NEO FOR NAMIBIA
HELPING BABIES SURVIVE

MISSION REPORT

Mission 2023 – 1

January 27, 2023 to February 25, 2023

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Windhoek, 08.03.2023

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www.neo-for-namibia.org

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1. INTRODUCTION

The 17th mission of NEO FOR NAMIBIA – Helping Babies Survive lasted from January 27 to February 25, 2023. This time, Prof. Thomas M. Berger and his wife, Sabine Berger, were accompanied by their friend Yvonne Fallet, a nurse from the Center da sandà Val Müstair in Switzerland. They were met by their driver Isaak Boois at the Windhoek Husea Kutako International Airport.

With the help of Mr. Prince Elago, a consignment agent from Xtreme Freights, all equipment and consumables were cleared by the customs authorities. After dropping the three members off at the Windhoek Luxury Apartments for a one-night-stay, Isaak Boois set out on his 1200 km trip to Katima via Rundu to bring the car and all the equipment and consumables to the north. On January 29, 2023, he handed over the car to the mission team at Mpacha Airport, 10 km southeast of Katima. While Prof. Thomas M. Berger, Sabine Berger, and Yvonne Fallet drove to their accommodation in town (3 Palms Lodge), Isaak Boois took the return flight to Windhoek.

The mission team spent the next 5 days at Katima Hospital. After a short break at the Victoria Falls in Zimbabwe, they headed for Rundu (more than 500 km east of Katima) where they arrived on February 6, 2023, after a one-night-stay at the Riverdance Lodge near Divundu.

The team continued its work at Rundu State Hospital from February 6 to 15, 2023. They then started to move south, traveling via the Wildacker Farm, Etosha National Park, and Okonjima Plains, finally arriving in Swakopmund on February 20, 2023. Over the following 3 days, Swakopmund and Walvis Bay hospitals were assessed to determine how NEO FOR NAMIBIA – Helping babies Survive could assist in the development of higher levels of neonatal care.

On February 24, 2023, the 17th mission was completed. While Sabine Berger and Yvonne Fallet returned to Switzerland, Prof. Thomas M. Berger stayed in Windhoek to welcome Christoph M. Honegger, MD, two weeks later for the 18th mission of NEO FOR NAMIBIA – Helping Babies Survive. Dr. Honegger is the head of Obstetrics and Gynecology at the Cantonal Hospital of Zug, Switzerland; for quite some time, he has expressed his interest in getting first hand insights into the activities of NEO FOR NAMIBIA – Helping Babies Survive.

Before leaving Windhoek for the 18th mission, Prof. Berger was able to meet Dr. Ben Nangombe, the Executive Director (ED) of the Ministry of Health and Social Services (MHSS), and his team. The meeting was used to provide feedback and discuss future projects.

2. MAIN MISSION GOALS

The goals of the 17th mission were:

1. To assess progress made at Katima Hospital under the guidance of Dr. Cristy Victor and to prepare for the introduction of MTTS Dolphin® CPAP devices (most likely during mission 18)

2. To evaluate the current organization of the Prem Unit at Rundu State Hospital after the arrival of additional medical officers (MOs) and interns

3. To complete the 2022 annual statistics for both Katima Hospital and Rundu State Hospital to evaluate recent trends

4. To analyze the utility and impact of point of care testing (POCT) of C-reactive protein (CRP) concentrations at both Katima Hospital and Rundu State Hospital

5. To update the inventory of all equipment and consumables provided by NEO FOR NAMIBIA – Helping Babies Survive at both Katima Hospital and Rundu State Hospital

6. To assess the neonatology units at both Swakopmund Hospital and Walvis Bay Hospital (Erongo region of Namibia) for possible support by NEO FOR NAMIBIA – Helping Babies Survive

3. HOSPITALS VISITED

As planned, the mission team spent 5 and 10 days working at Katima Hospital and Rundu State Hospital, respectively. At Katima Hospital, further progress made over the past months was obvious. Unexpectedly, urgent issues with malfunctioning equipment at Rundu State Hospital diverted our attention from direct patient care (see below). Nevertheless, most objectives could be achieved. In addition, regular training sessions for very motivated interns were organized. Finally, we were very welcome in the Erongo region and obtained a good insight into the organization of neonatal care at the Swakopmund and Walvis Bay Hospitals.

3.1 Katima Hospital

3.1.1 Overall impression

The Neonatal Unit is kept very clean, and Dr. Cristy Victor and her nurses try to deliver the best possible care (Fig. 1). Suggestions made on our previous missions are largely followed. Nevertheless, additional refresher training sessions will have to be provided for old and new staff.

Dr. Cristy Victor managed to get the portable X-ray repaired. As suggested to the hospital leadership on previous visits, the malfunctioning spring balanced positioning column was repaired at a 10th of the cost of a new unit. The image quality is nearly perfect.

Fig. 1. The Neonatal Unit at Katima Hospital is kept very clean, and the local medical staff tries to deliver the best possible care.

