NEO FOR NAMIBIA
HELPING BABIES SURVIVE

AUTHORS
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MISSION REPORT

Mission 2022 – 3

October 24, 2022 to November 23, 2022

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1. INTRODUCTION

The 16th mission of NEO FOR NAMIBIA – Helping Babies Survive lasted from October 24 to November 23, 2022. Prof. Thomas M. Berger was accompanied by Sarah Knoll, MD, a neonatology fellow from the University Children's Hospital in Basel, Switzerland; it was the third time that Sarah Knoll volunteered as a mission team member (Fig. 1).

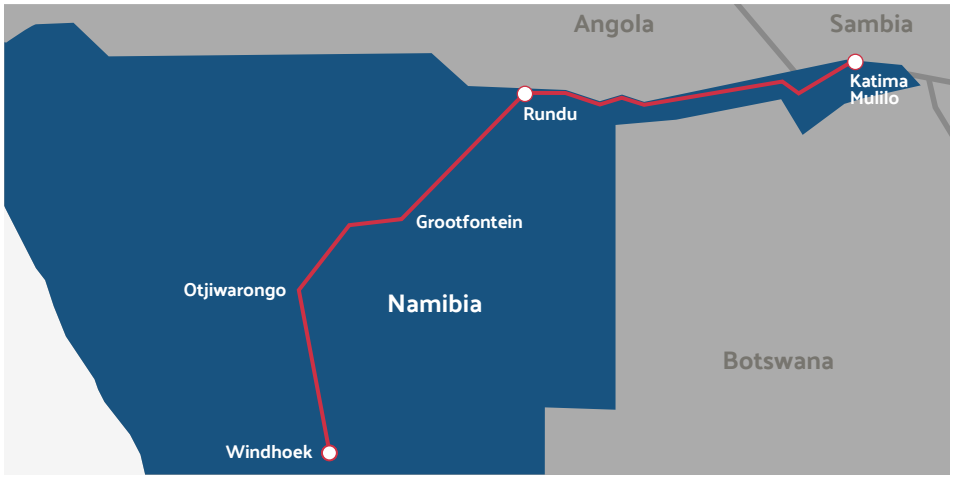

Fig. 1. Over the past 7 years, NEO FOR NAMIBIA – Helping Babies Survive teams have traveled to Namibia sixteen times, totaling 16 visits to Rundu State Hospital and 8 visits to Katima Hospital.

All equipment was brought through customs without any incidents; for the first time, a consignment agent from Xtreme Freight was at the airport and assisted in customs clearance. At the Hosea Kutaku International Airport, the team was met by their assistant and driver Isaac Boois. After loading all the equipment into the Toyota Hilux and dropping the team off at their hotel in Windhoek, Isaac Boois started his three-day-drive towards Katima via Grootfontein and Divundu; he would meet the other team members at Katima Airport.

While awaiting their connecting flight to Katima, Prof. Berger and Dr. Knoll visited the neonatal unit at Katutura Hospital. It was agreed that Prof. Berger would give some lectures on common neonatal topics and practical training sessions on the Pumani® bubbleCPAP machines prior to returning to Switzerland; the details were to be planned by the local doctors and nurses.

On October 28, 2022, Prof. Berger and Sarah Knoll flew to Katima (Fig. 2 – 4). They took over the car and all the equipment from their driver who flew back to Windhoek one hour later. The next three weeks, the physician team spent working at Katima Hospital (5 days) and Rundu State Hospital (15 days).

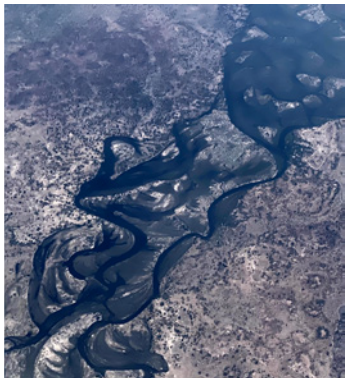

Fig. 2. Flying over Africa: the sceneries never seize to amaze us.

Fig. 3. Approaching the small airport of Katima (called Mpache, MPA), about 20 km west of the city center of Katima.

Fig. 4. Signs of the government's efforts to fight the challenges of the Corona pandemic could still be seen, even though most restrictions had been lifted.

On November 16, 2022, they left Rundu to return to Windhoek. Sarah Knoll returned to Frankfurt the next day while Prof Thomas M. Berger stayed on 5 more days before flying back to Zurich via Johannesburg.

