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European neonatal intensive care nursing research priorities: an e-Delphi study

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ABSTRACT

Objective: This study aimed to identify and prioritise neonatal intensive care nursing research topics across Europe using an e-Delphi technique.

Design: An electronic Delphi technique with three questionnaire rounds was performed. Qualitative responses of round one were analysed by content analysis and research statements were generated to be ranged on importance on a scale of 1-6 (not important to most important).

Setting: Neonatal Intensive Care Units (NICU) in 17 European countries.

Population: NICU clinical nurses, managers, educators and researchers (n=75).

Intervention: none

Main outcome measures: A list of 43 research statements in eight domains.

Results: The six highest ranking statements (≥ 5.0 mean score) were related to prevention and reduction of pain (mean 5.49; SD 1.07), medication errors (mean 5.20; SD 1.13), end-of-life care (mean 5.05; SD 1.18), needs of parents and family (mean 5.04; SD 1.23), implementing evidence into nursing practice (mean 5.02; SD 1.03), and pain assessment (mean 5.02; SD 1.11). The research domains were prioritized and were in ranking: 1) pain and stress; 2) family-centred care; 3) clinical nursing care practices; 4) quality and safety; 5) ethics; 6) respiratory and ventilation; 7) infection and inflammation; 8) professional issues in neonatal intensive care nursing.

Conclusions: The results of this study might support in developing a nursing research strategy for the nursing section of the European Society of Paediatric and Neonatal Intensive Care (ESPNIC). In addition, this may promote more European researcher collaboratives for neonatal nursing research.

INTRODUCTION

Neonatal intensive care nursing needs strategic directions and a common goal for strengthening and prioritizing their nursing practice. The WHO formulated the goals of improved health outcomes through the provision of competent, culturally sensitive, and evidence-based neonatal nursing and midwifery services, [1]. A way to achieve these goals is through research initiatives. In addition, nurses, midwives and parents can be involved in this process to meet their needs, and to encourage adhering to the cornerstone of collaborative action.

If researchers do not know about the most important problems affecting neonatal intensive care (as described by NICU nurses across Europe), then research may be directed in non-priority areas. Furthermore research priorities are constantly dynamic entities that change over time and differ culturally [2]. It is therefore crucial to determine neonatal intensive care nursing research priorities within Europe.

The European Society of Paediatric and Neonatal Intensive Care (ESPNIC) is a community of paediatric and neonatal intensive care physicians and nurses who share a common goal of promoting and advancing care through research and education, [3]. ESPNIC has restructured and established new themed sections to support these activities, [2]. The nurse science section intends to establish a Neonatal Intensive Care Unit (NICU) nursing research agenda within Europe and to develop a plan for future collaborative NICU nursing research activities. To achieve this, our present explorative and descriptive study aimed to identify NICU nursing research topics and to prioritise the identified topics as defined by European NICU nurses.

METHODS

We performed a modified three-round electronic Delphi study. The e-Delphi technique is a structured process distributing a series of questionnaires during several rounds to gather information and set priorities or gain consensus regarding a specific issue, [4, 5]. The Delphi

technique allows the inclusion of a large number of individuals across diverse geographical locations without them physically meeting. To date, the Delphi technique is often conducted via online web surveys, offering a number of advantages as they are quick to set up, relatively low cost and providing high level of data security, [6]. Systematic feedback, structured information flow, and iteration and anonymity are the main characteristics of a Delphi technique, [7].

Systematic feedback of panel members' responses takes place in between rounds by informing individual experts about the group opinions. Iteration takes place by presenting feedback via a certain number of rounds, [5]. The performed Delphi method is shown in Figure 1.

