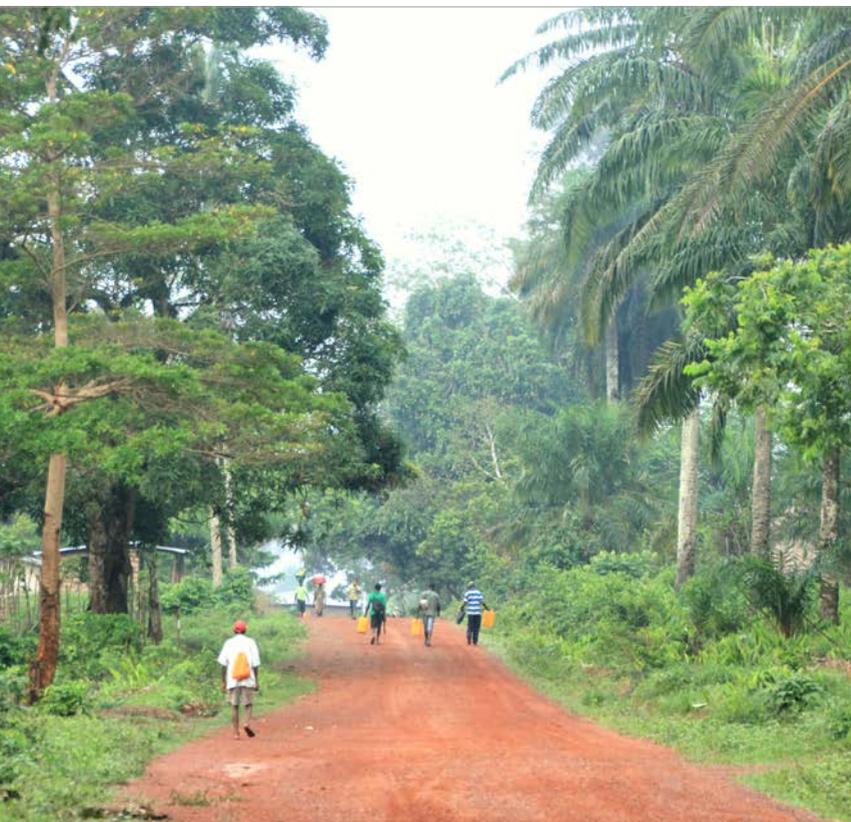


SWISS SOCIETY OF NEONATOLOGY

Efforts to reduce neonatal mortality in Sierra Leone

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Title figure:

Sierra Leone– countryside (source: Gudrun Jäger)

Sierra Leone is a West African country covering an area of 72'000 km² and with a population of 7.1 million people. From 1991 to 2002, the Sierra Leone Civil War was fought and devastated the country. The conflict left more than 50'000 people dead and much of the country's infrastructure destroyed. The country is still struggling to recover from the long-lasting effects of the war on health, education and administrative structures.

The Ebola crises of 2014 to 2016 struck the country with 3'856 deaths and had tremendous consequences for the whole community. For example, in Sierra Leone there are 3.4 skilled health care professionals per 100'000 population, compared to 219 per 100'000 in Switzerland (1). The Ebola epidemic killed 7% of the country's health care professionals (2). The Human Development Index of Sierra Leone is one of the lowest, ranking at 179 out of 188 countries in 2015 (3).

The under-five mortality rate in Sierra Leone (expressed per 1'000 live births), an important indicator of child health, has declined and halved over the last 20 years; nevertheless, there are still 120 children dying before their fifth birthday. Neonatal mortality (35 deaths per 1'000 live births) significantly contributes to this tragic loss (1). The country's maternal mortality rate is one of the highest in the world with 1360 maternal deaths per 100'000 births in 2015 (compared to 5 deaths per 100'000 in Switzerland) (1).

This is the setting, in which the NGO «German Doctors – sustainable help» (there will be a Swiss branch of the organization in the near future) supports a hospital in a little village named Serabu, around 5–7 hours driving distance away from the country's capital Freetown. The hospital serves a population of about 70'000 people. The NGO aims to improve mother and child health and to empower of local staff through teaching and supervised training. Educational activities mainly concentrate on nurses and community health workers, who play a very important part in the treatment and care of the patients. In fact, the community health workers are the first to treat the patients under the supervision of the European doctors and, depending on their experience, they work quite independently.

