

Improving Global Newborn Survival: Building upon *Helping Babies Breathe*

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Abstract

Achieving the targets of the Every Newborn Action Plan by the year 2030 will require accelerating the current reduction in neonatal mortality. Educational programs addressing the three major causes of neonatal death – intrapartum-related events (asphyxia), prematurity and small size at birth, and infection – have the potential to significantly reduce preventable mortality. *Helping Babies Breathe* is an example of an educational program that not only has given health care providers around the world access to current resuscitation science but has changed provider behavior and patient outcomes and resulted in perinatal quality improvement in small- and large-scale trials. However, to realize impact on neonatal mortality at the population level, perinatal educational programs that comprehensively address all aspects of essential newborn care must be implemented at scale with high coverage and quality.

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Background

The countdown to the 2030 target date of the global Sustainable Development Goals suggests that the trajectory of global neonatal mortality is not declining rapidly enough to meet the goals set by the Every Newborn Action Plan (ENAP) [1]. What can help bend the curve downward to achieve the targets? Simple interventions aimed at reducing the 3 major causes of neonatal death: prematurity and small size at birth, infection, and perinatal asphyxia, have the potential to significantly reduce preventable mortality [2]. Achieving global implementation of these interventions with high coverage and high quality represents a challenge not only for policy makers, but for neonatologists and educators who want to share progress in newborn care.

At the conclusion of the Millennium Development Goals, the global neonatal mortality rate for 2014 stood at 19 per 1,000 live births (down from 36 per 1,000 live births in 1990) with an estimated 2.7 million neonatal deaths per year (down from 5.1 million in 1990) [3]. The latest estimates for the year 2018 put the neonatal mortality rate at 18 with an estimated 2.5 million neonatal deaths per year, falling short of the average annual rate of reduction needed to meet the global goal of fewer than 10 deaths per 1,000 live births [1, 2].

Achieving further reduction in global neonatal mortality will require moving beyond broad public health ap-