Participants

The study sample included NICU clinical nurses, managers, educators and researchers from 17 European countries. It was aimed to generate a representative sample of eight nurses with various positions per country (two clinical practice neonatal nurses, two nurses in NICU education, two NICU nurse managers and two neonatal research nurses). The inclusion criteria was that nurses needed to work in a NICU setting, no minimal years of experience was defined. Exclusion criteria were nurses working in paediatric wards, paediatric intensive care and not taking care of critically ill newborns and infants on a regular basis. Contact details (names and email addresses only) were obtained through the ESPNIC nursing membership registry, through professional contacts and by searching the worldwide web. If less than eight nurses per country were identified, we asked nurses to provide contact details of colleagues in their country to reach the pre-determined number of eight nurses per country. If we received more than eight responses per country, all respondents would be invited as we did not want to exclude motivated participants who had already been contacted by a country lead. The recruitment strategy elicited 80 potential respondents from 17 European countries at the beginning, of which 75 (94%) responded to round one. Participants were informed about the voluntary nature of the study, the need for on-going participation in three Delphi rounds and informed consent was assumed by completing the questionnaires. Personal data characteristics was retained to

determine response rates and to link findings to nursing roles and countries; with all information stored on a secure password protected database. To maximise the response rate and decrease possible attrition between the three Delphi rounds, the consented 75 nurses received the questionnaire of all three rounds and three reminders per round.

Questionnaire

The e-Delphi study used three questionnaires for the three consecutive rounds. The first round was a qualitative questionnaire with one question to list a minimum of three and maximum of five priority research topics for NICU nursing. Two researchers (JMW and AvdH), independently performed content analysis on the answers, any disagreement was discussed and agreement was reached through discussion. This was then checked for validity by two other researchers (LNT and JML). The research statements were clustered into thematic domains according to the content and the number of suggestions using an analysis framework,[8, 9]. The content analysis generated a list of research statements and domains for round two. If the number of research statements relating to a specific topic was high we agreed this warranted a domain area of its own. The choice to add statements regarding parent education, discharge planning, breastfeeding and kangaroo mother care to the domain clinical nursing care practices instead of the domain family centred care is based on the fact that in many countries this is part of daily clinical care practice whereas family centred care is not yet uniformly practised across Europe. For round two of the study, participants were asked to rank these statements and domains on a 6-point scale (1 not important to 6 extremely important). In round three, the questionnaire contained the same research statements and domains including the group mean scores of the previous round per statement and domain. Data collection of the three rounds e-Delphi questionnaires were completed between September 2012 and February 2013.

Statistical Analysis

Mean and standard deviations (SD) of the round two and three responses were calculated. In the final analysis of round three, the statements were ranked on importance by calculating the

means and SD. Cohen's d was used to complement the t test by providing information on the relative magnitude of the effect size comparing the responses between round two and round three. The interpretation of the Cohen's d (standardised mean difference) is: 0.2 small effect, 0.5 medium effect and >0.8 large effect, [10]. The paired t test was used to calculate difference between round two and round three. Significance level was set at < 0.05. The importance of the statements was determined by the highest mean and the smallest standard deviation. A lead individual NICU nurse expert per country provided the translation of the questionnaires. A forward translation, with a double check with the translators in case of lack of clarity, was used. European regions were categorised for analysis using the definition in the ETHICUS study, [11][1]. SurveyMonkey™ Gold version was selected to administer the e-Delphi questionnaires and the data analysis was performed using IBM SPSS version 20 software. Ethical approval was granted from the Institutional Review Board approval of the University Medical Centre Utrecht, The Netherlands (protocol number 12/147).

RESULTS

Of the 80 nurses invited to participate, 75 (94%) nurses from 17 European countries agreed to participate. The dispersion of the participants varied per country with one participating NICU nurse from Finland, Greece, and Portugal to 10 NICU nurses in the UK. The response rates of consecutive rounds were: round two 68/75 (90.6%) and round three: 53/75 (70.6%) (Fig 1). Variation was seen in the number of nurses and roles per country because some countries had no nursing roles in NICU education or research. In the UK more than eight nurses started in round one. This was because our over recruitment strategy, all invited NICU nurses actually responded and participated. We did not want to exclude these motivated nurses who had already been contacted by the country lead. The characteristics of the respondents remained similar over the three rounds (Table 1).

