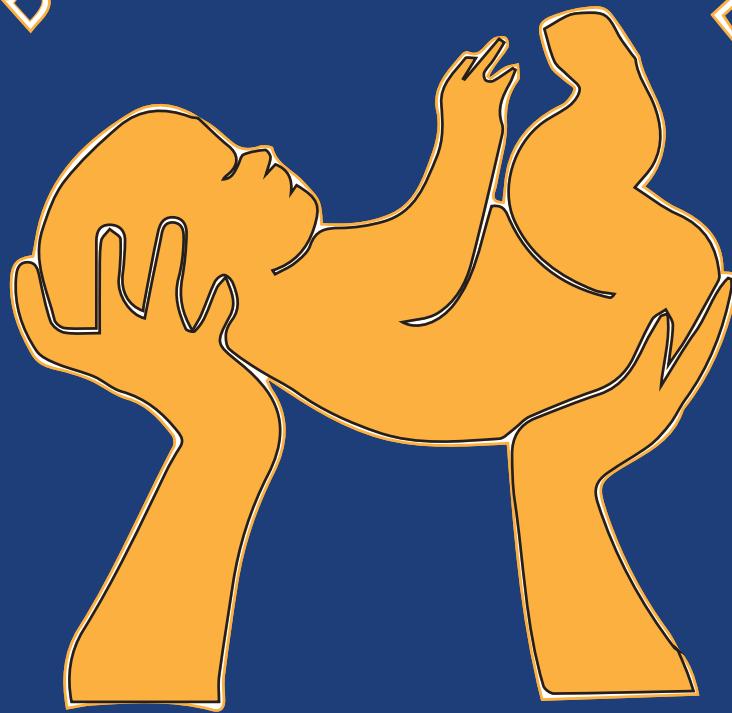




SAVING BABIES LIVES IN ETHIOPIA



ROTARY FOUNDATION



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EXECUTIVE SUMMARY

In 2015, around 87,000 babies died in Ethiopia in their first month of life. The majority of these deaths could have been prevented using standard interventions^{1,2}. Furthermore, as of 2014, only 16% of births in Ethiopia had a skilled birth attendant present. Thus, standardized training programs to equip healthcare professionals in Ethiopia with skills needed to resuscitate newborns and care for premature infants are desperately needed.

Dr. Karin Davies, a retired pediatrician and Rotary Club of Del Mar member, and Dr. Pat Bromberger, a neonatologist who has experience establishing neonatal care programs in underdeveloped regions, sought to address both problems by developing a “Train the Trainer” program to provide systematic, multidisciplinary training in neonatal resuscitation techniques and care for premature and ill newborns in Ethiopia.

Dr. Davies connected with faculty at the University of Gondar in the Amhara region of Ethiopia, who embraced the opportunity to enhance the skills of their physicians and hospital staff, as well as their medical, nursing and midwifery students. This grant addresses two Rotary Foundation areas of focus, Maternal and Child Health and Disease Treatment and Prevention. In partnership with Rotary Club of Del Mar, and host club Rotary Club of Gondar Fasiledes, Dr. Davies secured a Global Grant from Rotary International to fund the resulting project: Saving Babies’ Lives in Ethiopia.

Global Grant GG 1525173 supported purchase of training equipment and supplies and also funded four trips to Ethiopia by the Vocational Training Team (VTT) that included Drs. Davies and Bromberger, Emilie Jean (respiratory therapist), Elisa Imonti (neonatal intensive care nurse), Kathy Johnson (respiratory therapist) and Fary Moini (nurse and logistics coordinator). During these trips, the VTT trained over 60 clinicians to deliver neonatal resuscitation program (NRP) and post-resuscitation care (PRC) instruction that would equip physicians, midwives, nurses and students with the skills needed to care for seriously ill newborns. These trainings also incorporated leadership and communication skills workshops to ensure that clinicians could work together in emergency situations. The VTT then mentored the newly trained instructors as they taught the NRP and PRC courses and also provided distance mentoring via video conference for trainings conducted between visits.

In total, Global Grant funding supported the training of more than 70 NRP and PRC instructors and over 800 providers. It also facilitated the delivery of 30 independent classes by the newly trained instructors. These values exceeded predictions, both for number of instructors and providers trained, by nearly 2-fold. The success of this training is highlighted by the reduced neonatal mortality rates at the University of Gondar Hospital, which now has the lowest rate in the Amhara region. The “training of the trainers” ensures sustainability of the program results by increasing the number of skilled instructors. Trained providers can also take their newly acquired skills to different regions of Ethiopia. The success of this project will continue with a subsequent Global Grant that will fund incorporation of the program learning materials into the University of Gondar College of Medicine and Health Science (CMHS) curriculum. Funding from The Rotary Foundation for this Global Grant will help thousands of children in Ethiopia have a healthy beginning in life.

BACKGROUND

The story of this Global Grant begins in 1952 when Robert Loomis, then an Oklahoma State University graduate student pursuing a doctorate in limnology, the study of inland waters, moved to Ethiopia. In addition to his research, Robert worked with “The Point Four Program” implemented as part of foreign policy goals outlined by President Harry Truman that sought to use scientific advances made by the United States to benefit underdeveloped countries³.

Joining Robert were his wife Eva, their daughter Karin, son Mike, and their youngest child, Steve, who was then just 2 months old (Fig. 1). Eva was a registered nurse, and Karin would accompany her to village tukuls, thatched-roof homes, where she watched her mother provide medical care for local residents. Karin’s early exposure to the importance of skilled medical care likely provided inspiration for her subsequent career as a pediatrician.

In 2012, Dr. Karin Loomis Davies and her brothers returned to Ethiopia and were delighted to find the school their father helped to establish, the Jimma Agricultural and Technical School, had grown into Jimma University, one of the top universities in Ethiopia (Fig. 2). During this trip, Dr. Davies felt a strong desire to use her medical training to help the youngest and most vulnerable population in Ethiopia: newborns.

NEONATAL MORTALITY IN ETHIOPIA

Ethiopia occupies around 425,000 square miles, and with a population of ~100 million, is the second most populous country in Africa. The median age in Ethiopia is ~19 years-old and just under 80% of the population lives in rural areas⁴. Urban areas such as the city-state of Addis Ababa tend to have lower neonatal mortality rates, whereas the rates are higher in rural areas (Fig. 3).

Between 1990 and 2012, the under-five mortality rate (deaths that occur between birth and the 5th birthday) in Ethiopia declined from 204 to 88 per 1,000 live births, or a reduction of more than 200,000 deaths annually⁵.



Figure 1. The Loomis family ~1952.



Figure 2. The Loomis family 2012. (left to right) Mike, Karin, Steve

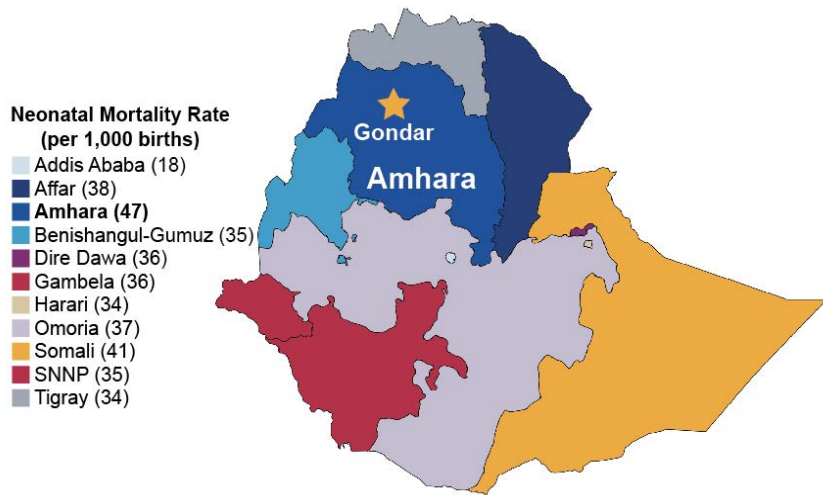


Figure 3. Neonatal mortality rate (average for the period between 2006 and 2016) for regional states and chartered cities in Ethiopia. Source: EDHS 2016. Gondar, the focus of this project, is indicated by a star and is located in the state of Amhara.

