“Helping Babies Breathe” Training for Healthcare Workers in Fiji

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“Helping Babies Breathe” Training for Healthcare Workers in Fiji

Sarah Gadd

A clinical project submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Science

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ABSTRACT

“Helping Babies Breathe” Training for Healthcare Workers in Fiji

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Master of Science

Worldwide over 3 million neonates die annually. Roughly one-quarter of these deaths are reportedly due to birth asphyxia. Birth asphyxia occurs most commonly when there is an interruption of placental blood flow to the fetus and results in a hypoxic-ischemic end-process. Hypoxic ischemia can, in turn, lead to long-term neurological problems and even death of a newborn. Basic neonatal resuscitation steps taught in the Helping Babies Breath (HBB) program have been shown to improve outcomes related to birth asphyxia-related injuries and are vital interventions that save lives. Furthermore, HBB has been shown to reduce neonatal mortality by up to 47% and decrease the number of stillbirths due to asphyxia by 24%. The purpose of this project was to introduce the HBB training program in three locations in Fiji.

The effectiveness of HBB training classes were measured using a pre-test/post-test design. Training courses were held at three sites, two in Labasa, Fiji and one in Savusavu, Fiji. Participant total scores from each location were compared and found to be similar. T-tests showed a significant increase in knowledge (df=31, t=-6.96, p < .001). The HBB program is a lifesaving training created for use in countries with limited resources. HBB training was statistically significant in improving the basic neonatal resuscitation knowledge of the participants in Fiji.

Keywords: Helping Babies Breath (HBB), birth asphyxia, neonatal resuscitation, Golden Minute, OSCE, bag-and-mask ventilation
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“Helping Babies Breathe” Training: Fiji Project

Worldwide nearly 3 million neonates die annually (Cordova, Al-Rousan, Castillo-Angeles, Aftab, & Nelson, 2018). Roughly one-quarter of these deaths are reportedly due to birth asphyxia. Birth asphyxia occurs most commonly when there is an interruption of placental blood flow and results in a hypoxic-ischemic end-process, which can lead to long term neurological problems and even death of a newborn (Kamath-Rayne et al., 2018). Neonates suffering from birth asphyxia invariably appear flaccid, white/bluish, and non-breathing with a slow or absent heart rate (Ersdal et al., 2018). Basic neonatal resuscitation steps taught in the Helping Babies Breath (HBB) program have been shown to improve outcomes of birth asphyxia-related injuries and are vital interventions that save lives (Kamath-Rayne et al., 2018). Furthermore, these steps have been shown to reduce neonatal mortality by up to 47% and decrease the number of stillbirths due to asphyxia by 24% (American Academy of Pediatrics [AAP], 2016).

HBB supports the notion that basic neonatal resuscitation should be available to every baby wherever that child is born. HBB was developed in 2010 by The American Academy of Pediatrics (AAP), the World Health Organization, US Agency for International Development (USAID), Save the Children’s Saving Newborn Lives program, the National Institute of Child Health and Development (NICHD), and several other global health stakeholders. The HBB course is a 1-to-2-day simulation-based training that has been introduced around the globe and has reached half a million healthcare professionals in more than 80 countries (Hodgins, 2018). HBB is a simulation-based program used to teach the initial steps of neonatal resuscitation. The initial steps include assessing a baby, drying a baby thoroughly, and keeping a baby warm on the mother's chest while removing secretions if needed. If
additional steps are required, the program instructs how to resuscitate a baby using bag-and-mask ventilation. All steps must be accomplished within the first crucial minute of life, known as the “Golden Minute” to improve neonatal outcomes.

HBB knowledge and skills can be retained and even improved over time with simple, inexpensive interventions (Hodgins, 2018). The skills essential for lifesaving clinical procedures like bag-and-mask resuscitation should be practiced regularly. Regular practice reinforces skills and confidence to apply those skills when needed (Hodgins, 2018). HBB was explicitly designed for birth attendants in resource-limited countries, such as Fiji, and improves neonatal resuscitation skills through hands-on learning and practice using a newborn mannequin simulator (Kamath-Rayne et al., 2018).

Fiji, a South Pacific island country, has a population of approximately 892,000 people, with more than 18,000 births annually. Fifty-four percent of Fijians dwell in rural areas (Ministry of Health and Medical Services, 2017). Throughout the country, access to antenatal care is generally good, and all healthcare, including transport, is provided and funded by the Fijian government. Fiji’s two main islands are home to several hospitals, health centers, and nursing stations that are widely distributed in the rural areas (Ministry of Health and Medical Services, 2017). Each village has one healthcare worker who is responsible for the general health of village members and who is required to come to a local hospital for regularly scheduled education and training.