2. MAIN MISSION GOALS

The goals of the 16th mission were:

1. To evaluate progress made at Katima Hospital after moving into the new neonatology unit and having a dedicated physician and a larger nursing team

2. To introduce a point of care testing (POCT) device to measure C-reactive protein (CRP) concentrations at Katima Hospital and to evaluate the first 6 months of POCT CRP determinations at Rundu State Hospital

3. To introduce a new ventilator (MTTS Impala®) and a new CPAP device (MTTS Beluga®) to be used during initial stabilization of newborn infants in the delivery rooms at Rundu State Hospital

4. To support local health care professionals at Rundu State Hospital by helping with daily ward rounds in Block A of the new Prem Unit

5. To train interns at Rundu State Hospital and health care professionals at Katutura Hospital

3. HOSPITALS VISITED

3.1 Katima Hospital

On their first day, Prof. Berger and Dr. Knoll were met by Dr. Kabidiki (acting CMO), Dr. Zishumba (acting SMO), Dr. Likokoto, Dr. Dziva (Head of Pharmacy), Dr. Victor (MO Pediatrics) and Dr. Mashinyira (MO Pediatrics). As suggested in advance, Dr. Victor had set up a schedule for several teaching sessions for the next days.

3.1.1 Overall impression

The new neonatology unit (Fig. 5) functions well and has proven to be a big step forward for the quality of care of neonates at Katima Hospital. It was obvious that Dr. Cristy Victor had tried her level best to transfer new knowledge into daily practice. She was assisted by a dedicated core group of nurses who no longer rotate to other departments in the hospital.

Fig. 5. Nurses and doctors responsible for the neonatal unit at Katima Hospital are highly motivated to further improve the care of their patients.

3.1.2 Stable case load

In contrast to Rundu State Hospital (see below), the case load at Katima Hospital in 2022 has remained at the level of 2021: on average, the were about 30 admissions per month resulting in a daily patient census of between 8–12 patients.

3.1.3 Rounds

Rounds were usually well organized, and the use of structured progress note sheets has become the standard. The ready availability of laboratory results was still not guaranteed; NIP performance remained unacceptably poor. Therefore, it is obvious that POCT of certain laboratory parameters (glucose, hemoglobin, bilirubin, CRP) would greatly facilitate daily rounds. In addition to making rounds more efficient, it requires much smaller blood sample volumes and is therefore much more baby friendly.

Monitoring of patients remained inadequate: while many patients were on continuous pulse oximetry monitoring, the response to alarms was poor. More training will be needed to increase the awareness and interpretation of monitor alarms. While this appears to be simple in theory, its translation into routine practice is challenging. In part this can be explained by nurse-to-patient ratios, but other factors are likely to play a role. Health care professionals in leadership positions must encourage their peers to perform better.

3.1.4 Introduction of a new POCT CPR measuring device

Encouraged by the preliminary experience at Rundu State Hospital, a POCT CRP measurement device (AIDIAN QuikRead go®) was introduced at Katima Hospital (apart from the machine (CHF 900.00), 200 test kits at a cost of CHF 3.00/test (NAD 50.00/test) were provided). It was emphasized that for every patient a) the indication for the test, b) the result, as well as c) the consequences must be recorded (Fig. 6). This will allow proper evaluation of its use in the upcoming missions of NEO FOR NAMIBIA – Helping Babies Survive.

Fig. 6. Data form (left) for the prospective collection of information on POCT CRP measurements (right).

Name: Baby of _____ **Birth weight:** _____

Date of birth: _____ **Date of admission:** _____

Previous test: ☐ no

☐ yes Date: _____ ☐ **Result:** _____ mg/l

☐ **Result:** not available

Date of current test (POCT): _____ **Result (POCT):** _____ mg/l

A) Indication

☐ r/o neonatal sepsis (on antibiotics); 2nd CRP (question: can ABx be stopped?)

☐ r/o neonatal sepsis (not on antibiotics); 1st CRP (question: must ABx be started?)

