

**NEO FOR
NAMIBIA**
HELPING BABIES
SURVIVE



AUTHORS

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MISSION REPORT

Mission 2023-2

February 25, 2023 to March 31, 2023

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1. INTRODUCTION

The 18th mission of NEO FOR NAMIBIA – Helping Babies Survive lasted from February 25 to March 31, 2023. Following the 17th mission, Prof. Thomas M. Berger remained in Windhoek to await the arrival of his colleague, Dr. Christoph M. Honegger, head of the Department of Obstetrics and Gynecology at the Cantonal Hospital of Zug, Switzerland.

During this time, Prof. Thomas M. Berger completed two mission reports (2021-3 and 2023-1). In preparation of the next mission, some minor car repair work needed to be done. He also managed to buy 10 non-touch soap dispensers and 2 hand dryers (from Taurus Maintenance Products) for Rundu and Katima. Regrettably, most of the time, the basics for proper hand hygiene (soap and paper towels) had not been available at these hospitals. Finally, he also purchased an X-ray view box (from Uni Med) for the neonatal unit and adult blood pressure cuffs (from Bio Dynamics) for the obstetrical unit at Katima Hospital. In the past, despite a very high incidence of pre-eclampsia, blood pressures could not be measured at Katima Hospital because all of the blood pressure cuffs were leaking.

Shortly before leaving Windhoek, Prof. Thomas M. Berger was able to meet with representatives from the Ministry of Health and Social Services (MHSS): ED Dr. Ben Nangombe, Deputy ED Mrs. Taimi Anaambo, PA of the ED Dr. Theo-Ben Kandetu, and the Regional Director of the Erongo Region, Mrs. Anna Jonas. Feedback information from the 17th Mission were provided, and prerequisites for future activities of NEO FOR NAMIBIA – Helping Babies Survive were discussed.

2. MAIN MISSION GOALS

The goals of the 18th mission were:

1. To revisit Swakopmund Hospital and review statistical data that would help to determine the future needs for centralized neonatal care in the new Neonatal Unit at the government hospital
2. To provide a 2-day-seminar on neonatal care (Prof. Thomas M. Berger) and obstetrical emergencies (Dr. Christoph M. Honegger) for health care professionals from the Erongo region of Namibia
3. To introduce Dr. Christoph M. Honegger to the team of Obstetrics and Gynecology at both Rundu State Hospital and Katima Hospital
4. To analyze problems with MTTs Dolphin CPAP devices and one of the EVE TR Neo ventilators at Rundu State Hospital
5. To introduce MTTs Dolphin CPAP devices at Katima Hospital
6. To repeat the 2-day-seminar on neonatal care (Prof. Thomas M. Berger) and obstetrical emergencies (Dr. Christoph M. Honegger) for health care professionals at Katima Hospital

3. HOSPITALS VISITED

As planned, the mission team spent 3, 5 and 6 days working at Swakopmund Hospital, Rundu State Hospital and Katima Hospital, respectively. Dr. Christoph M. Honegger was very welcome at all three institutions by his obstetrical colleagues; he took part in daily rounds, performed, or assisted in several surgical procedures and, together with Prof. Thomas M. Berger, gave several lectures in the hospitals of Swakopmund and Katima. He therefore gained a thorough insight into challenges and opportunities in his field of medicine. Prof. Thomas M. Berger trained medical officers and nursing staff at all three hospitals. He tried to find solutions for malfunctioning equipment used for non-invasive and invasive respiratory support of neonates at Rundu State Hospital.

3.1 Swakopmund Hospital

Swakopmund is the capital of the Erongo administrative district. In 2011, the town had more than 44'000 inhabitants. Swakopmund was founded in 1892 as the main harbor for German South West Africa. Surrounded by the Namib Desert on three sides and the cold Atlantic waters to the west, Swakopmund has a desert climate with mild conditions year-round. The average temperature ranges between 15 to 25 °C (Fig. 1, 2).

Fig. 1. Swakopmund is a city on the Atlantic coast, 352 km west of the Namibian capital Windhoek; it is the fourth largest population center in Namibia.

