

Helping Babies Survive: Lessons Learned From Global Trainers

Hasan S. Merali, MD, MPH,^a Michael K. Visick, MD,^b Erick Amick, MPH, MA,^c Renate D. Savich, MD^d

abstract

BACKGROUND: The Helping Babies Survive (HBS) suite of programs was launched in 2010 as an evidence-based educational package to train health care workers in low- and middle-income countries in neonatal resuscitation, immediate newborn care, and complications of prematurity. To date, there has been no purposeful examination of lessons learned from HBS trainers. Our intent with this study is to gather that data from the field.

METHODS: To estimate the total global reach of the HBS program, we obtained equipment distribution data from Laerdal and HBS material download data from the HBS Web site as of March 2020. To understand the lessons learned from HBS trainers, we examined comments from trainers who recorded their trainings on the HBS Web site, and other first-hand accounts.

RESULTS: More than 1 million pieces of equipment (simulators, flip charts, provider guides, and action plans) have been distributed worldwide. HBS materials have been downloaded from the Web site >130 000 times and have now been translated into 27 languages. HBS equipment and training has reached an estimated 850 000 providers in 158 countries. Qualitative analysis revealed 3 major themes critical to building successful and sustainable HBS programs: support, planning and local context, and subthemes for each.

CONCLUSIONS: Lessons learned from experienced trainers represent a vital distillation of first-hand experience into widely applicable knowledge to be used to reduce potential failures and achieve desired outcomes. Findings from this study offer further guidance on best practices for implementing and sustaining HBS programs and provide insight into challenges and successes experienced by HBS trainers.

WHAT'S KNOWN ON THIS SUBJECT: Helping Babies Survive has been an innovative and effective method for teaching neonatal resuscitation and initial newborn care in low- and middle-income countries.

WHAT THIS STUDY ADDS: We have identified critical components of successful teaching and implementation of Helping Babies Survive from trainers. Support, local context, and planning before, during, and after courses are critically important. Planning for continued practice after courses are taught is vital for sustained improvement.

^aMcMaster Children's Hospital, Hamilton, Ontario, Canada; ^bMaternal and Newborn Care, Latter-day Saint Charities, Salt Lake City, Utah; ^cAmerican Academy of Pediatrics, Itasca, Illinois; and ^dUniversity of Mississippi Medical Center, Jackson, Mississippi

Drs Merali, Visick, Mr Amick, and Dr Savich all conceptualized and designed the study, designed the data collection instruments, analyzed the data, drafted the initial manuscript, and reviewed and revised the manuscript, and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

DOI: <https://doi.org/10.1542/peds.2020-016915F>

Accepted for publication Aug 4, 2020

Address correspondence to Hasan S. Merali, MD, MPH, Division of Pediatric Emergency Medicine, McMaster Children's Hospital, 1280 Main St West, HSC-2R104, Hamilton, ON L8S 4K1, Canada. E-mail: meralih@mcmaster.ca

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

Copyright © 2020 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

To cite: Merali HS, Visick MK, Amick E, et al. Helping Babies Survive: Lessons Learned From Global Trainers. *Pediatrics*. 2020;146(Supplement_2):e2020016915F

In 2010, the American Academy of Pediatrics and several partners introduced Helping Babies Breathe (HBB).¹ HBB was developed to equip birth attendants in low- and middle-income countries (LMICs) with the critical skills of basic newborn resuscitation. Based on the latest resuscitation science and using a simple educational approach, HBB was an elegant solution to address intrapartum asphyxia, a common cause of preventable newborn mortality in LMICs. HBB was well-received by a variety of stakeholders, including frontline care providers, ministries of health, and many nongovernmental organizations and aid agencies. The enthusiastic embrace of HBB by stakeholders quickly generated a demand for other newborn care curricula using HBB's simple methodology.² Two companion curricula, Essential Care for Every Baby (ECEB) and Essential Care for Small Babies (ECSB), were developed to address essential newborn care and specialized care for low birth weight and preterm infants, respectively. Together with HBB, these curricula are known as the Helping Babies Survive (HBS) suite of programs and address the 3 most common causes of preventable newborn mortality.^{3,4} As such, HBS training programs have been formally adopted into national health systems in many LMICs.^{5,6} Even with systematic government-led integration efforts, HBS remains largely a grassroots intervention often initiated at the facility level by individuals, frequently called trainers, who have received training in the HBS train-the-trainer model of implementation (E. Amick, E. Schoen, unpublished report, 2018).⁷

In the decade since, much has been learned regarding best practices for effective trainings, overcoming challenges to implementation, and sustaining impactful HBS interventions around the world. These practices, or lessons learned,

represent a vital distillation of first-hand experience into widely applicable knowledge that can be used to reduce potential failures and achieve desired outcomes. However, HBS-related lessons learned have been reported somewhat infrequently among networks of HBS trainers and referenced rather sporadically in the HBS literature.⁸⁻¹⁰ To date, there has been no purposeful examination of lessons learned from HBS trainers. Our aim with this study is to gather the disparate data points on lessons learned and offer an in-depth qualitative analysis of trainer feedback to identify the essential elements of successful HBS interventions around the world. Findings from this study offer further guidance on best practices in implementing and sustaining HBS trainings and provide insight into challenges and success experienced by HBS trainers in LMIC settings around the world. Evaluating these lessons learned through the lens of implementation science can result in enhanced ability for trainers to train others in HBS and sustain implementation of this new educational method for teaching newborn resuscitation and care.

