PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	A comprehensive mapping and nursing-sensitive outcome indicators of developmental care interventions in NICU: A Scoping review protocol
AUTHORS	Héon , Marjolaine; Aita, Marilyn; Lavallée, Andréane; De Clifford-Faugère, Gwenaëlle; Laporte, Geneviève; Boisvert, Annie; Feeley, Nancy

VERSION 1 – REVIEW

REVIEWER	Westrup, Björn Karolinska Institute, Women's and Children's Health
REVIEW RETURNED	03-Feb-2021

GENERAL COMMENTS	Sadly, I have to note that the researchers are not aware of the recent development in the concept of what was formally named Developmental Care but since some years back both in Europe and North America has merged to the more comprehensive concept called Infant- and Family-Centered Developmental Care - IFCDC. a- EFCNI, B. Westrup, and P. Kuhn. European Standards of Care for Newborn Health: Infant- and family-centred developmental care (IFCDC). 2018 December 19, 2020]; Available from: https://newborn-health-standards.org/standards/infant-and-family-centred-care/overview/. b- University of Notre Dame. 2020. 'Developmental Care Standards for Infants in Intensive Care', Accessed December 19. https://nicudesign.nd.edu/nicu-care-standards/. Infant- and family-centred developmental care (IFCDC) is a descriptive term for a framework of newborn care that incorporates the theories and concepts of neurodevelopment, neuro-behaviour, parent-infant interaction, parental involvement, breastfeeding promotion, environmental adaptation, and change of hospital systems. It is based on the leading-edge work of Als (as you refer to) and Brazelton and on the World Association for Infant Mental Health Declaration of Infants' Rights. The core pillars of IFCDC are: sensitive care based on infant behavioral communication and cues gives the infant a voice and is beneficial for brain growth, parent engagement supports parental wellbeing and infant development, and customized adaptations of the NICU environment and hospital system as a whole. The strategies for implementing this approach are based on supporting the unity of infant and parents, i.e. family access and integration into all care, early bonding, shared-decision-making, and parental involvement as the primary caregivers. The practical

	implementation is assured by early and continuous skin-to-skin contact between mother or father and the newborn infant, as well as by the promotion and support of breastfeeding. Sensory and environmental expectations of the newborn infant are paramount, since early sensory experiences have been shown to have significant impact on neurodevelopment. The model, as the authors point out, advocates protection from deleterious environmental stimuli in newborn intensive care units and access to positive sensory stimulation from parents and other caregivers. Hardly mentioned however are the fact that support strategies for families play a major role, including socioeconomic, mental health, and spiritual services as well as an individual case management plan for each newborn infant. The researchers include management plan is established in collaboration with parents but do not include parents as the primary caregivers. I also believe one must also acknowledge the importance of trained and supported healthcare professionals who receive counseling and regular clinical supervision in communicating with and providing emotional support for parents as a prerequisite for proficient successful implementation of IFCDC. According to the upmost importance of the placing the parents as the key members of the "nursing team", I strongly recommend to involve parent organizations/representatives in the planning of this study in order to correctly identify the most important components of IFCDC. I certainly welcome the objective to identify measurable indicators, which are warranted not the least for national quality registers, but parents must be involved in this process. Serious omissions of crucial IFCDC components: 1. Zero separation and Family access 2. Parents as primary caregivers 3. Early and contiuous skin-to-skin contact as an essential part of IFCDC 4. Family supportive services 5. Staff training in FCDC and counseling Finally, if one really understands the complexity of the sick och prematurely born baby and the importance of parent-baby triad, it becomes evident that it actually is quite inadequate to try to find and evaluate separate "nursing sensitive" interventions. Instead one needs to assess the success of implementing "nurturing newborn care" /IFCDC which "sensitive/responsive care" including adapting medical care and procedures and nursing as much as possible to the sensitive baby by understanding its language/behaviour. Without this understanding, no intervention will be developmentally supportive. The process of the planning of this study might have proceeded too far for taking my comments above into consideration. However, these must be mentioned in the Introduction and in the list and DISCUSSION of limitations.

REVIEWER	Phillips, Raylene Loma Linda University, Neonatology
REVIEW RETURNED	14-Apr-2021

GENERAL COMMENTS	Review of “Nursing developmental care interventions for preterm infants in the neonatal intensive care unit: A scoping review protocol”

