

**NEO FOR
NAMIBIA**
HELPING BABIES
SURVIVE



AUTHORS

Prof. Thomas M. Berger, MD

Windhoek, 4.04.2024

MISSION REPORT

Mission 2024 - 1

March 15 to April 5, 2024

NEO FOR NAMIBIA
HELPING BABIES SURVIVE

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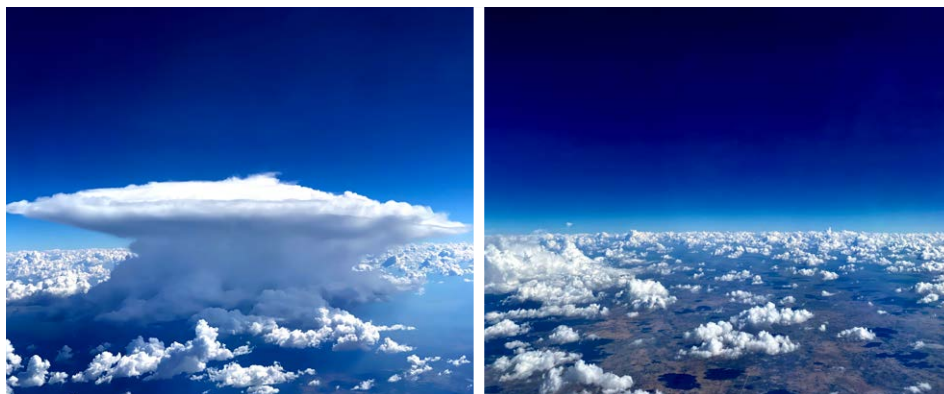
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1. INTRODUCTION

The 21st mission of NEO FOR NAMIBIA – Helping Babies Survive lasted from March 15 to April 5, 2024. It was carried out by Prof. Thomas M. Berger and his Namibian friend and driver, Isaak Boois.

After a quiet overnight flight from Zurich to Johannesburg (flight time 9:50 hours), and a 5-hour-stopover at O.R. Tambo International Airport, he travelled on to Windhoek (flight time 1:45 hours) (Fig. 1). All four suitcases with equipment and consumables had arrived at Hosea Kutako International Airport, and, with the help of Prince Elago from XtremeFreight, was cleared through customs without incidents. Prof. Thomas M. Berger was picked up by Isaak Boois and brought to the Windhoek Luxury Suites in Klein Windhoek.

Fig. 1. Above the clouds: Airlink flight from Johannesburg to Windhoek.



The next day, the team drove to Swakopmund (360 km east of Windhoek on the Atlantic Coast) to meet with doctors and nurses from both Swakopmund and Walvis Bay hospitals. They were warmly welcomed at both hospitals.

Four days later, they proceeded Rundu with a one-night stopover at the Out of Africa Hotel in Otjiwarongo, covering a total of 933 km in two days (Swakopmund – Otjiwarongo (via Okahandja): 466 km, Otjiwarongo – Rundu 467 km). The detour via Okahandja had become necessary because of administrative issues: Vincent Eiseb, another driver, had to pick up passports so that there would be enough time for the Ministry of Home Affairs to validate the work permits for Prof. Thomas M. Berger and Sabine Berger.

After working for 5 days at the hospital, they drove east to Katima (515 km), interrupted by an overnight stay at the Riverdance Lodge near Divundu. During their short visit of Katima Hospital (2 days), they were able to meet with Dr. Cristy Victor, Dr. Sharon Mungofa, Dr. Yurisleydi Valdes and her husband, Dr. Manolo Berbe.

Prof. Thomas M. Berger had planned to fly back to Windhoek, while Isaak Boois would travel by car. Unfortunately, Prof. Thomas M. Berger's passport was still with the Ministry of Home Affairs for final VISA and work permit approval. When it could not be clarified if the authorities at Katima's Mpacha Airport would allow boarding with a Swiss ID but no passport, the team decided to return to Windhoek by car via Divundu and Otjiwarongo (1'225 km). Overall, the team of the 21st mission of NEO FOR NAMIBIA – Helping Babies Survive drove more than 3'500 km.

On April 2, 2024, Prof. Thomas M. Berger was able to pick up his and his wife's passports in Mr. Gerson Doeseb's HR office at the Ministry of Health and Social Services. Two days later, he flew back to Switzerland via Cape Town and arrived safely in Zurich on April 5, 2024.