Despite the progress in reducing the childhood mortality rate, successes in reducing the rate of deaths during the first month of life- the neonatal period- are less pronounced (Fig. 4). Nearly half (44%) of childhood deaths in Ethiopia occur in the first month of life, and of those, around 16% of babies took their first and last breath on the day they were born (Fig. 5) ^{1,6}.

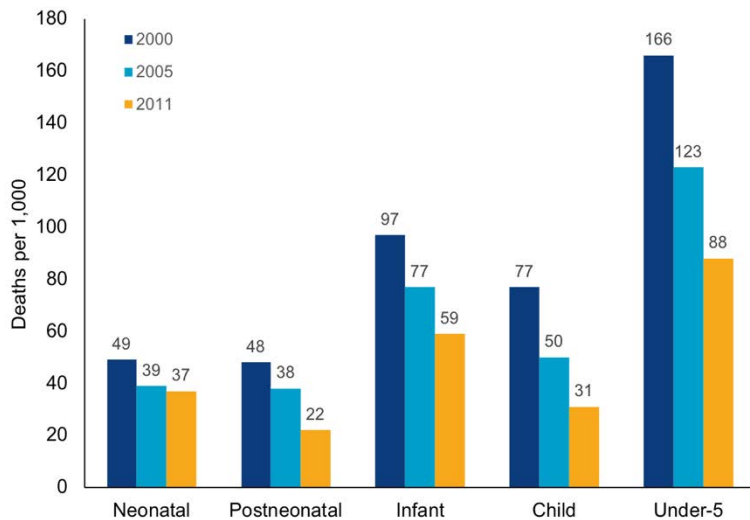


Figure 4. Trends in early childhood mortality in Ethiopia. The neonatal period is the first four weeks of life and post-neonatal indicates the period between the first month and first birthday. Infant represents deaths that occur within the first year of life. Child and Under-5 indicate the deaths that occur between the first and fifth birthday and all deaths that occur between birth and the fifth birthday, respectively. Source: EDHS 2014.

In Ethiopia in 2015, around 87,000 babies died in their first month of life, and nearly three-quarters, or 62,000, of those deaths could have been prevented using standard interventions ^{1,2}. The number of births that are attended by a skilled birth provider in Ethiopia has increased in recent years, although by 2014 the rate remained low at 16% ⁷.

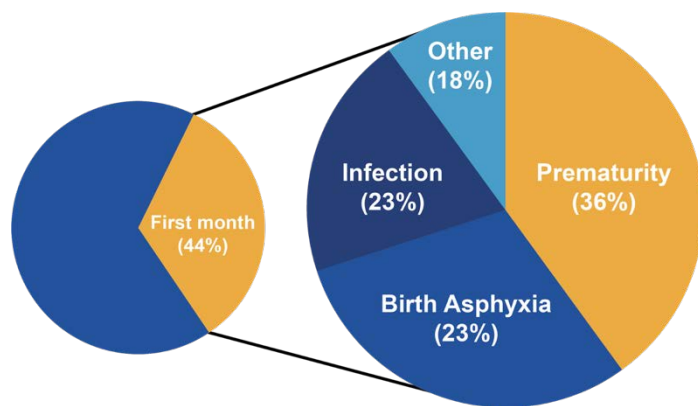


Figure 5. Percentage (left) and causes (right) of neonatal mortality in Ethiopia. Birth asphyxia refers to breathing difficulties immediately after birth. Prematurity refers to births that occur before 37 weeks of pregnancy are completed.

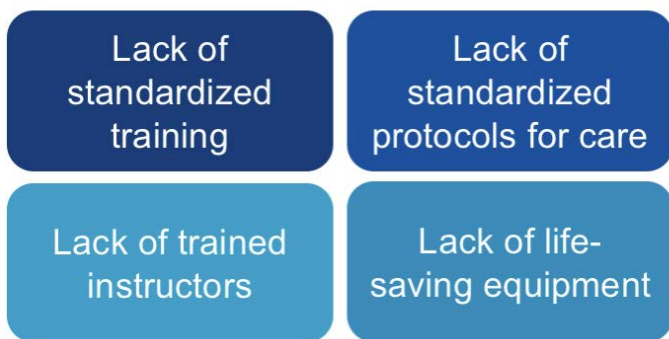


Figure 6. Obstacles to life-saving options for newborns in Ethiopia.

Medical Universities in Ethiopia lack standardized training programs and protocols that are commonly part of medical training and medical school curricula in more developed nations (Fig. 6). Furthermore, Ethiopia has few instructors trained in neonatal resuscitation techniques and lacks equipment needed to support struggling newborns. If equipment is available, it is often poorly maintained, or medical staff lack training in its proper use. As such, there was tremendous need for improved

training of clinicians in techniques that could help improve the likelihood of neonatal survival in Ethiopia.

THE VISION OF SAVING BABIES’ LIVES IN ETHIOPIA (GG 1525173)

When Dr. Davies returned from her Ethiopia trip in 2012 she contacted her colleague at Kaiser Permanente, neonatologist Dr. Patricia (Pat) Bromberger, who had experience setting up neonatal intensive care units (NICUs) in Ghana as well as teaching Neonatal Resuscitation Program (NRP) courses in several underserved regions. Initially, they thought they would simply go to Ethiopia, using their own funds, and teach neonatal resuscitation techniques. But it quickly became clear that Ethiopia’s needs were far greater. Although the number of patients and medical students grew enormously over the past 5 years, there was no concurrent increase in the number of trained faculty who can treat these patients and train these students. Thus, what Ethiopia truly needed was a program to train the trainers.

With that need in mind, Dr. Davies began reaching out to various medical universities in Ethiopia. Of those she contacted, the University of Gondar was the most receptive. Through Dr. Davies’ friend Dr. Carole Leland, a respected professional in the Leadership Development and

Change field who has worked as a leadership consultant on several projects in Ethiopia and who would later be involved in leadership training for the program (see below), she met Dr. Mulu Maleta, an OB/GYN, and Dr. Zemene Tigabu, then chairman of the Pediatrics Department at the University of Gondar College of Medicine and Health Science (CMHS). They both emphasized the need for specialized training in resuscitation techniques at the medical university level, as well as other approaches that would reduce neonatal mortality.

After learning of the needs and developing an outline of the program plan, Dr. Davies began looking for funding. She approached large agencies, such as the Bill and Melinda Gates Foundation, but most did not fund smaller-scale projects. She eventually learned of grants from The Rotary Foundation and sought out clubs in the San Diego area that were qualified to sponsor Global Grants. She sent letters to several clubs and Peggy Martin, then Chair of the International Services Committee of the Rotary Club of Del Mar, found Dr. Davies's proposal so compelling that she responded the same day she received the letter to express interest. Dr. Davies herself became a member of the Rotary Club of Del Mar in September 2014.