	The authors seem to have a goal of doing a literature analysis of developmental care practices for NICU babies done specifically by nurses. The need for this review is not entirely clear. The focus on care practices done by nurses is a fundamental flaw in understanding the nature of neuroprotective family-centered developmental care. Unless a multidisciplinary approach is used and every discipline has a shared understanding about the philosophy and science of neuroprotective family-centered developmental care, the care practices are likely to be inconsistent and ineffective. The authors of this proposed scope review have taken 3 different models of neuroprotective family-centered developmental care, each of which cover essentially the same material but divide the categories slightly differently and have created a 4th model which most closely resembles the Neuroprotective Core Measures model with the exception of dividing Core Measure 1 into 2 categories. It is not clear why this division of Core Measure 1 would enhance understanding of developmental care practices for that Core Measure. One rationale given for needing this scope review is that neuroprotective family-centered care practices related to nursing care are not well described in the literature. The reference given for the Neuroprotective Core Measure model is the original publication form 2013. A more recent publication from 2016 focused specifically on nursing care practices as found in "Altimier L & Phillips R. The neonatal integrative developmental care model: advanced clinical applications of the seven core measures for neuroprotective family-centered developmental care. NAINR 2016; 16(4): 230-244. doi:10.1053/j." If the authors wish to expand on the care practices given in the article listed above with more recent evidence-based practices, this is a worthy goal, but credit should be given to work already done for this purpose. I would recommend that the authors make the need for this scope review more clear and more relevant to a multidisciplinary approach to neuroprotective family-centered developmental care and also acknowledge the work already done to describe neuroprotective family-centered developmental care clinical practices.

VERSION 1 – AUTHOR RESPONSE

Reviewer: 1
Dr. Björn Westrup, Karolinska Institute
Comments to the Author:

Sadly, I have to note that the researchers are not aware of the recent development in the concept of what was formally named Developmental Care but since some years back both in Europe and North America has merged to the more comprehensive concept called Infant- and Family-Centered Developmental Care - IFCDC.

a- EFCNI, B. Westrup, and P. Kuhn. European Standards of Care for Newborn Health: Infant- and family-centred developmental care (IFCDC). 2018 December 19, 2020]; Available from: https://newborn-health-standards.org/standards/infant-and-family-centred-care/overview/.
b- University of Notre Dame. 2020. 'Developmental Care Standards for Infants in Intensive Care', Accessed December 19. https://nicudesign.nd.edu/nicu-care-standards/.

Infant- and family-centred developmental care (IFCDC) is a descriptive term for a framework of newborn care that incorporates the theories and concepts of neurodevelopment, neuro-behaviour, parent-infant interaction, parental involvement, breastfeeding promotion, environmental adaptation, and change of hospital systems. It is based on the leading-edge work of Als (as you refer to) and Brazelton and on the World Association for Infant Mental Health Declaration of Infants' Rights.

The core pillars of IFCDC are: sensitive care based on infant behavioral communication and cues gives the infant a voice and is beneficial for brain growth, parent engagement supports parental wellbeing and infant development, and customized adaptations of the NICU environment and hospital system as a whole.

The strategies for implementing this approach are based on supporting the unity of infant and parents, i.e. family access and integration into all care, early bonding, shared-decision-making, and parental involvement as the primary caregivers. The practical implementation is assured by early and continuous skin-to-skin contact between mother or father and the newborn infant, as well as by the promotion and support of breastfeeding. Sensory and environmental expectations of the newborn infant are paramount, since early sensory experiences have been shown to have significant impact on neurodevelopment. The model, as the authors point out, advocates protection from deleterious environmental stimuli in newborn intensive care units and access to positive sensory stimulation from parents and other caregivers. Hardly mentioned however are the fact that support strategies for families play a major role, including socioeconomic, mental health, and spiritual services as well as an individual case management plan for each newborn infant. The researchers include management plan is established in collaboration with parents but do not include parents as the primary caregivers. I also believe one must also acknowledge the importance of trained and supported healthcare professionals who receive counseling and regular clinical supervision in communicating with and providing emotional support for parents as a prerequisite for proficient successful implementation of IFCDC.

According to the upmost importance of the placing the parents as the key members of the "nursing team", I strongly recommend to involve parent organizations/representatives in the planning of this study in order to correctly identify the most important components of IFCDC. I certainly welcome the objective to identify measurable indicators, which are warranted not the least for national quality registers, but parents must be involved in this process.

Serious omissions of crucial IFCDC components:
1. Zero separation and Family access
2. Parents as primary caregivers
3. Early and contiuous skin-to-skin contact as an essential part of IFCDC
4. Family supportive services
5. Staff training in FCDC and counseling

Finally, if one really understands the complexity of the sick och prematurely born baby and the importance of parent-baby triad, it becomes evident that it actually is quite inadequate to try to find and evaluate separate "nursing sensitive" interventions. Instead one needs to assess the success of implementing "nurturing newborn care" /IFCDC which "sensitive/responsive care" including adapting medical care and procedures and nursing as much as possible to the sensitive baby by understanding its language/behaviour. Without this understanding, no intervention will be developmentally supportive.

The process of the planning of this study might have proceeded too far for taking my comments above into consideration. However, these must be mentioned in the Introduction and in the list and DISCUSSION of limitations.

Our answers to Dr. Westrup's comments:

Thank you for your relevant and accurate comments and suggestions, Dr. Westrup.