2. MAIN MISSION GOALS

The goals of the 21st mission were:

- To introduce a POCT bilirubin measuring device (Pfaff® Medical, Germany) in three additional neonatology units (Swakopmund, Walvis Bay, Oshakati); the device has been in reliable use for many years in the hospitals in Rundu, Katima, and Katutura
- To introduce video laryngoscopy in Swakopmund/Walvis Bay and Katima
- To offer ventilator training with the ResVent® iHope ventilator in Rundu (currently available in Rundu and Oshakati)
- To bring a variety of consumables to all the hospitals visited (umbilical venous catheters, pulse oximetry sensors, test kits for POCT CRP determinations, dressing material)
- To review the use of the point of care testing (POCT) for C-reactive protein (CRP) and the use of antibiotics at Rundu Intermediate Hospital and Katima State Hospital to determine the need for ongoing surveillance
- To finalize statistical data for 2023 in all hospitals visited
- To discuss strategies for a large-scale introduction of the Vayu® bCPAP device

3. HOSPITALS VISITED

3.1 Swakopmund State Hospital and Walvis Bay Hospital

In Swakopmund, the team was welcomed by Dr. Beatrice Maringo (Specialist Pediatrician from Tanzania) and Dr. Memory Shipanga (Medical Officer). They also met Dr. David Tjiyokola, the Chief Medical Officer. He described current challenges and the frustration with the enormous delay in getting their new intensive and intermediate care units completed because of legal difficulties with various contractors (Fig. 2, 3).



Fig. 2. New neonatal unit in Swakopmund: construction work is on hold until a new contractor can be found.

Fig. 3. New neonatal unit in Swakopmund: the roof is still not covered, and unprotected structures show signs of damage.



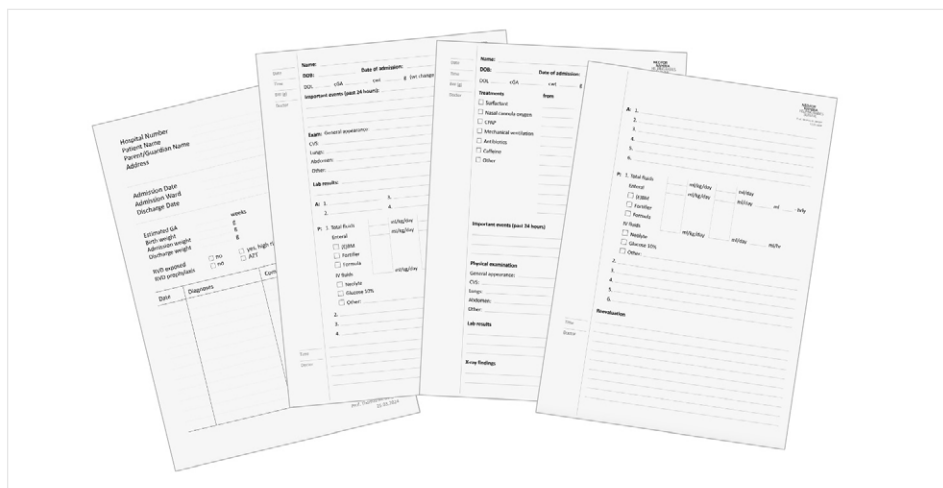
In Walvis Bay, accompanied by Dr. Beatrice Maringo, a meeting was arranged with Dr. Augustu Gawab, the Chief Medical Officer (CMO), as well as Dr. Dina Iishi (Medical Officer) and Rejoice Chawes (Medical Officer). To the mission team's surprise, there was a warm welcome by doctors and nurses in the hospital conference room. Prof. Thomas M. Berger was asked to describe how NEO FOR NAMIBIA – Helping Babies Survive could potentially support further development of neonatal care in Walvis Bay and other parts of the Erongo region.

3.1.1 Overall impression

Teams at both hospitals continue to be very interested in a collaboration with NEO FOR NAMIBIA – Helping Babies Survive. The circumstances under which they must provide care remains precarious. For example, Swakopmund Hospital has run out of paper, so templates for the medical records can no longer be printed; therefore, progress notes must be written on the back of other forms that are still available.

To solve this problem rapidly – if only temporarily – Prof. Thomas M. Berger and Isaak Boois were able to get large quantities of various templates developed by NEO FOR NAMIBIA – Helping Babies Survive printed at a nearby shop (Fig. 4). By the way: the same problems were later encountered in Rundu and Katima (in both hospitals, paper was available, but the quality of copies had deteriorated over time). Again, the shortage of the required forms could be corrected at local print shops.

Fig. 4. Because hospitals had run out of paper, various templates developed by NEO FOR NAMIBIA – Helping Babies Survive had to be printed in large quantities in nearby print shops.



3.1.2 Introduction of video laryngoscopy

With the help of an intubation manikin, Prof. Thomas M. Berger was able to demonstrate the use of the Leyte® Medical video laryngoscope (Fig. 5). The device is delivered with a large variety of blades and therefore can be used in neonates, children, and adults.



Fig. 5. The new video laryngoscope was demonstrated in Swakopmund (left), and later in Katima and Rundu (right).