☐ other (describe): _____

B) Consequence regarding antibiotics

☐ Antibiotics stopped

☐ Antibiotics continued

☐ Antibiotics started

☐ Antibiotics changed

☐ Antibiotics withheld

C) Comments (if general rules were not followed, indicate why):

As outlined in previous reports, the consequences of having CRP results rapidly available are numerous (in addition to the fact that only 10 µl of blood are required contrasting with 1–2 ml if sent to NIP):

- Many (up to 95 %) of babies do not have EOS and are unnecessarily exposed to prolonged courses of antibiotics with a negative impact on their intestinal microbiome
- Babies with prolonged antibiotic exposure are at higher risk for late-onset sepsis (LOS) and necrotizing enterocolitis (NEC)
- Massive overuse of antibiotics likely leads to selection of multi-resistant bacteria, potentially rendering first and even second line antibiotics ineffective
- Prolonged courses of antibiotics generate significant costs (IV access, drugs)

3.1.5 Teaching sessions for nurses and doctors

Refresher training on neonatal resuscitation (with hands-on practical exercises) was provided. In contrast to what had been anticipated, no interns had yet arrived at Katima Hospital. Planned lectures on neonatal respiratory support and fluid and nutrition management had to be cancelled because of an acute emergency in the neonatal unit.

On several occasions, nurses and doctors were instructed on how to use the AIDIAN QuikRead® go CRP device. Monthly quality control with a control serum was explained and the need for documentation emphasized.

3.1.6 Delivery rooms

Practical sessions on neonatal resuscitation were also offered for midwives. Unfortunately, the infrastructure and equipment in the delivery rooms remained catastrophic (Fig. 7). This observation was pointed out and discussed with Dr. Berbe Manolo, a dedicated Cuban physician in charge of obstetrics and gynecology.

Fig. 7. Room for improvement: the labor and delivery ward at Katima Hospital continues to be poorly equipped (the wall-mounted neonatal resuscitation device on the right was no longer in use but had not yet been removed) and existing equipment is poorly maintained.

When we found out that all of the four new MTTS Wallaby® warming tables had been kept in Rundu, we arranged for transfer of two of them to Katima. The tables arrived on the day of our departure, were quickly assembled, and – together with 2 pulse oximeters from the neonatal unit – put to use in the labor and delivery area. We will have to verify their proper use during our next visit (January/February 2023). Finally, we left 10 Kiwi vacuum extractors with Dr. Manolo.

3.1.7 Statistics

Interim analysis of the 2022 neonatal unit statistics revealed ongoing improvements. From January 1 to October 31, 2022, 317 babies had been admitted to the ward; 37 of them died (Mortality rate 11.7 %). Theis represented a significantly lower mortality rate in 2022 compared to 2021. In part, this might be explained by variations in case mix (e.g., significantly lower number of admissions of extremely low birth weight infants). On the other hand, mortality rates had decreased in all birth weight categories (Fig. 8).

Statistics 2021 (01-12 2021) versus 2022 (01-10 2022)

Neonatal Unit - Katima Hospital

	01 - 12 2021			01 - 10 2022		
	Admissions	**Deaths**	**Mortality rate**	**Admissions**	**Deaths**	**Mortality rate**
	343	**64**	**18.7%**	**317**	**37**	**11.7%**
< 1000 g	20	16	80.0%	4	3	75.0%
1000 - 1500 g	54	18	33.3%	40	12	30.0%
1501 - 2500 g	128	14	10.9%	105	9	8.6%
> 2500 g	141	18	12.8%	168	13	7.7%
Total	**343**	**64**	**18.7%**	**317**	**37**	**11.1%**

Fig. 8. Analysis of statistical date from Katima Hospital: birthweight-specific mortality rates had continued to improve (the low number of ELBW infants admitted in 2022 will need to be explained).

It is worthwhile to remember that in 2019, when the hospital was first visited by NEO FOR NAMIBIA – Helping Babies Survive, the mortality rate of inborn infants for that year was 33.3 %. The 66 % reduction in mortality rate over a period of only 3 years is extraordinary!

3.1.8 Next steps

Given the nice progress seen at Katima Hospital, the neonatal unit can be developed further: NEO FOR NAMIBIA – Helping Babies Survive will provide MTTS Dolphin® CPAP machines and train the local physicians in providing INSurE (Intubate – Surfactant – Extubate). As pointed out above, the use of the 2 MTTS Wallaby® warming tables and Rad-G pulse oximeters in the delivery rooms will have to be reviewed on our next visit. Finally, portable X-ray must again be made available.