METHODS

To estimate the total global reach of the HBS program, we first obtained equipment distribution data from Laerdal Global Health, co-creators of the program, who manage the materials and are responsible for all equipment orders. We then examined HBS material download data as of March 2020 from the HBS Web site, which included facilitator flip charts, provider guides, action plans, and parent guides in pdf format.

To understand the lessons learned from HBS trainers, we examined 3 pieces of data available on the HBS Web site (hbs.aap.org). Data were examined by using content analysis, a two-phase process of reviewing

data to identify and derive meaning from the text. Using publicly available information from the HBS Web site, the research team analyzed data collected over the 10-year history of HBS. The study was focused on areas of the HBS Web site where trainers share information about their experiences conducting HBS trainings, including a database, "Stories from the Field," and a forum to share tips to "Know Before You Go."

The first phase in this iterative, data-driven process consisted of open coding to identify categories that occur in the data. In this phase, the research team reviewed the largest source of data on the HBS Web site, a basic database (hbs.aap.org/Record) where site visitors can view the historical log of HBS trainings from trainers around the world. The self-reported data collected in this database include various aspects of HBS trainings, such as date and location of training, numbers of individuals trained, and a field for entering lessons learned from the training experience. The database contains hundreds of entries, which offered an opportunity to examine a broad range of data points.

Using themes identified in the first phase, the research team used thematic coding in the second phase to analyze narratives and first-hand accounts reported in "Stories from the Field" (hbs.aap.org/Stories) and the "Know Before You Go" forum (hbs.aap.org/Know). "Stories from the Field" is a collection of first-hand narrative accounts of training experiences submitted by HBS trainers and provides readers with an in-depth depiction of the training experience. Similarly, the "Know Before You Go" forum of the HBS Web site contains robust first-hand lessons learned and offers tips and tricks to readers planning HBS trainings of their own. Submission forms for both of these forums include the following prompts:

- What worked best for your course?
- What did not work well for your course?
- Can you name one completely unanticipated challenge you faced and how you were able to overcome it?
- What advice would you offer others implementing HBS programs in the field?
- What is one thing you would have done differently?

RESULTS

Using material distribution data from Laerdal, >1 million pieces of HBS equipment have been circulated worldwide as of March 2020. This includes 173 591 simulators (NeoNatalie, PreemieNatalie, and MamaBreast), 56 448 flip charts, 113 608 action plans, and 744 260 provider guides (Table 1). Using these data, we estimate 850 000 providers have been trained worldwide. It should be noted, however, that this is a conservative estimate and likely underestimates the total number of providers trained because simulators are generally re-used for multiple trainings, and written materials are often downloaded from the Web site and printed in-country rather than being ordered.

TABLE 1 Equipment Distributed by Laerdal Worldwide

	<i>n</i>
Simulators	
NeoNatalies	136 298
MamaBreast	19 889
PreemieNatalies	17 404
HBB flip charts	40 403
Learning materials	
HBB provider guides	520 820
HBB action plans	88 578
ECEB flip charts	9759
ECEB provider guides	140 420
ECEB action plans	15 359
ECSB flip charts	6286
ECSB provider guides	83 020
ECSB action plans	9671
Total pieces	1 087 907

TABLE 2 Electronic Materials Downloaded at InternationalResources.aap.org

	<i>n</i>	Total
HBB		114 617
Downloads HBB flipchart (first and second editions)	37 075	—
Downloads HBB Provider guide and workbook	44 275	—
Downloads HBB action plan	33 267	—
ECEB		15 963
Downloads ECEB flip chart	4133	—
Downloads ECEB provider guide	3581	—
Downloads ECEB action plan	5936	—
Downloads of ECEB parent guide	2313	—
ECSB		3897
Downloads ECSB lip chart	606	—
Downloads ECSB provider guide	537	—
Downloads ECSB action plan	2287	—
Downloads of ECSB parent guide	467	—
Grand total downloads all HBS programs		134 477

—, not applicable.

Using data from InternationalResources.aap.org as of March 2020, we found that HBS materials were downloaded 134 477 times. The majority, 114 617 (85.2%), were for HBB materials, 15 963 (11.9%) were for ECEB materials, and 3897 (2.9%) were for ECSB materials (Table 2). Combining data from Web site downloads, courses taught, and distribution data, HBS has reached 158 countries and has been translated into 27 languages (Fig 1).

