



## Neonatal resuscitation training for midwives in Uganda: Strengthening skill and knowledge retention

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### ABSTRACT

The objective of this project was to improve birth outcomes for babies in a regional referral hospital in Uganda by strengthening factors that influence the retention and application of neonatal resuscitation skills. Initial training in neonatal resuscitation is not enough on its own. In order to better understand the gap between training and effective practice, an evaluation of a neonatal resuscitation program was carried out. This included practical skill testing of local midwives using a neonatal resuscitation doll pre- and post-training, as well as follow up testing at 1 month and 12 months, followed by focus groups and interviews. Test scores revealed that participants' knowledge grew significantly immediately following the workshop, and remained high after 1 month, but fell by 12 months post-training. Interviews with hospital staff revealed a number of facilitators and barriers to practice, namely knowledge retention and skill application. The most important barrier identified is the lack of refresher training post-workshop. Importantly, the findings demonstrated a need not for refresher training alone, but for improved organizational and administrative support for the newly assigned trainers.

### Introduction

Globally, 99% of neonatal deaths occur in low and middle-income countries (LMICs). The World Health Organization (WHO) estimated that one quarter of all neonatal deaths globally are caused by birth asphyxia (2012). Out of the 10% of newborns globally requiring some form of assistance to begin or sustain breathing, most can be helped with the simplest neonatal resuscitation techniques and only 1% require resuscitation measures more advanced than the bag and mask (Wall et al., 2009; American Academy of Pediatrics and American Heart Association, 2011). Birth asphyxia accounts for nearly 25% of the approximately 4 million neonatal deaths around the world each year (Enweronu-Laryea et al., 2009; Bookman et al., 2010; American Academy of Pediatrics and American Heart Association, 2011; World Health Organization, 2012), and a similar number of newborns who survive develop brain damage (Bream et al., 2005).

Although delivery and death records in Uganda may state the condition of the newborn or cause of death of a newborn, national statistics are difficult to compile. Fewer than 60% of births are attended by health staffs (who are responsible for the records) and only 30% of

birth registrations are complete. Using the estimate of global neonatal deaths due to birth asphyxia, approximately 7400 babies in Uganda die from birth asphyxia every year (World Bank, 2015).

There is evidence that neonatal resuscitation can prevent a significant proportion of neonatal deaths (Carlo et al., 2010; Msemo et al., 2013). The high incidence of birth asphyxia can be attributed to a number of issues, including inadequate training in neonatal resuscitation, inadequate neonatal resuscitation equipment, and other, more complex organizational problems. The most important part of neonatal resuscitation is the ventilation of the newborn's lungs (American Academy of Pediatrics and American Heart Association, 2011). The basic neonatal resuscitation steps—those needed the most often—consist of drying and stimulating the baby, positioning and clearing the airway, and if still not breathing, applying positive pressure ventilation with the bag and mask. As a simple yet life-saving procedure, it is crucial to better understand the connection between the training and the effective and consistent application of neonatal resuscitation.

It can be difficult to collect and compile the data necessary to observe a direct effect of neonatal resuscitation on neonatal mortality,

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though there is generally a positive correlation. In Zambia, data on all-cause, 7-day neonatal mortality rates was collected and observed to decrease from 11.5 per 1000 live births to 6.8 deaths per 1000 live births after basic newborn care training (Carlo et al., 2010). The decrease in neonatal deaths was attributed to a decrease in rates of birth asphyxia and infection. The study enrolled over 71,000 neonates over 3 study periods and witnessed a further reduction in 7-day neonatal mortality rates after an additional Neonatal Resuscitation Program (NRP) training. Similarly, Msemo et al. (2013) reported a sustained 47% decrease in early neonatal mortality after 24 hours and a 24% decrease in fresh stillbirths after 2 years at 8 hospitals of varying size in Tanzania. Both studies employed a train-the-trainer model.

Training in neonatal resuscitation skills, even the basic steps alone, is cost-effective, simple, and can have a great impact on neonatal mortality and morbidity from birth asphyxia (Bream et al., 2005; Wall et al., 2009; Carlo et al., 2009; Carlo et al., 2010; Bookman et al., 2010; Lawn et al., 2010; Msemo et al., 2013). Basic neonatal resuscitation is possible with minimal equipment and does not necessitate intensive care facilities in 95% of cases where it is required (Opiyo et al., 2008) and may even prevent inappropriate use of more advanced techniques (Wall et al., 2009; Carlo et al., 2010).

Bream et al. conducted focus groups with obstetric nurses in Malawi and found that facilitators to neonatal resuscitation included their professional experience (i.e. they were very good at recognizing asphyxiated babies) and the number of cases of birth asphyxia (i.e. enough to maintain their skills). Barriers consisted of a lack of resources such as time, staff, and equipment, poor layout of the maternity ward, and a lack of standard protocols (Bream et al., 2005). Other studies also pointed to the need for functioning and well-maintained equipment (McClure et al., 2007; Wall et al., 2009). A lack of ongoing refresher training is often cited as a barrier to effective practice of neonatal resuscitation (Skidmore and Urquhart, 2001; Carlo et al., 2009; Bookman et al., 2010).