The shared vision for this grant is to join Rotarians with the University of Gondar CMHS to create a self-sustaining training program to teach medical, nursing and midwife students, as well as medical interns, residents and University of Gondar Hospital staff newborn resuscitation techniques and procedures for caring for newborns after resuscitation (Fig. 7).

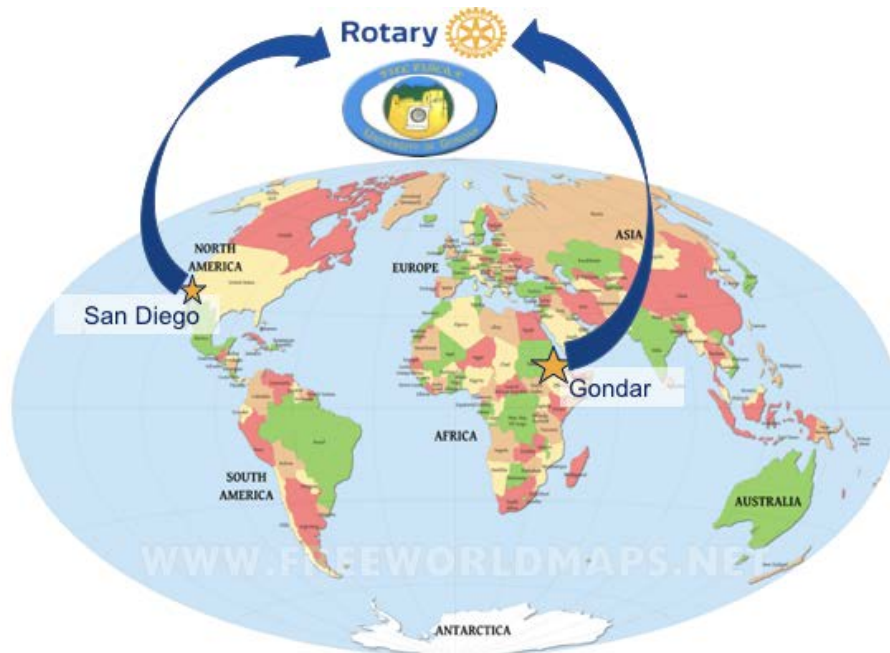


Figure 7. The Rotary Global Grant 1525173 connects Rotary clubs in the United States with University of Gondar to provide funds and expertise for training in neonatal care and resuscitation.

UNIVERSITY OF GONDAR COLLEGE OF MEDICINE AND HEALTH SCIENCES (CMHS) AND PARTNER ROTARY CLUBS

The University of Gondar was founded in 1954 as a Public Health College and Training Center and is the oldest institution for medical training in Ethiopia (Fig. 8). In 1978 a bilateral agreement between Karl Marx University in Germany and Addis Ababa resulted in the establishment of a medical faculty with training provided by German medical experts who also provided opportunities for Ethiopian staff to train in Germany. The CMHS has played an enduring role in improving public health in Ethiopia.

The CMHS at the University of Gondar maintains a 400 bed referral teaching hospital and a maternal and child care hospital is under construction. In addition, the CMHS has a general hospital and provides outreach services for 50,000 households in the neighboring regions. For over 20 years, the CMHS has conducted demographic and health surveillance of the region.

Along with the Schools of Medicine and Nursing, the University of Gondar has a Midwifery Department that is the largest training institute for midwifery in Ethiopia. The program offers both undergraduate and postgraduate training and nearly 660 students are currently enrolled. Given its breadth of programs and receptiveness to learning life-saving techniques, the University of Gondar CMHS provided an optimal setting to fulfill the mission of this Global Grant.

The Rotary Club of Del Mar was the international partner and The Rotary Club of Gondar Fasiledes (of which Dr. Zemene is a member) acted as the Global Grant host partner (Fig. 9). The Rotary Foundation, Rotary International Districts 5340 and 2770, as well as Rotary Clubs of Del Mar, La Jolla Golden Triangle, Blythe and Valley Center provided financial support (Table 1).

Table 1. Financial Support

Source	Amount (USD)	Source	Amount (USD)
Rotary Club of Del Mar	15,000.00	District 2770 DDF*	15,000.00
Rotary Club of La Jolla Golden Triangle	15,000.00	District 5340 DDF	13,500.00
Rotary Club of Blythe	2,000.00	The Rotary Foundation	45,250.00
Rotary Club of Valley Center	1,500.00		

*District Designated Fund



Figure 8. The logo and main gates of the University of Gondar.



Figure 9. Host partner Rotary Club of Gondar Fasiledes.

TRAIN THE TRAINER PROGRAM

Coursework

Development of the training program to instruct health care workers in neonatal care techniques was founded on the premise that hands-on training is one of the most effective approaches to ensure proficiency and knowledge retention (Figure 10).

In the “train the trainer” courses, brief background lectures introduce important concepts that are reinforced by small group learning activities that allow the instructors in training to demonstrate their proficiency in a given technique (Fig. 11). In the small group setting, trainees rotate through skill stations (see below) to gain hands-on learning experience with equipment and supplies used with realistic mannequins. The trainees then “returned” the skill to show their mastery before applying their new knowledge and skills to real-life scenarios they might encounter in clinical practice. These activities provided a safe setting to learn from mistakes and also to develop teamwork skills.

Asian Proverb

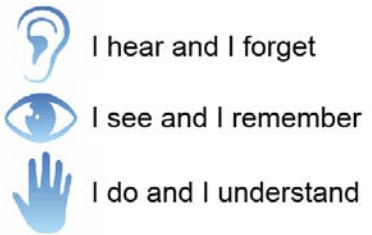


Figure 10. Hands-on learning opportunities increase the likelihood of knowledge retention.

Train the Trainers

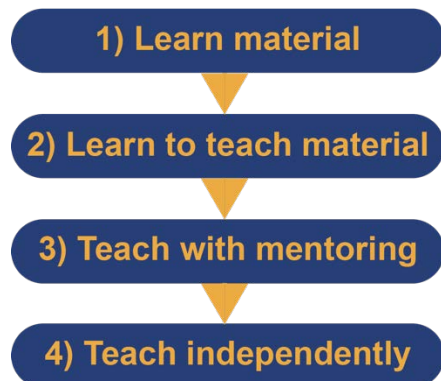


Figure 11. Four part scheme for the Train the Trainers program.

After the instructors in training experience the course and learn the material, they practice teaching the course to each other, then teach their first class, all the while being mentored by VTT team members. Between visits by the VTT, the newly trained instructors taught at least two courses independently. They also continued to receive mentoring and feedback on their performance via Skype video calls with VTT members.

Each course had specific learning outcomes that outlined what concepts the students should know by the end of the course and were used to gauge how well the students learned the material. Prior to the course, instructors administered a knowledge and skills pretest to determine the students’ level of awareness of the material.

Evaluation

Evaluations for both the instructor and students were administered at the end of each course. The students took both a written and practical skills post-test to evaluate knowledge retention and the ability to perform the techniques. They also visited skill stations (see below) to test how they would apply their new skills in a clinical scenario. At each skill station, an instructor evaluated the student's performance. The students also completed a questionnaire at the end of the training program (Appendix I). The instructors used the student evaluations to monitor whether the students felt they were achieving their learning goals and to discover strengths and weaknesses of their teaching style, as well as suggestions for course improvement.

Skill Stations

One critical facet of this training program is hands-on activities that allowed students to practice life-saving techniques. The Global Grant funding was vital in providing the equipment and supplies that are needed to gain hands-on experience. After an introductory lecture to outline key concepts, the students move to skill stations where instructors evaluate their understanding of the concept. The students watch a demonstration of a skill before practicing that skill and demonstrating mastery. They then apply their new knowledge and skills to clinical scenarios that they will encounter in practice (Fig. 12).