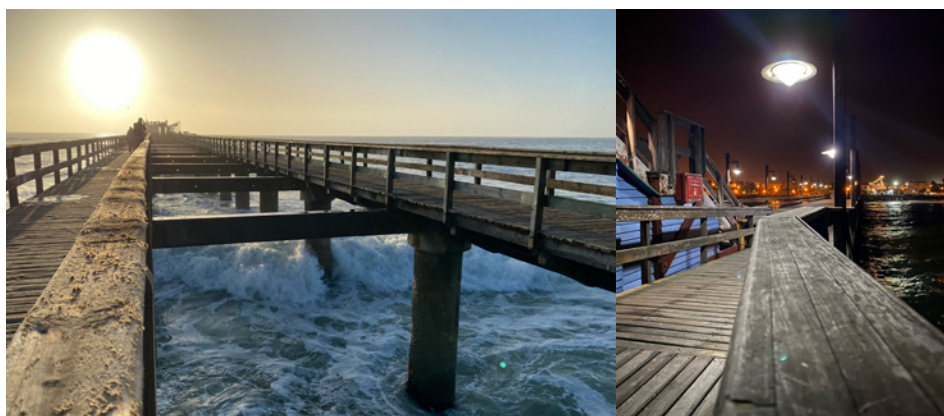


Fig. 2. Swakopmund is situated at the edge of the Namib desert.



3.1.1 Temporary Neonatal Unit

As suggested on our previous visit, the Neonatal Unit was moved to a new and much more spacious location. There is now enough space for the Wallaby® warming tables, the Colibri® phototherapy units and the Pumani® bubbleCPAP devices. Prof. Thomas M. Berger took the opportunity to demonstrate new pieces of equipment to the nurses and medical officers (Fig. 3).

Fig. 3. Equipment donated by NEO FOR NAMIBIA – Helping Babies Survive: phototherapy units (left top), open warming tables (left bottom); instructing nurses in the use of the Rad-G pulse oximeter (right).



3.1.2 Meeting with hospital leadership and engineers

There are plans to establish a perinatal center for the Erongo region in Swakopmund. As outlined in Mission Report 2023-1, the new buildings have yet to be completed; it seems highly unlikely that the work will be finished by the end of May 2023 (as currently suggested by the constructor) (Fig. 4).

Fig. 4. The new neonatal unit in Swakopmund: the building is still in its shell, and it appears doubtful that it will be completed by the end of May 2023.



NEO FOR NAMIBIA – Helping Babies Survive offered to act as advisors regarding the necessary installations (e.g., power, gas supply, vacuum, to name a few) needed to run a neonatal intermediate or even intensive care unit. At the meeting, an extensive list of equipment for the new unit was presented and discussed (Fig. 5). Prof. Thomas M. Berger questioned the validity of this list given the estimated future caseload: for example, requesting 26 incubators for a unit that has a catchment area of perhaps 5'000 deliveries/year does not seem to make any sense. He therefore requested to be provided with more detailed statistical data from the entire Erongo region. Dr. Helvi Joel, the current Head of Pediatrics at Swakopmund Hospital, and Anna Jonas, the Regional Director of the Erongo Region, will attempt to obtain this information.

Reference	High value equipment	No	Reference	High value equipment	No
3.2.1	Incubator – closed	26	3.2.9	CPAP machines	13
3.2.2	Radiant warmer	12	3.2.10	Neopuff	14
3.2.3	“Giraffe” type Omnibed or similar	2	3.2.11	Infant bassinets	6
3.2.4	Mechanical respirator / ventilator	3	3.2.12	Suction machines	2
3.2.5	LED phototherapy units	10	3.2.13	IVAC infusion pumps	35
3.2.6	Ultrasound with curvilinear probe	1	3.2.14	Syringe drivers	10
3.2.7	Whole body cooling system	1	3.2.15	Apnoea monitors	6
3.2.8	EEG monitor (option)	1	3.2.16	Cardiopulmonary / blood pressure monitor	28
			3.2.17	Mobile pulse oximeters	6
			3.2.18	Bili blankets	5
			3.2.19	Laryngoscopes + pediatric blades (sets)	3
			3.2.20	Transcutaneous bilimeters	2
			3.2.21	Blood gas analyzer	1



Fig. 5. Equipment list for the new Neonatal Unit in Swakopmund (author unknown): there is poor correlation between the expected caseload and the numbers listed per item.