The aim of this study was to investigate the gap between the training and the effective and consistent practice of neonatal resuscitation among midwives in rural Uganda working in a busy public referral hospital. The study assesses short and longer term learning outcomes of registered midwives and nurse-midwives in Uganda who took a neonatal resuscitation course delivered by the University of British Columbia, Canada (UBC) Midwifery Program, and identifies barriers to practice through focus groups and interview. The paper concludes with recommendations for ongoing training and mentoring in newborn resuscitation in LMICs.

## Background

The UBC Midwifery Program developed a global citizenship program in Uganda in 2006. Low resourced maternity wards in Uganda provide Canadian students a chance to learn about global midwifery challenges, including assisting mothers who are experiencing anemia, obstructed labour, malpresentation or HIV. The global program also prepares them for clinical and team-based practice in rural and remote settings in Canada.

The UBC global citizenship program works together with Ugandan midwives to provide continuing education for both urban and rural midwives in their country. In 2008, a Ugandan midwife came to Canada to become a neonatal resuscitation instructor as part of the program's commitment to reciprocity of learning. At each site, one or more Ugandan mentors are selected to help provide two consecutive years of continuing midwifery education, who then help to reinforce the changes in practice. The following year, they join the Canadian-Ugandan team of physicians and midwives to present workshops in locations identified by Ministry of Health and regional directors as needed. The Ugandan and Canadian trainers work together to teach emergency skills for midwives and neonatal resuscitation workshops. This study took place alongside the 2014 neonatal resuscitation workshops and looked retrospectively at the outcomes of the 2013 workshops.

## Methods

### Data collection

This mixed methods approach used a pre-test, post-test design questionnaire with semi-structured interviews and focus groups as a secondary tool to collect qualitative data on experiences of and barriers to performing neonatal resuscitation. This pragmatic strategy of bringing midwives together as a group for a skills assessment and refresher workshop seemed the best way to obtain the information we needed to strengthen facilitators for newborn survival through improving skills in neonatal resuscitation (Creswell, 2009). The assessment of midwives in the use of neonatal resuscitation techniques was planned in conjunction with an Emergency Obstetric Skills workshop delivered by UBC Midwifery. The workshops' content was in-line with Ugandan Ministry of Health accepted neonatal resuscitation programs, taken from accepted teaching content on skill-based and knowledge, and were adapted over time as required. The content in 2013 and 2014 stayed the same as per country guidelines. The practice of using chest compressions as a step in neonatal resuscitation was not included as it had been phased out of practice. The program 'Helping Babies Breathe' was only just in the process of being adopted, and had not yet arrived in this rural area.

The questions in the check-list tool used to evaluate skills in neonatal resuscitation were determined by consensus through working with other licensed midwives and instructors of neonatal resuscitation in Uganda, who taught through Ugandan Ministry of Health, and Canada. We found the questions to have both face and content validity (Guest et al., 2012). The neonatal resuscitation workshops were both delivered to midwives and intern doctors at the same regional referral hospital and from health units in the same surrounding health district in South-Western Uganda over the course of 1 year. Both the midwives trained in 2013 and in 2014 participated in pre- and post-testing at the time of the workshop and longer term post-testing, at 12 months and 1 month, respectively.

The first cohort for this study consisted of trainees who attended the neonatal resuscitation workshop in June 2013, along with an obstetrical emergency skills component. Pre- and post-test data from 2013 consisted of a routine anonymized report on the range of emergency obstetric skills and newborn resuscitation taught in the workshop and was furnished by UBC Midwifery. Due to anonymization, the intern physicians' test scores could not be removed from the 2013 data set. Furthermore, results in the neonatal resuscitation component of the test could not be differentiated from the rest of the test. These test scores, including both obstetrical emergency skills and neonatal resuscitation skills, served as a proxy to the practice scenario used in 2014. All midwives who participated in the 2013 training were eligible to participate in the 12-month post-test.

The second cohort attended the neonatal resuscitation workshop delivered in June 2014. The intern physicians' test results were not removed from the data set to remain consistent with the 2013 data set; however, it should be noted that removing the intern physicians' scores would not have changed the average pre-/post-test scores. All 18 midwives were pre- and post-tested on neonatal resuscitation during the June 2014 workshop using a scenario developed by the co-investigator and were eligible for the 1-month post-test.

	Cohort 1	Cohort 2
<b>Date of Workshop Attended</b>	June 2013	June 2014
<b>Number of Midwives</b>	20	18
<b>Number of Intern Physicians</b>	2	2
<b>Total Number of Participants</b>	22	20
<b>Follow-up Length of Time</b>	12 months	1 month
<b>Number of Follow-up Participants</b>	10	3

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