By using the HBS training database in the first phase of the qualitative analysis, 3 major themes critical to building sustainable HBS programs were identified: support, local context, and planning (Fig 2). From

the information provided by HBS trainers, success in teaching HBS required recognition of these 3 necessary components. Implementation of the program required not only teaching the HBS modules but recognition that significant work and planning is needed to be accomplished both before and after teaching the actual workshops. Subthemes identified emphasized the importance of (1) having local contacts initiated before training; (2) communication with local health care systems and in the local language; (3) frequent and sustained hands-on practice during and after the course; (4) demonstrating success to the learners; (5) ensuring appropriate language is used, taking into account provider literacy; (6) identifying gaps in knowledge or care within the local health system; (7) having adequate time for training; (8) being able to deal with unexpected challenges in-country; (9) adapting to changing situations; and (10) ensuring the proper supply of training materials.

The second phase of the qualitative analysis added examination of the “Stories from the Field” and the “Know Before You Go” sections of the Web site. Overall, the majority of the trainers were from the United States (60.1%), with 39.9% based in other

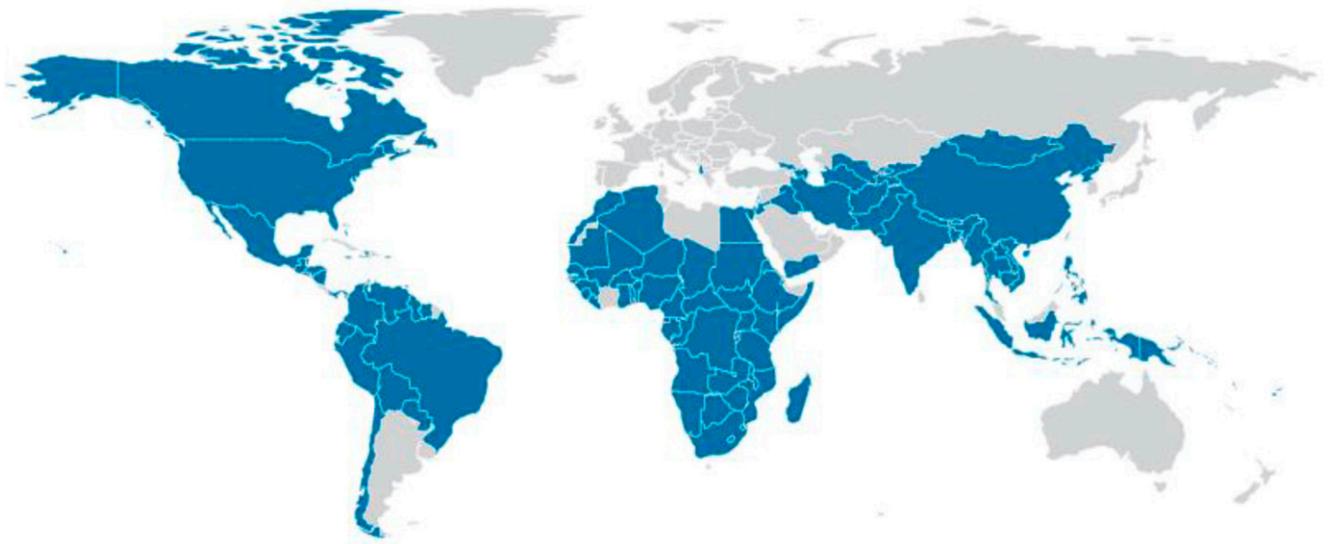


FIGURE 1
Global reach of HBS implementation. (Image from hbs.aap.org reproduced with permission of the American Academy of Pediatrics).

countries. All 3 sources of qualitative data represent implementation in a variety of countries (Table 3). Using these data, we were able to provide further definitions and examples for themes and subthemes identified in the first phase. We also selected the most illustrative quotes from the “Know Before You Go” section (Table 4).

DISCUSSION

HBS has been shown to be an effective educational method to train birth attendants worldwide in newborn resuscitation and care. Implementation science is the study of how evidence-based programs can be embedded to maximize successful outcomes.¹¹ We used this framework



FIGURE 2
Essential elements of sustainable and impactful HBS programs.

to help identify whether HBS trainers had successfully implemented best practices to train birth attendants. However, as implementation science and feedback from HBS trainers would indicate, teaching the course alone is not sufficient to sustain change in practice and improve care.⁸ Recent research in implementation science has identified the components for successfully implementing any new program, and we can use these scientific underpinnings to further hone our ability to reduce newborn mortality from asphyxia, infection, and prematurity using HBS training.¹²

Support is one of the major themes identified by HBB trainers. This can be broadly defined as any effort intended to facilitate the successful implementation of and adherence to the planned, or newly introduced, HBS project. Within the broader theme of support, 3 subthemes were identified: local contacts, communication, and hands-on practice. Trainers identified local contacts as crucial not only to the initial introduction and preimplementation phase of the program^{13,14} but also to ensure the training runs well at the time of

delivery and that the project is sustained long-term. Specifically, contacts that were identified as being vital were the in-country Ministry of Health (MOH), hospital leadership, and “local champions”: providers and leadership in the hospital or health center who believe in and support the program. Hospital leadership, for example, can ensure that participants have protected time off so they are able to fully participate in the educational sessions.^{13–15} It is also helpful to formally identify implementation leaders who will take responsibility for the implementing of the project and who come from within the target organization.¹⁵ Engaging stakeholders, local ownership, identifying a champion, and ensuring that the program is aligned with the organization’s objectives are key factors in achieving sustainability.¹⁶