Currently, babies are intubated to administer surfactant or prior to transfer to Windhoek. For the INTubation-SURfactant-Extubation (INSURE) procedure, oro-tracheal intubation is performed; for transports, the naso-tracheal route is preferred. Both physicians and nurses were able to practice. Dr. Beatrice Maringo (Specialist in Pediatrics) and Dr. David Tjiyokola (Chief Medical Officer and anesthesiologist) will take responsibility for the device and provide feedback.

3.1.3 Introduction of POCT bilirubin measurements

The use of the Bilifuge® (a centrifuge to prepare the samples for measurement) and the Bilimeter® (the device that measures the total bilirubin concentration) was instructed at both hospitals (Fig. 6). In addition, a lecture on neonatal hyperbilirubinemia was given in Swakopmund, and laminated reminders were handed over to staff in both hospitals be put up in their neonatal units. The new devices were received with great enthusiasm!

Unfortunately, the device given to Walvis Bay Hospital intermittently malfunctioned (screen message: lamp dark). Prof. Thomas M. Berger managed to contact Tim Pfaff in Germany who gave helpful advice how the problem could be solved. Its proper use was again explained on a video call. Dr. Dina Iishi later confirmed that the machine was now working.



Fig. 6. Prof. Thomas M. Berger explains the use of the Bilifuge® and Bilimeter®, a point of care testing (POCT) device to measure total serum bilirubin concentrations in babies with neonatal jaundice.

3.1.4 Review of the 2023 ward statistics

Statistical data was abstracted from various sources in Swakopmund (there was no time to do the same in Walvis Bay). Unfortunately, despite combined efforts, data capture remained incomplete. Nevertheless, the following observations could be made for the 8-month-period from June 1, 2023, to February 29, 2024:

- The number of admissions was 213
- The number of recorded deaths in the neonatal unit was 15
- A total of 18 patients were transferred to other hospitals: 13 to Windhoek for more advanced care, and 5 back to their referring hospitals to feed and grow (4 to Walvis Bay, 1 to Usakos) with no information on their ultimate outcome
- Reasons for transfer to Windhoek varied widely and the ultimate outcome of the babies remained unknown
- While no certain predictions can be made, up to 7 additional patients might have died (severe HMD: 2, pulmonary hemorrhage: 1, omphalocele: 1, trisomy 13 with congenital heart disease: 1, transposition of the great arteries: 1, trisomy 21 and meconium aspiration syndrome: 1)
- Therefore, the mortality rate may be as low as 10.6% and as high as 23.2%; it is likely to be around 15–16%

3.1.5 Discussion of the Vayu® bCPAP project

Representatives of both units expressed a great interest in continuing to use the Vayu® bCPAP device (Fig. 7). Swakopmund prefers it over their Pumani® bubbleCPAP machines for the following reasons: light weight, easy to assemble and use, superior patient interface, better humidification resulting in fewer episodes of nasal blockage.

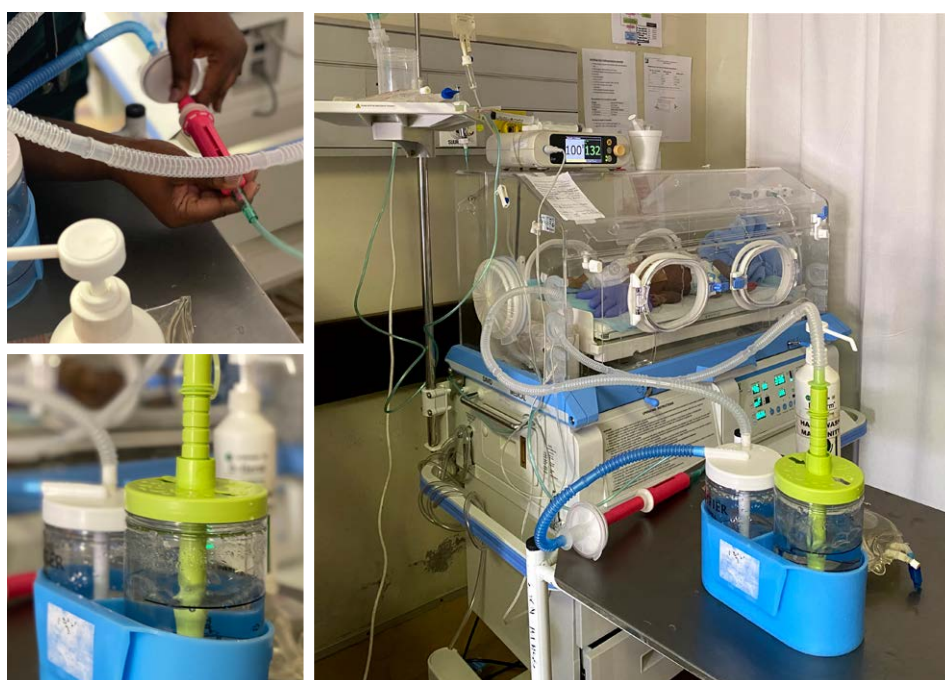


Fig. 7. The Vayu® bCPAP device has been successfully used both at Swakopmund and Walvis Bay Hospitals.

