensive care. Therefore, there may be some "contamination" of the PIC nursing study participants with that of neonatal intensive care nurses. However, where possible, nurses identifying themselves as only "neonatal" nurses were excluded in this survey. A further limitation was that this study only consulted PIC nurses about their research priorities and did not consult service users (parents or older children who had experience of PIC). The strength of the study lies in the electronic nature of the study. This enabled rapid responses and faster data analysis and reduced the costs. Others have recently reported the benefits of e-Delphi studies (8). Additionally, the local translations of the survey meant that it did not restrict it to only English-speaking nurses, which has been a limitation of other studies (1). Our lack of back translation for round 1 may also be a limitation; however, any unclear statements were sent back to the country lead for clarification. A final limitation

was that when comparing differences between nursing roles, the groups were not equal in number and many countries did not have research/science nurses and this may have introduced bias into the findings. Because of the necessity of grouping the nursing roles in two groups, clinical and nonclinical, this may have impacted on our findings.

CONCLUSIONS

Delphi studies focusing on establishing research priorities are a useful way to initiate research programs. This was a key driver for the ESPNIC nurse science section. Nine PIC nursing priority research domains were identified. The results of this study allow nurse researchers within Europe to establish and review their PIC nursing research agenda. This will encourage collaborative initiatives for nursing research, as well defining the research topics that should be financially supported. With the increasing importance of empowering children and parents in healthcare decisions, further research should investigate the perspectives of children and parents in research priorities.

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