3.1.2 Equipment and consumables

Sabine Berger and her colleague Yvonne Fallet, both registered nurses, updated the equipment and consumable inventories of the unit. The following devices donated by NEO FOR NAMIBIA – Helping Babies Survive were found to be in fully functioning conditions (Fig. 2–4):

- 6 MTTS Wallaby® warming tables (2 of which were placed in the obstetrical unit)
- 4 MTTS infant cot beds
- 6 MTTS Koala® infant cot beds
- 3 MMTS Colibri® phototherapy lights
- 4 Pumani® bubbleCPAP devices
- 1 Masimo® Rad-5 (battery driven) pulse oximeter
- 6 Masimo® Rad-8 pulse oximeters
- 2 Masimo® Rad-G pulse oximeters (brought on the current mission and placed in the obstetrical unit
- 5 Kangaroo Mother Care (KMC) reclining chairs
- 1 Bilimeter 3 and 1 Bilifuge (POCT bilirubin measurements)
- 1 Aidian QuikRead® CRP (POCT C-reactive protein measurements)

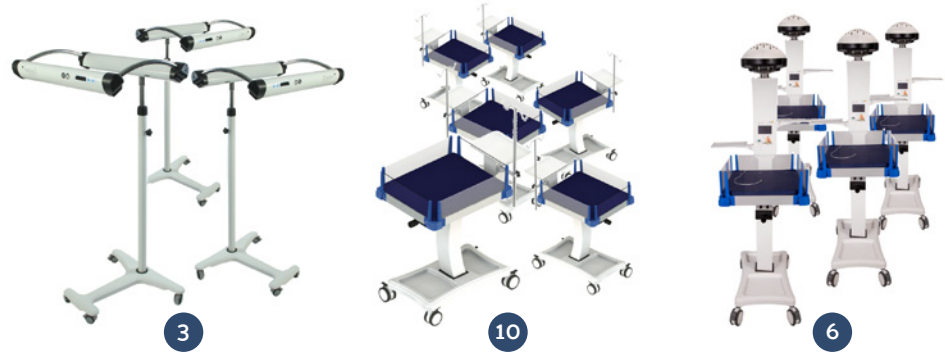


Fig. 2. Essential equipment at Katima Hospital for the care of sick neonates: phototherapy units (3 pcs.), infant cot beds (10 pcs.), warming tables Total (6 pcs.)

Fig. 3. Essential equipment at Katima Hospital for the care of sick neonates: pulse oximeters and CPAP machines.

Fig. 4. Essential equipment at Katima Hospital for the care of sick neonates: POCT devices (left: Bilifuge® and Bilimeter® for bilirubin measurements; QuikRead go® for CRP measurements.

They also managed to check all the Pumani® bubbleCPAP devices (Fig. 5, 6). The Pumani® is affordable (current price is US$ 900.0), robust and easy to service; this makes the machine very suitable for low-resource settings. Its main disadvantage is the lack of heating and humidification of the gas.

Fig. 5. The Pumani® is robust and easy to service; this makes the machine very suitable for low-resource settings.

Fig. 6. It only takes a screwdriver: servicing, and occasionally repairing, a Pumani® CPAP device is simple.

3.1.3 Resuscitation areas in the delivery rooms

Despite some concerns, we have decided to equip the obstetrical unit with 2 Wallaby® warming tables and 2 Masimo® Rad-G pulse oximeters. We will verify on our next mission in March 2023 whether the equipment is well kept. The pediatrician, Dr. Cristy Victor, and the obstetrician, Dr. Manolo Berbe, agreed act as supervisors.

3.1.4 Training sessions for medical officers and nurses

Refresher lectures on neonatal resuscitation, as well as fluid and nutrition management were offered on two occasions. The presentations were attended by consultants, medical officers, and nurses. In addition, teaching rounds were used to train local staff (Fig. 7). We were pleased to see that the NEO FOR NAMIBIA – Helping Babies Survive progress note templates were used routinely in the neonatal ward.

Fig. 7. Mobile X-ray has again become available in Katima: discussing X-ray findings with Dr. Cristy Victor.

3.1.5 Analyses of the use of POCT CRP measurements

Following the introduction of POCT CRP measurements in November 2022, data on its utility was collected prospectively. Analysis of this data revealed that the tool had been used appropriately in 90 % of cases (Fig. 8).

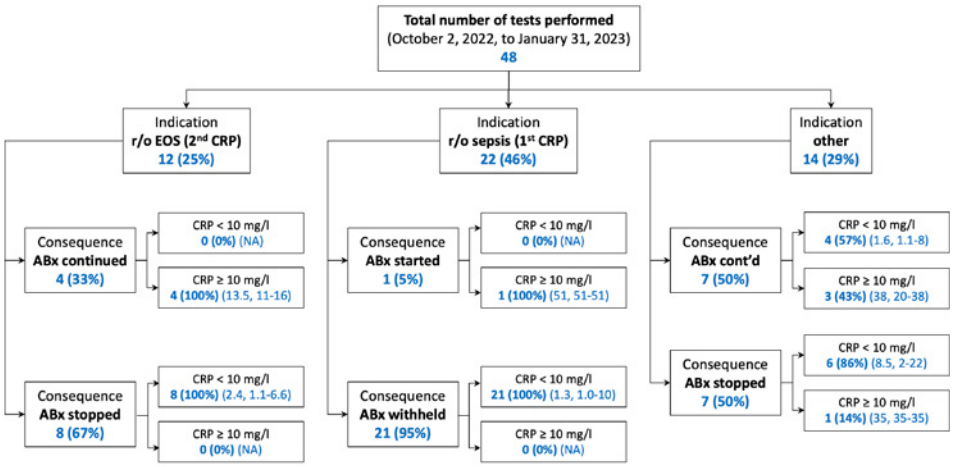


Fig. 8. Analysis of CRP tests performed at Katima Hospital over a 4-month-period.