Figure 12. Skills stations involve hands-on practice (left), video demonstrations (center), and evaluations of technique (right).

Equipment Maintenance

A significant amount of equipment was either purchased using Global Grant funds or donated. In preliminary visits prior to the grant period, VTT members noted that what equipment was available was often broken or not used due to lack of training.

To ensure the sustainable use of training equipment, the VTT demonstrated procedures for equipment care, cleaning and maintenance (Fig. 13). They also prepared videos of these demonstrations and laminated instruction cards that could be kept with the equipment for quick reference. The newly trained Ethiopian instructors demonstrated to the VTT that they were capable of equipment maintenance.



Figure 13. Proper equipment maintenance is critical for program sustainability.

PLAN: VOCATIONAL TRAINING TEAM VISITS TO TRAIN THE TRAINERS

After consultation with CMHS pediatric and obstetric faculty, a plan for four visits over a two year period to provide instructor training in neonatal resuscitation programs (NRP) and post-resuscitation care (PRC) was developed (Fig. 14). Over the course of the grant, VTT members Dr. Davies (team leader; pediatrics), Dr. Pat Bromberger (neonatologist), Emilie Jean (respiratory therapist), Kathy Johnson (respiratory therapist), Elisa Imonti (neonatal intensive care nurse) and Fary Moini (logistic coordinator; nurse) would make four visits to the University of Gondar. The visits were to be spaced seven months apart, but because of civil unrest in Ethiopia, one year separated the third and fourth visits (Table 2).



Figure 14. Drs. Karin Davies (left) and Pat Bromberger (right) work to develop course material.

Table 2. Schedule of VTT trips and program objectives

Trip	Planned date	Objective
1	February 2015	Train instructors to teach Neonatal Resuscitation Program (NRP)
2	September 2015	Train instructors to teach techniques for premature newborn care (Post Resuscitation Care Part 1 (PRC1))
3	April 2016	Train instructors to teach techniques for care of seriously ill newborns (e.g., birth asphyxia, infection, jaundice); develop treatment protocols (PRC2)
4	October 2016 (<i>actual May 2017</i>)	Train instructors to teach new instructors techniques in NRP and post-resuscitation care (training of trainers of trainers); develop refresher course for skill maintenance

REVIEW OF VTT TRIPS

VTT TRIP 1: FEBRUARY 4-24, 2015

VTT team members

Patricia Bromberger MD neonatologist; Karin Davies MD, pediatrician; Elisa Imonti RN, neonatal intensive care nurse, Emilie Jean RT, respiratory therapist; Fary Moini RN, nurse and logistics coordinator (as well as Rotary Club of La Jolla Golden Triangle member) (Fig. 15).



Figure 15. Rotary Club of Gondar Fasiledes members and University of Gondar CMHS representatives greet VTT team members at the airport.

Objective

Conduct training of trainers program in neonatal resuscitation (NRP).

Four day instructor training course

The instructor training course consisted of four eight hours days. During this visit, the VTT trained 17 health care professionals at the University of Gondar CMHS. This first group, which included 4 pediatricians, 1 general practitioner, 3 obstetricians, 4 nurse-midwives and 5 nurses, learned how to perform neonatal resuscitation themselves, as well as how to teach the techniques to others (Fig. 16).



Figure 16. Instructor training course small group discussions (left) and return demonstrations (right).

During the first two days of the instructor training course, the prospective new instructors complete the NRP provider course and become NRP providers. During Days 3 and 4, they learn how to teach the NRP course. They practice giving brief lectures, learn how to present a skill station, evaluate knowledge and skills, and to promote teamwork and communication. On Days 5 and 6, groups of four or five instructors teach their first NRP provider course with the VTT providing mentoring, support and problem-solving advice (Fig. 17).

The Learning Objectives for the NRP instructor course included: i) knowledge of NRP instructor attributes; ii) understanding of active learning techniques; iii) key skills and points of emphasis for the skill stations; and iv) understanding strategies for planning, setting up, conducting, and assessing learning in an NRP provider course.



Figure 17. Newly trained NRP instructors with VTT members Karin Davies (row 2, second from left), Pat Bromberger (second row, fifth from left) and Fary Moini (first row, center).

Two day provider course

After completing the instructor training program, the VTT then mentored groups of four or five instructors as they taught their first provider course (Fig. 18). These two day, 16 hour courses taught healthcare professionals initial resuscitation steps, bag and mask ventilation techniques, intubation, cardiac compressions and umbilical vein catheterization. Each method was taught using hands-on learning after demonstration of the technique and discussion of the theory. As with the instructor course, the provider course integrated communication skills throughout the session. The students also discussed methods to improve neonatal resuscitation performance, and the importance of teamwork in emergency situations.



Figure 18. Newly trained NRP instructors deliver their first NRP course for NRP providers.

The NRP provider course trained 67 providers (12 pediatricians, 1 general practitioner, 20 obstetricians, 16 midwives, and 18 nurses). Importantly, all training materials for the course, materials used for continuing the training program, and medical supplies needed to implement newborn resuscitation techniques in the delivery room were supplied by the Global Grant.

VTT TRIP 2: SEPTEMBER 14-26, 2015

VTT team members

Patricia Bromberger MD neonatologist; Karin Davies MD, pediatrician; Elisa Imonti RN, neonatal intensive care nurse, Emilie Jean RT, respiratory therapist; Carole Leland, PhD, leadership development; Fary Moini RN, nurse and logistics coordinator (Fig. 19).



Figure 19. The VTT leaves from San Diego airport for VTT Trip 2. (L to R) Elisa Imonti (neonatal nurse), Fary Moini (RN, logistics coordinator), Pat Bromberger, Karin Davies, Kathy Johnson (respiratory therapist).

Objective

Conduct training of trainers program in post-resuscitation care (PRC) of the premature infant.

Four day instructor course

In this course, 15 health care professionals (Table 3) received training in major issues for PRC of preterm infants (Fig. 20). The PRC course followed the same design as that of the NRP instructor course, again with a strong emphasis on helping the instructors teach students how to develop teamwork and communication skills. In addition to learning the theory and techniques for treating neurological issues and respiratory distress in preterm infants, the instructors in training also covered nutritional and thermal care methods and strategies to prevent infection. The course also included discussion of how healthcare professionals in Ethiopia could improve performance through the use of evidence-based practices such as care bundles⁸ and care paths⁹ that can improve outcomes for premature infants (Appendix II).



Figure 20. Training of post-resuscitation care (PRC) instructors

Two day provider course

As with the previous VTT Trip, the newly trained instructors taught their first provider course in groups of 5 instructors who were mentored by VTT members. The instructors delivered three two-day provider courses to train 38 students (Fig. 21; Table 3).



Figure 21. New PRC instructors teach PRC classes with mentoring from VTT members.

One-day NRP provider course for new interns

The VTT trip concluded with Ethiopian NRP instructors trained on VTT Trip 1 holding a one-day NRP training for 20 newly arrived pediatrics and obstetrics interns. The VTT observed the course and provided mentoring and feedback to the instructors.

Workshop on implementing change

Given the emphasis on performance improvement, Dr. Carole Leland joined the VTT to present a one day workshop on the Dynamics of Change, designed to facilitate development of leadership skills (Fig. 22). The workshop hosted more than 40 professionals, including nurses, physicians, medical residents, psychiatrists and nursing administration. During the workshop, the attendees participated in large group discussions, small group activities, personal reflection and role-playing games.



Figure 22. Dr. Carole Leland holds a workshop on implementing change.