For Walvis Bay, it is the first time that they have ever used a CPAP system, and they are impressed with how well it has worked for their babies.

It was therefore concluded that additional Vayu® bCPAP will be directed towards the two hospitals, hopefully in the very near future. During the coming months, patient registry forms should continue to be filled to document how the device performs.

3.1.6 Future collaboration

As pointed out above, care of sick neonates should be concentrated in Swakopmund where a new perinatal center will open once a suitable contractor will finish the new building. At this time, no firm dates could be given. NEO FOR NAMIBIA – Helping Babies Survive is willing to assist in planning and training of health care professionals.

3.2 Rundu Intermediate Hospital

3.2.1 Overall impression

Prof. Thomas M. Berger arrived in the Prem Unit on Saturday, March 23, 2024. He was warmly welcomed by Dr. Isha Kamara and Cecilia Ndepavali, RN. They both had recently come back to work in the unit: Dr. Isha Kamara after maternity leave, and Cecilia Ndepavali after a year of additional training at Windhoek Central Hospital.

They expressed their gratitude towards NEO FOR NAMIBIA – Helping Babies Survive for the ongoing support of the Prem Unit at Rundu Intermediate Hospital. Dr. Isha Kamara oversees neonatology while a new Specialist in Pediatrics from Ethiopia is in charge of the other wards of the Department of Pediatrics (OPD, Casualty, General Pediatric Ward, IV Unit, and High Care Unit). As Senior Medical Officer (SMO), Dr. Geraldine Beukes has the administrative lead of the Department (she was on leave during Prof. Thomas M. Berger's visit).

Finally, during a brief meeting, the CMO, Dr. Medson Chibwe and the Chief Matron, Martina Hausiku thanked NEO FOR NAMIBIA – Helping Babies Survive for the procurement of oxygen sensors for the ResVent® iHope ventilators (see below).

3.2.2 Discussion of the Vayu® bCPAP project

Experience with the new CPAP device has still been limited because nurses put most patients on one of the seven MTTs Dolphin® bubbleCPAP machines, their preferred choice. Nevertheless, Dr. Isha Kamara and Cecilia Ndepavali, RN, agreed that more experience with the Vayu® bCPAP is needed to evaluate its use for stabilization of patients in the delivery room and at referring hospitals (Nkurenkuru, Nyangana, Andara), and for ambulance transports to Windhoek. They will try to motivate their staff to use the device more frequently.

They also mentioned that the Pumani® CPAP machines are no longer used in Rundu. They were reluctant to consider their use in older children in the High Care Unit, as suggested by Prof. Thomas M. Berger. It was therefore decided to remove them from the Prem Unit and bring them to Katima where only three MTTs Dolphin® bubbleCPAP machines are available (see below).

Prof. Thomas M. Berger took the opportunity to explain the potential benefits of the Vayu® bCPAP and retrain nurses and doctors in its use. It became clear that not everybody was comfortable with the use of the new blender that is based on the Venturi principle (Fig. 8, 9)

Fig. 8. Rundu State Hospital: setting up the Vayu® bCPAP device for a baby that was just admitted (left); studying the oxygen blender that is used for the CPAP device and free-flow oxygen (right).



Fig. 9. Rundu State Hospital: very low birth weight (VLBW) infant supported with the Vayu® bCPAP.



3.2.3 Invasive mechanical ventilation

Until very recently, the ResVent® iHope ventilators (4 in the Prem Unit, 4 in High Care) could not be used because they had been delivered with oxygen sensors that had gone beyond their expiry date. NEO FOR NAMIBIA – Helping Babies Survive had procured these sensors and the machines are now fully functional. However, because no formal training had been provided, nurses and doctors still preferred to use the two EVE® neo ventilators donated by NEO FOR NAMIBIA – Helping Babies Survive in 2019 and 2021, respectively. These machines had been serviced in Switzerland in 2023.

Prof. Thomas M. Berger took the opportunity to demonstrate the main features of the new ventilators. On upcoming missions, additional training sessions should be provided to ensure that the machines are used in the best possible way.

3.2.4 Infection control and antibiotic stewardship

Dr. Isha Kamara reported on a current outbreak of late-onset sepsis among former very low birth weight (VLBW) infants. In the likely index case, *Enterococcus faecalis* had been grown in the blood culture. The baby's condition has since improved, but unfortunately recovery was not without complications (Fig. 10). Prof. Thomas M. Berger performed a cranial ultrasound examination that showed that the patient must have had a periventricular/intraventricular hemorrhage (PIVH) and now was developing posthemorrhagic

hydrocephalus (PHH) (Fig. 11). Based on these findings, the baby was later transferred. The Vayu® bCPAP device was used for the ambulance transport to Windhoek Central Hospital (710 km); reportedly, the baby arrived safely.