Totally, 285 research topics were provided in round one and content analysis revealed 43 research statements divided in eight domains. The 43 statements ranged from the lowest mean score of 4.05 (SD 1.21) to the highest mean score 5.18 (SD 1.19) in rounds two and three (Table 3). The eight research domains identified were: pain and stress (mean 5.18; SD 1.19), family centred care (mean 4.84; SD 1.29), clinical nursing care practices (mean 4.82; SD 1.16), quality and safety (mean 4.78; SD 1.15), ethics (mean 4.64; SD 1.16), respiratory and ventilation (mean 4.44; SD 1.10), infection and inflammation (mean 4.16; SD 1.24), and professional issues in Neonatal Intensive Care nursing (mean 4.05; SD 1.21). There was no significant change in mean scores on domain level between round two and round three (Table 2).

On the level of individual statements, five statements, related to environmental factors and neonatal development, neonatal temperature, palliative care pathways, sepsis management, and nursing education and training scored in round three statistically significant lower compared to round two. One statement on identifying interventions to implement evidence into practice scored statistically significant higher in round three compared to round two (Table 2). In round three, six statements reached a mean score of ≥ 5.0 . These were related to interventions to prevent or reduce pain, best practice for pain assessment, reducing medication errors, end of life care, supporting the needs of parents and family members and implementing evidence based practice (Table 3).

No significant differences were found in the ranking of research priorities between European regions (Table 4).

DISCUSSION

Until now NICU research priorities had never been identified. European NICU nurses have prioritised pain and stress as well as fundamental clinical nursing care issues for critically ill newborns and their families (family centred care) within NICU nursing practice. Quality and

safety, ethics, respiratory and ventilation, infection and inflammation and organisational and professional issues were also identified as priority research areas. Other studies of research priorities in critical care nursing have identified similar findings, [12-18]. Many of these have also used Delphi-type techniques to generate research priorities. A European adult intensive care study identified research priorities that related to organisational aspects of clinical intensive care practice and organ-system support, [16]. In an Australian and New Zealand Delphi study of PICU nursing research priorities, 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, [14]. In a recent study undertaken with PICU nurses from Europe in 2013, top priorities were related to issues such as end-of-life care, sustaining treatment, prevention of pain, reducing healthcare-associated infections, but also education, staffing and implementing evidence into practice, [13].

Our study showed that on the level of individual statements, five statements, related to environmental factors and neonatal development, scored in round 3 statistically significant lower compared to round two. The top nursing research priorities identified in our study relate to prevention and reduction of pain, medication errors, end-of-life care, the needs of parents and family, implementing evidence into nursing practice and pain assessment. Some individual NICU nurse researchers are already conducting research in several of these research areas, [19-25]. They either work nationally or internationally, such as a European study on end-of-life decision making practices supported by ESPNIC or a national study on end of life practices in NICU, [19, 20]. Other nurse researchers are active in pain and stress management in neonates [21-23, 26-31]. Other areas of active NICU nursing research are in staffing levels, education, parents and clinical issues, [30-31].

The research priorities generated in this study do not necessarily reflect a lack of research in these areas, but rather may represent a lack of effective implementation of research

evidence into clinical nursing practice. Or indeed that even despite the research conducted in NICU nursing, nurses still believe more research is needed. This is the case for a number of our identified research priorities. Systematic reviews are available on breast milk, venepuncture, oral sucrose and glucose, kangaroo care and non-pharmacological pain management in NICU, [26-31]. Yet, this evidence may not have been translated into nursing practice. The research priorities identified in our study could be associated with the lack of interventions to implement evidence into NICU nursing practice. A statement related to this shortcoming scored statistically significant higher in round three compared to round two.

The findings of this study may promote neonatal nurse researchers across Europe to collaborate more on priority areas and establish new collaboratives focussing on these priority topics. There is some concern that Delphi studies identifying research priorities have not impacted on actual research outputs, but if used within a framework supported by an organisation such as ESPNIC, they are more likely to be effective, [32]. Establishing research priorities is advocated for helping researchers gain research funding aligned with European evidence needs, [1, 4, 27, 28, 33, 34]. The results of this study are intended to develop a European nursing research agenda and a future roadmap with the support of ESPNIC, [13]. These priorities however are dynamic and will change over time, thus needs revisiting in the future.