3.1.3 Seminar on basic neonatal care and obstetrical emergencies

Dr. Helvi Joel organized a 2-day-seminar on basic neonatal topics and obstetrical emergencies. This event was hosted at a conference room in a retirement home near the Swakopmund Hospital. It was well attended by health care professionals from the entire Erongo region (40–45 participants). Doctors and nurses from both government and private hospitals were present. A total of eight lectures were presented:

Neonatology (Prof. Thomas M. Berger)

- History of neonatology
- Neonatal adaptation and resuscitation
- Neonatal respiratory support
- Hyperbilirubinemia
- Writing fluid and nutrition orders
- Neonatal early- and late-onset sepsis and antibiotic stewardship
- Peripartal asphyxia and hypoxic-ischemic encephalopathy (HIE)
- Apnea of prematurity

Obstetrical emergencies (Dr. Christoph M. Honegger)

- Pre-eclampsia
- Postpartum hemorrhage
- Postpartum sepsis

3.1.4 Practical neonatal resuscitation training

The last full day in Swakopmund was used for practical neonatal resuscitation training sessions in small groups. These sessions were again attended by doctors and nurses from the entire Erongo region: teams from Swakopmund, Walvis Bay, Omaruru and Usakos actively participated. Participants received certificates to ensure they would receive CPD (continuous professional development) credit points. With use of a baby manikin, a total of 36 health care professional were instructed based on the algorithm for neonatal resuscitation: T-Thermoregulation, A-Airway, B-Breathing, and C-Circulation (Fig. 6).

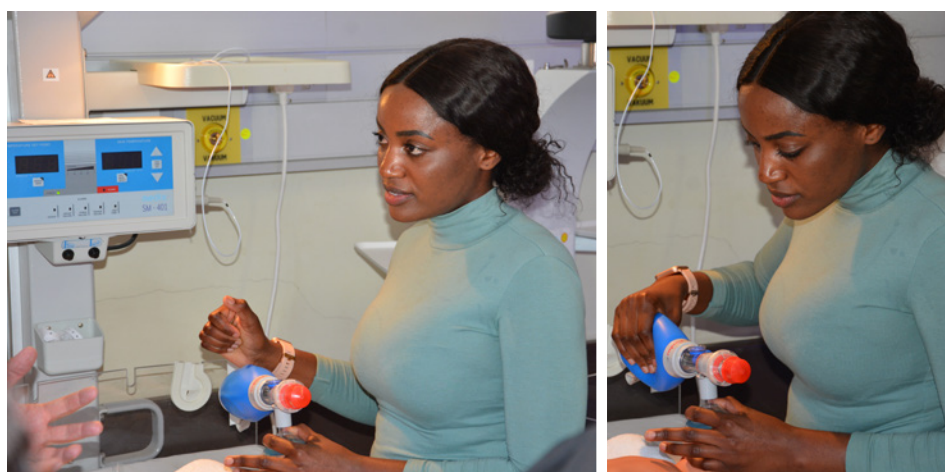


Fig. 6. Small group sessions for practical resuscitation training: each participant was taught how to proper position a baby during resuscitation, and how to perform bag-mask ventilation and chest compressions.

3.1.5 Next steps

NEO FOR NAMIBIA – Helping Babies Survive is interested in supporting the development of centralized neonatal care in Swakopmund. As already mentioned, a more detailed baseline assessment based on solid statistical data will be required to better define future needs (including equipment requirements, see above). This data must provide information on caseload (number of deliveries, number of admissions to neonatal units, number of transfers) and mortality rates. The latter should include outcomes of babies transferred to Windhoek since the exclusion of the sickest patients would lead to underestimation of true mortality rates.

With perinatal regionalization, each hospital receives a designation indicating the level of care they can provide. As a result, they can focus on improving the skills needed for those services. And, when a mother or baby has problems that require more expert care than the level of care they can provide, they must be transferred to their Regional Perinatal Center. Timely antenatal transfer of women with high-risk pregnancies and safe postnatal transfer of sick babies must always be guaranteed.