Fiji has made improvements in neonatal mortality rates and is working to meet the 2030 targets set by the World Health Organization of 12 deaths per 1000 live births and at least 90% of all deliveries attended by a skilled birth attendant (World Health Organization, 2017). However, perinatal mortality accounts for over half of all deaths recorded among children
younger than five years of age in Fiji (Raman, Iljadica, Gyaneshwar, Taito & Fong, 2015). Indeed, a regulatory review showed that little progress had occurred in reducing neonatal death, and mortality rates have been slowly increasing since 2010 (Raman et al., 2015). According to Fiji (2015), neonatal mortality rates have increased from 9.8 to 10.6 per 1,000 live births since 2010.

**Project Aims**

The purpose of this project was to introduce the HBB training program to healthcare workers in three locations in Fiji. The course of neonatal resuscitation skills helped solidify previous training and brought the most up-to-date resuscitation techniques to participants. Additionally, in one location, course supplies were donated so that the healthcare staff would be able to become HBB teachers so that it could be taught to village healthcare workers by peers.

**Methods**

The effectiveness of the HBB training was measured using a pre-test/post-test design. Training courses were held at three sites, two in Labasa and one in Savusavu. These locations were chosen because of their remoteness within Fiji and due to previous connections with the sites.

**Methods of Evaluation**

To evaluate the effectiveness of this project, pre- and post- knowledge tests (from the HBB second edition), objective structured clinical examinations (OSCEs), and a bag and mask ventilation skills checklist were utilized. Pre and post knowledge tests contain 18 multiple-choice questions relating to the care of a neonate (see Appendix A). OSCEs are scenario-based examinations in which one participant reads a situation and acts as an evaluator while another participant plays the role of a provider. If participants are in sets of three, one participant will
role-play as the mother coming to give birth, the second will role-play as the provider, and the third will evaluate the provider (see Appendix B). The participant reading the scenario will assess the other participant’s knowledge as they complete the scenario. Each group of OSCE participants has an assigned facilitator (one of the instructors) that conducts a debriefing session on what went well and areas for improvement for the participants.

Two scenarios were created by the authors of HBB to be used in courses, OSCE A & B, and each participant had the opportunity to play a provider, a mother, and an evaluator. Similar to the OSCEs, the bag and mask ventilation skills checklist involves a scenario that is read to a participant. As the provider-participant works through the simulation performing the appropriate ventilation skills, another participant works with a facilitator to evaluate the provider using the bag and mask ventilation skills checklist (see Appendix C).

**Equipment**

The equipment supplied by Brigham Young University consisted of five simulator kits, eight flip charts, and 16 provider guides. We used the equipment in each location and donated it to Savusavu, which was our last location. Each simulator kit included a NeoNatalie™ mannequin, a detachable cord, two cord ties, a hat, two blankets, a stethoscope, a penguin suction, one-minute timer, and a bag and mask ventilator. On the front of flipcharts, there were pictures for participants to follow along with visually. On the back of the flipcharts were instructions for trainers as well as additional background information and questions trainers use to quiz participants. Each flip chart came with an action plan poster that could be displayed for easily viewing by participants (see Appendix D). Provider booklets contained information similar to the flipcharts and included the action plan on the back cover.
Settings and Procedures

At each location, the participants had different backgrounds, experiences, and resources. The groups included urses, midwives, and physicians. HBB training meetings were held in two cities, Labasa and Savusavu, on the island of Vanua Levu in Fiji. HBB instructors were two graduate students in the Family Nurse Practitioner program and a Ph.D. professor at Brigham Young University who had each completed an HBB master-trainer course. Participants at each location received a 4-hour training session, which incorporated instruction from a master-trainer, hands-on practice, and skill demonstration checks.

**Labasa.** Training sessions were held in two locations in Labasa; at the divisional hospital and public health nurses’ station. The project team brought all the necessary equipment for training, however, we did not donate any supplies to either location in Labasa.

**Divisional hospital.** The Labasa divisional hospital is one of three hospitals on Vanua Levu and is the largest, most westernized hospital with the most available resources. High-risk maternity cases and most emergencies are referred to this hospital. The Labasa hospital has an eight-bed neonatal intensive care unit (NICU) and a 12-bed labor ward with at least three midwives on duty at all times. Labasa hospital personnel have the ability and training to perform cesarean sections and neonatal surgeries. The hospital has an average of eight vaginal deliveries and one cesarean section daily (L. Kurishru, personal communication, May 9, 2018).