Fig. 10. This preterm baby survived late-onset sepsis but showed obvious signs of a rapidly progressing hydrocephalus.

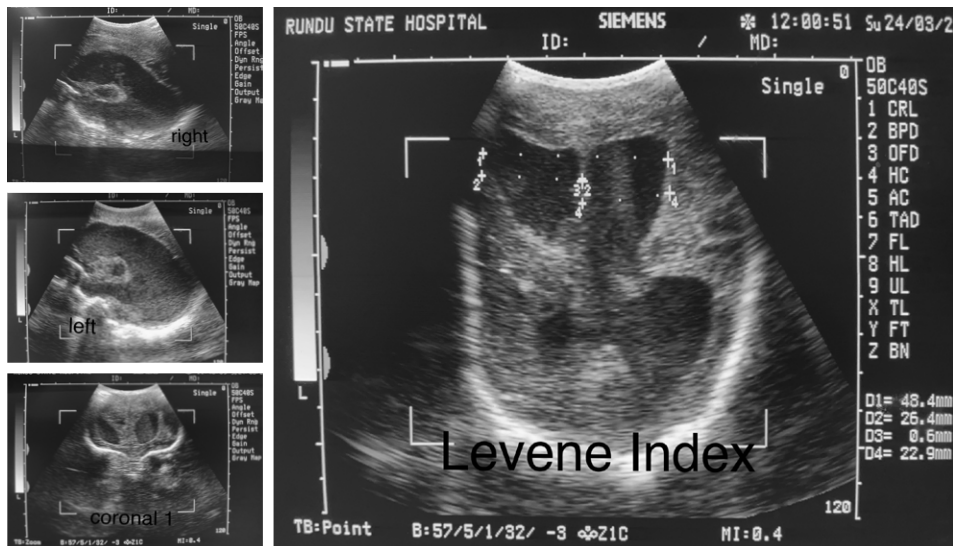


Fig. 11. Cerebral ultrasound examination of the baby shown in Fig. 10 (performed with a very old, only partially functioning ultrasound machine): evidence of so-called posthemorrhagic hydrocephalus.

Dr. Isha Kamara asked Prof. Thomas M. Berger to examine another baby that had been mechanically ventilated following recurrent apnea spells. Fortunately, the head ultrasound examination following extubation did not reveal any abnormalities (Fig. 12). It appears reasonable to consider the introduction of a simple and robust ultrasound device to the busy Prem Unit in Rundu, provided that adequate training can be guaranteed.



Fig. 12. Cerebral ultrasound examination in a preterm baby following a period of invasive mechanical ventilation for recurrent apnea spells; Dr. Isha Kamara and Cecilia Ndepavali watch closely.

It was noted that hand hygiene was compromised because soap dispensers had not been refilled and dead batteries had not been replaced; in addition, hand blowers were no longer functioning. Prof. Thomas M. Berger encouraged Cecilia Ndepavali to rapidly address these issues.

Doctors and nurses confirmed that POCT CRP measurements have made a great difference in how antibiotic therapies are prescribed. Exposure to antibiotics is said to have decreased significantly because they are usually stopped when two consecutive measures are negative (below 10 mg/l). A quick review of the medical records of currently hospitalized patients only partially confirmed that statement: there are still patients with prolonged courses of antibiotics despite negative biomarker values. In addition, the interval between first and second measurements is often more than 36–48 hours.

It was agreed that medical officers must be reminded of the principles of biomarker-guided antibiotic therapy, rules must be reenforced, and data will again be collected and analyzed from July 1 to December 31, 2024.

3.2.5 Statistics 2023

Prof. Thomas M. Berger was able to compile complete statistical data for 2023, both for the Prem Unit and the DR (delivery room). A total of 6037 infants were born alive at Rundu Intermediate Hospital. 10 babies died in the DR, and 1011 (16.7%) were admitted to the Prem Unit. In addition, there were 39 fresh still births and 48 macerated stillbirths. Of note, the Cesarean section rate was 20.5%.

There were a total of 1098 admissions to the Prem Unit (1011 inborn infants, 87 out-born infants), and the overall mortality rate was 8.3%. Outcome for inborn babies was much better with a mortality rate of 7.0% (71/1011) than for outborn babies with a mortality rate of 23.0% (20/87).

For the team from NEO FOR NAMIBIA – Helping Babies Survive it is extremely rewarding to see what has happened since Prof. Thomas M. Berger and his wife Sabine Berger, RN, first visited Rundu State Hospital in 2015. From 2012–2015, the average mortality rate for babies admitted to the Prem Unit after having been born in the hospital (i.e., inborn babies) was 14.7% (of note: newborn infants who died in the Pediatric Ward were not captured in those statistics). Therefore, NEO FOR NAMIBIA – Helping Babies Survive has witnessed a reduction of mortality rate by more than 50%. Changes seen on 21 missions over 9 years have been remarkable and resulted in 78 (7.7% of 1011) additional survivors among inborn infants admitted to the Prem Unit in 2023 alone.

