

Review Title: What are the Components of Interprofessional Education Programs in Neonatal Medicine? A Focused Review

Review Group Members

Shweta Parmekar, Assistant Professor of Neonatology, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA

Rita Shah, Assistant Professor of Neonatology, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA

Ganga Gokulakrishnan, Assistant Professor of Neonatology, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA

Sharada Gowda, Assistant Professor of Neonatology, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA

Delinda Castillo, Registered Nurse, Education Coordinator, Texas Children's Hospital, Houston, Texas, USA

Suzanne Iniguez, Respiratory Therapist, Texas Children's Hospital, Houston, Texas, USA

Jennifer Gallegos, Neonatal Nurse Practitioner, Texas Children's Hospital, Houston, Texas, USA

Amy Sisson, MS, MLS, Librarian, The Texas Medical Center Library, Houston, Texas, USA, 77030

Satid Thammasitboon, Associate Professor of Critical Care Medicine, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA

Mohan Pammi, Associate Professor of Neonatology, Baylor College of Medicine, Texas Children's Hospital, Houston, Texas, USA

Table of Experience of Review Group

Name	Academic Role	BEME Experience	Systematic Reviews Experience	Area of Specialty/ Research
Shweta Parmekar	Assistant Professor, Section of Neonatology, Department of Pediatrics, Baylor College of Medicine (BCM)	First time involvement with a BEME Review	Systematic reviews of research Experience in education assessment	Enrolled in a master's Health Professions Education program Qualitative research methods Educational research in healthcare
Rita Shah	Assistant Professor, Section of Neonatology, Department of Pediatrics, BCM	First time involvement with a BEME Review	Gaining experience in systematic reviews	Resident education Quality improvement Evidence based medicine
Ganga Gokulakrishnan	Assistant Professor, Section of Neonatology, Department of Pediatrics, BCM	First time involvement with a BEME Review	Performed systematic reviews	Resident education Systematic reviews Evidence based medicine
Sharada Gowda	Assistant Professor, Section of Neonatology, Department of Pediatrics, BCM	First time involvement with a BEME Review	Performed a Cochrane systematic review	Resident and fellow education
Delinda Castillo	Pavilion for Women NICU Education Coordinator, Texas Children's Hospital	First time involvement with a BEME Review	Gaining experience in systematic reviews	Nursing, respiratory therapist, and licensed staff education Quality improvement

Suzanne Iniguez	Respiratory Therapist, Texas Children's Hospital	First time involvement with a BEME Review	Gaining experience in systematic reviews	Fellow, nursing, respiratory therapist education Quality improvement
Jennifer Gallegos	Neonatal Nurse Practitioner, Texas Children's Hospital	First time involvement with a BEME Review	Gaining experience in systematic reviews	Neonatal nurse practitioner, nursing education Quality improvement
Amy Sisson	Librarian at Texas Medical Center Library	First time involvement in a BEME Review	Research & Instruction librarian	Systematic reviews
Satid Thammasitboon	Associate Professor, Section of Critical Care, Department of Pediatrics, BCM	First time involvement with a BEME Review	Educational reviews	Research in health professions education Education theories Evidence based medicine
Mohan Pammi (Lead reviewer)	Associate Professor, Section of Neonatology, Department of Pediatrics, BCM	First time involvement with a BEME Review	Performed reviews for the Cochrane Collaboration. Associate editor for Cochrane Neonatal	Evidence based medicine Systematic reviews Educational research

Contact details of lead reviewer

Mohan Pammi, Associate Professor of Neonatology,
Texas Children's Hospital
6621 Fannin Street
WT 6-104
Houston, Texas 77030
832-824-3206
mohanv@bcm.edu
USA

Sources of Support: None

All members of the group will undertake an active role in the current review. Tasks performed by each individual member have been allocated based upon the member's interest and expertise.

1. Abstract

Background: Care delivery in neonatal medicine is dependent on an interprofessional team. Collaborative learning and education amongst professionals is necessary to successfully manage critically ill patients and to beneficially impact outcomes. Interprofessional educational (IPE) program strategies and their effectiveness in neonatal medicine have not been systematically reviewed. This focused review seeks to assess the components and impact of such IPE programs in Neonatal medicine.

Aim: To perform a focused review of interprofessional educational programs in neonatal medicine.