A total of 48 tests had been performed over a period of 4 months. Of these, 12 (25 %) were used to rule out early-onset neonatal sepsis (EOS): antibiotics could be stopped after 48 hours in 67 % of cases when two consecutive CRP levels were less than 10 mg/l. In 22 instances, the test was used to rule out late-onset sepsis (LOS): in 95 % of cases, antibiotics were withheld.

Therefore, one can expect that approximately 250 tests will be needed per year (since a more liberal use would still be appropriate) at a total cost of CHF 750.00. The potential for reducing antibiotic exposure is huge. For now, data collection will continue with a modified data collection form. If analyses of additional data confirm the above findings, provisions will be made to secure the uninterrupted availability of the test kits.

3.1.6 Statistics

Delivery room and neonatal ward statistics for 2021 and 2022 were compiled and analyzed. The number of live births decreased from 4'810 in 2021 to 4'072 in 2022 (-15 %). The rate of stillbirths remained at around 2 %. Similarly, the rate of Cesarean sections continued to be low with 5.1 % and 6.7 % in 2021 and 2022, respectively (Fig. 9).

Fig. 9. Delivery room (DR) statistics at Katima Hospital 2021 and 2022 (BBA: baby born before arrival; CS: Cesarean section; FSB: fresh stillbirth; MSB: macerated stillbirth; NSVD: normal spontaneous vaginal delivery; VE: vacuum extraction).

Delivery room (DR) statistics - Katima Hospital													
2021	Number of deliveries	NSVD	VE	Forceps	CS (n)	CS (%)	BBA	FSB	MSB	Total SB (n)	Total SB (%)	Live births	DR deaths (n)
Total	5'005	4'482	1	0	228	5.1%	197	39	58	97	2.2%	4'810	6
2022	Number of deliveries	NSVD	VE	Forceps	CS (n)	CS (%)	BBA	FSB	MSB	Total SB (n)	Total SB (%)	Live births	DR deaths (n)
Total	4'136	3'663	8	10	246	6.7%	135	33	41	74	2.0%	4'072	1

Admissions to the neonatal ward increased from 343 in 2021 to 405 in 2022 (+18 %). At the same time, overall mortality rate decreased from 18.7 % to 10.6 %, a striking improvement. At least in part, this can be explained by a much lower admission rate of extremely low birth weight (ELBW) infants (birth weight < 1'000 g): 20/343 (5.8 %) in 2021, compared to 4/405 (1.0 %), a finding that is difficult to explain. However, mortality rates did improve in all birth weight categories (Fig. 10).

Neonatal Unit statistics - Katima Hospital				
Summary statistics 2021	Admissions	% of total	Deaths	Mortality rate
Admissions	**343**	**100%**	**64**	**18.7%**
BW categories				
< 1000 g	20	5.8%	16	80.0%
1000-1500 g	54	15.7%	16	29.6%
1501-2500 g	128	37.3%	14	10.9%
> 2500 g	141	41.1%	18	12.8%
Summary statistics 2022	Admissions	% of total	Deaths	Mortality rate
Admissions	**405**	**100%**	**43**	**10.6%**
BW categories				
< 1000 g	4	1.0%	3	75.0%
1000-1500 g	48	11.9%	13	27.1%
1501-2500 g	141	34.8%	12	8.5%
> 2500 g	212	52.3%	15	7.1%

Fig. 10. Comparison of admissions and birth weight-specific mortality rates at Katima Hospital (2021 versus 2022): the mortality rate has now dropped to a third of the 2019 level (the time when the hospital was first visited by a NEO FOR NAMIBIA – Helping Babies Survive team).

3.1.7 Next steps

Progress made at Katima Hospital is remarkable. The team seems to be eager to improve further. Dr. Cristy Victor plays a key role in this development. The unit is ready for the introduction of MTTS Dolphin® CPAP devices. These more sophisticated machines have arrived in Windhoek and, hopefully, will be delivered to Katima in time, so that Prof. Berger can oversee their assembly and instruct nurses and doctors on their proper use during the upcoming 18th mission.

3.2 Rundu State Hospital

3.2.1 Overall impression

The Prem Unit at Rundu State Hospital continued to be extremely busy. Fortunately, the number of physicians had finally been increased: next to Dr. Kamara and Dr. Beukes, six additional medical officers (MOs) had joined the Pediatrics team (Dr. Nakuanda, Dr. Masenda, Dr. Ipumbu, Dr. Gabriel, Dr. Mwula, and Dr. Mbaroro). Unfortunately, we did not have a chance to get to know them more closely. In addition, seven interns were rotating through the different Pediatric wards. Two of them had gone to Medical School in Namibia, three in Russia, one in China, and one in the Ukraine. They all seemed to be eager to learn and attended a total of six lectures by Prof. Berger (Fig. 11).

Fig. 11. Prof. Berger on rounds with one of the interns assigned to the Department of Pediatrics at Rundu State Hospital; Job was trained in Russia and still required a lot of supervision.

Several considerable concerns became apparent during the 10-day-stay at Rundu State Hospital: a) supervision of less experienced physicians (MOs and interns) is currently inadequate, b) not all physicians follow standard operating procedures previously agreed upon (Fig. 12), c) the problem of equipment maintenance has not yet been solved, and d) there seemed to be some reluctance to discuss or follow advice given by the team members of NEO FOR NAMIBIA – Helping Babies Survive.

Fig. 12. Insertion of an umbilical venous catheter (UVC) by an intern under the supervision of a medical officer: sterile precautions are clearly inadequate.