3.2.6 A special encounter

One day, while buying food for the mothers in the Prem Unit, Prof. Thomas M. Berger was approached by a woman: “Hello, doctor, you treated my child.” She went on to explain that her son David had been born on April 4, 2022, with a birthweight of 1600 g. His hospital course was complicated by periventricular/intraventricular hemorrhage (PIVH II-III) and later posthemorrhagic hydrocephalus (PHH) (Fig. 13).

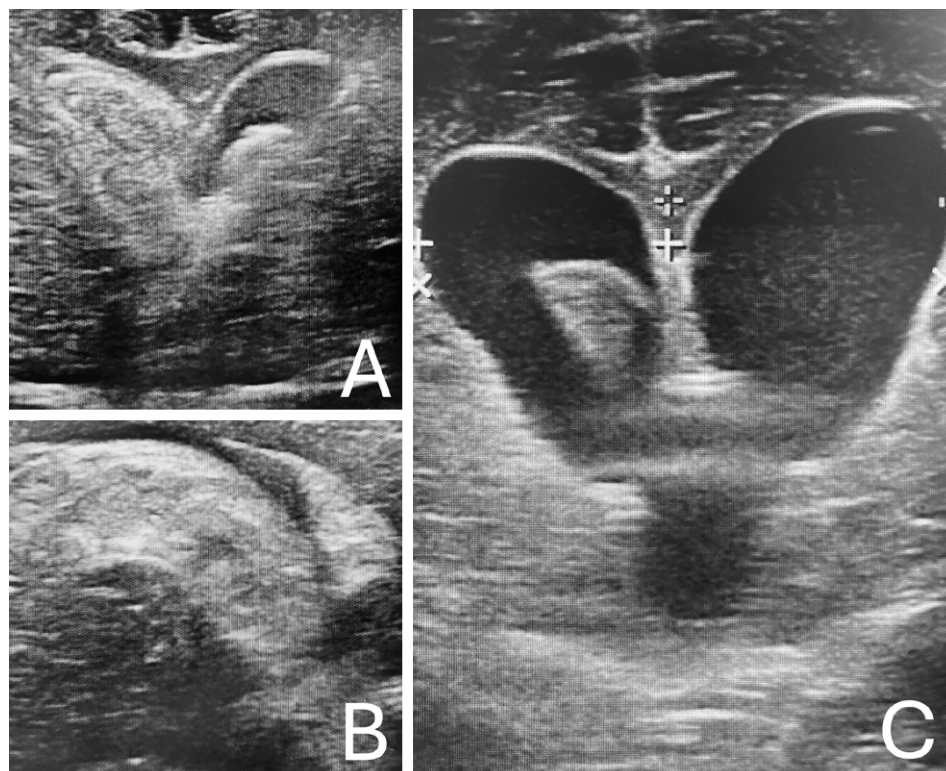


Fig. 13. Cerebral ultrasound images from a 1600 g baby born in 2022.

At the time, referral to Windhoek Central Hospital was recommended, however, the doctors refused to accept the patient because of a predicted “very poor prognosis” (note in health passport). Happily, the mother reported that the hydrocephalus had resolved without intervention, and her son was doing very well (confirmed by entries into the health passport)!

3.2.7 Future collaboration

NEO FOR NAMIBIA – Helping Babies Survive will continue to support the Prem Unit at Rundu Intermediate Hospital, mostly by providing consumables and supporting maintenance and repair of equipment donated by the NGO. Prof. Thomas M. Berger will evaluate the possibility of donating a portable ultrasound device to allow for bedside head ultrasound examinations (up to now, neonates with suspected CNS lesions can only be investigated with head CTs).

There is also an urgent need for infusion pumps: currently, only 5 of 10 infusion pumps (Comen®, a Chinese brand) are working because a software update cannot be provided by the Namibian distributor. This is a critical problem: adequate infusion therapy is vital in small infants, and systems without precise control of flow (ml/hour) are potentially dangerous. Whether suitable alternatives can be found by NEO FOR NAMIBIA – Helping Babies Survive remains to be seen.

3.3 Katima State Hospital

3.3.1 Overall impression

This time, on the 12th visit of Katima State Hospital, only very limited time was available. In addition, Easter holidays coincided with that visit. Nevertheless, the team was welcomed by Dr. Cristy Victor, Dr. Yurisleydi Valdes and Dr. Sharon Mungofa.

The Neonatology Unit looks well organized, and doctors and nurses in charge continue to work well. The improved quality of care was obvious (Fig. 14–16). Prof. Thomas M. Berger congratulated the team and expressed the interest of NEO FOR NAMIBIA – Helping Babies Survive to continue its collaboration with Katima State Hospital.