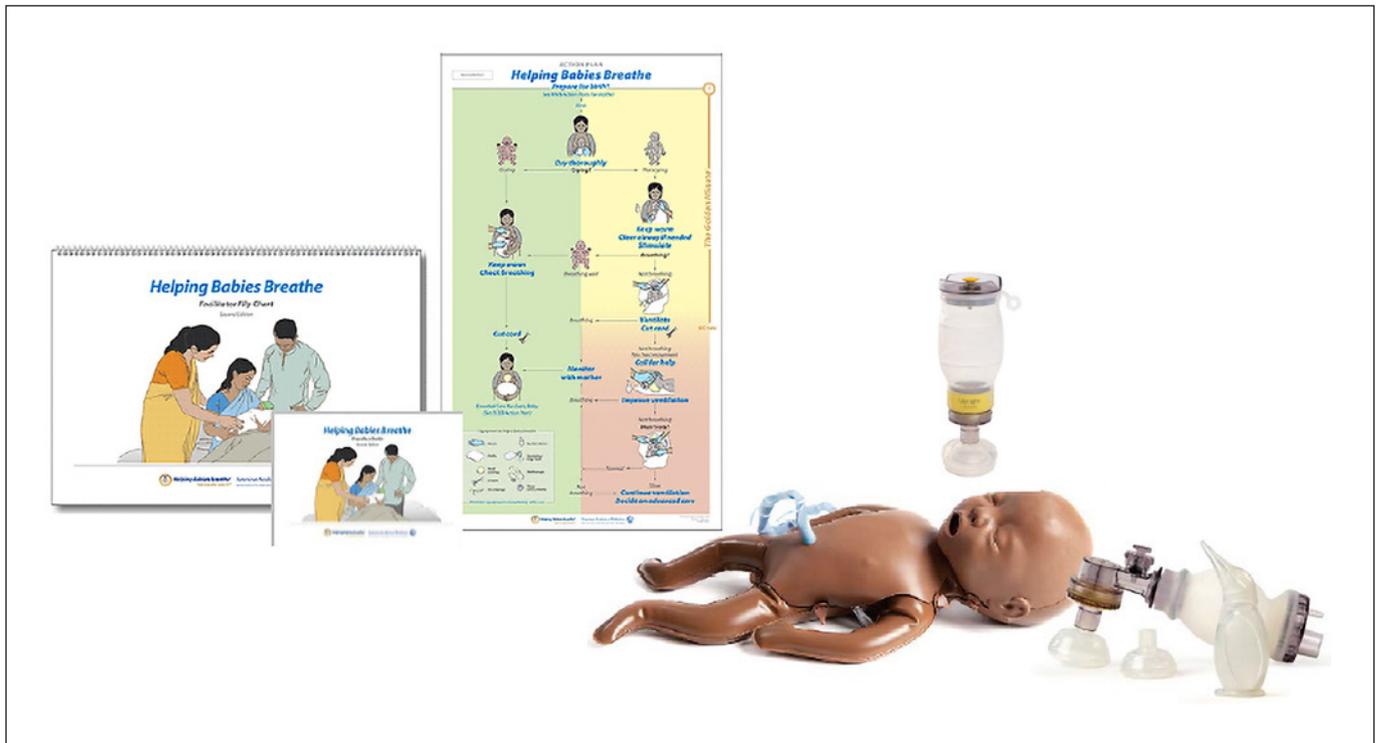


Fig. 1. Educational materials and clinical equipment for Helping Babies Breathe. The action plan, facilitator flip chart, and provider guide present clinical content. A low-cost, high-fidelity neonatal simulator and resuscitation equipment are used in skills practice.

proaches to more individualized care of mothers and newborns. While public health interventions such as clean delivery in health facilities and exclusive breastfeeding have had important impact, the next phase of reduction in mortality will depend upon improved obstetric care and individualized neonatal care that meets babies' special requirements for feeding, warmth, resuscitation and prevention, recognition, and treatment of infection [4]. This review will examine the role of educational programs for health professionals in low- and middle-income settings in achieving the ENAP goals, using the example of *Helping Babies Breathe* and the *Helping Babies Survive* programs for essential newborn care.

Development of Helping Babies Breathe

Goal and Educational Approach

Helping Babies Breathe (HBB), an educational program developed by the American Academy of Pediatrics, was introduced in 2010 with the specific goals of sharing progress in neonatal resuscitation and support of transition at birth and reducing neonatal mortality attributable

to intrapartum-related events, or perinatal asphyxia [5]. At the time, the global health community generally regarded neonatal resuscitation as an intervention requiring intensive care, and therefore not feasible in resource-limited settings. As a consequence, a large proportion of birth attendants lacked current knowledge and functional skills in neonatal resuscitation [6]. HBB shifted the paradigm to focus on basic, lifesaving interventions by frontline health workers empowered through capacity-building and peer learning. HBB was designed to deliver up-to-date resuscitation science, based on the ILCOR treatment recommendations, to the broad range of health care providers who attend births in LMIC [7]. The educational methodology emphasized active learning to equip providers with the essential skills of basic resuscitation (drying, stimulation, clearing the airway, bag-and-mask ventilation with air) and purposely did not include advanced interventions (chest compressions, medications) which are needed in less than 1% of resuscitations, but distract from the central importance of ventilation. HBB also stressed support of normal transition by maintaining warmth through skin-to-skin contact, delayed umbilical cord clamping, and early initiation of breast-

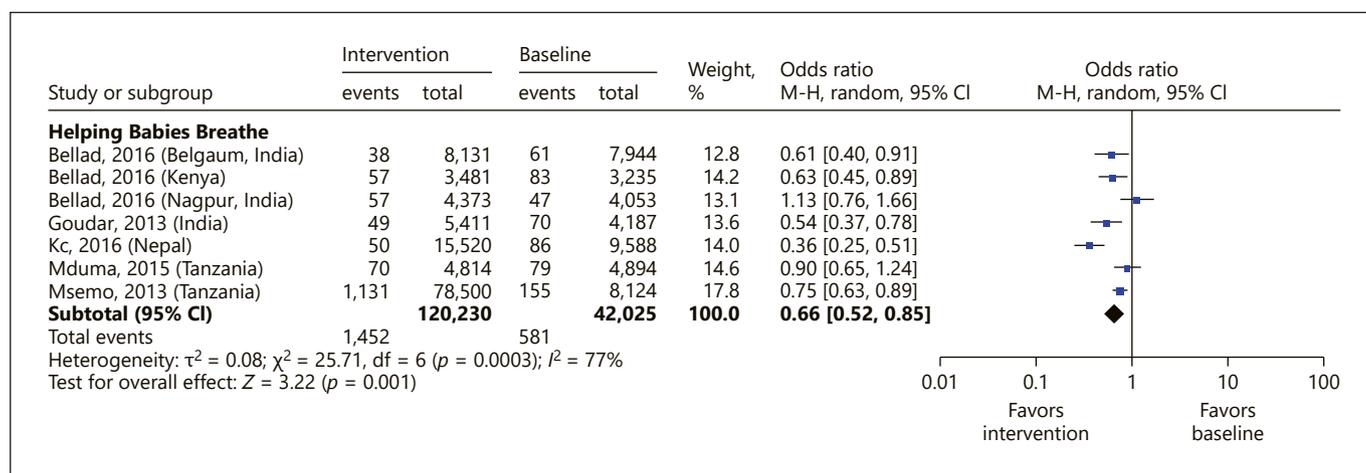


Fig. 2. Impact of Helping Babies Breathe on perinatal mortality (adapted with permission from Wolters Kluwer Health Inc. from Dol et al. [11]). M-H, Mantel-Haenszel.

feeding [8]. Furthermore, the educational package delivered equipment to provide clinical care simultaneously with education and included low-cost, high-fidelity neonatal simulators to permit continued practice of techniques such as bag-and-mask ventilation, which may be used infrequently, but are critically important when required (Fig. 1) [9].