Methods: We plan to search medical and education databases for reports focused on the development and results of interprofessional educational programs to improve knowledge, skills, and attitudes about neonatal care. We will exclude articles related to interprofessional care and collaboration. We will review all citations without language restriction.

Importance: The results of this review will identify strategies and components to consider for the development of future successful interprofessional education programs in neonatal medicine. We plan to report the common strategies, tools, conceptual frameworks, outcomes of IPE programs including patient healthcare outcomes.

Keywords: Interprofessional, knowledge, multidisciplinary, strategies, behavior, skills, neonatology, education, interdisciplinary, training, patient safety, and neonatal care

2. Background

Interprofessional education (IPE) is a process that

“Occurs when learners from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes (WHO, 2010)”.¹

Interest in the IPE educational strategy has increased over the years, especially in pre-professional undergraduate and medical student education.² The importance of multi-disciplinary health care team education in various learning environments including classroom sessions, skills labs, and clinical rotations are frequently utilized in undergraduate and medical school programs. Such models are used to emphasize and develop important team-building competencies comprising systems-based practice, communication skills, and efficiency.³ IPE has the potential to strengthen healthcare teams and impact patient outcomes in a multi-disciplinary clinical environment such as neonatal intensive care and neonatal resuscitation.

The Institute of Medicine’s most recent consensus statement stresses the need for rigorous evidence evaluating the role of IPE in continuing medical education.⁴

Optimizing patient care to improve outcomes requires the involvement of multiple stakeholders with a common mission, vision, and goal. A recent systematic review on IPE suggests that it can improve learner’s attitudes, skills, and knowledge along with a greater appreciation of collaborative learning.² Establishing effective and safe collaborative practice in an organized manner may also narrow gaps in knowledge, sustain knowledge content, and potentially reduce errors in patient care by highlighting the value of shared accountability.⁵

TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Patient Safety) and CRM (crisis resource management) are validated standardized curricula for team-based training that have shown effectiveness in role understanding, team behaviors, and compliance with established unit protocols within intensive care medicine.⁶ Emerging evidence suggests that IPE has a role in healthcare due to its effective promotion of collaboration within a shared learning environment that fosters a culture of teamwork,

collegiality, and psychological safety.⁷ In conjunction with established team-training programs, IPE can be a useful tool to implement programs to promote principles of safety, communication, and satisfaction for patients and providers.⁶

Neonatal medicine encompasses the care of critically ill newborns affected by a multitude of disease processes including respiratory failure, congenital cardiac disease, infection, and gastro-intestinal anomalies. These patients represent a vulnerable population that requires comprehensive care provided by multi-disciplinary healthcare staff and families. The ability to provide optimal care is based on all providers working synergistically as a team in the intensive care environment.

Evidence-based guidance in the development of IPE programs is paramount for designing the most effective programs. Educational methods for IPE that are based on adult learning theory and their effect on provider and patient outcomes need to be systematically studied. Educational strategies and programs for providers in Neonatal medicine have not been systematically reviewed. This BEME review will focus on effective IPE programs that address knowledge, behavior, and outcomes for professionals working in neonatal medicine. We intend to synthesize the components of IPE into a conceptual framework about practice determinants, which then could be used in other medical specialties.

3. Review questions, objectives, and key words

This is a focused review that will address the following research questions, objectives, and process:

Research Question:

What are the components, strategies, and outcomes of an interprofessional educational approach in neonatal medicine?

Objectives:

1. To review the literature by systematically searching online medical and education databases to identify and summarize data involving IPE in neonatal medicine
2. To describe the IPE program in regard to setting, participants, content, context, educational methodology, and scope
3. To evaluate the outcomes of the IPE programs using Kirkpatrick's levels of evaluation
 - a. Self-reported satisfaction
 - b. Self-reported confidence
 - c. Measure of change in knowledge, skills, and attitudes of health care professionals participating in IPE
 - d. Measures of patient outcomes
4. To identify the effect of IPE programs on patient outcomes
5. To formulate a conceptual framework and recommendations for developing an IPE program based on the results of this focused review

Process:

1. Develop a search strategy
2. Screen title and abstracts from literature search
3. Perform a complete review of articles based on inclusion criteria
4. Conduct data extraction and synthesis using guidelines proposed by Gordon et al⁸
5. Disseminate review findings to provide insight on IPE educational programs

Keywords:

Interprofessional, knowledge, multidisciplinary, strategies, behavior, skills, neonatology, education, interdisciplinary, training, patient safety, and neonatal care.