The second subtheme, related to local contacts, was communication. This refers to any dialogue with participants and partners both before and, importantly, after training to provide coaching, supportive supervision, and quality improvement (QI) follow-up. Several trainers in this

TABLE 3 Countries and Sources for Lessons Learned

Implementation Country	Stories from the Field	Know Before You Go "Lessons Learned"	Courses Recorded with American Academy of Pediatrics
Africa			
Democratic Republic of Congo	1	—	5
Ethiopia	—	3	3
Gambia	—	—	1
Ghana	—	6	8
Kenya	1	4	5
Liberia	—	—	1
Madagascar	3	1	—
Malawi	—	2	—
Mauritania	—	1	1
Mozambique	1	2	—
Niger	1	—	1
Nigeria	1	1	1
Rwanda	—	7	6
Sierra Leone	—	1	4
Tanzania (including Zanzibar)	1	4	2
Uganda	—	6	4
Zambia	2	—	4
Zimbabwe	1	—	—
Asia			
Albania	—	—	1
Bangladesh	1	3	2
India	—	5	7
Kyrgyzstan	—	1	—
Nepal	—	1	2
Pakistan	1	2	5
Russia	—	—	2
Southeast Asia			
Cambodia	—	3	—
Guam	—	—	5
Indonesia	—	—	1
Myanmar	—	—	1
Papua New Guinea	—	1	—
Thailand	—	1	—
Vietnam	—	5	3
Middle East			
Iraq	1	—	—
Jordan	—	1	—
Yemen	1	—	—
Central America			
Belize	—	1	—
El Salvador	—	1	—
Guatemala	1	6	6
Honduras	—	1	3
Mexico	—	3	—
Nicaragua	—	2	—
South America			
Bolivia	—	—	1
Colombia	—	—	1
Ecuador	—	3	1
Guyana	1	—	1
Peru	—	—	2
Caribbean			
Antigua	—	—	1
Dominican Republic	—	1	2
Haiti	1	1	4
Jamaica	—	—	1
St. Kitts and Nevis	—	—	1
United States	1	8	27
Canada	—	1	1

TABLE 3 Continued

Implementation Country	Stories from the Field	Know Before You Go "Lessons Learned"	Courses Recorded with American Academy of Pediatrics
Australia	—	1	—
Europe	—	2	—

—, 0.

study emphasized the need to leave participants with a concrete plan as to how they will continue to practice their skills in local facilities. Having a plan for the postimplementation phase¹³ is critical for the success of any program because successful implementation can take between 2 and 4 years.¹⁷

Third, there is the subtheme of hands-on practice. This is at the core of the HBS programs, and many of the facilitators emphasized how useful and important this is. Hands-on practice applies not only to the sessions, when participants may be introduced to simulated practice, but also afterward for ongoing low-dose, high-frequency (LDHF) practice. Both HBB knowledge and skills have been shown to deteriorate over time.^{18,19} LDHF practice²⁰ and quality improvement initiatives²¹ are critical for skill maintenance. Long-term continuous quality improvement, combined with LDHF practice, has demonstrated significantly increased perinatal survival.²² In published studies, participants from multiple countries have stated they value the hands-on approach HBS programs provide.^{5,9} Making learning dynamic and interactive is a known strategy to integrate implementation science principles into practice,¹² and mixed interactive and dynamic education are more effective than either one is alone.²³

The second broad theme identified by HBS trainers was local context, referring to any of the characteristics of the local environment that influence implementation or sustainability. The most important subtheme here is gaps in knowledge or applied practices that obstruct

implementation or sustainability. There is overlap with the themes of support and planning, and it is critical to assess gaps and barriers in the clinical setting. For example, after 3 years of a well-supported and well-planned scale-up of HBB training in Malawi, 13% of facilities still lacked soap for hand-washing, almost one third did not have a resuscitation area for the infant or a posted HBB action plan, and 17% did not have an infant bag and mask to use their new skills for infants not breathing at birth.²⁴ Several examples, like the above, were brought up by HBS trainers in which providers received great training, such as HBB, but then returned to a facility with no resuscitation equipment to put their skills into practice and/or no practice equipment or designated newborn resuscitation practice area (a "practice corner") to enable them to maintain their skills. In either case, no behavior change is likely to take place, and in as little as 6 months, resuscitation skills will have declined.¹⁸ However, if providers are empowered by the training and introduced to quality improvement as a means to generate change, they can do their own gap analysis and create their own solutions.

In-country training venues, cuisine, endemic or epidemic disease, unexpected holidays, and local customs were all brought up by HBS trainers as challenges to successful training, most commonly for Westerners who arrive in-country to implement or teach. These comments from trainers highlight the need for conscientious and, importantly, culturally aware preparation for Western trainers. There may also be

ongoing issues that frustrate the efforts of local trainers and champions to build capacity or perpetuate training. Some of those noted by trainers were change in personnel within the MOH or partner organization, elections, civil unrest (revolution in Nicaragua 2018), natural disasters (earthquake in Nepal 2015), and terrorism (Boko Haram in northeastern Nigeria).