This premature female infant was born at around 28 weeks of gestation with a birth weight of 800 g. Prior to delivery, gestational age was thought to be lower and prognosis expected to be very poor; therefore, lung maturation had not been performed. The 16-year-old mother developed eclampsia and the infant was delivered by emergency Cesarean section. The infant developed mild respiratory distress, and was transferred to the neonatal unit of the hospital (Fig. 1). A nasogastric tube was put in place and intermittent monitoring - due to the limited number of available monitors - was initiated (Fig. 2).

Nutrition was started with small amounts of oral glucose 10%. Continuous intravenous fluids, let alone parenteral nutrition are not an option in this hospital. Preterm infants can only be fed with mother's milk since preterm formulas are not available.

Antibiotic treatment was not felt to be indicated since delivery was by Cesarean section for maternal indication. Temperature control was achieved by wrapping the girl in local cotton and donated knitwear, and by placing her under a radiant heater with intermittent recording of rectal temperatures. Kangaroo care is encouraged in the unit, but was not possible in the first few days due to the mother's critical condition. Breathing remained stable with some apnea spells and a mild respiratory distress syndrome, requiring small amounts of supplemental oxygen administered by nasal prongs.



Fig. 1

Neonatal unit at Serabu Community Hospital in Serabu, Sierra Leone.



Fig. 2

Case Report 1: extremely low birth weigh infant (estimated gestational age 28–29 weeks, birth weight 800 g) on day of life 2 supported with nasal cannula oxygen.



Fig. 3

Case Report 1: during a power outage, the infant was transferred to the X-ray department, located next to the operating theatre, where back-up electricity was available to run the oxygen concentrator.



Fig. 4

Case Report 1: day of life 4, back in the neonatal unit, the infant is supported with nasal cannula oxygen and fed through an orogastric tube.



Fig. 5

Case Report 1: Feeding and growing in Kangaroo care.

In this hospital, the mortality rate of infants with a gestational age of 28 weeks is very high, and parents and even the health care professionals are understandably quite pessimistic about the chances of survival. Sometimes, they must be motivated to care for such small premature infants. Parents normally do not give their infants a name in the first weeks of life; they are named either baby (girl) or bobor (boy).

On the third day of life, the electricity went off and the diesel generator took over. Due to a problem with the cables, the generator supply did not cover the newborn unit. Consequently, the oxygen concentrator could not run, and the patient's oxygen saturations dropped to 66%. Improvisation is helpful in such circumstances, and the infant was transferred to the X-ray department close to the operating theatre, which was covered with electricity. Wrapped in blankets, the premature girl was observed in the scanning room, supported by oxygen, but with external heat source (Fig. 3). She returned to the newborn unit three hours later with a body temperature of 35.5°C (Fig. 4).

Fortunately, her further course was uneventful (Fig. 5), she slowly gained weight, learned to breast feed and was discharged 12 weeks later with a body weight of 2020 g. This was a great success for the whole team and was celebrated in the local tradition.

CASE REPORT 2

This mother came to the hospital with premature twins, born at home. The mother had attended antenatal care, and a scan had estimated the gestational age at around 28 weeks. There is an option for pregnant women to stay in a waiting house on the hospital compound, but this mother had declined. The first twin was born in the late morning hours and established spontaneous breathing postnatally. The second twin was born several hours later, apparently following breech presentation. It would have been possible for the local public health units to ask for an ambulance from the hospital, but this was not requested and the parents and the grandmother arrived at the hospital on their own.

On arrival in the early evening hours, the second twin had died. The first twin, a boy with a birth weight of 820 g, was breathing with little effort and oxygen saturations were in the 80's in room air. He was treated with tube feedings, caffeine citrate and intermittent oxygen therapy with sporadic oxygen saturation measurements. Because of preterm delivery, he was put on intravenous antibiotics for the first days of life. In the first 3 weeks, there was a 20% weight loss, but with increasing oral intake (240 ml/kg/day mother's milk) he regained weight slowly (Fig. 6). He was discharged 11 weeks later with a body weight of 2000 g.



Fig. 6

Case Report 2: surviving twin on day of life 21.

DISCUSSION

Practicing neonatology in a resource-limited country is extraordinarily challenging and deaths in the neonatal period are common. In fact, neonatal mortality is the most important contributor to the overall under-five mortality. There are mainly three conditions responsible for this high neonatal mortality: birth asphyxia, prematurity and infections (4).