Some limitations of our study need to be recognised. The first is that we did not examine NICU parent's perspectives on NICU research priorities or indeed other healthcare professionals involved in the care of these infants. Secondly, there was considerable variation in the number of nurses per country and some European countries were not represented. All efforts were made to have a sample representing all European countries; however this was not achievable for all countries. Another potential bias within this study due to the way that NICU is delivered within Europe, some NICUs are combined with paediatric intensive care. Therefore there may be some 'overlapping' of the NICU nursing study participants with that of paediatric

intensive care nurses. Finally, using the ESPNIC registry as a starting point could imply that the results reflect the opinion of the ESPNIC members. However, the experts were asked to identify nurses and email addresses in various roles and across various units and participators in this study were asked to provide their opinion based on their own NICU experience and expertise. In addition, we were not able to analyse research priorities by nursing role because some countries did not have research nurses or education nursing roles in NICUs and thus analysing only small numbers of these respondents would introduced bias into the countries that have these roles.

The main strength of this e-delphi study is that it was electronic in nature. Electronic surveys enable more rapid responses, more rapid data analysis, less attrition between survey rounds and reduces costs, [6]. Furthermore, having 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, [16].

A primary goal for the ESPNIC nurse science section is initiating research programs. It goes without saying that a Delphi study focussing on establishing research priorities is a good starting point to reach that goal. In conclusion, eight NICU nursing priority research domains were identified. The findings of this study may promote neonatal nurse researchers across Europe to collaborate more on priority areas and establish new research collaboratives focussing on these priority topics, which in turn may assist in achieving research funding. And including parents in research teams is not an option but rather a must to allow empowerment and involvement of parents in all health care activities.

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Contribution of Authors:

Joke M. Wielenga RN, PhD: contributed to the development of the research protocol, data collection, data analysis and interpretation; writing the first draft of the manuscript; approved the final version for submission; agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Lyvonne N. Tume RN, PhD: contributed to the development of the research protocol, data collection, data analysis and interpretation; revising drafts of the manuscript; approved the final version for submission; agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Jos M. Latour RN, PhD: contributed to the development of the research protocol, data collection, data analysis and interpretation; revising drafts of the manuscript; approved the final version for submission; agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Agnes van den Hoogen RN, PhD: contributed to the development of the research protocol and applied for Ethical approval, data collection, data analysis and interpretation; revising drafts of the manuscript; approved the final version for submission; agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

What is already known on this topic

- NICU nursing research priorities had never been identified

What this study adds

- Neonatal intensive care nurses have identified fundamental clinical nursing care issues as a priority research area.
- The identified neonatal intensive care nursing research priorities provide a roadmap for future collaborative research efforts.