Staff at this hospital were familiar with and had received The Neonatal Resuscitation Program ® training, which is a more advanced resuscitation training than HBB. The hospital provided the team with a large conference room with four tables that were arranged in a “U” formation. An instruction table and whiteboard were also utilized for the training.
The HBB class began with an explanation of the purpose and development of the HBB program. Participants took the pre-test, the facilitator then provided an overview of course content and equipment. The lecture portion of the training was given followed by hands-on practice, and the other master-teacher team members assisted the instructor. Next, participants completed the OSCEs, the bag and mask skills checklist, and the post-test. One facilitator reviewed the answers for the post-test and collected the test. Participants who completed the training and successfully passed the post-test were awarded a certificate for completing the course.

**Public health nurses’ station.** The Labasa public health nurses’ station functions as a primary care clinic as well as a central office for public health nurses. Although rarely exposed to neonatal resuscitation, public health nurses travel to villages and nurses’ stations where they could have the opportunity to use the knowledge taught in the HBB course.

The team was provided a small break room that was enclosed on three sides and had a curtain for the fourth wall. There were four large tables in the room. The instructor used one of the tables for demonstration, participants used the other tables for practice. There were no whiteboards or space to hang posters in the room. The room was too small to allow participants to fully engage in hands-on practice without physically interfering with other participants.

The training began with an explanation of the purpose and development of the HBB program. Each participant completed the pre-test, and the instructor provided an overview of the day and allowed time for participants to become familiar with the equipment. The HBB content was taught using the action plan poster and the flip charts. Time was allotted for hands-on practice and questions. Each participant completed OSCEs A and B and the bag and mask skill
check. The participants then completed the post-test. The instructor reviewed the answers and collected the post-tests. Each participant received a signed certificate for completing the course.

**Savusavu.** Two-hours by car from the Labasa divisional hospital is the Savusavu sub-divisional hospital. The Savusavu hospital is a rural, limited-resource facility with adult and pediatric wards, an urgent care clinic, and a labor ward consisting of six beds. The Savusavu hospital staff usually expect between two and four vaginal deliveries each day with one midwife on duty at all times in the labor ward. The hospital is not equipped to do cesarean sections. The hospital is charged with the continuing education of its staff and healthcare workers from surrounding villages.

These circumstances make the Savusavu hospital an ideal location to implement the HBB curriculum. For the training, the hospital provided a medium-sized conference room with a “T”-shaped table formation. At the Savusavu hospital, the structure of the training was focused on teaching staff to become teachers to disseminate the information to local healthcare workers. Five NeoNatalie™ kits, 16 provider guides, and eight flip charts were donated to the hospital for further education for staff and to take to rural health centers and villages to conduct training meetings. The supplies was donated at this location as Savusavu was in the greatest need, was the most remote location and had made a commitment to use the supplies for further trainings with the surrounding village health care workers.

The four-hour training began with an explanation of the importance of the HBB program and outlining the skills that would be taught. Each participant then completed a pre-test. An overview of the training and its accompanying equipment was explained to the participants. The instructor from Brigham Young University taught the program content and gave periodical breaks during the lecture for hands-on practice. The participants completed both OSCEs A and
B, the bag and mask skill check, as well as the post-test. Time was given to the participants to practice with their peers and to prepare them to teach the material themselves. Hygiene maintenance for the equipment was reviewed, and signed certificates of completion were distributed to each participant. The head nurse and medical director at Savusavu hospital agreed to serve as HBB instructors and facilitators to train surrounding village healthcare workers and to perform regular refresher training sessions.

**Results**

IMB SPSS Statistics for Windows, Version 25.0 (Released 2017 IBM Cor, Armonk, NY) was used for data analysis. Scores from all three locations were compared and found to be similar. T-tests showed a significant increase in knowledge (df=31, t= -6.96, p < .001). Therefore, further analysis was completed with aggregate data. Aggregate results showed mean score increased from 14.8 (pre-test) to 17.1 (post-test). Chi-square tests comparing the number of participants giving correct responses on the pre-test with the number of participants providing correct responses on the post-test for each question were performed (see Table 1).

The table indicates that scores improved on 13 of the 18 questions from pre- to post-test. Six questions showed statistically significant improvements between pre- and post-test scores. However, two out of the 18 questions showed a decrease in the number of correct answers on the post-test, and three out of 18 questions showed no change from pre- to post-test.

The six questions with statistically significant improvements were questions 7 through 10, 12, and 17. Question seven stated, “Routine care for a healthy baby at birth includes….” The incorrect responses for question seven on the pre-test were a) Drying, removing the wet cloth (n=2), and c) Bathing and putting clean clothes on baby (n=2). The correct answer was b) Drying, removing the wet cloth, and positioning the baby skin-to-skin (n= 28); however, on the
post-test, all participants chose answer b) \(n=32\). Question eight asked, “when should the umbilical cord be clamped or tied and cut during routine care?” The incorrect response on the pre-test was c) *Immediately after the baby is born (n=19)*. The correct answer was b) *around 1-3 minutes after birth (n=13)*. On the post-test, every participant chose the correct answer.