4. Search sources and Strategies

We performed a pilot search (Appendix 1) that has informed our objectives, process, and outcomes of this protocol. Our search sources will include PubMed, Ovid Embase, MedEdPublish, CINAHL, Scopus, ERIC, DARE, the Cochrane Central Register of

Controlled Trials (CENTRAL) of the Cochrane library, and Ovid MEDLINE (1980 to February 2020).

We will use a search strategy that includes keywords and controlled vocabulary (e.g., MeSH). Examples of keywords include:

- Interprofessional, interdepartmental, interdisciplinary, multidisciplinary, interoccupational, multiprofessional, team, teamwork
- Education, training, curriculum, coursework, workshop, simulation, student, learner
- Neonatal, NICU, infant, newborn, baby,

We will also employ Boolean combinations of the selected search terms. In addition, we will search abstracts of relevant conferences and Google (www.google.com) for relevant grey literature such as organizational policy documents, clinical practice guidelines and dissertations and theses. doctoral theses databases such as Opengrey. We will limit the search to English language and human studies. A priori decision has been made to screen only the first 100 hits for Google after considering the time required for screening and the insignificant yield from further screening. Any articles or studies with suggestion “similar articles” will be further explored to include relevant literature such as abstracts etc. Attached (Appendix 1) list the initial search strategy used in several key databases, outcome of the initial scoping search and a list of representative publications.

We will independently review all the studies or articles for evidence of

1) Formal educational curricula in neonatal medicine where interdisciplinary groups such as physicians, dietitians, pharmacy staff, student health care learners, advanced practice providers (APPs), physical therapists (PT), occupational therapists (OT), respiratory therapists (RT) and/or registered nurse (RN) staff, participate and learn.

5. Study Selection Criteria

Population: Interprofessional providers and learners in neonatal medicine including physician providers, advanced practice providers, nurse practitioner, nursing staff, respiratory therapists, dietician staff (nutrition), pharmacy staff, health professions learner (student, resident and fellow), physical therapy and occupational therapy

Intervention: Studies will be included only if they report a formal interprofessional education program. An interprofessional educational program in neonatal medicine comprised of two or more health professional groups.

Outcomes:

1. IPE program components and associated instructional methods/strategies
2. Conceptual framework/model used to guide program development and structure
3. Outcome evaluation of the program based on Kirkpatrick levels⁹
 - a. Self-reported satisfaction
 - b. Self-reported confidence
 - c. Measure of change in knowledge, skills, and attitudes of health care professionals participating in IPE
 - d. Measures of patient outcomes
4. Measure of safety and adverse events outcomes
5. Measures related to the well-being of healthcare professionals such as stress and burnout
6. Measures of teamwork
7. Satisfaction and understanding of families and caregivers; family centered care.

Articles that meet any of the following criteria will be excluded from the review:

1. Studies that are commentaries or opinion pieces
2. Studies relevant to general newborn care or newborns and infants in the outpatient setting (such as infants with disabilities)
3. Studies where outcomes are primarily related to maternal care and maternal outcomes

Studies that do not report formal interprofessional education programs but only interprofessional collaboration or care will be excluded.

Two reviewers (SG, GG) will independently screen the titles and abstracts of all potentially applicable articles after the search has been performed. Any identified duplicates will be excluded. The study eligibility screening criteria will be applied. Abstracts that meet inclusion criteria after the initial phase will undergo a full article review using the selection criteria by two reviewers (SP, RS). Disagreements on inclusion based on full articles will be discussed with a third reviewer (MP).

6. Quality appraisal

Two reviewers (SP, RS) will independently appraise the quality of the studies using three item questions followed by a 5-point scale grading system to evaluate the strength of the findings¹⁰ (p 12, Box 7). They will also determine Kirkpatrick’s level of outcomes reported⁹. The differences of opinion will be resolved by discussion first in the pair and then, if needed, by a third person (ST).