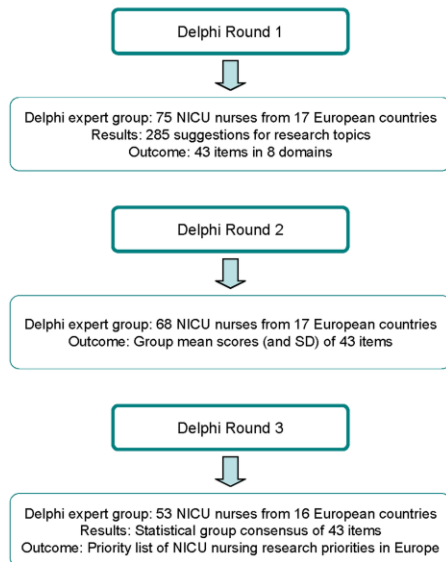


Fig 1

NICU Delphi Study Flowchart

SD Standard deviation; NICU Neonatal Intensive Care Unit

Table 1 Respondent demographics

| | Round 1 <i>n</i> =75 | Round 2 <i>n</i> =68 | Round 3 <i>n</i> =53 |
|---------------------------------------|-------------------------|-------------------------|-------------------------|
| Female (%) | 87.7 | 72.1 | 75.5 |
| Age (years); mean (SD) | 44.9 (10.1) | 44.0 (9.0) | 45.1 (9.5) |
| NICU experience (years); mean (SD) | 17.7 (9.0) | 17.7 (7.8) | 18.1 (7.9) |
| Main nursing role | | | |
| Clinical (%) | 34.2 | 27.9 | 28.3 |
| Education (%) | 19.2 | 26.5 | 24.5 |
| Research (%) | 24.7 | 19.1 | 22.6 |
| Management (%) | 20.5 | 20.6 | 18.9 |
| Missing (%) | 1.4 | 5.9 | 5.7 |
| Unit type | | | |
| NICU (%) | 67.1 | 52.9 | 64.2 |
| PICU-NICU combined (%) | 21.9 | 16.2 | 17.0 |
| Missing (%) | 11.0 | 30.9 | 18.9 |

SD Standard deviation; NICU Neonatal Intensive Care Unit;
PICU Paediatric Intensive Care Unit

Table 2 Results of domains and statements of Round 2 and Round 3

| Domains and Statements | Round 2 mean (SD) | Round 3 mean (SD) | Cohen's <i>d</i> | <i>P</i> value |
|--|----------------------|----------------------|------------------|----------------|
| 1. Pain and Stress | 4.96 (1.26) | 5.18 (1.19) | -0.18 | 0.19 |
| Identifying effective interventions to prevent or reduce pain or stress | 5.11 (1.52) | 5.49 (1.07) | -0.29 | 0.21 |
| Identifying best practices for pain assessment | 5.07 (1.13) | 5.02 (1.11) | 0.05 | 0.83 |
| Identifying pain and/or stress guidelines | 4.84 (1.02) | 4.76 (1.05) | 0.08 | 0.82 |
| 2. Family Centred Care | 4.86 (1.44) | 4.84 (1.29) | 0.10 | 0.76 |
| Identifying strategies to support the needs of parents and family members | 5.05 (1.13) | 5.04 (1.23) | 0.01 | 0.89 |
| Identifying and evaluating strategies to support parental attachment | 4.94 (1.09) | 4.85 (1.37) | 0.07 | 0.56 |
| Identifying best practices for the implementation of family centred care | 4.69 (1.25) | 4.80 (1.21) | -0.09 | 0.91 |
| Evaluating the role and involvement of parents in the care of their infant | 4.83 (1.20) | 4.78 (1.20) | 0.04 | 0.43 |
| Evaluating developmental care | 4.76 (1.06) | 4.75 (1.14) | 0.01 | 1.00 |
| Evaluating the effect of environmental factors on neonatal development | 4.81 (1.09) | 4.65 (1.11) | 0.15 | 0.03 |
| Evaluating individual care aspects (sleep, positioning, body language) of developmental care | 4.66 (1.19) | 4.60 (1.15) | 0.06 | 0.32 |
| Evaluating the effectiveness of NIDCAP and NIDCAP strategies | 4.61 (1.16) | 4.31 (1.18) | 0.26 | 0.09 |
| 3. Clinical Nursing Care Practices | 4.71 (1.39) | 4.82 (1.16) | -0.09 | 0.47 |
| Improving the care and parental education of chronically ill neonates requiring long term care | 4.77 (1.30) | 4.76 (1.22) | 0.01 | 0.94 |
| Nursing management of very low birth weight infants | 4.53 (1.32) | 4.75 (1.19) | -0.18 | 0.07 |
| Improving nutrition in pre-term and sick term infants | 4.74 (1.33) | 4.67 (1.19) | 0.06 | 0.88 |
| Identifying best practice in the management of invasive lines and catheters | 5.02 (1.09) | 4.65 (1.16) | 0.33 | 0.08 |
| Identifying best practices in enteral feeding | 4.38 (1.15) | 4.60 (1.20) | -0.19 | 0.20 |
| Identifying best practices breastfeeding | 4.20 (1.23) | 4.53 (1.10) | -0.28 | 0.08 |
| Identifying and evaluating interventions to improve skin and wound care in neonates | 4.60 (1.43) | 4.45 (1.21) | -0.14 | 1.00 |