Fig. 14. In Katima, the MTTs Dolphin® CPAP device (left) has become the preferred machine to support small preterm babies; CPAP bottles (right bottom), patient tubing (right top) are cleaned and kept in old incubators for later reuse.



Fig. 15. Good nursing care is important; motivated nurses look well after the babies in the Neonatal Unit at Katima State Hospital.



Fig. 16. Mothers of hospitalized babies wait outside the Neonatal Unit at Katima State Hospital; they take care of their babies around the clock (2- to 3-hourly feedings, changing diapers, Kangaroo Mother Care).



3.3.2 Introduction of video laryngoscopy

As he had done previously in Swakopmund, Prof. Thomas M. Berger was able to demonstrate the use of the Leyte® Medical video laryngoscope. The new device was well received, and the doctors promised to provide feedback on how useful it is for them.

In Katima, babies are only intubated to administer surfactant or for safe transport to Windhoek if they are in an unstable condition. At some point in the not-too-distant future, the introduction of invasive mechanical ventilation will have to be discussed.

3.3.3 Discussion of the Vayu® bCPAP project

Doctors and nurses reported that most babies that require CPAP support are put on the MTTs Dolphin® bCPAP. Given its simplicity, the Vayu® bCPAP device is now preferred over the Pumani® bubble CPAP device.

Prof. Thomas M. Berger encouraged them to continue to complete the Vayu® bCPAP patient registry forms to allow for detailed assessment of how the device is used. This feedback will allow to more clearly define the role this device will play in the future.

3.3.4 Infection control and antibiotic stewardship

Doctors and nurses confirmed that the possibility of measuring C-reactive protein concentrations at the point of care (POCT) in the unit has greatly facilitated decision-making for patients with suspected early-onset sepsis. While there was no time to review the CRP registry data, it became clear that the rules for biomarker-guided antibiotic therapy should be applied in a more stringent form. For example, the 48-hour-interval between 1st and 2nd measurement should strictly be followed; prolonging the interval to 72 and sometimes 96 hours is not justified and leads to unnecessary exposure to broad-spectrum antibiotics. Data will continue to be collected for now. It will be analyzed on the next mission.

Of note, the soap dispensers still work, and paper towels are still available. Prof. Thomas M. Berger encouraged the local leaders to order supplies as needed from Taurus in Windhoek to guarantee proper hand hygiene. NEO FOR NAMIBIA – Helping Babies Survive will gladly cover the costs.

3.3.5 Statistics 2023

Prof. Thomas M. Berger was able to gather complete statistical data for 2023, both for the Neonatal Unit and the DR (delivery room). A total of 3543 infants were born alive at KatimaState Hospital; in addition, there were 27 fresh still births and 51 macerated still-births (for a total of 3621 babies born). Of note, the Cesarean section rate was very low with 6.5% (232/3572), and only 23 babies were born by vacuum-assisted vaginal delivery.

There was a total of 514 admissions to the Neonatal Unit (14.5% of all liveborn infants), and the overall mortality rate was 8.9%. This extraordinarily low rate must be further explored by analyzing different birth weight categories. Babies weighing < 1000g, 1000–1500g, 1501–2500g and > 2500g contributed 1.9%, 9.1%, 34.6% and 54.3% to all admissions, respectively. The same birth weight categories were responsible for 19.6%, 26.1%, 26.1% and 28.3% of all deaths, respectively.

Notably, many extremely low birth weight (ELBW) infants are not admitted to the Neonatal Unit because they are considered “abortions” even if they show signs of life after birth. Nevertheless, 10 babies with a birth weight of less than 1000 g were admitted to the Neonatal Unit in 2023; only one of them survived. It remained unclear, why these babies were admitted while others were left to die in the female or maternity ward.

Table 1. Comparison of birthweight-specific mortality rates (babies with birthweight < 1000 g excluded) at Rundu Intermediate Hospital and Katima State Hospital for the year 2023: except for very low birthweight (VLBW) infants, mortality rates are similar.

It is interesting to compare mortality rates at Katima State Hospital with those at Rundu Intermediate Hospital. However, due to the different approaches to ELBW infants, the comparison must be restricted to infants weighing more than 1000 g (Table 1). Mortality rates in infants with birthweights > 1500 g are comparable, whereas the mortality rates for infants with a birthweight between 1000 – 1500 g is more than twice as high at Katima Hospital (25.5 % versus 10.7%); in part, this may be due to the fact that invasive mechanical ventilation is not available at Katima State Hospital.

| Birthweight category | Rundu Intermediate Hospital | | | Katima Hospital | | |
|----------------------|-----------------------------|--------|----------------|-----------------|--------|----------------|
| | Admissions | Deaths | Mortality rate | Admissions | Deaths | Mortality rate |
| 1000 – 1500 g | 140 | 15 | 10.7% | 47 | 12 | 25.5% |
| 1501 – 2500 g | 309 | 29 | 9.4% | 178 | 12 | 6.7% |
| > 2500 g | 610 | 24 | 3.9% | 279 | 13 | 4.7% |
| Total | 1059 | 68 | 6.4% | 504 | 37 | 7.3% |

3.3.6 Future collaboration

NEO FOR NAMIBIA – Helping Babies Survive has promised to continue to work with Katima Hospital by providing additional training, supplying consumables, and supporting maintenance and repair of equipment donated by the NGO.