Question nine asked, “a baby is quiet, limp and not breathing at birth. What should you do?” The incorrect pre-test responses were b) *Shake the baby (n=3)* and d) *Hold the baby upside down (n=9)*. The correct answer was a) *Dry the baby thoroughly (n=20)*. On the post-test, almost all participants chose the correct response \(n=30\), while two participants incorrectly responded on the post-test choosing answer b) \(n=1\) and answer d) \(n=1\). Question 10 asked, “a newborn is quiet, limp and not crying. The baby does not respond to steps to stimulate breathing. What should you do next?” The most incorrect responses on the pre-test were a) *Slap the baby’s back (n=7)*, and b) *Hold the baby upside down (n=2)*. The correct answer was d) *Begin ventilation (n=23)*; however, nearly all participants correctly responded d) on the post-test \(n=31\) with an incorrect response of a) \(n=1\).

Question 12 stated, “suctioning a baby unnecessarily or frequently can….” The incorrect responses on the pre-test were b) *Make a baby start coughing and breathing (n=4)*, c) *Stimulate a baby to cry (n=2)*, and d) *Increase the baby’s heart rate (n=12)*. The correct answer was a) *Cause a baby to stop breathing (n=14)*. On the post-test, there was an increase of participants that correctly answered a) \(n=27\) and the remaining five participants answered b) \(n=2\), c) \(n=1\), or d) \(n=2\). Question 17 stated, “a baby who received ventilation….” The incorrect responses on the pre-test were b) *Cannot be fed (n=1)* and c) *Always needs advanced care (n=11)*. The correct answer was a) *Needs continued observation with mother (n=20)*. On the
post-test, five participants still chose answer c); however, the remaining participants correctly selected answer a) (n=27).

The number of participants that chose incorrect responses on the post-test increased in two questions. For question one, “what should you do in the Golden Minute?” the number of participants who chose the correct answer d) Help the baby breath if necessary, decreased from 30 (on the pre-test) to 29 (on the post-test). The only incorrect answer chosen on the pre-test was c) Evaluate the heart rate (n=2), while the only incorrect answer selected on the post-test was a) Bathe the baby (n=3). Question 15 stated, “you can stop ventilation if…” Every participant on the pre-test correctly responded d) A baby’s heart rate is normal and the baby is breathing or crying. On the post-test, one participant incorrectly chose answer c) A baby’s heart rate is normal and the chest is not moving, which decreased the number of participants that correctly chose answer d) on the post-test (n=31). Additionally, participants scored 100 % on both pre- and post-tests on three questions.

**Discussion**

This project assessed the impact of the HBB training program on healthcare workers regarding neonatal resuscitation knowledge in three locations in Fiji. Results were statistically significant, supporting current literature that training using the HBB program increases provider knowledge (Hodgkins, 2018). Groothuis and Genderen (2019) reported that providers, regardless of prior medical training, demonstrate an improvement in both skills and knowledge due to HBB training sessions.

Content areas which showed most significant improvements were in the following areas of knowledge: preparing the area for delivery, how to keep a baby clean, routine care at birth, required interventions for a neonate who is limp and not breathing at birth, when to suction and
effects of over suctioning, correct application of a bag and mask, appropriate heart rate of a newborn, and care for a newborn who received ventilation. Improvement in knowledge and skill is critical as every year, 10 million newborns require some degree of resuscitation. However, more than 95% of babies will respond to simple interventions such as drying, stimulation, warmth, suctioning, and ventilation with a bag and mask (Budhathoki, Gurung, Ewalkd, & Thapa, 2019). An increase in knowledge of these simple interventions will improve birth attendants' confidence and decrease neonatal mortality.

**Preparing the Area for Delivery and How to Keep a Baby Clean**

Each step in the HBB program addresses actions to equip providers for effective resuscitation, starting with preparing the area for delivery. For many infants, the need for resuscitation cannot be anticipated before birth. Because of this uncertainty, it is necessary to have a fully operational area prepared for the delivery that includes a clean, warm environment with resuscitation equipment and medications (Perlman et al., 2010). Delivery preparation also includes keeping the area as hygienic as possible to limit the risk of infection.

**Routine Care at Birth, Required Interventions**

An essential step in the HBB program is evaluating the level of care required by a newborn. This evaluation should begin immediately after birth and continue throughout the resuscitation process. Completing an integrated assessment, including factors such as cry or respiration rate, heart rate, presence of meconium, color, muscle tone, or gestation of infant, should be performed to determine if the newborn needs routine care (drying, warmth, and skin to skin on mother) or more advance interventions (suction or bag-and-mask ventilation) (Perlman et al., 2010).