3.2 Rundu State Hospital

3.2.1 Overall impression

During their daily work in Block A of the Prem Unit, Prof. Thomas M. Berger and Dr. Sarah N. Knoll were confronted with various obstacles that interfered with their work. Some of these (e.g., equipment malfunction, lack of medications due to brittle supply chains) had to be accepted. Others, however, such as inappropriate behavior of a few staff members were not excusable and had to be discussed openly with the hospital leadership.

Over the past seven years, neonatology at Rundu State Hospital has made enormous progress (Fig. 9, 10). Survival chances for sick babies have never been higher at this hospital. However, it must be recognized that poor supervision and slack leadership could potentially jeopardize these results. This is particularly true in an organization that continues to grow and employs increasing numbers of staff members from diverse backgrounds.

Fig. 9. The Prem Unit at Rundu State Hospital now functions as a referral center for the Kavango and Zambezi regions of Namibia; it has evolved into a level III neonatal intensive care unit.

Fig. 10. Progress made over the past years at Rundu State Hospital is clearly visible; maintaining the current level of neonatal care will require strong local leadership.

3.2.2 Equipment

Prof. Thomas M. Berger was able to assemble and demonstrate the back-up MTTS Impala® ventilator and VADI humidifier (Fig. 11). Several drawbacks were noted: a) the ventilation mode that had been used with the EVE® TR neo ventilators (SIMV + PS) could not be used because PS was not available for the SIMV mode on the MTTS Impala®; b) the flow curve was not scalable; c) triggering appeared to be unreliable. These issues were discussed with Steffen Reschwamm from MMTS in Vietnam. He promised to address these issues with his team. (Note: a software update was later installed by John Namwira that corrected these deficits).

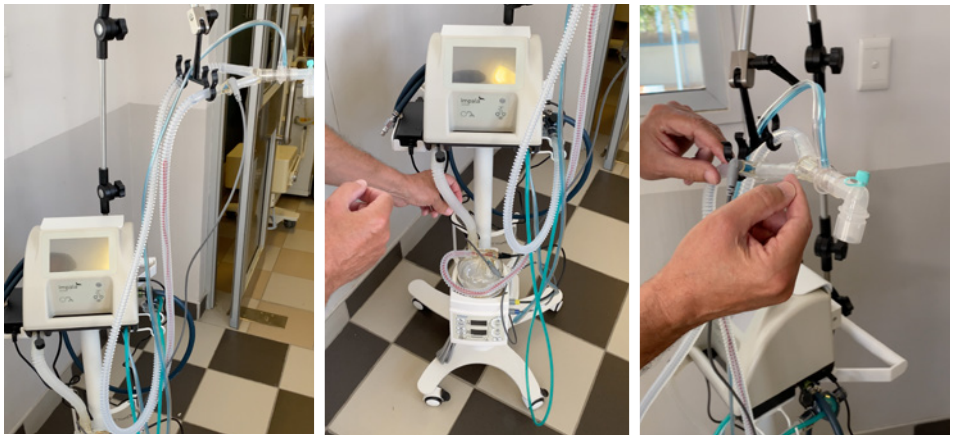

Fig. 11. The MTTS Imapala® ventilator will primarily be used as a backup device when the more sophisticated EVE® TR neo ventilators are both in use or sent for servicing.

The incubators purchased from Phoenix Medical Ltd. continued to malfunction despite several attempts to get the problems solved (Fig. 12). We will request a full refund from VIA Global Health. Consequently, it will be important to look for alternative solutions from a different supplier.

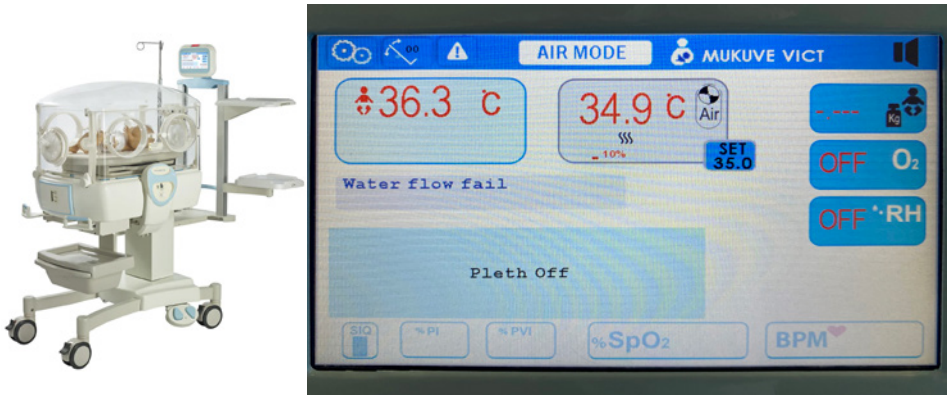

Fig. 12. The Phoenix INC 200 incubator was still not functioning properly: while the air could be heated, it could not be humidified because of persistent "water flow fail".