Results of Implementation Trials

Since its introduction in 2010, HBB has been implemented in over 80 countries [10]. Meta-analysis of implementation trials using HBB demonstrates a clinically significant and consistent reduction in fresh stillbirth and very early (<24 h) neonatal mortality (Fig. 2). Reductions in fresh stillbirth average 34% (OR 0.66; 95% CI 0.52–0.85), and very early neonatal mortality average 30% (OR 0.70; 95% CI 0.51–0.98) [11]. Reduction in fresh stillbirth and neonatal mortality reflects emphasis on prompt recognition of babies who need help to breathe and assuring that babies are either breathing effectively or receiving bag and mask ventilation by the end of the Golden Minute, the first minute after birth. Preparing birth attendants to intervene promptly with stimulation and ventilation also has reduced prior misclassification of babies who did not breathe or show visible signs of life as stillbirths [12]. That neonatal mortality does not increase as fresh stillbirth decreases supports the contention that survivors of basic resuscitation in many cases experience good quality of survival [13].

Refinement of Implementation Methods

Dissemination and implementation research using HBB in multiple countries and settings helped refine the key steps necessary to actually improve patient outcomes. As well documented in education literature, simply participating in a workshop is not sufficient to change practice and affect outcomes [14]. The addition of low-dose, high-frequency practice in the facility has the effect of reinforcing newly acquired skills, moving providers toward mastery of those skills, acknowledging the acceptability of new practices in the facility, and spreading skills to new providers and those unable to participate in the formal workshops – thus achieving higher coverage of providers within a facility [15, 16]. Low-dose, high-frequency practice led by a designated coordinator/champion within the facility improves adherence to practice and is associated with improved outcomes [15, 17].

The most significant and consistent reductions in fresh stillbirth and neonatal mortality have occurred when HBB is implemented in conjunction with quality improvement cycles around resuscitation aims. Among the effective practices identified, self-reflection by individual providers on each resuscitation performed is one of the simplest associated with positive change in outcomes. Monitoring and case review with weekly quality meetings can develop a culture of local data collection and use and help shift the narrative from punitive management practices to shared efforts toward more efficient and effective care [18, 19]. Debriefing, including use of video recordings, has been used in a variety of settings [18–22]. The transportability and generalizability of

quality improvement approaches have been demonstrated in a cluster randomized trial among district hospitals in Nepal [23].

The Challenges and Gaps in Current Programs to Promote Global Newborn Survival

Expanding the Scope to Address the Three Major Causes of Neonatal Mortality

Despite success in improving outcomes, the impact of HBB on the overall global outcome of 28-day neonatal mortality is limited. Interventions to improve resuscitation outcomes are essential as a base for later improvements, but interventions focused on the first minutes and first day, while necessary, are not sufficient to substantially influence 28-day neonatal mortality resulting from causes such as hypothermia, inadequate feeding, and infection [24, 25]. Helping Babies Survive (HBS) programs using the HBB educational methodology (Essential Care for Every Baby and Essential Care for Small Babies) to address the other primary causes of neonatal mortality have demonstrated effective learning [26]. The Essential Newborn Care Course (ENCC) from the World Health Organization has been shown to positively affect outcomes [27, 28]. However, no comprehensive educational programs in essential newborn care (either HBS or ENCC) have achieved widespread uptake and use. Furthermore, reducing neonatal mortality through 28 days requires influencing care after discharge from the facility which includes educating parents about practices to continue at home and signs to seek care. Connections from the facility to the community need to be strengthened to support the baby with special needs (e.g., warmth, feeding) once released from the facility in order to avoid subsequent morbidity and mortality.