**Suctioning**
According to the guidelines set by the World Health Organization (2012), suctioning a neonate at birth is not always warranted. Instances when suctioning is appropriate include when the mouth or nose has visible secretions and when a baby is born with meconium-stained amniotic fluid and does not start breathing on their own. Meconium-stained amniotic fluid alone is not justification for suctioning. Not every situation requires suctioning, and the HBB program teaches inappropriate or aggressive suctioning can cause vagal bradycardia and delay the onset of spontaneous breathing (Perlman et al., 2010).

**Correct Application of a Bag and Mask Ventilation**

According to Perlman et al. (2010), the key to successful neonatal resuscitation is the establishment of adequate ventilation through the use of a bag-and-mask. The ability to properly use a bag and mask for ventilation is a vital skill. Scheduling time for practicing the bag and mask is part of the HBB program. According to Cordova et al. (2018), practicing the skills lead to retention of mastery of the bag and mask ventilation skill.

**Care for a Newborn Who has Received Ventilation**

Participants are provided instruction on how to care for an infant who has received ventilation support. Newborns who have received ventilation with a bag and mask require continued monitoring and should be assessed more frequently than the newborn who does not receive ventilation (World Health Organization, 2018).

Although there were noted increases in knowledge from pre-test to post-test, two areas demonstrated a decline in the number of correct answers selected on the post-test. The two items included what all steps to be completed during the “Golden Minute” and when to stop bag and mask ventilation. The decrease in correct responses indicates that either there were errors in answering or that that area of content was not emphasized adequately during the training. The
“Golden Minute” item covers the HBB protocols that during the first minute after delivery, every newborn should either spontaneously breathe or receive ventilation. The “Golden Minute” is an essential protocol to understand as up to 15% of term newborns require help to start breathing (Groothious & Genderen, 2019).

Guidelines set by the World Health Organization (2012) are incorporated into the HBB training to allow participants to understand better when to cease ventilation efforts. Guidelines include discontinuing ventilation after 10 minutes of effective ventilation if the newborn has no detectable heart rate, or if after 20 minutes of effective ventilation and the newborn has no spontaneous breathing. The results from the knowledge check reveal gaps in understanding from the training suggest areas for increased attention in future training sessions. The three questions that showed no change from pre to post-test could not show improvement because every participant answered correctly on the pre and post-test. These three questions examined the participants on the following topics: preparation for birth, keeping a baby warm, and when to disinfect the equipment were solidified by training.

**Limitations**

This project included a small sample of 32 participants in a specific setting, thus limiting the generalizability of findings. The public health nurses’ station provided a room that was not conducive for training. The physical space, number of participants, and number of tables at the public health nurses’ station did not give participants the necessary room to practice the skills easily, nor did it provide sufficient space for the instructor to demonstrate.

Only one four-hour training was completed at each location, although this was sufficient to certify the participants and for them to be able to teach the training to others. However, it did not allow time for the participants to practice teaching the material to their peers. To further
confound this project, the facilitators/trainers had little base knowledge of the needs of healthcare workers at each location, limiting the ability to tailor training to the unique needs of participants.

**Recommendations for Future Projects**

The information from this project indicates that four hours may be an adequate amount of time for participants to complete this course. However, refresher courses have been shown to aid in skill retention (Groothuis & Genderen, 2019). Although the recommended frequency of refresher courses remains disputed, knowledge retention increased with classes performed monthly or bi-annually (Cordova et al., 2018). Likewise, the HBB training program has the most significant effect if refresher classes are taught. Even simple, inexpensive interventions, such as weekly reviews and skills check-offs, improve knowledge and skills.

Additionally, local participants who become master-trainers and subsequently hold training classes for local healthcare workers might be more effective in facilitating learning and change, as these instructors are more familiar with local culture and base knowledge. According to Kamath-Rayne et al. (2018), involving local participants to become instructors of the HBB program has shown substantial decreases in birth asphyxia deaths. The creators of HBB emphasize the importance of local implementation and encourage the integration of the courses within local healthcare programs. Having a strong relationship with a local organization will establish a system for ongoing training, committed mentorship, and policies that support neonatal resuscitation training as an organization routine.

To truly make an impact on neonatal mortality and to create sustainability, it is crucial to implement high-quality neonatal resuscitation as a permanent part of a health system (Kamath-Rayne et al., 2018). It is also beneficial for a novice teacher who has taken the course themselves and would like to instruct to co-teach with an experienced facilitator. This co-teach
approach will allow for smoother transitioning when the newly trained participants teach courses themselves. When planning classes and refresher courses, nurses should follow the recommendation to have at least one trainer or facilitator for every five participants, to have ample space for practicing, and to have no more than two participants per table.