3.2.2 Equipment and consumables

The two nurses of the mission team, Sabine Berger and Yvonne Fallet, spent a lot of time checking equipment and stock levels of various consumables. While stock management has improved, various barriers still impair timely procurement of consumables.

3.2.2.1 Respiratory support

The Prem Unit had been equipped with two EVE TR neo ventilators (in 2019 and 2021). The machines could no longer be used as planned: first, the breathing circuits were leaking after multiple uses (a situation we had not been informed about), and second, one of the EVE TR neo ventilators repeatedly alarmed because of a blower failure. Obviously, these ventilators urgently require proper servicing. In 2022, an MTTS Impala® ventilator had been added as a back-up device. However, this machine is no match and can only serve as an emergency back-up.

Since the introduction of the MTTS Dolphin® CPAP machines, Pumani® bubbleCPAP devices are only used as back-up. Unfortunately, even though the machines had been serviced by John Namwira in December 2022, only two of the available six machines were fully functional. One device would not start up at all following a software update. The unit therefore had to be shipped to Ongwediva near Oshakati (486 km west of Rundu) (Fig. 13). It was found to have a power supply issue that can only be fixed with spare parts which need to be ordered in Vietnam. In another device, the heater and humidifier did not work; it was also sent to Ongwediva and was returned, still not functioning.

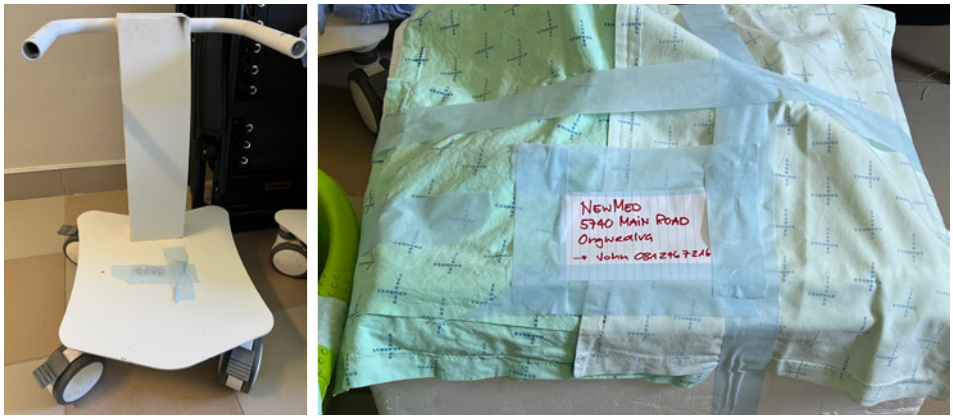


Fig. 13. The malfunctioning MTTS Dolphin® CPAP machines were disassembled and shipped to John Namwira's office in Ondangwa for repair.

3.2.2.2 Pulse oximetry

The Prem Unit has 10 Masimo® Rad-8, 5 Masimo® Rad-97 as well as 3 Masimo® Rad-G pulse oximeters. This is an undesired mix of monitors and patient cables that cannot be helped. The company Masimo no longer manufactures (nor has in stock) any of the perfectly suitable Rad-8 monitors. Switching from simple LED to touch screen displays will likely cause problems in low-resource countries. For now, monitoring of heart rate and oxygen saturation (SpO_2) is possible with these monitors; however, alternatives need to be explored.

The more affordable Rad-G monitors (the development of which reportedly had been supported by the Bill and Melinda Gates Foundation) are portable devices not designed for continuous but rather intermittent SpO_2-monitoring at the bedside. We therefore had to find a solution that would facilitate such use. We found a local craftsman (Gerhard Claassen) who could weld wall-mounted brackets for the 3D-printer clamping devices produced in Switzerland (Fig. 14).

Fig. 14. The wall-mounted brackets for the Masimo® Rad-G pulse oximeters are installed in the Prem Unit at Rundu State Hospital.

3.2.2.3 Warming tables, infant cot beds and phototherapy units

Fortunately, all the 9 Wallaby® warming tables, the 18 cot beds (6 of which are MTTS Koala® infant beds), and the 6 Colibri® phototherapy lights were in good condition and functioning reliably.

3.2.2.4 Point of care testing (POCT) devices

Both the Bilimeter® and the Bilifuge®, as well as the Aidian QuikRead go® were intact and functioning well. The respective consumables were all available. Undoubtedly, these devices have stood the test of time and have proved to be highly valuable. They should be made available in every neonatal unit in the country: affordable, simple and robust, they provide rapid access to results and thus facilitate decision-making during rounds!

3.2.3 Analyses of the use of POCT CRP measurements

The Aidian QuikRead go® CRP device had been in use for more than eight months. Doctors and nurses confirmed that the low blood volume required, and the rapid availability of the results have facilitated the management of patients with suspected or proven neonatal sepsis.

Over the past three months, 147 tests had been performed (Fig. 15). Of these, 99 (67 %) were used to rule out early-onset neonatal sepsis (EOS): antibiotics could be stopped after 48 hours in 79 % of cases, when two consecutive CRP levels were less than 10 mg/l. In only 6 instances, the test was used to rule out late-onset sepsis (LOS): in 67 % of cases, antibiotics were withheld. The remainder of the tests (n=42) were used for miscellaneous indications: antibiotics were continued, changed, or restarted in 55 % of cases, and stopped in 45 % of cases.

