

## Helping Babies Breathe can reduce deaths with the right combination of training and expertise

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Neonatal depression is unpredictable before birth and the need for resuscitation can only be anticipated in 50% of cases (1). Prompt resuscitation by trained multidisciplinary teams is now the expected norm in high-income settings and formal neonatal resuscitation training programmes, such as the Neonatal Resuscitation Programme, Neonatal Life Support and European Neonatal Life Support, have helped to develop standard procedures. Over the last 30 years scientific knowledge of the transition from intra to extra-uterine life has grown significantly and current resuscitation practices are strongly evidence based (2).

Effective resuscitation of newborn infants has the potential to save many lives around the world and reduce disabilities in children who survive intrapartum asphyxia. A systematic review calculated that if every birth was attended by someone who had undergone standardised formal neonatal training, 140,000 lives would be saved each year (3). This huge figure shows that major reductions in neonatal mortality are possible in those parts of the world with the highest perinatal mortalities, such as sub Saharan Africa. The global challenge is that an estimated 717,000 newborn infants die each year from intrapartum related causes and the inability to breathe immediately after birth. Helping Babies Breathe (HBB) is an evidence-based educational programme that started in 2010 and teaches basic

neonatal resuscitation techniques in resource-limited areas. The mission of HBB is to provide birth attendants in developing countries with essential skills in newborn resuscitation, with the goal of having at least one person who is skilled in neonatal resuscitation at the birth of every baby. A key principle of HBB is The Golden Minute, which states that within one minute of birth, a baby should be breathing well spontaneously or should be effectively ventilated with a bag and mask. The Golden Minute identifies the steps that a birth attendant must take immediately after birth to evaluate the baby and stimulate breathing. The HBB programme is low cost and portable and the resuscitation algorithm focuses on stimulation, drying, clearing the airway and bag-mask ventilation in air.

HBB has been very successful and since its launch in 2010 it has been introduced into 77 countries and 160,000 birth attendants have been trained and equipped. Studies evaluating HBB have shown decreases in neonatal mortality (3) and stillbirth rates (4). However, two recurring questions remain.

The first question is what improvements or modifications are needed for this reduction in mortality to be sustained in low-income and middle-income countries? Retention of skills after initial neonatal resuscitation training in these countries has remained a challenge (5). The study by Rule et al (6) in this issue of *Acta Paediatrica* describes a rural Kenyan hospital health professional team's use of quality improvement (QI) techniques to decrease hypoxic ischaemic encephalopathy rates by 50% within six months of HBB training. In the previous five years this hospital had tried to adopt the American Academy of Pediatrics' Neonatal Resuscitation Programme twice, but could not sustain the initiative due to a lack of trained local facilitators, simulators and planning for ongoing recertification. A hospital task force wanted to build a sustainable neonatal resuscitation programme

and invited a visiting HBB master trainer from North America to join the team and train its members in HBB and QI methodology. Gaps in care were recognised and 13 workshops were held to train 96 staff in the HBB intervention. The outcome of this intervention was successful; as suspected hypoxic ischaemic encephalopathy rates were reduced by 53% after initiating HBB training.

The World Health Organization has recognised quality of care as a critical factor in providing immediate postnatal care to mothers and newborn infants and standards for QI have been published (7). However, QI is still a new concept in many settings with a high neonatal death burden. Potential gains from integrating QI with HBB may not be achieved if newly formed QI teams or task forces are not guided by a QI coach (8). In the Rule *et al* study (6), the HBB master trainer and QI coach worked with the Kenyan hospital task force for a year and this undoubtedly contributed to the reported success. There are very few QI coaches in sub-Saharan Africa and efforts to improve local capacity are urgently needed to ensure countries will be on track to achieve global goals to reduce neonatal deaths.

The second edition of HBB was released in 2016 and, in addition to the evidence on best clinical practice, it focuses on important areas such as QI, implementation strategies and ways to improve skills retention. As well as providing training, HBB master trainers and QI coaches must now develop long-term relationships with local facilitators and providers to sustain the gains made by the HBB workshop.

The other question that needs to be addressed is how does the reduction in mortality from the HBB programme affect stillbirth, birth asphyxia and morbidity rates?

As well as reducing early neonatal mortality (3), the implementation of neonatal resuscitation programmes such as HBB in low-income and middle-income countries has also reduced stillbirth rates (4). This is because babies who were thought to be stillborn were recognised as being depressed and staff realised they had the potential to survive with basic HBB resuscitation. The study by Rule *et al* (6) did not report rates of stillbirths, delivery room deaths or survivor morbidity and the authors agreed that this was an important area for future study. Other studies have been reassuring about morbidity rates, as they have shown that babies who needed resuscitation from low-income and middle-income countries did not have an excess of neurological or developmental morbidity at 12 months of age (9, 10). More research, however, is needed to understand the long term effect of resuscitation programmes in the context of babies with birth asphyxia and subsequent neonatal encephalopathy (3).

The first standardised resuscitation programme - the American Academy of Pediatrics Neonatal Resuscitation Programme - was introduced in 1987 (1). At that time written protocols for neonatal resuscitation were only available in 55% of delivery rooms and only around 43% of individuals received training (1). Research is needed now in low-income and middle-income countries to implement and assess retention and improvement strategies in the classroom and clinical settings, so that the World Health Organization's goal of eliminating preventable neonatal deaths can be achieved by 2035.

## **References**

1. Chance G, Hanvey L. Neonatal resuscitation in Canadian hospitals. *CMAJ*. 1987; 136:601-6
2. Manley B, Owen L, Hooper S, Jacobs S, Cheong J, Doyle L, et al. Towards evidence-based resuscitation of the newborn infant. *Lancet*. 2017; 389:1639-48
3. Pammi M, Dempsey E, Ryan C, Barrington K. Newborn Resuscitation Training Programmes Reduce Early Neonatal Mortality. *Neonatology*. 2016; 110:210-24
4. Goudar S, Somannavar M, Clark R, Lockyer J, Revankar A, Fidler H, et al. Stillbirth and newborn mortality in India after helping babies breathe training. *Pediatrics*. 2013; 13:e344-52
5. Kamath-Rayne B, Berkelhamer S, Kc A, Ersdal H, Niermeyer S. Neonatal resuscitation in global health settings: an examination of the past to prepare for the future. *Pediatr Res*. 2017; May 24. doi: 10.1038/pr.2017.48
6. Rule A, Maina E, Cheruiyot D, Murei P, Simmons J, Kamath-Rayne B. Using quality improvement to decrease birth asphyxia rates after "helping babies breathe" training in Kenya. *Acta Paediatrica*. 2017;
7. WHO. Standards for improving maternal and newborn quality of care in health facilities. Geneva: World Health Organization. In: [http://www.who.int/reproductivehealth/publications/maternal\\_perinatal\\_health/improving-mnh-health-facilities/en/](http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/improving-mnh-health-facilities/en/), editor 2016
8. Islam F, Rahman A, Halim A. District and Sub-district Level Hospitals in Bangladesh: Description of Model Development Process. *Health Syst Policy Res* 2016; 3
9. Wallander J, Bann C, Chomba E, Goudar S, Pasha O, Biasini F, et al. Developmental trajectories of children with birth asphyxia through 36 months of age in low/low-middle income countries. *Ear Hum Devel*. 2014; 90:343-8
10. WA C, Goudar SS, Pasha O, Chomba E, Wallander JL, Biasini FJ, et al. Randomized trial of early developmental intervention on outcomes in children after birth asphyxia in developing countries. *J Pediatr*. 2013; 162