3.2 Rundu State Hospital

3.2.1 Overall impression

Prof. Thomas M. Berger and Dr. Christoph M. Honegger were welcomed by Geraldine Beukes, MD, and Emilie Nangura, RN. Isha Kamara, MD, was on medical leave. They also met briefly with the Chief Matron, Martina Haufiku, RN. A planned meeting with the hospital's superintendent and the Regional Director did not take place. The team could only spend a total of 5 working days in Rundu, including a weekend, and left on a public holiday (Independence Day, March 21, 2023).

While Christoph M. Honegger, MD, liaised with the OB/GYN team headed by Ruffine Mfutila, MD, to get a first-hand insight into their work, Prof. Thomas M. Berger was forced to focus on the most pressing issues: analysis of malfunctioning equipment and training sessions for the new medical officers (MOs). The Prem Unit was again very busy, and it was often difficult to find space for new admissions. Invasive mechanical ventilation has become quite common, and many babies have benefitted in the past from this more advanced mode of respiratory support (Fig. 7, 8).



Fig. 7. Prem Unit at Rundu State Hospital: often, space is too limited to accommodate all babies.



Fig. 8. Prem Unit at Rundu State Hospital: many babies have benefitted from invasive mechanical ventilation since its introduction in July 2019.

3.2.2 Department of Obstetrics and Gynecology

Christoph M. Honegger, MD, was well received and rapidly integrated into the OB/GYN teams routine. He participated in ward rounds, assisted in the operating room (OR) and even performed an urgent Cesarean section: he had planned to assist, but the local team insisted: „ No, you cut! “. Both mom and baby did well. He was also asked to give a lecture on obstetrical emergencies (preeclampsia, postpartum hemorrhage) during an 8 o'clock morning meeting (Fig. 9).

Fig. 9. Christoph M. Honegger, MD, and the OB/GYN team at Rundu State Hospital (left); Ruffine Mfutila, MD, head of the Department of OB/GYN at Rundu State Hospital performing an ultrasound examination with a old and only partially functioning machine (right).



Overall, he was impressed by the team's performance, but he also realized that the enormous challenges they are facing in their daily work lead to omissions and errors; also, there was not enough time for teaching of interns and nursing students.

3.2.3 Equipment maintenance and repair

Despite previous efforts to get the equipment serviced and repaired, only 4 of the 6 MTTs Dolphin® CPAP machines were fully functional. In one device, the inspiratory gas could no longer be heated and humidified. The second machine was still with John Namwira, a medical technician, awaiting the arrival of a replacement part from MTTs in Vietnam. This experience once again illustrated the importance of adequate servicing of more complex pieces of equipment.

Analysis of one of the EVE® TR neo ventilators unfortunately confirmed that the internal turbine, which generates the required airflow, was no longer working. Prof. Thomas M. Berger had contacted Anandic Medical Systems, the Swiss company from which the EVE® TR neo ventilators had been bought, to ask for help. The CEO of the company, Arash Tehrani, managed to organize an older, but still functional replacement device (AirBorne® TV1 transport ventilator). The ventilator was delivered in time for Dr. Christoph M. Honegger to bring the device to Windhoek when he arrived on his flight from Frankfurt on March 9, 2023. Despite the non-reassuring appearance of the box, the ventilator later proved to be in a working condition (Fig. 10).

Fig. 10. Although the box arrived in a dire condition (left), the replacement ventilator donated by Anandic Medical Systems was in a working condition (right).



Prof. Thomas M. Berger managed to assemble and test the machine. He wrote and laminated instructions (Fig. 11, 12), trained nurses and doctors, and soon the first patient was put on the ventilator. The malfunctioning ventilator will need to be repaired and serviced in Switzerland. Hopefully, the team for mission XIX will be able to bring the device back to Rundu in June 2023.