**Conclusion**

The HBB program is a lifesaving training program designed for limited-resource countries. Our project in Fiji showed the HBB training was statistically significant in improving the basic neonatal resuscitation knowledge of participants. The results of the pre- and post-test revealed the strengths of the HBB training as well as identified gaps and areas for improvement for future training and practice. This project also identified the base knowledge of the participants. Base knowledge will prove useful for future projects when using this same training to target the areas that demonstrated the need for improvement. Effective resuscitation can prevent a large portion of neonatal deaths globally. Every baby deserves the opportunity to receive basic care and the chance to breathe.
References


### Results Table 1

Chi square results of individual questions

<table>
<thead>
<tr>
<th>Question</th>
<th>n=32</th>
<th># correct</th>
<th>Pearson Chi-Square</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - What should you do in The Golden Minute?</td>
<td>30/29</td>
<td>0.217</td>
<td>0.641</td>
<td>0.641</td>
</tr>
<tr>
<td>2 - To prepare for a birth</td>
<td>32/32</td>
<td>0</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>3 - To prepare the area for delivery</td>
<td>30/32</td>
<td>2.065</td>
<td>0.151</td>
<td></td>
</tr>
<tr>
<td>4 - What should you do to keep the baby warm?</td>
<td>32/32</td>
<td>0</td>
<td>No change</td>
<td></td>
</tr>
<tr>
<td>5 - What should you do to keep the baby clean?</td>
<td>30/32</td>
<td>2.065</td>
<td>0.151</td>
<td></td>
</tr>
<tr>
<td>6 - Which baby can receive routine care?</td>
<td>29/31</td>
<td>1.067</td>
<td>0.302</td>
<td></td>
</tr>
<tr>
<td>7 - Routine care for a healthy baby at birth includes</td>
<td>28/32</td>
<td>4.267</td>
<td>0.039*</td>
<td></td>
</tr>
<tr>
<td>8 - When should the umbilical cord be clamped or tied?</td>
<td>13/32</td>
<td>27.022</td>
<td>&lt;.001*</td>
<td></td>
</tr>
<tr>
<td>9 - A baby is quiet, limp, and not breathing at birth. What should you do?</td>
<td>20/30</td>
<td>9.143</td>
<td>0.002*</td>
<td></td>
</tr>
<tr>
<td>10 - A newborn baby is quiet, limp, and not crying. The baby does not respond to steps to stimulate breathing. What should you do next?</td>
<td>23/31</td>
<td>7.585</td>
<td>0.006*</td>
<td></td>
</tr>
<tr>
<td>11 - In which situation should a baby be suctioned?</td>
<td>27/28</td>
<td>0.129</td>
<td>0.719</td>
<td></td>
</tr>
<tr>
<td>12 - Suctioning a baby unnecessarily or frequently can</td>
<td>14/27</td>
<td>11.470</td>
<td>0.001*</td>
<td></td>
</tr>
<tr>
<td>13 - Which of the following statements about ventilation with bag and mask is TRUE?</td>
<td>25/26</td>
<td>0.97</td>
<td>.756</td>
<td></td>
</tr>
<tr>
<td>14 - A baby's chest is not moving with bag and mask ventilation. What should you do?</td>
<td>30/32</td>
<td>2.065</td>
<td>0.151</td>
<td></td>
</tr>
<tr>
<td>15 - You can stop ventilation if</td>
<td>32/31</td>
<td>1.016</td>
<td>0.313</td>
<td></td>
</tr>
<tr>
<td>16 - A newborn baby's heart rate should be:</td>
<td>27/31</td>
<td>2.943</td>
<td>0.086</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Yes/No (%)</td>
<td>z-score</td>
<td>p-value</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>------------</td>
<td>---------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>A baby who received ventilation</td>
<td>20/27</td>
<td>3.925</td>
<td>0.048*</td>
<td></td>
</tr>
<tr>
<td>When should the bag and mask and suction device be disinfected?</td>
<td>32/32</td>
<td>0</td>
<td>No change</td>
<td></td>
</tr>
</tbody>
</table>

*<.05, statistically significant
## Appendix A

### Knowledge check (HBB 2nd Edition)

*Select the best answer to each question or statement
Circle the letter of the correct answer*