Another local context subtheme highlighted by this study was language, and how being able to use training materials in the native language and teach in that language is central to success. Also encompassed in this subtheme is the challenge of illiteracy, which required trainers to focus on creative solutions, even with the highly pictorial learning materials in HBS.

Finally, local context also incorporates the need to "win over" reluctant participants or, more importantly, skeptical stakeholders noted by HBS trainers. Often reluctant participants will be convinced by the strength of the teaching methodology, simulation-based hands-on learning, and the enthusiasm of their peers and colleagues at the training. Inviting stakeholders, particularly those from the MOH, to observe or participate in the training can be enough for them to "catch the vision."

We also evaluated the third broad theme of careful planning before teaching and implementing HBS in-country, as well as planning for sustained implementation and skills after the training. First of all, having equipment (simulators, bag and mask ventilators, suction devices) and materials (flip charts, provider

TABLE 4 Top Ten Subthemes for Lessons Learned From HBS Trainers

Themes and Subthemes	Definitions and Examples	Selected Quotes ^a
Support	Category definition: broadly, any effort intended to facilitate the successful implementation and adherence to the planned (or newly introduced) HBS project.	
Local contacts	Connecting with local providers, MOH officials, and others necessary to introduce and nurture HBS in-country.	<p>“Do an assessment before you go to teach. Work on developing a strong in-country partnership in order to create a sustainable program.”</p> <p>“Must identify a local champion prior to the training...after [the training] must continue to communicate with the local champion...local champions can gather data, share with trainers.”</p> <p>“Trained 6 Master Trainers on day one and two. Then, those trainers taught with us for 8 days, teaching 36 providers each day...The Master Trainers truly understood the working of the program and... have gone on to continue teaching since then.”</p> <p>Mentor new trainers in putting on a course or training others before your team leaving the area or country.</p> <p>“It’s vital to have the in-country Hospital administration, MOH and key players buy off on the training. We have been going for five years and are well known and have MOU with the hospital at the training clinic we built, but it took a long time.”</p>
Communication	Pre-planning discussions; dialogues with in-country partners; post-training follow-up and other methods of communicative support (coaching, supportive supervision, etc).	<p>“After the training there needs to be a plan in place as to how the participants will practice skills. This can be through the use of a skills corner that is equipped, where health care workers practice at the beginning of each shift.”</p> <p>“It is difficult to sustain HBB skills over time, and continued refresher trainings are needed.”</p> <p>“Return again and again to continue to mentor. Let them contact you with questions and stories of successes. Help them set up QI systems and check to be sure they are continuing to use the systems. Check in with those in charge of QI and hold them accountable.”</p> <p>“Provide training materials way in advance.” Give participants the provider guide at least 2 to 3 days in advance to study.</p> <p>HBB Champions wear a different color scrubs “and are known as the HBB teachers.”</p>
Hands-on practice	Providing opportunities to use equipment (NeoNatalie, ventilator, flip chart pages, etc) and peer-to-peer learning for mentorship in how to train others.	<p>“Summarize what was learned with a ball of yarn. Stand in a circle and ask each learner to say one thing they learned or that they will do differently, then toss the ball to another, etc. At the end, the string formed a ‘spider web’ and we put the manikin on it to show how we could now “support” the baby with our new knowledge.”</p> <p>“Train and re-train and leave a baby (Neonatalie) where health care providers can practice between deliveries etc”</p> <p>“Then we have 5 active resuscitations with the staff in the labor ward, real live, before they are deemed competent.” Teaching at the bedside and in labor ward.</p>
Local context	Construct definition: any of the qualities or characteristics of the local environment that can influence training and sustainability.	
Demonstrate success	Illustrating utility of HBS, “winning over” skeptical stakeholders, successful resuscitation by participants and providers after training.	<p>“Go for it! Engage your students by telling stories of your experiences and encouraging them to tell stories of theirs.”</p> <p>“It was also helpful to have non-clinical participants who had leadership roles in the health care center/hospital to understand what the course was about and how important it is.”</p> <p>“Create benchmarks for institutions to determine when they’ve integrated the skills into their protocols effectively. We saw a dramatic reduction in newborn death, but it took about two years.”</p>