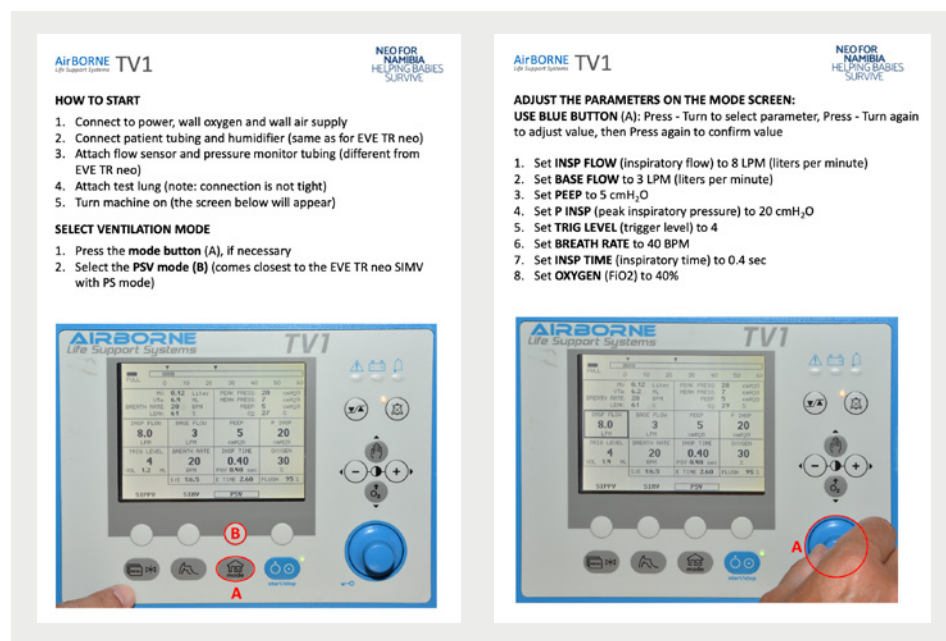


Fig. 11. Instructions for the new ventilator were written, laminated and put next to the device: how to start, selecting ventilation mode, adjusting parameters.

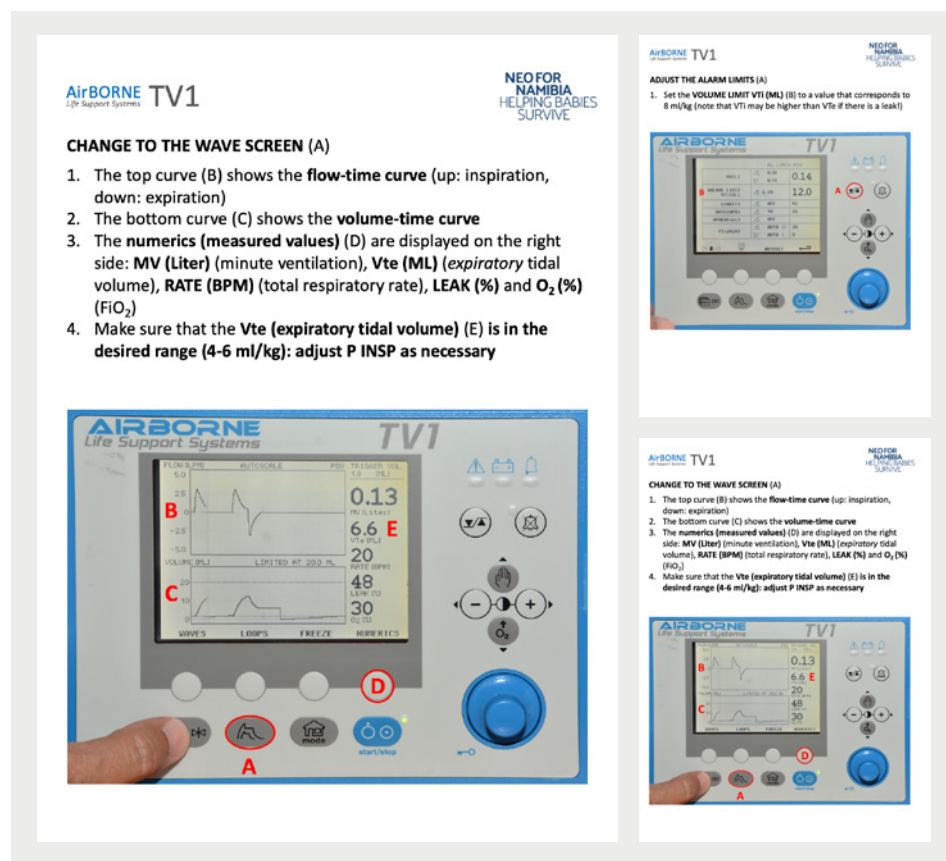


Fig. 12. Instructions for the new ventilator were written, laminated and put next to the device: explanation of wave screen with measured values, alarm limits, additional features.

