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Addressing High Infant Mortality in the Developing World: A Glimmer of Hope

John Kattwinkel

Pediatrics; originally published online January 21, 2013;
DOI: 10.1542/peds.2012-3171

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AUTHOR: John Kattwinkel, MD

Department of Pediatrics, University of Virginia, Charlottesville, Virginia

KEY WORDS
asphyxia, infant mortality, Helping Babies Breathe, neonatal mortality, neonatal resuscitation

ABBREVIATIONS
AAP—American Academy of Pediatrics
FSB—fresh stillbirth
HBB—Helping Babies Breathe
NMR—neonatal mortality rate
NRP—Neonatal Resuscitation Program

www.pediatrics.org/cgi/doi/10.1542/peds.2012-3171

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Accepted for publication Oct 24, 2012

Address correspondence to John Kattwinkel, MD, University of Virginia, Department of Pediatrics, PO Box 800386, Charlottesville, VA 22908. E-mail: jk3f@virginia.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: *Dr Kattwinkel received a stipend from the American Academy of Pediatrics and American Heart Association to serve as editor of the Neonatal Resuscitation Program Textbook.*

FUNDING: No external funding.

COMPANION PAPERS: Companions to this article can be found on pages e353 and e344, online at www.pediatrics.org/cgi/doi/10.1542/peds.2012-1795 and www.pediatrics.org/cgi/doi/10.1542/peds.2012-2112.

Extraordinary progress has been made in reducing infant mortality in the developed world over the past 7 decades, with death rates during the first year of life falling by more than 90% since my own birth in 1941. However, infant mortality rates in the developing world are still nearly 10 times higher than in the United States (Fig 1). Two articles in this month's *Pediatrics* suggest that help is on the way to narrow this unacceptable gap.[1,2]

It has been estimated that early birth asphyxia is responsible for nearly one-third of the neonatal mortality rate (NMR), as well as contributing substantially to neurodevelopmental disability.[3] To address this problem in the United States, the American Academy of Pediatrics (AAP) and American Heart Association developed the Neonatal Resuscitation Program (NRP), which has been highly successful, with >3 million health care providers completing the course in the United States alone. This success has led >130 other countries, from both the developed and developing world, to express interest in adopting the NRP curriculum. But is NRP really an appropriate model for the developing world? At least 1 intervention attempting to do just that produced disappointing results,[4,5] perhaps because of differences in the environment, personnel, and equipment associated with childbirth in the United States. In most of the world, most births take place in the mother's home or in regional clinics rather than in hospitals. Physicians or highly trained midwives attend nearly all births in the United States, whereas traditional midwives, doulas, or all too frequently no trained attendants at all are present during births in the developing world. Optimum equipment for resuscitating newborns is available in every licensed hospital in the United States, whereas such equipment is not available for the vast majority of births in the developing world, even if an attendant were to be available and knew how to use it.

Recognizing these differences, the AAP moved quickly to develop a new resuscitation program, Helping Babies Breathe (HBB), by using the same evidence-based, breathing-first principles on which NRP was based. Because evidence has shown that resuscitation steps beyond assisted ventilation are unnecessary for >99% of compromised newborns,[6] it stops short of activities that are impractical and generally unachievable in developing areas.

The reports published this month describing implementation of the HBB strategy in 2 developing countries suggest that this new program may well be an effective tool to bring infant mortality in the developing world more in line with that achieved in the rest of the world.

Goudar et al[1] implemented HBB in southern India, with AAP instructors conducting 2-day workshops for regional trainers, who subsequently educated 599 birth attendants from rural primary health

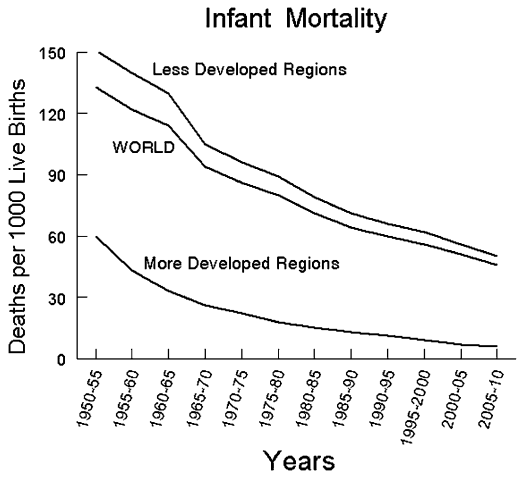

FIGURE 1

Infant mortality. From: United Nations. Department of Economic and Scientific Affairs, Populations Division. 2011. World Population Prospects: The 2010 Revision. CD-ROM Edition.

centers and district and urban hospitals. During the relatively brief period of 6 months after the program, there was a 48% reduction in "fresh stillbirths" (FSBs), which have been speculated to include a substantial number of potentially viable infants who would not have previously been offered resuscitation.[7] It should be noted, however, that >90% of the attendants who administered bag-and-mask ventilation in both the pre- and post-training periods were physicians, not the nurses and other providers who are generally the workers in the field.

In the second study, by Msemo et al,[2] a similar HBB strategy was used to train 40 "master instructors" from 8 study site hospitals in Tanzania, who then delivered the program to regional instructors who in turn trained health providers in the smaller facilities within each of the 8 districts. During the 2 years after intervention, there was a 24% reduction in FSBs and a 47% reduction in early neonatal mortality, defined as death within the first 24 hours. This program was focused on the grass-roots birth attendants, many of whom practice in rural facilities, rather than on hospital-based physicians, and included strategies such as conducting refresher courses and requiring all attendants to demonstrate resuscitation skills with a manikin at the start of each shift in the delivery area, including practicing bag-and-mask ventilation.

Although both studies used the HBB program as their primary intervention, the study designs were sufficiently different to prohibit direct comparisons. Nevertheless, several conclusions appear justified. First, a reduction in FSB rates in both studies without a simultaneous increase in NMR indicates that lives were indeed saved, particularly with the observation in India that nearly 3 times as many infants received positive pressure ventilation during the post-training period. Second, the observed decrease in early neonatal mortality in the Tanzanian study, where education was focused on the traditional birth attendants rather than physicians, with repeated exposure to the intervention over a 2-year period, and where over 78 000 births were evaluated, suggests that the HBB program may well result in a substantial improvement in NMR when implemented in large populations and aimed at primary birth attendants. The Tanzanian study does not report the more conventional 28-day NMR, perhaps because of the difficulties involved with obtaining reliable follow-up in these populations, where the mothers and infants are often available to the investigators for only a few hours after birth. UNICEF has estimated that a child is "about 500 times" more likely to die in the first day after birth than at 1 month of age,[8] so the "early NMR" reported in the Tanzanian study likely provides a reasonable reflection of trends in a country's 28-day NMR and even its 1-year infant mortality rate. Third, both studies were conducted in the environment of hospitals, presumably because of the controlled environment and inability to collect reliable data in the more common birthing environment of the home or rural clinic. However, if the Tanzanian study design of focusing repeated exposure of HBB to primary birth attendants can be replicated in rural traditional birthing settings, where training is currently often nonexistent, the impact on FSB and NMR would likely be even greater than observed in these hospital-based studies.

With the identification of a promising intervention, those in a position to provide the resources have recognized the need, including private and international organizations, such as the US Agency for International Development, Save the Children, the Laerdal Foundation, and the Eunice Kennedy Shriver National Institute of Child Health and Human Development. The United Nations Millennium Summit of 2000 had recently defined targets for success: the Millennium Development Goals.

Now that we have a tool that seems to work, the next step is to get the job done.

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