VTT TRIP 3: APRIL 4-19, 2016

VTT Team members

Patricia Bromberger MD neonatologist; Karin Davies MD, pediatrician; Elisa Imonti RN, neonatal intensive care nurse, Emilie Jean RT, respiratory therapist; Fary Moini RN, nurse and logistics coordinator

Objective

Conduct training of trainers program in care of the seriously ill newborn

Four day instructor course

Seventeen healthcare professionals were trained to provide training in major neonatal care topics (Fig. 23). Subjects covered included treatment of perinatal asphyxia, care of the encephalopathic infant, prevention and treatment of infection, and jaundice treatment. The modules again included best practice care bundles and care paths that were modified by the Ethiopian instructors to comply with protocols and resources available in the NICU.



Figure 23. PRC instructors trained in VTT Trip 3.

Two day provider course

As for VTT Trips 1 and 2, the newly trained instructors taught their first provider course in groups of five instructors who were mentored by VTT members. The instructors delivered three two-day provider courses to train 44 students (Table 3).

Leadership development workshop

Ms. Yemeserach Balayneh, head of Reproduction and Family Planning Services at the Packard Foundation in Ethiopia and also a Rotarian, facilitated a workshop on leadership development and team dynamics that was attended by 27 nurses and 7 physicians from different CMHS departments (Fig. 24). The participants were divided into teams, and each team created a presentation that identified a specific issue they had encountered in their workplace (e.g., effective hand hygiene, oxygen availability, leadership vision at the administrative level) and developed solutions for these problems.

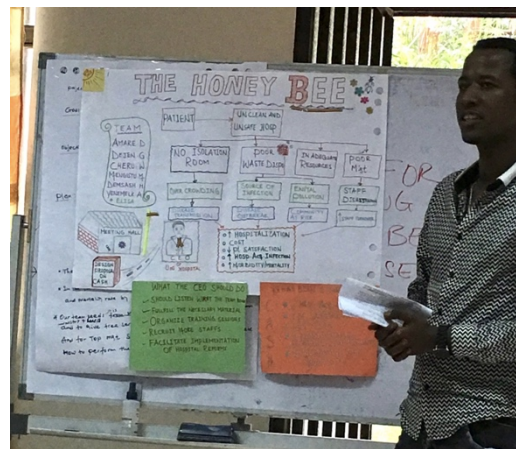


Figure 24. Presentation of workplace solutions in a leadership development workshop.

Warm Chain Champions training and birthing kit project

Hypothermia is a major contributor to neonatal mortality in Ethiopia. Newborns are particularly vulnerable to hypothermia because they cannot regulate their body temperature as effectively as adults. In developed countries, a “warm chain” in which newborn babies are immediately dried and placed on the mother’s chest to allow skin-to-skin contact that helps prevent heat loss is standard practice (Fig. 25) ¹⁰. However, in Ethiopia, mothers often deliver while wearing tight-fitting street clothes that prevent this skin-to-skin contact. Most hospitals in Ethiopia also lack towels to dry newborns, blankets to cover them, and hats to prevent heat loss through the head.



Figure 25. 10-step warm chain

Simple birthing kits that include: i) a gown that opens in the front to facilitate skin-to-skin contact; ii) two flannel blankets- one to dry the baby and one to place over the mother and baby; and iii) a hat for the newborn can be used in the delivery room as part of warm chain techniques (Fig. 26). University of Gondar CMHS staff estimated they would need ~500 birthing kits, which can be recycled through the hospital laundry service for use by the >7,000 mothers who deliver there annually.



Figure 26. Birth kit includes gown for mother (left) and blankets and hats for the newborn.

Material to compile 250 birthing kits was taken to Ethiopia and in a separate project, another 250 kits were made by volunteers that included Rotarians, Girls Scouts, and retired Kaiser physicians. Sharp Hospital in San Diego donated more than 100 hundred hospital gowns for inclusion in the kits.



Ten obstetrics residents and seven nurse midwives working in Labor and Delivery at the University of Gondar Hospital attended a half-day workshop, “Improving Neonatal Outcomes” led by the VTT for training in the 10-step warm chain (Fig. 27). The workshop attendees used role playing to practice the techniques, which they then shared with their colleagues and students.

Figure 27. New warm chain champions.

VTT TRIP 4: May 25-June 10, 2017

VTT Team members

Patricia Bromberger MD, neonatologist; Karin Davies MD, pediatrician; Elisa Imonti RN, neonatal intensive care nurse; Fary Moini RN, nurse and logistics coordinator

Objective

Train instructors to teach new instructors in NRP and PRC and develop refresher course for skills maintenance.

New NRP Instructor Training Course

This fourth VTT trip marked the beginning of the transition to independent training of trainers. In this visit, the VTT was assisted by four Ethiopian NRP and four PRC instructors who co-taught the respective courses and in turn became Instructor Trainers. These new Instructor Trainers trained 15 and 12 new NRP and PRC instructors, respectively, and were mentored by the VTT as they taught their first provider classes, which trained 18 new NRP providers and 12 new PRC providers that included 6 neonatal nurses (Fig. 28). A half-day NRP refresher course was also delivered.



Figure 28. New PRC providers and their instructors in VTT Trip 4.

Advanced neonatal skills seminar

The VTT taught 18 members of the University of Gondar Pediatric Department a seminar on the care of neonatal surgical patients (Fig. 29). The trainees learned to identify infants with congenital anomalies and about surgical treatment options.



Figure 29. Advanced neonatal skills seminar on care of the neonatal surgical patient and recognition of congenital anomalies.

Teamwork and communication training

The NRP and PRC classes were intentionally designed to be multi-disciplinary and educate physicians, nurses and midwives, as well as medical, nursing and midwifery students, together. The inclusion of multiple levels of skills increases the likelihood that these professionals will rely on teamwork in a clinical setting. The students, particularly those in pediatrics and obstetrics,

noted that this design provided an important opportunity for them to get to know each other and to work cooperatively. Moreover, having nurses train alongside doctors emphasizes the important role of assistants in many of the skills and clinical scenarios.



Figure 30. TeamSTEPPS exercises on teamwork (left, working together to build the tallest spaghetti tower) and communication (right, assembling Mr. Potato Heads using only verbal instructions).

Many of the trainees had not been exposed to concepts of clear communication that are needed in emergency situations. Thus, all of the coursework incorporated SBARR: Situation, Background, Assessment, Recommendations, Review/Response, a structured method for communicating important information that requires immediate action and input.

The Global Grant also funded a TeamSTEPPS (Strategies and Tools to Enhance Performance and Patient Safety) course that was presented to members of the pediatrics and nursing departments as well as Rotary Club of Gondar Fasiledes members (Fig. 30). TeamSTEPPS is an evidence-based team training program developed by the American Hospital Association that has been documented to improve attitudes, increase knowledge and improve behavioral skills¹¹. Through games and clinical scenarios, students learned the qualities of well-performing teams and to recognize barriers to effective team performance.

Across the four VTT trips, over 60 new instructors received training, and they in turn provided classes that trained nearly 200 providers across a range of disciplines (Table 3).

Table 3. Number of professionals trained to be neonatal resuscitation instructors and providers during VTT Trips 1-4.