3.2.4 Statistics

After a concerning trend towards increased mortality rates at the end of last year (11.2% and 16.2% in November 2022 and December 2022, respectively, with an annual average of 8.7%), it was reassuring to see that the rates have again dropped in the first two months of this year. In January, there were 102 admissions and 10 deaths (mortality rate 9.8%); in February, there were 87 admissions and 8 deaths (mortality rate 9.2%). It is important to add that these are only preliminary figures since 4 and 10 babies born in January and February 2023, respectively, had not yet been discharged.

Hopefully, training and supervision of new MOs will continue and intensify, and mortality rates will once again stabilize at lower levels. Leadership development both for doctors and nurses will be crucial to guarantee sustainability.

3.3 Katima Hospital

It was nice to return to Katima Hospital for the 10th time (Fig. 13). Many things have changed since our first visit in November of 2019. Progress made within only three years has been truly remarkable.



Fig. 13. Katima Hospital: all facilities are housed in one-storey buildings (top); patients often spend time in the large courtyard (bottom).

3.3.1 Overall impression

Our visit to Katima Hospital had been well organized by Cristy Victor, MD. The neonatal unit was extraordinarily busy with up to 18 patients at a time (Fig. 14). While the use of CPAP had become routine, and the recommended strategies regarding initiation and weaning CPAP had been implemented, details still needed to be corrected (positioning, always keeping nasal prongs in place, reliable attention to monitor alarms, adjustment of FiO₂ to maintain SpO₂ values in the target range, to name a few).

Fig. 14. Compared to 2019, the neonatal unit at Katima Hospital has become increasingly busy: CPAP is used routinely and a “start CPAP early - wean CPAP gradually” strategy has been successfully implemented.



The medical officers now rotated on a weekly basis: while one of them took care of the neonatal unit and the maternity unit, another was responsible for the pediatric ward and the outpatient department (OPD). They took call every three days.

Christoph M. Honegger, MD, worked closely with Manolo Berbe, MD, the only obstetrician and gynecologist in the hospital. Together they did Cesarean sections, hysterectomies and some difficult deliveries.

Prof. Thomas M. Berger concentrated on ward rounds and the introduction of a new CPAP device (see below). In addition, he analyzed statistical data and ongoing experience with the POCT device to measure C-reactive protein concentrations. He also was able to provide feedback to the hospital leadership.

3.3.2 Neonatal care at Katima Hospital: moving forward

Given the significant progress made in 2022, Katima was ready for the introduction of new MTTs Dolphin® CPAP devices. Particularly patients requiring longer periods of CPAP support would benefit from the use of heated and humidified air. A more comfortable patient interface and simple adjustment of the FiO₂ were additional advantages of the device compared to the Pumani® bubbleCPAP machine. Prof. Thomas M. Berger instructed both doctors and nurses. Both machines were almost immediately put to use (Fig. 15–17).

Fig. 15. Explaining the new CPAP device: the MTTs Dolphin® CPAP machine heats and humidifies the inspired air (this requires a heater wire and temperature probes for the patient tubing) and has a more user-friendly patient interface.



Fig. 16. As an additional feature, the MTTs Dolphin® has an integrated Masimo pulse oximeter.



Fig. 17. An MTTs Dolphin® CPAP machine in action: flow of 6 l/Min, FiO₂ 21%, pressure of 6 cmH₂O (note: the patient is still monitored with a stand-alone Masimo® Rad-8 pulse oximeter).



He also assisted in the administration of surfactant in three preterm babies using the INSURE technique (INtubate – SURfactant – Extubate), another first in Katima. Two patients responded very well and are likely to survive. The third one (birth weight 1040g) had received surfactant late (at 36 hours of age), when he was no longer achieving normal oxygen saturations while on CPAP with a pressure of 6 cmH₂O and an FiO₂ of 100%. The baby initially responded quite well (FiO₂ down to 40%) but died 4 days later (likely due to obstructed nasal passages and late-onset sepsis).

3.3.3 Delivery room

Two MTTs Wallaby® warming tables and two mobile Masimo® Rad-G monitors were now used in the delivery rooms at Katima Hospital. Neonatal stabilization, appropriate triage, and timely transfer to the neonatal unit of remained suboptimal. Additional training will be required (Fig. 18).