A review of the content of current educational programs also identifies gaps with respect to persistent deficiencies in practice, cross-cutting quality themes, and new areas of evidence and policy development. For example, despite concerted efforts to limit the use of oropharyngeal suction in newly born infants the unnecessary practice of suction remains widespread and difficult to change; bag-and-mask ventilation remains a challenging skill to master and maintain, and despite the proven benefits of physiologic umbilical cord clamping and uninterrupted skin-to-skin care for the first hour after birth, facility routines have been slow to change when substantial changes in workflow are required [29, 30]. Similarly, kangaroo mother care remains apart as a specific program

rather than a central approach to care of small newborns. Development of global standards for quality in childbirth, newborn, and child health emphasizes the importance of cross-cutting themes such as infection prevention/control and respectful care for mothers and newborns and highlights the role of local data collection and data use [31]. Growing evidence supports the importance of nurturing care, and developmentally supportive care in the case of hospitalized newborns, to achieving not just survival but high-quality survival that puts newborns on a path to thrive [32, 33].

Delivery of In-Service versus Pre-Service Education

To date, global educational initiatives have focused on in-service education rather than addressing both in-service and pre-service education [34]. While directing education to those already providing patient care is an urgent priority to improve patient outcomes, the logistics of providing continuing education in the clinical setting are particularly challenging. Removing active staff from their site of clinical practice to attend continuing education programs creates difficulties around coverage of patient care responsibilities, expenses associated with travel and per diem support, physical context which does not reflect actual circumstances of practice, and at times, hardship for the extended family of health workers [16, 35]. Holding educational programs in the health care facility provides valuable context for translating new knowledge and skills into practice, reduces expenses associated with travel (by moving only a few faculty), and opens access to more providers. However, in situ training requires space in the health facility and flexibility to incorporate urgent clinical demands into the learning experience [16, 17]. Integrating competency-based education more fully into pre-service education is supported by current educational theory [36, 37]. Students in a variety of health disciplines (nursing, midwifery, medicine, community health) can benefit from educational elements that emphasize practical skills and smooth their transition to the clinical setting. Nonetheless, in most countries, health ministries do not direct curriculum content for pre-service education, necessitating involvement of a separate group of education stakeholders.

Use of Technology

Current educational programs have not yet taken full advantage of rapid change in technology to reach users. Improved access to Internet resources on mobile phones and tablets in low- and middle-income countries offers expanded opportunities for self-learning, distance learn-

ing, and hybrid learning. With such options, face-to-face time can focus on interactive discussion, problem-solving, and practice of skills and communication in teams. Video resources offer unique advantages for learning specific physical exam findings and analyzing clinical situations [37]. Self-paced learning with interactive features to check understanding and “re-access” and reinforce new knowledge can to a great extent replace conventional didactic presentations with slides or lectures [35]. Utilization of electronic platforms for learning can permit more focus on building skills that support improved patient outcomes. Quality improvement becomes a seamless part of both education and daily patient care.

Building Better Educational Programs and Implementation Strategies

Enhancing Learning and Embedding Quality Improvement

To build upon the strengths of existing programs and better address the gaps that remain calls for reimagining the scope of current educational programs and extending partnerships to achieve broad coverage with high quality. Establishing a patient-centered framework of clinical evaluation, decision-making, and action cycles can be accomplished for a variety of providers and students using active learning with simulation and case scenarios. This orienting framework can then guide exposure to and examination of clinical practices and quality improvement initiatives. Use of accessible electronic platforms (especially mobile phones) permits efficient use of face-to-face classroom time and just-in-time refresher learning in the clinical setting. Amplifying the framework of clinical action steps, a series of in-depth learning modules on selected topics can link to more detailed exploration of physiology and current evidence. Focused examination of clinical practices naturally leads to identification of aims for quality improvement. Whether in a pre-service setting or in-service setting, the approach serves to integrate quality improvement seamlessly into the provision of clinical care.

The algorithm for clinical decision-making and action also serves as a framework for identification and collection of process and outcome indicators. Local collection and use of a set of key indicators empowers facilities to make positive change – identifying the issues most important locally and implementing targeted education or reorganization of workflow – changes which may be possible with modest financial or commodity support from higher

levels of the health system. Standardized educational packages and quality indicators also facilitate broader regional and national efforts, such as quality collaborations. However, flexibility in the manner in which health systems incorporate such programs into their program structure allows for ownership and ideally sustainability.

Achieving Broad Coverage with High Quality

The global community must actively promote practices that will accelerate the reduction in neonatal mortality if the goals of the ENAP are to be met. Global stakeholders, including United Nations health agencies, governmental and nongovernmental organizations, and professional associations, have the opportunity to help integrate innovative, effective perinatal education into health systems and national newborn plans. Achieving impact at the population level will require adoption and adaptation of educational materials into comprehensive pre-service and in-service education packages, systems for supply and logistics management, and linkages with regional and national quality improvement initiatives. Efforts on the part of governments and stakeholders to bring coverage and quality of essential newborn care to scale have the potential to reduce neonatal mortality.

Disclosure Statement

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