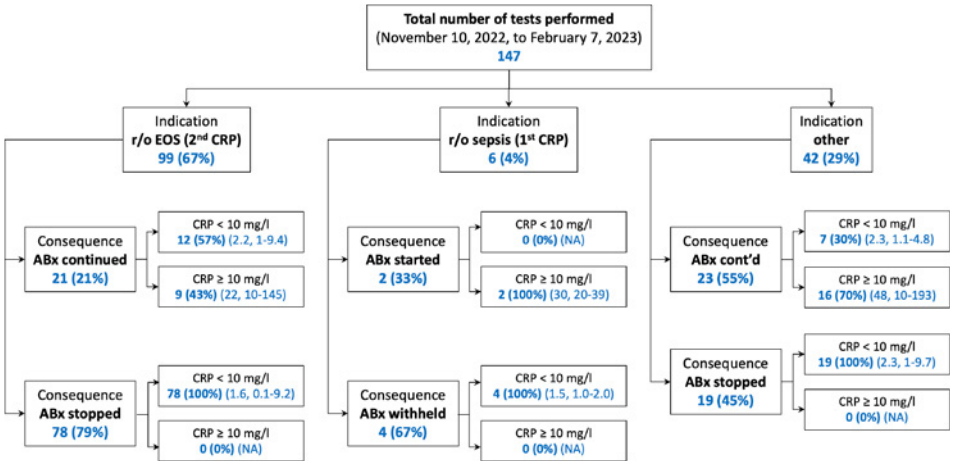


Fig. 15. Analysis of CRP tests performed at Rundu State Hospital over a 3-month-period.

Detailed case-by-case analysis revealed that the general rules (using a cot-off CRP concentration of < 10 mg/l to stop or withhold antibiotics) were followed in 83 % of the cases. Overall, the decisions were judged to be appropriate or likely to be appropriate in 118/147 (80 %). In the remaining 29/147 (20 %) cases, the test was either used inappropriately (antibiotics were continued despite negative CRP results, wrong timing of 2nd test, mostly to late) or not enough information was given to understand the decisions made.

The following conclusions can be drawn from this data: 1) approximately 600 tests will be needed per year at a total cost of CHF 1'800.00, 2) more training is needed on biomarker-guided antibiotic therapy, and c) doctors and nurses must accept the advice given.

3.2.4 Statistics

Delivery room (DR) and Prem Unit statistics for 2021 and 2022 were compiled and analyzed. The number of live births decreased from 7'213 in 2021 to 6'613 in 2022 (-8 %). The rate of stillbirths remained at around 2 %. Of note, the rate of Cesarean sections continued to be much higher than at Katima Hospital (Fig. 9) with 16.0 % and 18.5 % in 2021 and 2022, respectively (Fig. 16). In a WHO statement on Cesarean section rates, published in 2015, a panel of experts concluded that "Cesarean section rates higher than 10 % are not associated with reductions in maternal and newborn mortality rates. However, they also emphasized that "Healthcare facility rates of Cesarean births vary widely depending on differences in case-mix of the obstetric population they serve, in their capacity and provisions, and in clinical management protocols. Therefore, population-based Cesarean section rates cannot be applied as the ideal rate at the hospital level."

Delivery room (DR) statistics - Rundu State Hospital											
2021	**Number of deliveries**	**Live births**	**NSVD**	**VE**	**Forceps**	**CS (n)**	**CS (%)**	**FSB**	**MSB**	**Total SB (n)**	**Total SB (%)**
Total	7'252	7'213	6'037	57	0	1158	16.0%	49	77	126	2.1%
2022	**Number of deliveries**	**Live births**	**NSVD**	**VE**	**Forceps**	**CS (n)**	**CS (%)**	**FSB**	**MSB**	**Total SB (n)**	**Total SB (%)**
Total	6'631	6'613	5'357	46	0	1228	18.5%	55	62	117	1.8%

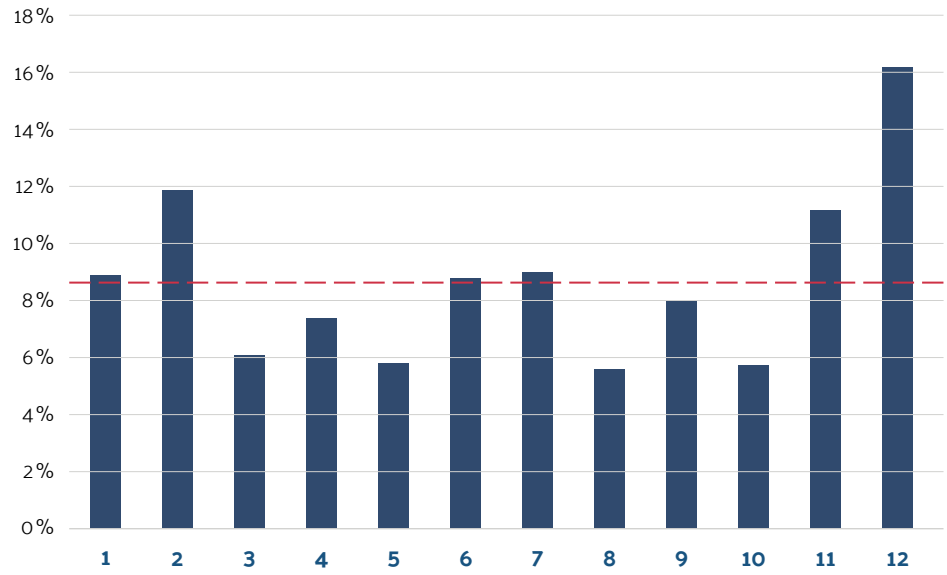
Fig. 16. Delivery room (DR) statistics at Rundu State Hospital 2021 and 2022 (BBA: baby born before arrival; CS: Cesarean section; FSB: fresh stillbirth; MSB: macerated stillbirth; NSVD: normal spontaneous vaginal delivery; VE: vacuum extraction).