| | | | | |
|---|--------------------|--------------------|--------------|-------------|
| Identifying and implementing best practices in discharge planning | 4.64 (1.30) | 4.45 (1.43) | 0.14 | 0.60 |
| Identifying the best care practices for infants with neurological problems | 4.57 (1.41) | 4.44 (1.12) | 0.10 | 0.72 |
| Improving advanced life support strategies to improve patient outcomes | 4.65 (1.18) | 4.44 (1.12) | 0.18 | 0.46 |
| Identifying the best care practices for surgical infants | 4.45 (1.37) | 4.24 (1.18) | 0.16 | 0.38 |
| Identifying and implementing strategies to promote Kangaroo Mother (skin-to-skin) care | 4.24 (1.27) | 4.20 (1.39) | 0.03 | 0.80 |
| Evaluating strategies for regulation of neonatal temperature | 4.95 (1.18) | 4.13 (1.09) | 0.72 | < 0.01 |
| Evaluating routine nursing care procedures | 4.48 (1.18) | 4.00 (1.37) | 0.38 | 0.17 |
| 4. Quality and Safety | 4.72 (1.33) | 4.78 (1.15) | -0.05 | 0.84 |
| Identifying and evaluating strategies to reduce medication errors | 5.03 (1.05) | 5.20 (1.19) | -0.15 | 0.35 |
| Identifying safe medication administration practices | 4.61 (1.23) | 4.96 (1.19) | -0.29 | 0.07 |
| Improving patient safety and patient outcomes | 4.79 (1.23) | 4.78 (1.03) | 0.01 | 0.74 |
| Improving health care team communication and collaboration | 4.73 (1.17) | 4.78 (1.17) | -0.04 | 0.44 |
| Identifying and implementing a safe working environment for staff | 4.68 (1.11) | 4.36 (1.21) | 0.28 | 0.10 |
| 5. Ethics | 4.44 (1.45) | 4.64 (1.16) | -0.15 | 0.49 |
| Improving end-of-life care for neonates and their families | 4.73 (1.21) | 5.05 (1.18) | -0.27 | 0.14 |
| Exploring the role of parents in ethical decision making | 4.90 (1.27) | 4.95 (1.35) | -0.04 | 0.94 |
| Developing palliative care pathways for neonates | 5.24 (1.04) | 4.78 (1.10) | 0.43 | 0.03 |
| 6. Respiratory and Ventilation | 4.29 (1.44) | 4.44 (1.10) | -0.12 | 0.46 |
| Identifying best practices in the care of non-invasive ventilation in infants | 4.97 (1.07) | 4.85 (1.21) | 0.11 | 0.92 |
| Identifying best practices in the care of the mechanically ventilated infant | 4.92 (1.23) | 4.65 (1.31) | 0.21 | 0.38 |
| 7. Infection and Inflammation | 4.07 (1.54) | 4.16 (1.24) | 0.01 | 0.87 |
| Evaluating infection prevention strategies | 5.11 (1.17) | 4.78 (1.29) | 0.27 | 0.57 |
| Identifying and evaluating interventions to monitor and reduce hospital associated infections | 4.96 (1.19) | 4.71 (1.20) | 0.21 | 0.21 |
| Evaluating sepsis management and care to improve outcomes | 5.05 (1.04) | 4.36 (1.50) | 0.60 | 0.03 |
| 8. Professional Issues in NICU Nursing | 4.14 (1.50) | 4.05 (1.21) | 0.07 | 0.81 |

| | | | | |
|--|-------------|-------------|-------|------|
| Identifying interventions to implement evidence into NICU nursing practice | 4.59 (1.41) | 5.02 (1.03) | -0.35 | 0.03 |
| Identifying strategies to reduce stress and improve performance in NICU nursing | 4.60 (1.30) | 4.85 (1.11) | -0.21 | 0.10 |
| Evaluating nursing education and training strategies | 5.08 (0.83) | 4.64 (1.11) | 0.45 | 0.03 |
| Evaluating the impact of the changing NICU workforce on patient outcomes (Advanced Nurse Practice roles, Physician Assistants etc) | 4.53 (1.26) | 4.55 (1.10) | -0.02 | 0.40 |
| Identifying optimal nurse staffing levels | 5.00 (0.98) | 4.49 (1.25) | 0.45 | 0.10 |