Fig. 18. A preterm baby in one of the delivery rooms at Katima Hospital is nursed on an MTTs Wallaby® warming table, receiving oxygen by face mask from an oxygen concentrator.



3.3.4 Pediatric cardiology

Since no pediatric subspecialty consultations are available in Katima, patients with more complex medical problems generally must be referred to Windhoek by ambulance (1'200 km from Katima).

Interestingly, a private radiologist had set up a system where a technician performed echocardiographies which were then analyzed by him from a distance. While such a telemedicine project could have its merits, the quality of the investigations was obviously flawed. One patient with multiple dysmorphic features (low-set and posteriorly rotated ears, large occiput, micro-retrognathia, rocker bottom feet, systolic murmur) suggestive of a genetic disorder (possible trisomy 18) was diagnosed with tetralogy of Fallot (TOF) on a first echo and with an isolated ventricular septal defect (VSD) on a follow-up study. Reportedly, the consultant charges NAD 10'000.00 for such an exam. Obviously, a reliable telemedicine system would be extremely helpful; the current solution, however, is of little to no help.

3.3.5 POCT CRP testing

From October 2, 2022, to March 24, 2023, a total of 179 point of care testing (POCT) C-reactive protein (CRP) measurements had been done at Katima Hospital. Of these, 37 (21%) were baseline measurements in patients with suspected early-onset sepsis (EOS) when CRP measurements could not be done by the hospital's NIP lab. Therefore, 142 measurements could be analyzed for adherence to antibiotic stewardship guidelines (Fig. 19).

A) Rule out neonatal sepsis (2nd CRP measurement, patient on antibiotics): in 58/67 (87%) of cases antibiotics could be discontinued; B) Rule out neonatal sepsis (1st CRP measurement, patient not on antibiotics): antibiotics were withheld in 26/47 (55%) of cases; C) Other indications (e.g., follow-up CRP measurements): antibiotics were stopped in 11/28 (39%) of cases. Overall, the test was used appropriately in 120/142 (85%) of cases. This resulted in significant reductions antibiotic exposure.

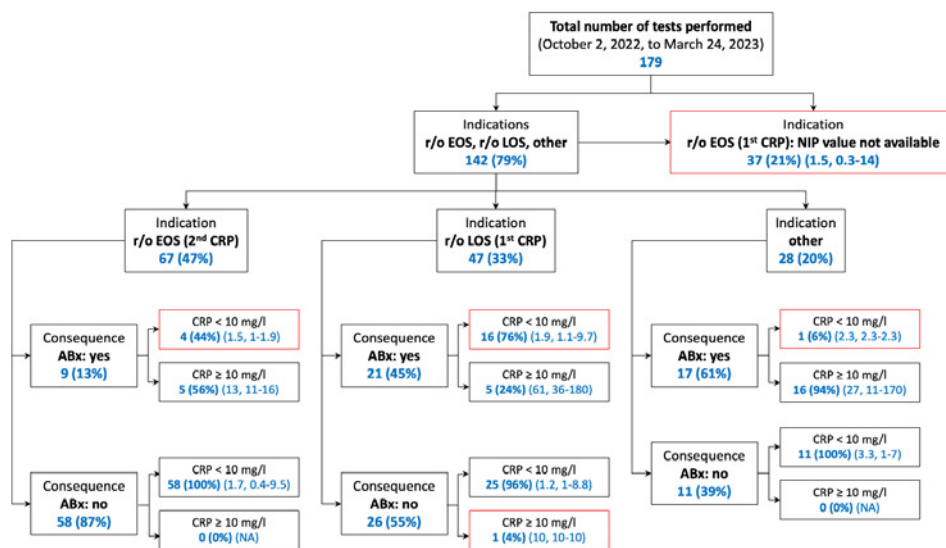


Fig. 19. Analysis of the use of point of care testing (POCT) of C-reactive protein (CRP) concentrations at Katima Hospital: in 85% of cases, appropriate decisions were made resulting in significant reductions of unnecessary use of antibiotics.

3.3.6 Statistics

In January 2023, there were 35 admissions and 5 deaths (mortality rate 14.3%); in February 2023, there were 46 admissions and 2 deaths (mortality rate 4.3%). It is important to add that these are only preliminary figures since 5 babies born in February 2023 had not yet been discharged.