"Developmental care" is a generic term that is widely used by our group of researchers and other nursing researchers (see publications below). This umbrella term encompasses the infant and family centered developmental care, and it refers to an interdisciplinary approach, as underscored in a concept analysis conducted by one of our coauthors (Aita & Snider, 2003). Therefore, we have kept this

terminology in our manuscript, but we have adjusted the text to reflect that “developmental care” does not only imply nursing practice. We have also considered the references you have suggested. As recommended, we have included the 10 European standards of care for newborn health and the six key practice domains of infant and family centered developmental care in the intensive care unit.

Although we appreciate the importance of assessing the success of implementing nurturing newborn care, the main aim of our scoping review is to identify nursing-sensitive outcome indicators related to development care in the NICU. As we argue in our manuscript, “*there is a pressing need for a comprehensive mapping of nursing-sensitive outcome indicators with regard to developmental care interventions. Such effort is essential to identify outcome indicators that have been reported so far in the scientific literature and those that require further assessment, as well as to circumscribe the effects of developmental care interventions on delivered by nurses on preterm infants’ and families’ health and development.*”

References of exemples of previous works on developmental care in the field of nursing

Lavallée A, De Clifford-Faugère G, Garcia Becerra CA, Fernandez Oviedo, AN, Héon M, Aita M. (2019). PART 2: Practice and research recommendations for quality **developmental care** in the NICU. Journal of Neonatal Nursing, 25: 160-4

Lavallée, A., De Clifford-Faugère, G., Fernandez N., Garcia, C., Héon, M., & Aita., M. (2019). PART 1: **Developmental care** for the preterm newborn: Narrative overview and implications for practice. Journal of Neonatal Nursing, 25: 3-8.

Lebel V, Aita M. [**Developmental care** principle-based concept analysis] (2013). Recherche en Soins Infirmiers, 113: 34-42.

Aita, M. & Snider, L.M. (2003). The Art of Providing **Developmental Care** in the NICU: A Concept Analysis. Journal of Advanced Nursing, 41: 223-32

Milette I, Martel MJ, Ribeiro da Silva M, Coughlin McNeil M (2017). Guidelines for the Institutional Implementation of **Developmental** Neuroprotective **Care** in the NeonatalIntensive Care Unit. Part A:Background and Rationale. A JointPosition Statement From the CANN,CAPWHN, NANN, and COINN. Canadian Journal of Nursing Research, 49: 46–62

Reviewer: 2
Dr. Raylene Phillips, Loma Linda University

The authors seem to have a goal of doing a literature analysis of developmental care practices for NICU babies done specifically by nurses. The need for this review is not entirely clear. The focus on care practices done by nurses is a fundamental flaw in understanding the nature of neuroprotective family-centered developmental care. Unless a multidisciplinary approach is used and every discipline has a shared understanding about the philosophy and science of neuroprotective family-centered developmental care, the care practices are likely to be inconsistent and ineffective.

The authors of this proposed scope review have taken 3 different models of neuroprotective family-centered developmental care, each of which cover essentially the same material but divide the categories slightly differently and have created a 4th model which most closely resembles the Neuroprotective Core Measures model with the exception of dividing Core Measure 1 into 2 categories. It is not clear why this division of Core Measure 1 would enhance understanding of developmental care practices for that Core Measure.

One rationale given for needing this scope review is that neuroprotective family-centered care practices related to nursing care are not well described in the literature. The reference given for the Neuroprotective Core Measure model is the original publication form 2013. A more recent publication from 2016 focused specifically on nursing care practices as found in “Altimier L & Phillips R. The neonatal integrative developmental care model: advanced clinical applications of the seven core measures for neuroprotective family-centered developmental care. NAINR 2016; 16(4): 230-244. doi:10.1053/j.” If the authors wish to expand on the care practices given in the article listed above with more recent evidence-based practices, this is a worthy goal, but credit should be given to work already done for this purpose.

I would recommend that the authors make the need for this scope review more clear and more relevant to a multidisciplinary approach to neuroprotective family-centered developmental care and also acknowledge the work already done to describe neuroprotective family-centered developmental care clinical practices.

Our answers to Dr. Phillips’ comments:

Thank you for your relevant and accurate comments and suggestions, Dr. Phillips.

We agree that “developmental care” is a interdisciplinary approach, as as underscored in a concept analysis conducted by one of our coauthors (Aita & Snider, 2003). Nevertheless, the main aim of our scoping review is to identify nursing-sensitive outcome indicators related to development care in the NICU. We have revised our manuscript in order to clarify and strengthen the rationale for conducting such a scoping review.

We have made an additional effort to give credit to the work already done on developmental care models, practice guidelines, core mesures, and standards of care. We have added the reference you have suggested (Altimer & Phillips [2016]), as well as the 10 European standards of care for newborn health and the six key practice domains of infant and family centered developmental care in the intensive care unit, as suggested by reviewer 1, Dr. Westrup. Our objective was not to propose a new model, but rather to suggest categories inspired and inclusive of models, core measures, practice guidelines, and standards of care that already exist. Since these categories are not always the same (see Table 1), we have reorganized them in order to facilitate the classification of identified developmental care interventions.

Thank you!