TABLE 4 Continued

Themes and Subthemes	Definitions and Examples	Selected Quotes ^a
Language	Issues related to language barriers, interpretation, literacy, etc.	<p>At each table, consider “having two instructors (one experienced mentor, one newer teacher)” - builds the capacity of facilitators while building capacity in the learners as well.</p> <p>“Allow yourself enough time to go through the material slowly. Some participants may not have any experience, English is their second language and need you to speak slowly to understand, or you may need to use an interpreter.”</p> <p>“We didn’t know most of our audience was illiterate and spoke a native language (not Spanish) ...We didn’t know our students wouldn’t be able to read/write.”</p>
Gaps in care or practice	Deficiencies in knowledge or applied practices with regard to providing care or implementing and sustaining change.	<p>“Afterwards, the trainers must debrief the course and review participant evaluations.”</p> <p>“Know your audience. I always want to know what they don’t have so I can work with what they do have. Understand they will not be able to perform as if they work in a US hospital. It will be different, but they have the talent and desire to do a good job for their patients. Help them figure out the work-arounds. Give them the gift of confidence that comes with knowledge. Love them.”</p> <p>Training midwives, nurses, and physicians helps to break down barriers, create bridges between roles.</p> <p>“Understand ethnic conflict in your area and common biases.”</p> <p>“Don’t assume what you teach in a classroom will translate into active ward care.”</p>
Planning	Construct definition: the purposeful efforts to address the fundamental steps in implementing an HBS program. This includes the development of timelines, securing resources, making necessary connections, and overseeing the program from concept to training and sustainability or follow-up. Anything related to preparing for the introduction and perpetuation of an HBS program.	
Time	The amount of time needed to procure resources, provide adequate attention to providers, or achieve buy-in from key stakeholders. The component always underestimated by well-intended HBS trainers.	<p>“More time. There is never quite enough time. Making them come back a separate day is almost impossible in most venues.”</p> <p>“Doing the course over two days to have more time to practice.”</p> <p>“Give yourself grace and schedule a follow-up session for what is left incomplete.”</p> <p>“Consider a stipend for participants, especially those travelling from a great distance, to offset that cost.”</p> <p>“Determine beforehand what time the course must end for participants to be safe travelling home.”</p>
Unexpected	The myriad challenges of implementing a project in low-resource environments. Examples: differentials in punctuality, higher than anticipated number of participants, inadequate training space, providers being called away for work duties.	<p>“I had been told by funding organization I would be teaching ECSB but when I arrived, local organizers had been told I was to teach ECEB. I had not been given any materials for ECEB, but because I knew the course well, I did teach it. It was an unpleasant surprise, but knowing the coursework well saved the day.”</p> <p>“We had miscommunication regarding it being a 2-day program and we had to cram in one day. We concentrated on the keeping the baby warm and delayed cord cutting and how that applied directly to their practice.”</p> <p>“Difficulty downloading the HBB resuscitation video that is so impactful. I was not prepared for how weak the Internet access was in a city of 70 000 people. This would have been completely avoided if we would have downloaded it in the states prior to take-off.”</p> <p>The doctors had to go and cover the wards during breaks and lunch, so “we allocated one trainer to catch them up if they missed any of the training.”</p>
Adapting		<p>“Plan, plan, plan, and then plan some more. Anticipating every possible struggle or complication is what helped my team</p>

TABLE 4 Continued

Themes and Subthemes	Definitions and Examples	Selected Quotes ^a
Equipment	Flexibility, creative solutions, and other actions necessary to address unexpected challenges in the planning, implementation, and sustaining of HBS programs. Any supplies or materials necessary for implementation of HBS program and its subsequent sustainability. Examples: NeoNatalie, resuscitation equipment, printed learning materials, other necessary items.	<p>survive. Having team members with critical thinking skills is a MUST.”</p> <p>“I was still surprised by HOW resource poor some places were: no running water, no electricity, no cord clamps or ties, etc. Talking with people about what they do and what they do have available was critical, and then catering training to use what they can access.”</p> <p>Being “willing to change table [assignments] if it became apparent that a participant was struggling once the course had started.”</p> <p>“Smaller numbers and more frequent courses” meant “more time for practicing and more focused support from the trainers.”</p> <p>“Continual hospital renovations that interrupted training and ability to localize/maintain training and clinical supplies.”</p> <p>“Host country did not have enough equipment for program to be sustainable in rural outlying health care centers.”</p> <p>“Provide posters, [workbooks], NeoNatalies to leave in country”</p> <p>“Learners will not be able to sustain the program if they have 5 bag/masks in the entire hospital.”</p> <p>There is a tendency to try and teach 10 or even 20 learners with just one NeoNatalie because the skills are so sought after. One trainer eliminated this barrier by “scheduling different times for each pair to practice with the mannequin.”</p>

^a A few quotes were paraphrased for length or clarity.

guides, and action plan) is critical for successful teaching. Several of the HBS trainers encountered difficulty with the ordering and delivery of equipment and materials in a timely manner. Issues encountered included the cost of the equipment for many poor countries or programs with minimal financial resources. There was also difficulty in having the equipment clear customs and arrive to the teaching sites in sufficient time for the learners to become familiar with the educational content before the training. Access to the equipment after the training was also an issue noted by the trainers. Developing a plan with the local contacts to ensure delivery and other help in this aspect was noted to be invaluable.

Pre-planning with local medical leaders and ministries of health was critical for the success of the course and training. The time spent planning assured that providers were available for teaching, and that a plan for sustaining the material learned at the

local level was in place. Several of the HBS trainers noted that without the involvement of local leaders, it was extremely difficult to implement the program.