Scoring on a 6-point scale; SD Standard deviation; NIDCAP Newborn Individualized Developmental Care and Assessment Program; NICU Neonatal Intensive Care Unit

Table 3 Top 20 ranking NICU research statements

| Research statement | Mean (SD) |
|---|-------------|
| 1 Identifying effective interventions to prevent or reduce pain or stress | 5.49 (1.07) |
| 2 Identifying and evaluating strategies to reduce medication errors | 5.20 (1.13) |
| 3 Improving end-of-life care for neonates and their families | 5.05 (1.18) |
| 4 Identifying strategies to support the needs of parents and family members | 5.04 (1.23) |
| 5 Identifying interventions to implement evidence into NICU nursing practice | 5.02 (1.03) |
| 6 Identifying best practices for pain assessment | 5.02 (1.11) |
| 7 Identifying safe medication administration practices | 4.96 (1.19) |
| 8 Exploring the role of parents in ethical decision making | 4.95 (1.35) |
| 9 Identifying strategies to reduce stress and improve performance in NICU nursing | 4.85 (1.11) |
| 10 Identifying best practices in the care of non-invasive ventilation in infants | 4.85 (1.21) |
| 11 Identifying and evaluating strategies to support parental attachment | 4.85 (1.37) |
| 12 Identifying best practices for the implementation of family centred care | 4.80 (1.21) |
| 13 Improving patient safety and patient outcomes | 4.78 (1.03) |
| 14 Developing palliative care pathways for neonates | 4.78 (1.10) |
| 15 Improving health care team communication and collaboration | 4.78 (1.17) |
| 16 Evaluating the role and involvement of parents in the care of their | 4.78 (1.20) |
| 17 Evaluating infection prevention strategies | 4.78 (1.29) |
| 18 Identifying pain and/or stress guidelines | 4.76 (1.05) |
| 19 Improving the care and parental education of chronically ill neonates requiring long term care | 4.76 (1.22) |
| 20 Evaluating developmental care | 4.75 (1.14) |

Scoring on a 6-point scale; SD Standard deviation; NICU Neonatal Intensive Care Unit

Table 4 Comparison of Research domains per European region, Round 3

| Research Domain | Overall mean (SD) n=55 | Northern Europe mean (SD) n=27 | Central Europe mean (SD) n=20 | Southern Europe mean (SD) n=8 | P value |
|-------------------------------------|---------------------------|-----------------------------------|----------------------------------|----------------------------------|---------|
| Pain and Stress | 5.18 (1.19) | 5.07 (1.30) | 5.15 (1.23) | 5.62 (0.52) | 0.927 |
| Family Centred Care | 4.84 (1.29) | 4.89 (1.01) | 4.90 (1.33) | 4.50 (2.00) | 0.258 |
| Clinical Nursing Care Practices | 4.82 (1.16) | 4.67 (1.33) | 4.82 (1.16) | 5.13 (0.64) | 0.816 |
| Quality and Safety | 4.78 (1.15) | 4.67 (1.18) | 4.90 (1.07) | 5.38 (0.74) | 0.605 |
| Ethics | 4.64 (1.16) | 4.48 (1.19) | 4.70 (1.26) | 5.00 (0.76) | 0.115 |
| Respiratory and Ventilation | 4.44 (1.10) | 4.15 (0.82) | 4.55 (1.43) | 5.13 (0.64) | 0.082 |
| Infection and Inflammation | 4.16 (1.24) | 4.19 (1.24) | 3.95 (1.32) | 4.63 (1.06) | 0.897 |
| Professional Issues in NICU Nursing | 4.05 (1.21) | 3.85 (1.03) | 4.30 (1.22) | 4.13 (1.73) | 0.159 |

Scoring on a 6-point scale; SD Standard deviation; NICU Neonatal Intensive Care Unit