Particularly in smaller hospitals, lack of essential medicines and other medical supplies is often a major problem. The availability of clean, running water cannot be taken for granted in settings where – under the best circumstances – clean water must be fetched from water pumps. In many African countries, maintaining a constant supply of electricity is challenging. The use of solar energy in these countries might be an obvious option, but then again there needs to be a back-up for fall outs of solar energy, for example in the rainy season.

Perhaps the most important limiting factor is lack of education and poor knowledge of the health care staff. Therefore, training and supervision of community health workers, nurses and physicians is of paramount importance.

Given the low number of doctors in the whole country, many surgical procedures have not been available in large parts of the country for many years. There-

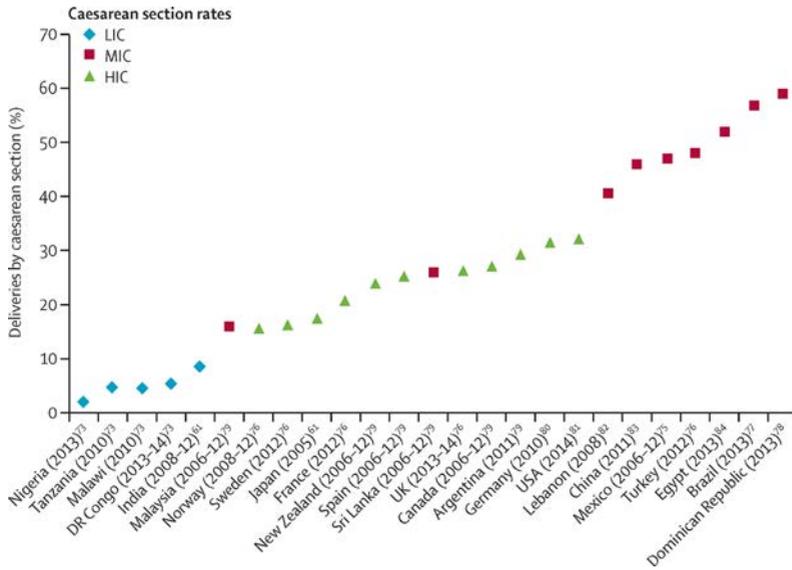


Fig. 7

Cesarean section rates in low, middle and high income countries: too little too late (TLTL) and too much too soon (TMT) (source: Miller S, et al. Lancet 2016;388:2176–2192) (5).

fore, a surgical training program was developed some years ago to train community health workers in Sierra Leone; this program has been very successful (2). Such an approach is particularly important because of the «brain drain» phenomenon, which is very prevalent in African countries: many nurses and doctors leave their countries and try to work in Western countries to escape the poverty in their own countries and in search of a better quality of life. Considering this fact, training community health workers is an important step towards sustainable progress.

To improve maternal and neonatal mortality rates, the possibility to perform emergency Cesarean sections at different levels of the health care system is critical; this has been well demonstrated by the World Health Organization (WHO) and Unicef. However, access to hospitals offering Cesarean sections remains limited and many pregnant women, particularly in rural areas, will not have this option (too little too late), putting them and their babies at risk (5) (Fig. 7).

The WHO and Unicef have proposed a bundle of actions aimed at reducing maternal and child deaths, including the availability of antenatal care, skilled birth attendance and access to a hospital that can perform Cesarean sections. For neonates, simple interventions after delivery are recommended (6): early breastfeeding, promotion of kangaroo care and skin to skin contact, and prevention of neonatal tetanus by

immunization of the mother. The American Academy of Pediatrics has launched an initiative called Helping Babies Survive, which includes a section on Helping Babies Breathe, a simple program to train skilled birth attendants (7). The Every Newborn Action Plan (ENAP) underlines the importance of these measures to reduce the high neonatal mortality rates, which have improved at a much slower rate than mortality rates after the neonatal period.

CONCLUSION

Caring for sick neonates in resource-limited countries is very challenging. Sophisticated Western medicine is not a priority, but simple steps, such as guaranteeing the availability of clean water and electricity, combined with reliable allocation of simple equipment and essential drugs, are needed. To achieve sustainability, local traditions and customs must be respected; at the same time, native people must be trained to enable them to become independent health care professionals.

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