Specialty	Instructor Course (number trained)				Provider Course (number trained)			
	VTT 1	VTT 2	VTT 3	VTT 4	VTT 1	VTT 2	VTT 3	VTT 4
Obstetrician	3	0	0	1	20	0	0	8
Pediatrician	4	3	10	18	12	9	9	0
General Practitioner	1	2	0	0	1	0	6	0
Nurse ¹	5	8	6	3	18	22	29	20
Interns ²	0	0	0	0	0	20	0	0
Midwife	4	2	1	2	16	7	0	2
Subtotal	17	15	17	24	67	58	44	30
Total	73				199			

¹Total includes neonatal and general nurses

²Total includes obstetric and pediatric interns

Delay of VTT 4

The fourth VTT trip was scheduled for October 2016, but was delayed until May 2017 because of civil unrest in Ethiopia. Due to this instability, many of the instructors and providers who were trained in the first three VTT trips left the region. However, a group of dedicated instructors remained to teach both the NRP and PRC classes to healthcare professionals eager to learn these skills. The continuation of these courses in the face of a challenging political climate represents a strong indication that these courses will be continued to achieve project goals and ensure program sustainability.

TRAINING DURING INTERIM PERIODS

The newly trained instructors independently taught a number of NRP and PRC courses between VTT trips (Table 4). Importantly, more than 300 providers were trained between VTT Trips 3 and 4, despite civil unrest and the absence of some instructors. These periods demonstrate that these instructors have the expertise and autonomy needed to continue the training program. Critical to the success of these trainings was support from the University of Gondar IT personnel who facilitated Skype videoconferences.

Table 4. Courses held during periods between VTT trips.

Period	Number of courses	Number trained
Interim VTT Trips 1 & 2 March 2015-September 2015	4	63
Interim VTT Trips 2 & 3 October 2015-March 2016	5	87
Interim VTT Trips 3 & 4 May 2016-May 2017	20	325
Interim VTT Trip 4 and grant end June 2017-October 2017	1	20
Total	30	495

BEYOND TRAINING: IMPROVEMENTS TO THE UNIVERSITY OF GONDAR HOSPITAL NICU

Before the training activity began, the neonatal nursery and NICU were crowded. Infants shared beds while new isolettes that had been previously donated sat unused because the staff had not been trained in their use. After finding eight new isolettes in storage, VTT member Elisa Imonti set them up and taught the staff how to use them. When the VTT returned on a subsequent visit, they found a reorganized neonatal nursery with a separate preterm nursery where the smallest babies received care (Fig. 31).



Figure 31. Prior to the program, newborns shared cribs and oxygen supplies (left). After training in isolette use, the University of Gondar Hospital staff installed eight previously donated isolettes (right) to upgrade the level of care for premature and ill newborns.

SUPPORT FROM HOST CLUB ROTARY CLUB OF GONDAR FASILEDES

The host club, Rotary Club of Gondar Fasiledes, (RCGF) led by President Abiyot Admassu Tegene and Past President Ermias Diro, was highly involved in the VTT Trips. RCGF members met the VTT at the airport and also arranged hotel and ground transportation. Club members helped transport the equipment and supplies needed to set up the skills lab, skill stations and teaching demonstrations. Their hospitality was without parallel. Club members arranged tea breaks and lunches for the students, purchased needed supplies, and were always willing to help solve problems. The RCGF hosted VTT members both at their club meetings and at their homes. They also ensured that the VTT had some leisure time by arranging tours of natural and historic sites around the region (Fig. 32).



Figure 32. Outstanding project support and hospitality from Rotary Club of Gondar Fasiledes (RCGF). President Abiyot Admassu Tegegne, together with RCGF members, oversaw travel arrangements and transport of training materials, while also providing wonderful hospitality for VTT members. Top left, a trip to the brewery for VTT and University of Gondar faculty and staff; top right, VTT members visit Falasha village; bottom left, VTT members at Fasiledes Castle (ca. 17th cen.); bottom right, boating on Lake Tana.

STEWARDSHIP OF FUNDS

A hallmark of The Rotary Foundation Global Grants is funding of projects that drive significant change without excessive cost. Through cost savings in several areas, leaders for this Global Grant maximized the funds that were devoted to actual instruction and equipment purchases (Appendix III). In particular, the Global Grant leaders secured funding from Jhpiego (Johns Hopkins Program for International Education in Gynecology and Obstetrics) to cover VTT Trip 2 travel. Several VTT members used frequent flyer miles for VTT trips. VTT members also secured donations of medical training equipment and disposable supplies from a variety of sources. Such donations ensured that funds were available to support additional independent classes that allowed the training of more professionals in life-saving skills.

PROGRAM SUSTAINABILITY

Projects funded by Rotary Foundation Global Grants must be sustainable. This Global Grant project benefited from partnerships with strong leaders who maintained a vigorous program across several leadership changes. Dr. Zemene Tigabu, Chairman of the Pediatrics Department when the project proposal was made, recognized the value of the project, and his leadership and vision helped guide the design of the program to be responsive to the needs and limitations of the region. Dr. Zemene became the head of the School of Medicine and Clinical Director of University of Gondar CMHS, but remains involved with the program. Dr. Mahlet Abeyneh succeeded Dr. Zemene as Department Chair, and she skillfully guided the training during the first three VTT trips. When Dr. Mahlet moved to Addis Ababa, Dr. Kassahun Belachew took over and helped transform the training program into a dynamic operation that exceeded all previous expectations. Dr. Kassahun is supported by young pediatricians who have strong leadership skills and are willing to support the program in future years. Through videoconferencing, the VTT can continue to provide support until the program achieves full independence.

PROGRAM AWARDS AND RECOGNITION

The University of Gondar recognized the contributions of this Global Grant to the education of its doctors, nurses and midwives by presenting RCGF with the Best Community Service Partner Organization Award at the Commencement Ceremonies held July 13, 2017 (Fig. 33). They also named GFRC President Abiyot Admassu Tegene as Best Individual Community Service Partner. Furthermore, the VTT awarded President Abiyot Admassu Tegene a Paul Harris Fellowship in recognition of his outstanding contribution to the success of this project. In May 2018 the San Diego County YWCA recognized Dr. Karin Davies with a Humanitarian Award for her work with the Saving Babies Lives in Ethiopia Global Grant at the TWIN (Tribute to Women & Industry) Awards banquet held in May 2018.

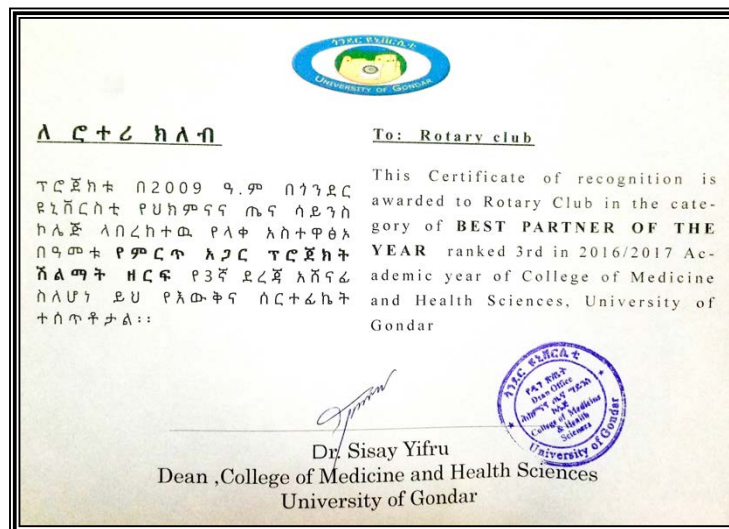


Figure 33. Recognition for the program.

TRAINING IMPACT: FEEDBACK FROM CMHS COLLEAGUES



Dr. Kosi, third year Obstetrics resident after completing a breech delivery in which the newborn wasn't breathing: "I dried and stimulated the baby as we learned, but he still wasn't breathing. I started bag and mask ventilation and the baby started to cry. THIS WORKS!!"