It was again noted that only very few babies with a birth weight < 1000g had been admitted; this observation contrasted with data from 2022. At a meeting with hospital leadership, it was discovered that mother with threatened preterm delivery at less than 28 weeks of gestation were generally admitted to the female ward, and if babies were born without signs of life, they were considered abortions (i.e., they not appear in the stillbirth statistics). If babies would breathe or if a heart rate was detected, they would be transferred to the maternity ward and possibly to the neonatal unit. It was not possible to determine the exact number of such deliveries, let alone the birth weight of such infants. Nor could it be explained why the number of admissions of extremely low birth weight (ELBW) infants differed greatly between 2021 and 2022 (20 and 4, respectively).

3.3.7 Final comments

Clearly, the neonatal unit at Katima Hospital has continued to make progress. Within only three years, prognosis for babies admitted to this unit has dropped dramatically. Further improvements are feasible, and, therefore, NEIO FOR NAMIBIA – Helping Babies Survive will continue its work in this remote area of Namibia. There is justified hope that more and more mothers will be able to take home a healthy baby even after a perhaps rough start (Fig. 20).



Fig. 20. Babies with their mothers at Katima Hospital: ready for discharge.

4. FUTURE DIRECTIONS

4.1 Next mission

The 19th mission of NEO FOR NAMIBIA – Helping Babies Survive is scheduled for June 2023. It is planned that Salome Waldvogel, MD, and Katharina Mäder, RN will visit both Rundu and Katima. Specific goals and other details have yet to be defined.

4.2 Next projects

It is planned to support the development of a neonatal referral center in Swakopmund over the next few years. Our next steps will depend on feedback from the MHSS and the Regional Director for the Erongo region, as well as the hospital leadership.

There are some rather urgent issues that need to be addressed and resolved at Rundu State Hospital: equipment maintenance, servicing of the EVE TR neo ventilators (hopefully one of them will be returned by the next mission team), as well as establishing a strong and uniformly acting leadership team.

Support at Katima Hospital should be intensified. The current interest and enthusiasm of the local team is encouraging, and rapid further progress seems feasible. Targeted INSURE, introduction of video laryngoscopy to help improve intubation skills, reinforcing antibiotic stewardship, ensuring adequate servicing of increasingly sophisticated equipment will be the next priorities.

5. AFRICA

When we travel through Namibia, we are always impressed by the beauty of the country's landscapes, the vast skies and the wild animals (Fig. 21 - 24). These images let us relax and recover from the sometimes exhausting work during our missions.

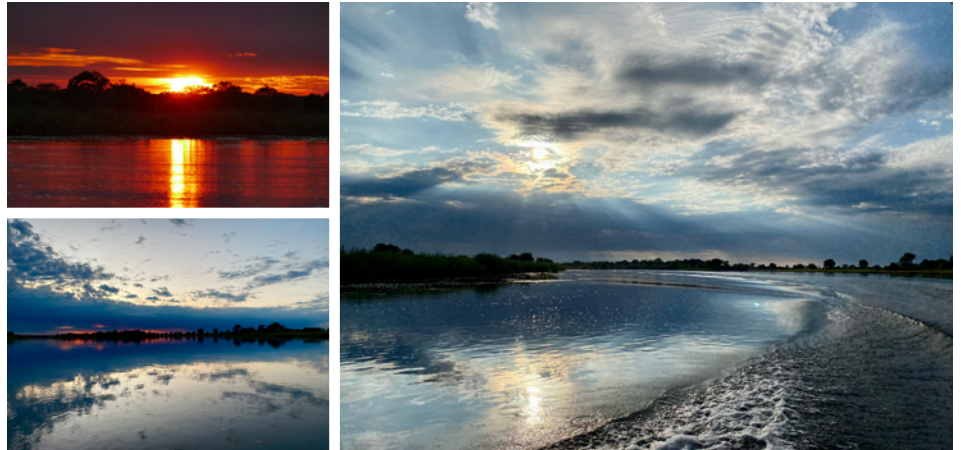


Fig. 21. On the Kavango River near Divundu early in the morning.



Fig. 22. Encounter with a large group of hippos on an early morning boat trip on the Kavango river.



Fig. 23. Termite hills



Fig. 24. African skies: always amazing!

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