7. Procedure for extracting data

Two reviewers (SP and RS) independently will extract data from included studies using excel sheets the details of which are provided in the table below. We will assess Cohen’s kappa coefficient for inter-rater agreement.

The following data will be extracted.

Author(s), year of publication, study location	
Study Populations	(e.g., health personnel, medical residents, social workers, etc.)
Study Objectives	(e.g., needs assessment, curriculum development, program evaluation)
Methods	(e.g., study design, review, perspective)
Conceptual Framework	(e.g., theories, principles, models)
Program Components	(e.g., longitudinal curriculum, capstone project, e-learning)

Instructional Methods/Strategies	(e.g., didactics, simulations, case-based learning, team-based learning)
Outcome Measures	(e.g., cognitive knowledge, skills, attitudes, career choice)
Limitations	(as noted by study authors and reviewers)
Additional Recommendations/Implications	(as noted by study authors)

Data will be entered independently by SP and RS using Microsoft Excel, then compared and a consensus will be reached. Contextual or process-oriented data (how conceptual framework is used to guide the study) from each study will be entered in descriptive text. . In cases where consensus between reviewers cannot be reached, disagreements will be resolved through discussion with a third reviewer (ST or MP).

8. Synthesizing data and translation into practice

Collating, summarizing, and reporting results

The analysis will include collating and summarizing the results in two forms - a quantitative summary estimates and a thematic analysis. Specifically, the quantitative portion which will include outcomes will be charted in Revman Software. Meta-analysis will be performed if enough data are available and heterogeneity is not significant. Odds ratios with 95% confidence intervals will be reported for dichotomous outcomes and mean differences for continuous outcomes. The thematic analysis will be conducted using qualitative content analytical techniques and facilitated by ATLAS.ti software (Scientific Software Development GmbH, Berlin, Germany).¹¹ We will report the current scope of IPE practices in terms of program components and their key features as indicated in the data-charting form. We will report strengths and limitations of current practices. Additionally, we aim to formulate a conceptual framework that can inform future development of IPE in Neonatal Medicine. The educational components identified across IPE programs to develop this framework will also be mapped to the IPEC core competencies for Interprofessional Collaborative Practice.¹² This mapping will provide a

strong foundation for continued interactive learning and collaboration across disciplines to ultimately improve patient care.

This focused review will describe the current interprofessional education in neonatal medicine and provide guidance in the development of an interprofessional education program using key components and educational strategies targeted in the improvement of outcomes such as content knowledge, skills, and behaviors of healthcare providers. Existing educational programs can also adapt described conceptual frameworks and strategies to enhance the quality of training delivered to professional learners. These approaches can be applied not only to programs focused in neonatal medicine, but also to adult and pediatric critical care programs that utilize the expertise of various health professionals in the management of critically complex patients. The impact of such programs would be improvements in knowledge, attitudes, and confidence in caring for critically ill patients in the intensive care unit ultimately leading to improved patient outcomes.

9. Project timetable – Our review group proposes the following timetable for completion of the review.

Table of projected timeline

Mar 2019 to June 2020	Jun' 19-Dec '19	Jan 2020 - Feb 2020	Aug 2020	Sept 2020	October 2020	Nov 2020	Dec 2020	Jan 2021	Feb 2021	March 2021
Protocol submission										
Initial literature search										
Focused search										
Screening abstracts and papers to determine inclusion/exclusion										
Review selected papers										
Create narrative synthesis of findings										
Review and dissemination										

10. Conflict of interest statement

None of the authors have conflicts of interest associated with the review. No funding support was obtained for the review.

11. Plans for updating the review

The review team would be happy to update this review in the future in light of new information whenever appropriate.

12. Changes to the protocol

At the time of protocol submission, the review group does not anticipate any major changes to the current revised protocol. Minor amendments to the review question/topic, study selection criteria, or protocol may become necessary. Any significant changes will be recorded and submitted to BEME for approval along with date of change and the rationale.

Appendix 1

Search Results

An initial scoping search was performed in April 2019 using the search strategy outlined below:

For Medline Ovid, the search strategy used is outlined below. This strategy was then translated to fit Embase, CINAHL, Academic Search Complete and ERIC.