Admissions to the neonatal ward increased from 1'004 in 2021 to 1'228 in 2022 (+22 %). At the same time, overall mortality rate decreased from 10.0 % to 8.7 %. As expected, mortality rates for outborn infants were significantly higher than for inborn infants: 17.9 % versus 8.0 % in 2021, and 18.0 % versus 6.5 % in 2022 (Fig. 17).

Neonatal Unit statistics - Rundu State Hospital				
Summary statistics 2021	**Admissions**	**% of total**	**Deaths**	**Mortality rate**
Admissions	**1004**	**100%**	**100**	**10.0%**
BW categories				
< 1000 g	41	4.1%	22	53.7%
1000-1500 g	133	13.2%	19	14.3%
1501-2500 g	276	27.5%	22	8.0%
> 2500 g	554	55.2%	37	6.7%
Summary statistics 2022	**Admissions**	**% of total**	**Deaths**	**Mortality rate**
Admissions	**1228**	**100%**	**107**	**8.7%**
BW categories				
< 1000 g	37	3.0%	21	56.8%
1000-1500 g	130	10.6%	24	18.5%
1501-2500 g	341	27.8%	25	7.3%
> 2500 g	720	58.6%	37	5.1%

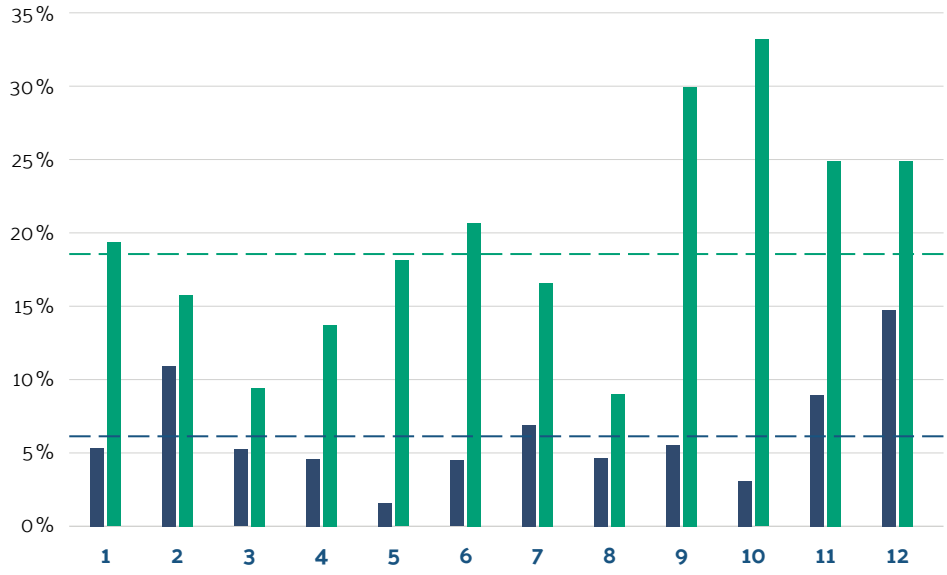
Fig. 17. Comparison of admissions and birth weight-specific mortality rates at Rundu State Hospital (2021 versus 2022): the overall mortality rate has further from 10.0 % to 8.7 %, and the mortality rate for inborns from 8.0 % to 6.5 %.

The fact that the mortality rate for inborn infants has decreased further despite a significantly higher caseload is truly remarkable. However, when the data is analyzed month by month, a potentially worrisome trend can be observed that cannot be explained by variations in the case-mix alone. The mortality rates of 11.2 % and 16.2 % in November and December 2022, respectively, were clearly above the annual average of 8.7 %. (Fig. 18, 19). This cannot be explained by the caseload, an increased percentage of admissions of outborn infants (Fig. 20), or by an increased percentage of admissions of high-risk preterm infants (Fig. 21). Therefore, other explanations must be taken into consideration and carefully explored (see 3.2.1 Overall impression). At the same time, it must be acknowledged that work in the Prem Unit at Rundu State Hospital is stressful for many reasons. Having to deal with 100 babies dying annually, it is above all emotionally draining.



annual average 8.7 %

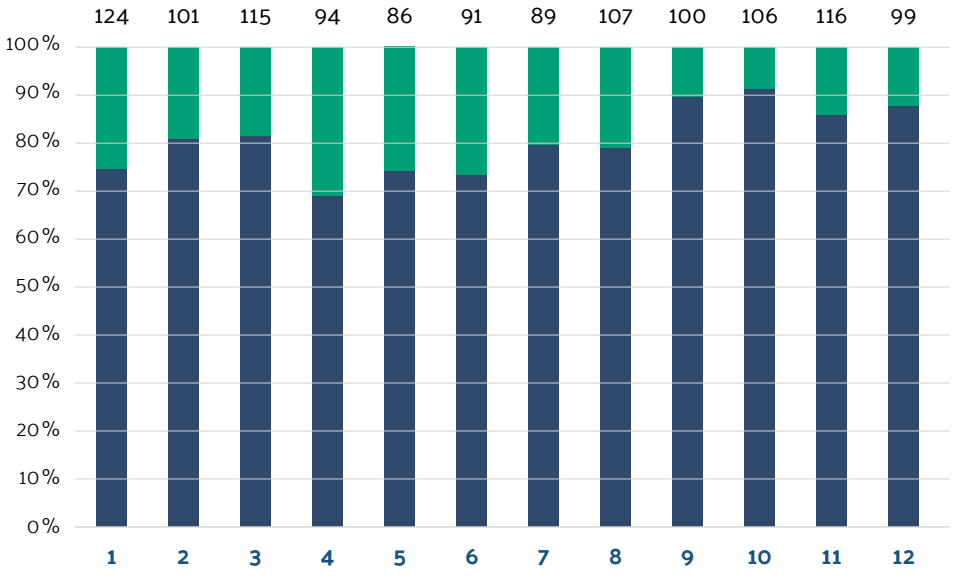
Fig. 18. Month-by-month analysis of Prem Unit statistics at Rundu State Hospital: overall mortality rate appears to be increasing in November and December 2022.