3.2.3 Statistics

The Prem Unit at Rundu State Hospital continued to be very busy; the number of admissions will likely exceed 1200 by the end of the year. The overall mortality rates of infants admitted to the Prem Unit at Rundu State Hospital had reached a value of less than 10 % for the first 10 moths of the year (Fig. 13). Improving survival rates for extremely low birth weight infants (birth weight < 1000 g) further will be difficult. Emphasizing the importance of proper hospital hygiene procedures and implementing strategies for antibiotic stewardship will play a major role because many of these babies survive initially but die later from (nosocomial) late-onset sepsis.

Statistics 2021 (01-12 2021) versus 2022 (01-10 2022)
Neonatal Unit - Rundu State Hospital

	01 - 12 2021			01 - 10 2022		
	Admissions	Deaths	Mortality rate	Admissions	Deaths	Mortality rate
	1004	100	10.0%	1013	78	7.7%
< 1000 g	41	22	53.7%	30	14	46.7%
1000 - 1500 g	133	19	14.3%	103	17	16.5%
1501 - 2500 g	276	22	8.0%	227	19	6.9%
> 2500 g	554	37	6.7%	603	28	4.6%
Total	1004	64	10.0%	1013	78	7.7%

Fig. 13. Analysis of statistical date from Rundu State Hospital: overall mortality rates (including both inborn and outborn infants) have now fallen below 10 %.

3.2.4 Challenging patients

3.2.4.1 Posthemorrhagic hydrocephalus

Head ultrasound (HUS) examinations are standard in very low birth weight infants in high income countries, primarily to rule out periventricular/intraventricular hemorrhage (PIVH) and periventricular leukomalacia (PVL). Once PIVH has been detected, HUS is used to rule out posthemorrhagic hydrocephalus (PHH) due to impaired flow of cerebrospinal fluid (Fig. 14, 15).

Fig. 14. On day of life 16, his former low birth weight infant (birth weight 1610 g) was noted to have a large head, a full anterior fontanel and widened cranial sutures.