Several of the trainers emphasized the need to “plan” for the unexpected. In addition, having flexibility during the training and adapting to unanticipated challenges helped to assure success of the course. Unanticipated challenges included such things as learners arriving late to courses, shortened teaching time, language and translator challenges, and requests for alternate courses to be taught. Others mentioned difficulty connecting to the Internet needed for teaching, limited local resources or medical supplies, and not having sufficient equipment to train or for use after the course.

Finally, a major focus of implementation science, and as noted by HBS trainers, is the need for planning sustained integration of new knowledge and skills after

the initial training.^{13,15} Several studies have shown that frequent and continued review of educational material and practice of clinical skills was important for sustained change after the trainers left the country or local site.^{20,22} Several HBS trainers emphasized the need for having a succinct and manageable plan for making sure that the skills learned continued to be practiced and for reinforcement of the medical knowledge. As noted above, without a plan for continued skills practice and team building at the local site over the following weeks to months, these best practices for resuscitation would not be sustained and improvements would not occur. It was clear that without this step, the new interventions would not be as successful and previous practices would prevail. Helping to plan a quality improvement process was also noted to ensure success. By implementing a plan to measure and record processes and

improvements, the local team could document better outcomes and share their success.

Although the current study is the first we are aware of attempting to gather lessons learned from the large cohort of global HBS trainers, our data are limited to the comments of those trainers who self-selected to record their trainings in the HBS database or forward comments to “Stories from the Field” or “Know Before You Go.” Our data represent only a portion of the many HBS trainings conducted in the last 10 years. Although trainers based outside the United States are well represented at nearly 40%, responses were weighted toward US-based trainers (60%). We favor increased efforts to connect international trainers to the American Academy of Pediatrics and to each

other to gain a deeper perspective on successful, sustainable training worldwide.

CONCLUSIONS

The past decade has been highlighted by widespread distribution of HBB programming, with helpful feedback provided by those who have facilitated trainings. We have identified important lessons learned, with respect to what has been successful in teaching and implementing as well as challenges and obstacles faced. Using implementation science to further integrate HBS into newborn care throughout the world will ensure continued uptake of new resuscitation skills and improve

neonatal morbidity and mortality in the next decade of HBS.

ACKNOWLEDGMENTS

We thank Sabrina Kernerman for her assistance in editing.

ABBREVIATIONS

ECEB: Essential Care for Every Baby
ECSB: Essential Care for Small Babies
HBB: Helping Babies Breathe
HBS: Helping Babies Survive
LDHF: low-dose, high-frequency
LMIC: low- and middle-income countries
MOH: Ministry of Health
QI: Quality Improvement

FUNDING: The American Academy of Pediatrics supports the Helping Babies Survive Web site and data sources.

POTENTIAL CONFLICT OF INTEREST: The authors are all members of the American Academy of Pediatrics Helping Babies Survive Planning Group and have no other conflicts of interest relevant to this article to disclose.

REFERENCES

1. American Academy of Pediatrics, Laerdal Global Health. Niermeyer S, Keenan W, Little G, Singhal N, eds. for helping babies survive. Helping babies breathe: facilitator flip chart [log-in required]. 2010. Available at: http://internationalresources.aap.org/Resource/ShowFile?documentName=hbb_flipchart_english.pdf. Accessed May 15, 2020.
2. Berkelhamer S, McMillan D, Amick E, Singhal N, Bose C. Beyond newborn resuscitation: essential care for every baby and small babies. *Pediatrics*. 2020; 146(suppl 2). e2020016915D
3. Bose C, Singhal N, eds. Helping Babies Survive: essential care for every baby: facilitator flip chart [log-in required]. American Academy of Pediatrics, Laerdal Global Health. 2014. Available at: http://internationalresources.aap.org/Resource/ShowFile?documentName=eceb_flipchart_english.pdf. Accessed May 15, 2020
4. Singhal N, Berkelhamer S, eds. Helping Babies Survive: essential care for small babies: facilitator flip chart [log-in required]. American Academy of Pediatrics. 2015. Available at: http://internationalresources.aap.org/Resource/ShowFile?documentName=ECSB_Africa_Flipchart.pdf. Accessed May 15, 2020
5. Kamath-Rayne BD, Thukral A, Visick MK, et al. Helping Babies Breathe, Second Edition: A Model for Strengthening Educational Programs to Increase Global Newborn Survival. In: *Glob Health Sci Pract*, vol. 6. 2018:538–551
6. Little G, Keenan W, Singhal N, Niermeyer S. International perspectives: Helping Babies Breathe: Evolution of a global neonatal resuscitation program for resource-limited areas. *NeoReviews*. 2014;15(9):e369–e380
7. Om'Iniabohs A, Amick E, Wisner L, et al. *Helping Babies Survive Asia Regional Workshop Meeting Report Dhaka, Bangladesh*. Washington, DC: Maternal and Child Survival Program; 2015. Available at: <https://www.healthynewbornnetwork.org/hnn-content/uploads/HBSMeetingReport.pdf>
8. Ersdal HL, Vossius C, Bayo E, et al. A one-day “Helping Babies Breathe” course improves simulated performance but not clinical management of neonates. *Resuscitation*. 2013;84(10):1422–1427
9. Isangula KG, Kassick ME, Kairuki AK, et al. Provider experiences with the large-scale ‘Helping Babies Breathe’ training programme in Tanzania [published correction appears in *Paediatr Int Child Health* 2018;38(1):80]. *Paediatr Int Child Health*. 2018;38(1): 46–52
10. Tabangin ME, Josyula S, Taylor KK, Vasquez JC, Kamath-Rayne BD. Resuscitation skills after Helping Babies Breathe training: a comparison of varying practice frequency and impact on retention of skills in different