<table>
<thead>
<tr>
<th>Question</th>
<th>Options</th>
<th>Correct Answer</th>
</tr>
</thead>
</table>
| 1. What should you do in The Golden Minute?                              | a. Bathe the baby  
   b. Deliver the placenta  
   c. Evaluate the heart rate  
   d. Help a baby breathe if necessary | c              |
| 2. To prepare for birth                                                  | a. You identify a helper and review the emergency plan  
   b. Ask everyone but the mother to leave the area  
   c. You prepare equipment only when you need it  
   d. You do not need a helper | a             |
| 3. To prepare the area for delivery                                      | a. Open all the doors and windows to get fresh air  
   b. Darken the room  
   c. Make sure the area is clean, warm, and well-lit  
   d. Keep the room temperature cold | c             |
| 4. What should you do to keep the baby warm?                             | a. Open all the windows  
   b. Give the baby a bath after birth  
   c. Place hot water bottles next to the baby's skin  
   d. Place the baby skin-to-skin with mother | a             |
| 5. What should you do to keep the baby close?                            | a. Wash your hands before touching the baby and help mother wash her hands before breastfeeding  
   b. Reuse the suction device before cleaning  
   c. Keep the umbilical cord tightly covered  
   d. Do not touch the baby | a             |
| 6. Which baby can receive routine care after birth?                      | a. A baby who is not breathing  
   b. A baby who is grunting  
   c. A baby who is crying and/or breathing well  
   d. A baby who is limp | a             |
| 7. Routine care for a healthy baby at birth                              | a. Drying, removing the wet cloth, and bathing the baby  
   b. Drying, removing the wet cloth, and positioning the baby skin-to-skin  
   c. Bathing and putting clean clothes on the baby  
   d. Drying and wrapping the baby in the wet cloth | b             |
| 8. When should the umbilical cord be clamped or tied and cut during routine care? | a. After the placenta is delivered  
   b. Around 1-3 minutes after birth  
   c. Immediately after the baby is born  
   d. Before a baby has cried | a             |
| 9. A baby is quiet, limp, and not breathing at birth.                    | a. Dry the baby thoroughly  
   b. Shake the baby  
   c. Throat cold water on the face  
   d. Hold the baby upside down | d             |
| 10. A newborn baby is quiet, limp, and not crying. The baby does not respond to steps to stimulate breathing. What should you do next? | a. Stop the baby's head  
    b. Hold the baby upside down  
    c. Squeeze the baby's foot  
    d. Begin ventilation | b             |
| 11. In which situation should a baby be suctioned?                       | a. When a baby is crying at birth  
   b. When a baby is crying but there is meconium in the amniotic fluid  
   c. When you see secretions blocking the mouth and nose  
   d. Before drying the baby | c             |
| 12. Suctioning a baby unnecessarily or frequently can                    | a. Cause a baby to stop breathing  
   b. Make a baby start coughing and breathing  
   c. Stimulate a baby to cry  
   d. Increase the baby's heart rate | b             |
| 13. Which of the following statements about ventilation with bag and mask is TRUE? | a. The mask should cover the eyes  
    b. Air should escape between the mask and face  
    c. Squeeze the bag to produce gentle movement of the chest  
    d. Squeeze the bag to give 80 to 100 breaths per minute | c             |
| 14. A baby's chest is not moving with bag and mask ventilation.          | What should you do?  
   a. Stop ventilation  
   b. Repeat the mask to get a better seal  
   c. Stop the baby's face  
   d. Give medicine to the baby | b             |
| 15. You can stop ventilation if                                            | a. A baby is blue and limp  
    b. A baby's heart rate is slow  
    c. A baby's heart rate is normal and the chest is not moving  
    d. A baby's heart rate is normal and the baby is breathing or crying | b             |
| 16. A newborn baby's heart rate should be                                 | a. Faster than your heart rate  
   b. Slower than your heart rate  
   c. Checked before drying the baby  
   d. Checked only when the baby is crying | c             |
| 17. A baby who received ventilation                                        | a. Needs continued observation with mother  
   b. Cannot be fed  
   c. Always needs advanced care  
   d. Should immediately receive antibiotics | a             |
| 18. When should the bag and mask suction device be disinfected?          | a. After every use  
    b. Only when they appear dirty  
    c. Weekly  
    d. Once a month | a             |

Appendix B

Objective Structured Clinical Evaluations (OSCEs) can be used to determine whether participants have learned the essential steps to help a baby breathe. They can be used to verify that a participant knows enough to pass the course, or also as an exercise repeated regularly for practice. Most importantly, each completed evaluation should be used as an opportunity for the participant to review and learn.

Read the case scenario aloud to the participant. Provide the prompts shown in red. Indicate the baby’s response to the participant’s actions using the neonatal simulator or words if using a mannequin. For example, when the participants evaluate crying, show that the baby is not crying with a simulator. Say that the baby is not crying if using a mannequin. As you observe the participant, tick ☑️ the boxes “Done” or “Not Done” for each activity. Apart from giving these prompts, keep silent during the evaluation. After participants complete the OSCE, ask the 5 questions written below OSCE A. These questions will help the participants reflect on what actions they took and what they can do better the next time. Participants who can recognize their own mistakes will better remember the right steps to take the next time. Comment on the participant’s performance only at the end of the case, after he/she has answered these 5 questions.