Dr. Yeshiwas, Former Chairman of the Obstetrics and Gynecology Department of CMHS: "This training has changed our practice of newborn resuscitation."



Dr. Mahlet, Former chairwoman of the Pediatric Department at the University of Gondar CMHS: "Before the training started we thought we were doing a good job of caring for our newborn babies. The unique feature of this training is changing the way we teach. We now use more hands-on practical learning and less lecture and theory. Now, after the training, we understand what quality neonatal care means. And we have already improved our care 1000%!"



Dr. Meseret, Clinical Director of University of Gondar Hospital: "Statistics for the past 3 months indicated that our neonatal nursery showed the best improvement of all the hospitals in the region. We think the training we received is largely responsible [for this improvement]."



Dr. Kassahun, Current Chairman of Pediatrics and Course Coordinator: "We have learned to use the warm chain and birthing kits to help prevent hypothermia, an important cause of newborn deaths in our nursery. Handheld radios supplied by the grant are now being used to assemble teams to respond quickly in emergencies in the labor and delivery ward."



Mengistu Mekonen, Nursing Instructor: "I have already incorporated the things we have learned in the courses into my teaching."

EXCEEDING EXPECTATIONS AND REDUCING NEONATAL MORTALITY

In every aspect, this Global Grant exceeded expectations by facilitating the training of nearly double the number of healthcare providers that was predicted at the outset of the funding period. A total of 30 NRP and PRC independent classes were offered by the new instructors trained by this Global Grant. Over 800 healthcare professionals now possess skills to care for newborns in distress and care for them after resuscitation (Table 5).

Table 5. Actual number trained significantly exceeded original predictions

Measure	Predicted	Actual	% Exceeded
Independent classes taught	12	30	250%
Number of Instructors	32	73	220%
Number of Providers	384	750 ¹	195%
Total	416	823	197%

¹Includes 56 providers taught in three clinical symposia: 1) Improving neonatal outcomes for OB staff (VTT Trip 3; 17 trained); 2) Advanced Neonatal Skills (VTT Trip 4; 18 trained); 3) Team STEPPS Training (VTT Trip 4; 21 trained)

The success of this program is borne out in the reduction in neonatal mortality in the Amhara region served by University of Gondar professionals. Dr. Abebaw Gebeyehu, Head of the Amhara Regional Health Bureau praised this progress in a letter:

“We have seen the impact to reduce early neonatal mortality in a short period of time. Let me share the facts here: Based on the [most recent] six month report, the early neonatal rate is ~18/1,000 live births [LB] in the region. About 560 early neonatal deaths [occurred] in hospitals. The highest (52/1,000 LB) neonatal mortality rate was observed in Alem Ketema hospital. The University of Gondar Hospital had the highest [number of] births but had the lowest neonatal mortality rate (9/1,000) rate among the referral hospitals of the region.

This success is because of the intervention [your team] made in training [neonatal and post-resuscitation care techniques]. We have visited [University of Gondar Hospital] and we have seen how the hospital is managing the LBW [low birth weight] neonates in its NICU. Because of this fact, I strongly recommend continuing the program in nearby hospitals or elsewhere in the region.

Many, many thanks!”

Although the University of Gondar hospital delivered the most babies in the Amhara region, and tended to handle higher-risk pregnancies, in 2016/2017 it reported one of the lowest neonatal mortality rates in the Amhara region (Table 6).

Table 6. Reduction in neonatal mortality rates at University of Gondar Hospital NICU.

Year	Mortality rate*
2012	13%
2013	14.2%
2014	13.8%
2015	12%
2016/7	9%

← Program initiated

*Percentage of NICU admissions to University of Gondar Hospital

FUTURE PLANS AND GOALS

Supporting medical education in life-saving neonatal care

During VTT Trip 4, VTT members met with representatives of RCGF, University of Gondar Hospital, and University of Gondar CMHS. During these meetings, plans were put into place for the impending Global Grant GG1743951. This grant will build on the success of GG1525173 to support ongoing NRP and PRC efforts, and will provide support to incorporate the materials developed during this Global Grant into the University of Gondar medical school curriculum as well as building training capacity at health centers and district hospitals in the North Gondar Zone of the Amhara region.

Goals for the future

Our hope for the future is that every doctor, nurse and midwife who graduates from the University of Gondar will possess the skills needed to care for seriously ill newborns that will help babies survive at birth. As these professionals move into practice throughout Ethiopia, they will take these skills with them. The efforts of this Global Grant will help Ethiopia achieve the goals of reducing neonatal mortality and having every birth attended by healthcare professionals who are trained in life-saving skills (Fig. 34).



Figure 34. Thank you Rotary!

ABBREVIATIONS

CMHS: College of Medicine and Health Sciences, University of Gondar

EDHS: Ethiopia Demographic and Health Survey

GG: Global Grant

JHPIEGO: Johns Hopkins Program for International Education in Gynecology and Obstetrics

LB: Live births

LBW: Low birth weight

VTT: Vocational Training Team

NICU: Neonatal Intensive Care Unit

NRP: Neonatal Resuscitation Program

PRC: Post-resuscitation Care

RCGF: Rotary Club of Gondar Fasiledes

RCDM: Rotary Club of Del Mar

SBARR: Situation, Background, Assessment, Recommendations, Review/Response

STEPPS: Strategies and Tools to Enhance Performance and Patient Safety

WHO: World Health Organization

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Barry LaForgia: For sharing teaching material in Newborn Resuscitation used by International Relief Teams (IRT) in programs in Eastern Europe and Vietnam

Jhpiego, Ethiopia

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Maroofa Fata RT: For assistance in obtaining teaching materials and respiratory equipment and supplies

Sharon Shorey OT and Jill Killion OT: For production of training videos for Developmental and Neurologic Care modules for Post-Resuscitation Care teaching materials

Joan Dillenbeck RN: For collection and organization of medical supplies

Anne Marie Garcia MD: For assistance in development and editing of PRC course Care Paths

Lucinda Millar, Kaiser Education and Research: For facilitation of training equipment purchasing and for use of medical equipment to create training videos

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Eric Bromberger PhD: For providing teaching video narration

Leadership Enterprises

Francine Deutsch PhD and Carole Leland PhD: For consultation and support for the development of the grant proposal, and for providing contacts in Gondar, Ethiopia, and at Rotary International. Dr. Leland also developed and led the module on Implementing Change in VTT Trip 2 and developed the Leadership Development module for VTT Trip 3

Neotech Products

Ernie Cavazos: For donations of respiratory equipment and supplies used in program instruction and implementation

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Michael Loomis DVM.: For assistance with literature searches and grant proposal development

Otay Lakes Church Latter Day Saints Women's auxiliary: For sewing isolette covers and developmental care equipment such as snugglies, binders and "frogs-positioners" for use in training and implementation

Philips Healthcare

Ed Myers: For donations of medical equipment, including cardiac and blood pressure monitors, and pulse oximeters

Rotary Clubs

Rotary Club of Gondar Fasiledes

Abiyot Admassu, Primary Host Contact: For managing all aspects of the grant

Ermias Diro MD, past president GFRC: For assistance in obtaining pre-import certificates for grant equipment and supplies

Hibste Mekonen: For assistance with grant management

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Estate of Jack Dodds: For providing grant matching funds

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Rotary Club of Del Mar

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Joyce Holfeld PhD, former Foreign Service Officer for USAID: For consultation on the development of a VTT Global Grant application

Rotary Club Del Mar- Solana Beach

Charles Foster: For guiding the search for an International Club to sponsor the project

Rotary Club of San Diego Coastal

Jenny Parker MD, anesthesiologist at Sharp Hospital: For arranging for Sharp Hospital San Diego to donate over 100 hospital gowns to the Birthing Kit Project.