- types of providers. *Int Health*. 2018; 10(3):163–171
11. Moir T. *Why Is Implementation Science Important for Intervention Design and Evaluation Within Educational Settings?* Lausanne, Switzerland: Frontiers in Education; 2018
 12. Lyon AR. *Implementation Science and Practice in the Education Sector*. SAMHSA; 2015. Available at: <https://education.uw.edu/sites/default/files/Implementation%20Science%20Issue%20Brief%20072617.pdf>
 13. Villalobos Dintrans P, Bossert TJ, Sherry J, Kruk ME. A synthesis of implementation science frameworks and application to global health gaps. *Glob Health Res Policy*. 2019;4:25
 14. Greenberg MT, Domitrovich CE, Graczyk PA, Zins JE. *The Study of Implementation in School-Based Preventive Interventions: Theory, Research, and Practice*. Rockville, MD: US Department of Health and Human Services; Substance Abuse and Mental Health Services Administration; 2005
 15. Dubrowski R, Barwick M, Dubrowski A. I Wish I Knew This Before...an Implementation Science Primer and Model to Guide Implementation of Simulation Programs in Medical Education. In: Safir O, Sonnadara R, Mironova P, Rambani R, eds. *Boot Camp Approach to Surgical Training*. Cham, Switzerland: Springer; 2018:103–121
 16. Scheirer MA. Is sustainability possible? A review and commentary on empirical studies of program sustainability. *Am J Eval*. 2005;26(3):320–347
 17. Fixsen DL, Blase KA, Naoom S, Wallace F. Implementation: the missing link between research and practice. NIRN implementation brief; 2009: 218–227
 18. Bang A, Patel A, Bellad R, et al. Helping Babies Breathe (HBB) training: what happens to knowledge and skills over time? *BMC Pregnancy Childbirth*. 2016; 16(1):364–375
 19. Dol J, Campbell-Yeo M, Murphy GT, Aston M, McMillan D, Richardson B. The impact of the Helping Babies Survive program on neonatal outcomes and health provider skills: a systematic review. *JBI Database Syst Rev Implement Reports*. 2018;16(3):701–737
 20. Mduma E, Ersdal H, Svensen E, Kidanto H, Auestad B, Perlman J. Frequent brief on-site simulation training and reduction in 24-h neonatal mortality—an educational intervention study. *Resuscitation*. 2015;93:1–7
 21. Rule AR, Maina E, Cheruiyot D, Mueri P, Simmons JM, Kamath-Rayne BD. Using Quality Improvement to Decrease Birth Asphyxia Rates after ‘Helping Babies Breathe’ Training in Kenya. In: *Acta Paediatr*, vol. 106. 2017: 1666–1673
 22. Mduma E, Kvaløy JT, Soreide E, et al. Frequent refresher training on newborn resuscitation and potential impact on perinatal outcome over time in a rural Tanzanian hospital: an observational study. *BMJ Open*. 2019; 9(9):e030572
 23. Forsetlund L, Bjørndal A, Rashidian A, et al. Continuing education meetings and workshops: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2009;(2): CD003030
 24. Gupta S, Kazembe A, Mupfudze T, et al. *Evaluation of the Helping Babies Breathe (HBB) Initiative Scale-Up in Malawi*. Lilongwe, Malawi: Maternal and Child Survival Program; 2014

Helping Babies Survive: Lessons Learned From Global Trainers
Hasan S. Merali, Michael K. Visick, Erick Amick and Renate D. Savich
Pediatrics 2020;146;S134
DOI: 10.1542/peds.2020-016915F

Updated Information & Services

including high resolution figures, can be found at:
http://pediatrics.aappublications.org/content/146/Supplement_2/S134

References

This article cites 13 articles, 3 of which you can access for free at:
http://pediatrics.aappublications.org/content/146/Supplement_2/S134#BIBL

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN®



PEDIATRICS[®]

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Helping Babies Survive: Lessons Learned From Global Trainers

Hasan S. Merali, Michael K. Visick, Erick Amick and Renate D. Savich

Pediatrics 2020;146;S134

DOI: 10.1542/peds.2020-016915F

The online version of this article, along with updated information and services, is located on the World Wide Web at:

http://pediatrics.aappublications.org/content/146/Supplement_2/S134

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 345 Park Avenue, Itasca, Illinois, 60143. Copyright © 2020 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN[®]