1. exp Interprofessional Relations/
2. interdepartmental relations/
3. Interdisciplinary Placement/
4. ('interprofession*' or 'inter-profession*' or 'interdepartment*' or 'inter-department*' or 'interoccupation*' or 'inter-occupation*' or 'multiprofession*' or 'multi-profession*' or 'multioccupation*' or 'multi-occupation*' or 'multilevel*' or 'multi-level*' or 'vertical integrat*' or 'near peer*').ti,ab,kw.
5. 1 or 2 or 3 or 4
6. education, professional/ or clinical clerkship/ or exp education, continuing/ or exp education, graduate/ or exp education, medical/ or exp education, nursing/ or exp education, pharmacy/

7. ((educat* or train*) adj3 (profession* or clerkship* or continuing* or graduate or medical* or nursing* or pharm*)).ti,ab,kw.
8. 6 or 7
9. Neonatology/
10. Neonatal Nursing/
11. exp Infant, Newborn/
12. (infant* or newborn* or "new-born*" or neonat* or "neo-nat*" or baby* or babies*).ti,ab,kw.
13. 9 or 10 or 11 or 12
14. 5 and 8 and 13

We screened a total of 440 non-duplicated results that were retrieved from our initial search. We selected 12 articles that included reviews on IPE and other studies on IPE programs which would be eligible for inclusion in our review. These 12 articles provided information that guided the writing of this protocol. The following themes emerged from reviewing the list of publications retrieved from our initial search: Simulation, quality improvement and maternal/perinatal interdisciplinary education, neonatal resuscitation and interdisciplinary communication. Simulation and quality improvement exercises also focused on inter-professional education.

This search also retrieved articles related to interdisciplinary education of professionals who work children with disabilities and IPE related to Early Childhood Interventions (ECI) services and those which dealt mostly with obstetrical management or emergencies. We plan to exclude such articles from this focused review.

The following publications have informed this protocol's objectives and have allowed us to identify certain themes for our scoping review.

Relevant articles and cited references

1. WHO. Framework for action on interprofessional education and collaborative practice. 2010 [cited] Available from: [BEME Review Protocol SPedits 071020.docx](#)
2. Reeves S, Fletcher S, Barr H, Birch I, Boet S, Davies N, *et al.* A BEME systematic review of the effects of interprofessional education: BEME Guide No. 39. *Med Teach* 2016, **38**(7): 656-668.
3. Kashner TM, Hettler DL, Zeiss RA, Aron DC, Bennett DS, Brannen JL, *et al.* Has Interprofessional Education Changed Learning Preferences? A National Perspective. *Health Serv Res* 2017, **52**(1): 268-290.
4. Medicine. CoMtlolEoCPaPOBoGHlo. *Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes*. National Academies Press (US): Washington (DC), 2015.

5. Golom FD, Schreck JS. The Journey to Interprofessional Collaborative Practice: Are We There Yet? *Pediatr Clin North Am* 2018, **65**(1): 1-12.
6. Low XM, Horrigan D, Brewster DJ. The effects of team-training in intensive care medicine: A narrative review. *J Crit Care* 2018, **48**: 283-289.
7. Frenk J, Chen L, Bhutta ZA, Cohen J, Crisp N, Evans T, *et al*. Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *The Lancet* 2010, **376**(9756): 1923-1958.
8. Gordon M, Grafton-Clarke C, Hill E, Gurbutt D, Patricio M, Daniel M. Twelve tips for undertaking a focused systematic review in medical education. *Med Teach* 2019, **41**(11): 1232-1238.
9. Kirkpatrick J, DeWitt-Weaver D, Yeager L. Strategies for evaluating learning outcomes. In: Billings D, Halstead J (eds). *Teaching in nursing: A guide for faculty*, 4th edn. W.B. Saunders: Philadelphia, 2004, pp 465-491.
10. Hammick M, Dornan T, Steinert Y. Conducting a best evidence systematic review. Part 1: From idea to data coding. BEME Guide No. 13. *Med Teach* 2010, **32**(1): 3-15.
11. Ehrich K, Freeman GK, Richards SC, Robinson IC, Shepperd S. How to do a Scoping Exercise: Continuity of Care. *Research Policy and Planning* 2002, **20**(1): 25-29.
12. Interprofessional Education Collaborative. (2016). Core competencies for interprofessional collaborative practice: 2016 update. Washington, DC: Interprofessional Education Collaborative.