Rotary Birthing Kit Initiative

Kaiser Volunteer Auxiliary: For donation of dozens of knitted hats, booties and blankets

Sharp Hospital San Diego: For donation of over 100 hospital gowns for the birthing kits

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Girl Scout Troops 1821 and 3103: For making hundreds of hats for the project. One member of the troop, Miheret, is from Ethiopia and was excited to help babies in her native country.

Rotary Club of Del Mar member Mary Savoy and her friends and family: For making hundreds of hats from stockinette and for donation of two large stockinette rolls used to make additional hats in Ethiopia

Emily Midgely: For raising money with her friends to buy blankets and hats after hearing about the birthing kit project from her Rotarian Godmother.

Minami Davies: For using her own money to buy stockinette and with her Rotarian grandmother helping to make over 50 baby hats for the birthing kit project

The Rotary Club of Del Mar Foundation Trust Individual Donors In Support of the Ethiopia Project

For individual donations to the project we thank:

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University of Gondar

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Zemene Tigabu MD, Head of the School of Medicine and Clinical Director of the College of Medicine and Health Sciences University of Gondar: For strong leadership and guidance in the development and implementation of the teaching program

Kassahun Belachew MD, Chair of the Department of Pediatrics College of Medicine and Health Sciences University of Gondar, Grant Project Coordinator, NRP and PRC Instructor: For supervision of course scheduling, record keeping, monitoring of course outcomes and participation in Skype video conferences between VTT visits; and for guidance on the implementation of new skills into clinical practice in the Department of Pediatrics

Mahlet Abayneh MD, former Chair of the Department of Pediatrics, College of Medicine and Health Sciences University of Gondar, NRP and PRC instructor: For support in the teaching program and guiding the implementation of skills learned into NICU clinical practice

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Bereket Worku Mebrat, Abraham Mihret Yirga, Ermiyas Birhanu Nurye: For providing vital assistance with Skype video conferences that allowed mentoring of the Gondar Team between VTT visits.

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APPENDIX I: COURSE EVALUATION

Advanced Neonatal Skills Course Evaluation

Date:

Instructors:

Please rate the following with 1=Lowest 5=Highest

- | | | | | | |
|--|---|---|---|---|---|
| 1. Were the course objectives clear? | 1 | 2 | 3 | 4 | 5 |
| 2. Could you understand the lectures? | 1 | 2 | 3 | 4 | 5 |
| 3. Were the jeopardy games helpful? | 1 | 2 | 3 | 4 | 5 |
| 4. Did the skills stations help you learn about care of the neonatal surgical patient? | 1 | 2 | 3 | 4 | 5 |
| 6. Did the course give you some new skills to evaluate a dysmorphic infant? | 1 | 2 | 3 | 4 | 5 |
| 7. Did the course prepare you to evaluate and stabilize the neonatal surgical patient? | 1 | 2 | 3 | 4 | 5 |
| 8. Can you use the skills you learned in your work? | 1 | 2 | 3 | 4 | 5 |
| 9. What was the best part of this course? | | | | | |
| 10. What part of the course needs improvement? | | | | | |

APPENDIX II: CARE PATHS AND CARE BUNDLES

CARE PATHS

Care paths describe protocols for diagnosis and treatment of various conditions. The care paths adopted in the training for this Global Grant include:

- Temperature-thermal care
- Respiratory care
- Prevention of neonatal infection
- Neurologic Care- infants with asphyxia
- Hypoglycemia- well infant
- Early onset neonatal infection
- Neurologic Care- infants with encephalopathy
- Hypoglycemia- sick infant
- Evaluation of infant with visible jaundice

CARE BUNDLES

Care bundles are groups of interventions that when used together can positively affect patient outcomes for a variety of conditions. In this Global Grant, the care bundles that were taught include:

- Hyperbilirubinemia
- Late preterm
- Supplemental Oxygen
- Neonatal infection
- Perinatal asphyxia
- Isolette care
- Apnea
- Prevention of neonatal infection
- Neurologic care of neonatal encephalopathy
- Large for gestational age
- Kangaroo mother care
- Nutrition
- Very preterm
- Thermal care

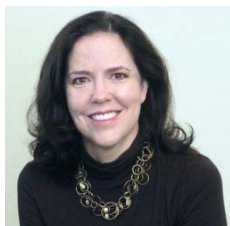
APPENDIX III: BUDGET

Description (Supplier)	Budgeted Cost (USD)	Actual Spent ¹		Amount Spent (USD)	Difference (USD) ³
		Trip	Amount		
Medical Teaching Equipment (Various)	15,000.00	Trip 1	5,961.00	16,683.00	1,683.00
		Trip 2	8,140.00		
		Trip 3	2,582.00		
Airfare and Transportation	43,000.00	Trip 1	8,872.00	21,397.00	21,603.00
		Trip 2	380.00		
		Trip 3	3,645.00		
		Trip 4	8,600.00		
Training Course Costs (Various)	23,200.00	Trip 1	6,138.00	21,649.00	1,551.00
		Trip 2	5,765.00		
		Trip 3	4,989.00		
		Trip 4	4,757.00		
Disposable Medical Teaching Equipment (Various)	5,000.00	Trip 1	1,111.00	5,778.00	778.00
		Trip 2	2,127.00		
		Trip 3	1,932.00		
		Trip 4	608.00		
Professional Consultants (Team)	5,000.00	Trip 1	550.00	2,650.00	2,350.00
		Trip 2	1,600.00		
		Trip 3	500.00		
Contingency (All Categories)	9,050.00	Trip 1	4,396.00	13,034.00	3,984.00
		Trip 2	2,172.00		
		Trip 3	2,534.00		
		Trip 4	3,932.00		
In Country Coordinator (Gondar University Hospital)	7,000.00	9/15	1,750.00	7,000.00	0.00
		12/15	1,750.00		
		9/16	1,750.00		
		2/17	1,750.00		
Independent courses taught	ns ²	7/15	2,195.00	19,063.00	19,063.00
		2/16	2,440.00		
		4/16	2,234.00		
		7/16	3,109.00		
		11/16	2,175.00		
		6/17	5,160.00		
Total	107,250.00			107,254.00	-4.00

Amount remaining in Rotary Club of Del Mar and Gondar Fasiledes accounts on July 1, 2017: 0

¹Values for Training Course Costs, In Country Coordinator, and Independent Courses taught were converted from Ethiopian currency, Birr, using contemporary exchange rates; ²not specified; ³red values indicate overages, which were compensated by savings in other areas (black text)

ABOUT THE AUTHOR



Sharon Schendel received a BA in Chemistry from Indiana University and a PhD in Biophysics from Purdue University. Her research concerned membrane protein insertion and molecular mechanisms governing cell death. She established the *Biochemical Journal* U.S. Editorial Office and was Graduate and Postdoctoral Education Specialist at the Sanford Burnham Prebys Medical Discovery Institute. Dr. Schendel is now Program Manager for the Viral Hemorrhagic Fever Immunotherapeutics Consortium (VIC) based at The Scripps Research Institute in La Jolla. The VIC seeks to develop improved treatments for infections caused by some of the most feared viruses, including Ebola, Marburg and Lassa. Dr. Schendel is a member of the Rotary Club of Del Mar. Since becoming a Rotarian in 2015, she has served as Program Chair and currently publishes the club newsletter and website.

CONTACT INFORMATION

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