Inborn MR
annual average inborn infants 6.5 %

Outborn MR
annual average outborn infants 19.0 %

Fig. 19. Month-by-month analysis of Prem Unit statistics at Rundu State Hospital: the increased mortality rate in November and December 2022 is most pronounced for inborn infants (9.0 % and 14.9 %, clearly above the annual average of 6.5 %).



admissions Inborn
admissions Outborn

Fig. 20. Month-by-month analysis of Prem Unit statistics at Rundu State Hospital: case mix: no trend recognizable in number of admissions or the proportion of outborn infants admitted.

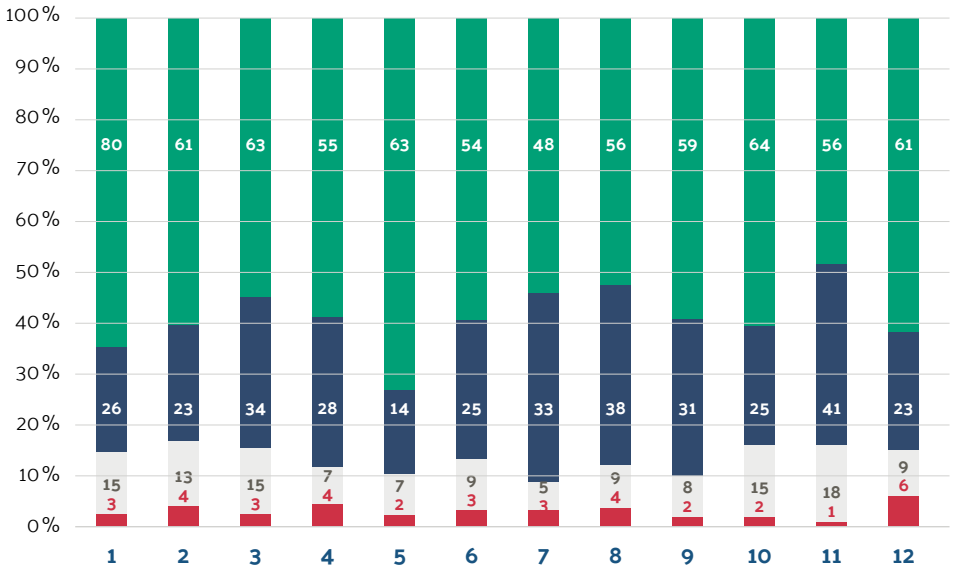


Fig. 21. Month-by-month analysis of Prem Unit statistics at Rundu State Hospital: case mix: no trend is recognizable in number or proportion of admissions in different birthweight categories.

3.2.5 Next steps

Prof. Berger and Sabine Berger first visited the Prem Unit at Rundu State Hospital in 2015. Since then, many improvements have been made. The unit has evolved from a low level neonatology ward where only the most basic care could be provided, to a busy neonatal intensive and intermediate care unit with dedicated doctors and nurses.

During the last two missions, two major issues became increasingly apparent that need to be addressed because they threaten the progress made. First, organizing maintenance, repair and replacement of vital equipment must be a priority for 2023. All MTTS Dolphin® CPAP machines must be put in a fully functional condition, and regular maintenance must be secured. Second, medical and nonmedical staff at Rundu State Hospital must now provide leadership qualities by taking initiative and developing a vision for the future collaboration with NEO FOR NAMIBIA – Helping Babies Survive. They were asked to prepare a draft to be discussed during mission XVIII.

3.3 Swakopmund and Walvis Bay Hospitals

3.3.1 Overall impression

At the invitation by Dr. Helvi Joel, a pediatrician from the Erongo region of Namibia, the team for the first time visited both Swakopmund Hospital and Walvis Bay Hospital. Dr. Joel and the Chief Medical Officers at both Hospitals went out of their way to show us their facilities (Fig. 22).

The neonatal units in both hospitals are small, poorly organized, and not well equipped. We were informed that a new Maternity and Neonatal Ward have been built with the support of UNICEF; the neonatologist, Prof. Clarissa Peeper, reportedly acted as an advisor. The new neonatology ward is not yet completed, in fact, it is still in the shell (Fig. 23).

Fig. 22. Main entrance of the Swakopmund Hospital.

Fig. 23. The new neonatology unit (grey building in the background) has remained unfinished for months; it is now supposed to open in May 2023.

The unit is too large for the current number of deliveries at Swakopmund Hospital. It will be essential to plan appropriate regionalization of perinatal care in the entire Erongo region of Namibia. This should include both antenatal transfers of mothers with high-risk pregnancies, as well as postnatal transfers of sick neonates. The latter will require an appropriately equipped transport incubator and ambulance.