4. INITIAL EXPERIENCE WITH THE VAYU® BCPAP DEVICE IN NAMIBIA

Since the donation of the first 10 Vayu® bCPAP units at the end of last year, a total of 49 patients have been treated with the new device (Table 2). The mean birthweight was 1720 g. The median duration of CPAP support was 9 days with a range of 1-11 days. Most of the patients were treated in the hospitals; in 5 cases, the device was used on transport to Windhoek.

The rate of survival to discharge was 75.5% (37/49); 6 patients were still hospitalized, but in stable condition. 12 patients died (one of them was successfully transported to Windhoek on Vayu® bCPAP but died 3 days), another one died on transport) (Table 2).

Table 2. Initial experience with the Vayu® bCPAP device in Namibia: the reported survival rate of 75.5% is encouraging, and user feedback was unanimously positive.

These results and unanimously positive feedback from users are very encouraging. It was agreed that the hospitals will continue to collect data on patients treated with this device. The way forward will have to be discussed with representatives of the MHSS (see below).



Vayu® bCPAP

(10 devices introduced in 12 2023)

| Hospital Site | Patients treated | Patients survived | Survival rate |
|---------------|------------------|-------------------|---------------|
| Swakopmund | 14 | 11 | 78.6% |
| Walvis Bay | 11 | 8 | 72.7% |
| Rundu | 13 | 10 | 76.9% |
| Katima | 11 | 9 | 81.8% |
| Total | 49 | 37 | 75.5% |

5. MEETING WITH REPRESENTATIVES OF THE MINISTRY OF HEALTH AND SOCIAL SERVICES

On April 3, 2024, Prof. Thomas M. Berger was able to meet with the Executive Director (ED) of the MHSS, Dr. Ben Nangombe, and two Personal Assistants (PAs) (Dr. Theo-Ben Kandetu and Mrs. Lydia Haufiku).

Following a short presentation of the preliminary results, Dr. Ben Nangombe agreed that the Vayu® bCPAP pilot data looked very promising, and discussions on how to best implement a wide-spread use should be made a high priority. Dr. Theo-Ben Kandetu promised to soon get back to NEO FOR NAMIBIA – Helping Babies Survive.

6. IMPRESSIONS FROM THE 21ST MISSION

6.1 African scenery

On their more than 3'500 km journey, Prof. Thomas M. Berger and Isaak Boois were once again impressed by the light, the intense colors, the landscapes, and ever-changing skies of Namibia (Fig. 17–19).



Fig. 17. African skies!

Fig. 19. At the Kavango river (Kaisosi River Lodge, left) and the Zambezi river (3 Palms Lodge, right).



Fig. 18. Not just the big five (lion, leopard, rhinoceros, elephant and buffalo): a long-legged armored katydid (*Acanthopplus longipes*) welcomes Prof. Thomas M. Berger (Out of Africa Lodge, Otjiwarongo).



6.2 People

Even more memorable were their encounters with people, some total strangers, others longtime friends (Fig. 20 – 23).



Fig. 20. Namibia is elephant country: Kids at David's (wood carver) roadside shop (left); on the road to Katima (right).



Fig. 21. At Eleotelia's place: Grace, Eleotelia's second child with Unique (left, top) and her mom (left, bottom); unlike her sister, Nicoteh, she was born at term without any complications.



Fig. 22. At Eleotelia's place: Nicoteh (center), the first child of Eleotelia Hamutenya, a former 1150 g preterm baby, and her friends.

Fig. 23. At Eleotelia's place: an old woman, sitting in front of her corrugated iron shack, gladly accepted some fresh fruit!



Eleotilia's sister, Otilia (better known by her nickname Unique), is a teacher. Unfortunately, she has no job. Therefore, she decided to open a pre-school in her neighborhood (Fig. 24, 25). Even though this will not generate a sufficient income, she says: "It is better than nothing!" Her efforts are privately supported by the founders of NEO FOR NAMIBIA – Helping Babies Survive as well as some of their friends.

Fig. 24. Eleotelia Hamutenya's sister, Otilia (better known as Unique), is a teacher; she currently is unemployed but has taken the initiative to open Unique's Pre-School in her village.





Fig. 25. Unique's Pre-School: a look inside the classroom.

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