HBB 2nd Edition OSCE A—Evaluation A

Instructions to the facilitator: Read the below instructions for the case scenario.

“I am going to read a role play case. Please listen carefully, and then show me the actions you would take. I will indicate the baby’s responses, but I will provide no other feedback until the end of the case.”

“You are called to assist the delivery of a term baby. There are no complications in the pregnancy. The baby will be born in less than 10 minutes. Introduce yourself and prepare for the birth and care of the baby.”

Identifies a helper and reviews an emergency plan .................................................. ☑️ Not Done
Washes hands .............................................................................................................. ☑️
Prepares an area for ventilation and checks function of bag, mask and suction device ...... ☑️ *

Prompt: After 5-7 minutes give baby to participant and say, “There is meconium in the amniotic fluid. The baby is delivered onto the mother's abdomen. Show how you will care for the baby.”

Dries thoroughly ............................................................................................................. ☑️ *
Removes wet cloth ........................................................................................................... ☑️

Prompt: Show the baby is not crying. “There is meconium blocking the mouth.”
Recognizes baby is not crying ..................................................................................... ☑️
Positions head and clears airway .............................................................................. ☑️ *
Stimulates breathing by rubbing the back ................................................................. ☑️ *

Prompt: Show the baby is breathing well (cries)
Recognizes baby is crying and breathing well ............................................................. ☑️
Clamps or ties and cuts the cord .................................................................................. ☑️
Positions skin-to-skin on mother’s chest and puts on the head covering ................. ☑️
Communicates with mother ......................................................................................... ☑️

Use the questions below to help the participant reflect on his or her own performance and then provide feedback.
1. What happened at the birth?
2. Did you follow the Action Plan?
3. What went well and what could have gone better?
4. What did you learn?
5. What will you do differently next time?

SCORING:
Successful completion requires a total score of 9 correct of 12 and “Done” must be ticked for the boxes marked with *.

Number Done Correctly .......... Facilitator initials: ...............
HBB 2nd Edition  OSCE B--Evaluation B

Instructions to the facilitator: Read the below instructions for the case scenario.

"I am going to read a role play case. Please listen carefully, and then show me the actions you would take. I will indicate the baby's responses, but I will provide no other feedback until the end of the case."

"You are called to assist at the birth of a 34 week (7/1-2 months) gestation baby. You have identified a helper, prepared an area for ventilation, washed your hands, and checked your equipment. The baby is born, and the amniotic fluid is clear. Show how you will care for the baby!"

<table>
<thead>
<tr>
<th>Prompt: Show the baby is not crying. &quot;You do not see or hear secretions in the baby's mouth or nose.&quot;</th>
<th>Done</th>
<th>Not Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognizes baby is not crying</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stimulates breathing by rubbing the back</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prompt: Show the baby is not breathing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognizes baby is not breathing</td>
</tr>
</tbody>
</table>

| Cuts cord and moves to area for ventilation or positions for ventilation | |
|---|
| Ventilates with bag and mask within 30 seconds | |
| Achieves a firm seal as demonstrated by chest movement | |
| Time of effective ventilation (chest moving gently at 120 per minute) | |
| Ventilates at 40 breaths/minute (30-50 acceptable) | |

| Evaluates for breathing or chest movement | |
|---|

<table>
<thead>
<tr>
<th>Prompt: Show the baby is not breathing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calls for help</td>
</tr>
<tr>
<td>Continues ventilation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prompt: Say, &quot;Please show what to do if the chest is not moving with ventilation.&quot; After one or more steps to improve ventilation, say &quot;The chest is moving now.&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repositions mask</td>
</tr>
<tr>
<td>Repositions head</td>
</tr>
<tr>
<td>Clears secretions from the mouth and nose as needed</td>
</tr>
<tr>
<td>Opens mouth slightly</td>
</tr>
<tr>
<td>Squeezes bag harder</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prompt: Show the baby is not breathing; heart rate is normal.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognizes baby is not breathing but heart rate is normal</td>
</tr>
<tr>
<td>Continues ventilation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Prompt: (After 3 minutes) Show the heart rate is 120 per minute and the baby is breathing.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognizes baby is breathing and heart rate is normal</td>
</tr>
<tr>
<td>Stops ventilation</td>
</tr>
<tr>
<td>Provides close observation for the baby and communicates with the mother</td>
</tr>
</tbody>
</table>

Use the questions below to help the participant reflect on his or her own performance and then provide feedback.
1. What happened at the birth?
2. Did you follow the Action Plan?
3. What went well and what could have gone better?
4. What did you learn?
5. What will you do differently next time?

SCORING:
Successful completion requires a total score of 17 correct of 23 and "Done" must be ticked for the boxes marked with *

Number Done Correctly | Facilitator Initials |
---|---|

Appendix D