3.3.2 Equipment

Dr. Helvi Joel had previously introduced CPAP at Swakopmund Hospital since she had come across the Pumani® bubbleCPAP during her training in Tanzania. At her request, we took the opportunity for some refresher training (Fig. 24, 25). In addition, we were able to add two machines to the existing two. Finally, we handed over 2 Masimo® Rad-G pulse oximeters and 144 pulse oximetry sensors (fitted with old connectors and therefore requiring an adapter cable).

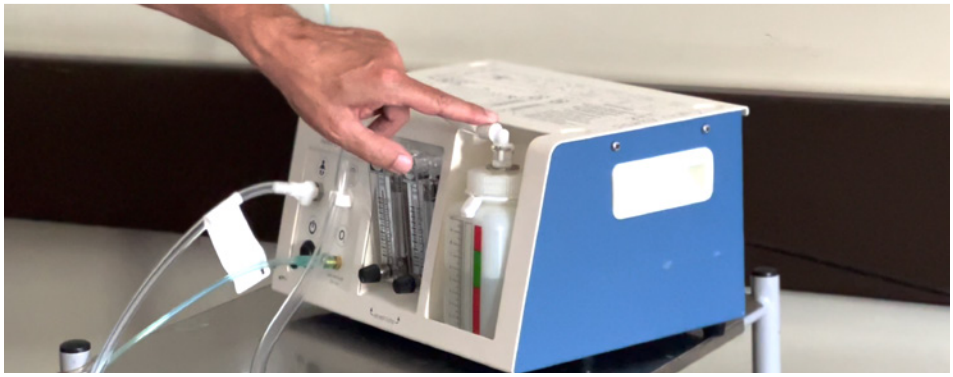


Fig. 24. Pumani® bubbleCPAP training at Swakopmund Hospital: explaining the basics of the device.

Fig. 25. Pumani® bubbleCPAP training at Swakopmund Hospital: explaining the oxygen blending table to determine the fraction of inspired oxygen (FiO_2).

4. FUTURE DIRECTIONS

4.1 Next mission

The 18th mission of NEO FOR NAMIBIA – Helping Babies Survive will take place in March 2023 Prof. Thomas M. Berger will be accompanied by Dr. Christoph M. Honegger, head of Obstetrics and Gynecology at the Cantonal Hospital of Zug, Switzerland Together, they will visit Swakopmund, Rundu and Katima.

4.2 Urgent issues

The following problems need to be addressed with high priority:

- Servicing and repairing the MTTS Dolphin® CPAP machines (Rundu State Hospital)
- Servicing and repairing the EVE® TR neo ventilators (Rundu State Hospital)
- Improving X-ray quality at Rundu State Hospital (this will likely require the acquisition of a new portable X-ray machine)
- Leadership at Rundu State Hospital must take initiative and develop a vision of the future collaboration with NEO FOR NAMIBIA – Helping Babies Survive

5. VISITING OUR AFRICAN FRIENDS

As always, it was a pleasure to meet our African friends in their homes: Johannes (Fig. 26–29), Moruru, Kassian, Laurentia Fig. (30–32), Eleotelia and Ottilia (Fig. 33). It is people like them that convince us to continue with our work despite several adversities we encounter along the way.

Fig. 26. When we are in Rundu, we load the car with basic foods and some cookies for the kids and visit Johannes' place (a guard at the Kaisosi River Lodge we have known for many years).

Fig. 27. Johannes' kitchen in Kaisosi village: the "Bushbaby" (a cast iron pot we bought years ago) has stood the test of time!

Fig. 28. Johannes' kitchen in Kaisosi village: food for everybody!

Fig. 29. Moruru still could not find a job and continues to live under most dire conditions; and yet he smiles.

Fig. 30. Bringing some apples and cookies for the kids at Laurentia's place: all the kids love it.

Fig. 31. Prof. Thomas M. Berger and Sabine Berger enjoy a little conversation with the kids at Laurentia's place.

Fig. 32. Kids in Kaisosi village just want to play: tennis anyone?

Fig. 33. Kids in Kaisosi village just want to play: a race with self-made wire toy cars.

6. IMAGES FROM AFRICA

The report of our 17th mission closes with some pictures of African landscapes and wild live (Fig. 34–43). The photographs were taken on the Kavango river, in the Chobe National Park, at the Victoria Falls, on the Wildacker Farm, in the Etosha National Park and the Okonjima Plains Nature Reserve.

Fig. 34. Scenes from the Kavango River near the Kaisosi River Lodge.

Fig. 35. Encounters with giraffes and elephants while traveling through the Chobe National Park on the way to the Zimbabwe border.

Fig. 36. Devil's Cataract (at the eastern end of the Victoria Falls).

Fig. 37. Devil's Cataract and Main Falls (viewed from the Zimbabwe side of the Victoria Falls).

Fig. 38. Horseshoe Falls and Rainbow Falls (viewed from the Zimbabwe side of the Victoria Falls).

Fig. 39. Waterbuck at the Wildacker Farm.

Fig. 40. Rhino in the waterhole at the Halali Camp in the Etosha National Park.

Fig. 42. Male and female lions in the Etosha National Park.

Fig. 41. Leopard in the Okonjima Game Reserve (home of the AfriCat Foundation).

Fig. 43. African weaverbirds building their nests in the Okonjima Game Reserve (home of the AfriCat Foundation).

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