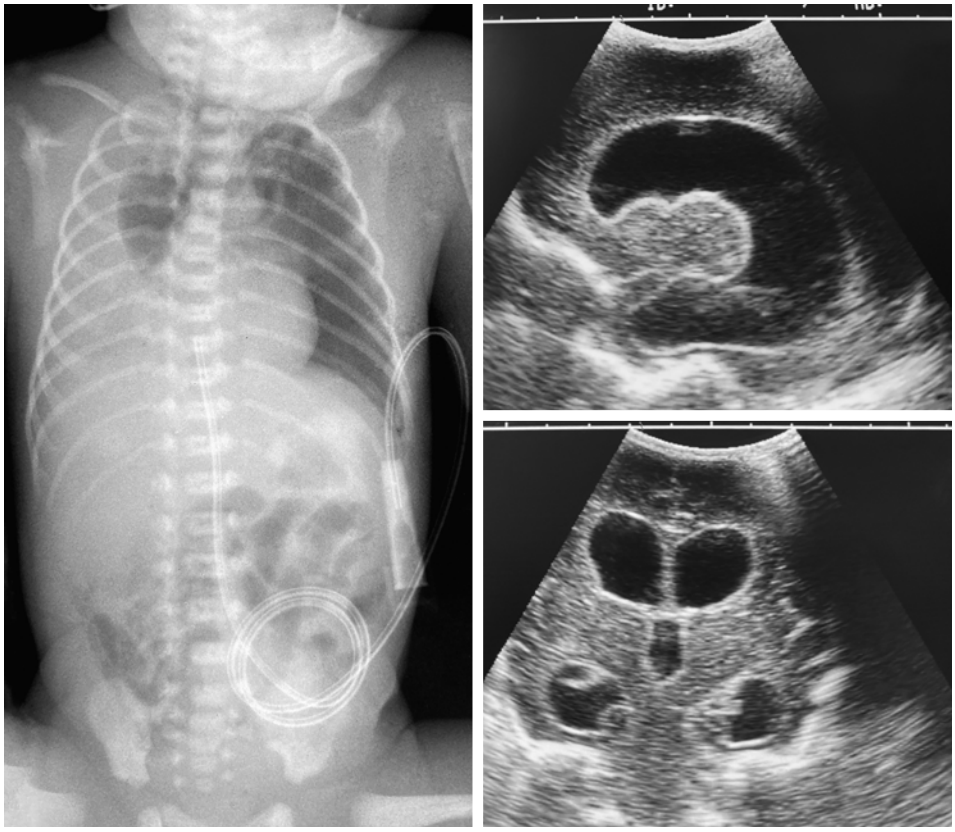

Fig. 15. This patient's initial hospital course had been complicated by hyaline membrane disease and a large right-sided pleural effusion (left); HUS on day of life 16 revealed posthemorrhagic hydrocephalus (right).

At Rundu State Hospital, HUS is not used for several reasons: 1) lack of know-how, 2) lack of a suitable US machine (the device used in obstetrics is very old), and 3) neurosurgeons at Windhoek Central Hospital apparently always request CT scans prior to accepting referrals (Fig. 16).

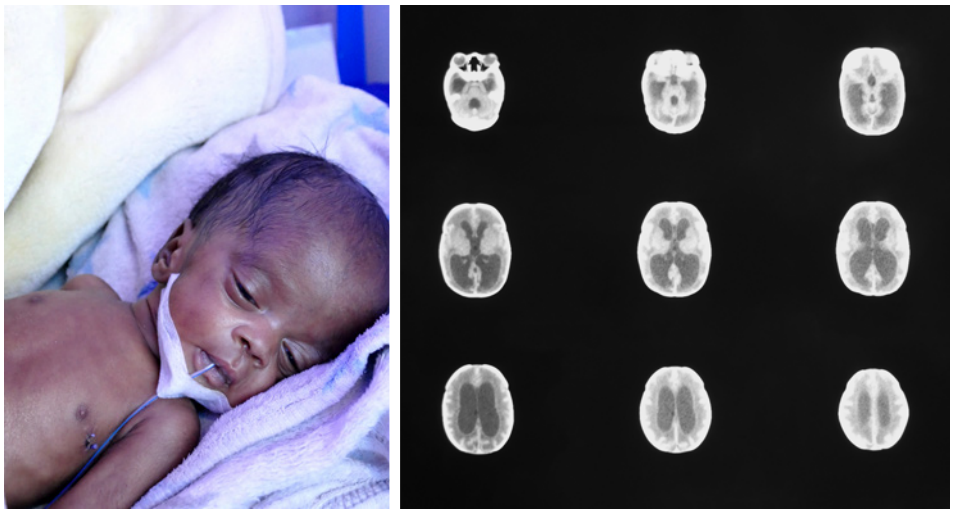

Fig. 16. Neurosurgeons at Windhoek Central Hospital insisted on a CT scan prior to the patient's referral to Windhoek: the findings of the HUS were confirmed.

3.2.4.2 Patient with extreme wight loss

Late referrals, particularly from the villages, still occur: this patient reportedly had been born at term with a birth weight of 3100 g. On admission, on day of life 16, the baby's wight was 1580 g, corresponding to a weight loss of 50 % (Fig. 17). After initial stabilization, the infant decompensated two days later requiring intubation and mechanical ventilation for 2 days. She was then successfully extubated and transitioned to CPAP and later on nasal cannula oxygen. Hopefully, she will make a full recovery.

Fig. 17. A former term infant (birth weight 3100 g) admitted with severe weight loss on day of life 16 (left); rehydration and refeeding had to be done without adequate laboratory investigations.

3.2.4.3 RSV cases

Not unlike to what had been reported from high income countries, after Coronavirus restrictions had been lifted, large numbers of (viral) upper and lower respiratory tract infections were observed. Many of the younger patients (< 1 year of age) required hospitalization (Fig. 18).

Fig. 18. The pediatric ward at Rundu State Hospital was very busy, mostly due to (viral) cases of upper and lower respiratory tract infections: this infant had obviously recovered from his RSV (respiratory syncytial virus) infection.

3.3 Katutura Hospital

Before returning to Switzerland, Prof. Berger once again visited Katutura Hospital. No significant changes could be observed in the neonatal unit (Fig. 19, 20). The 3 Pumani® bubbleCPAP devices and consumables (which had never been used) were therefore removed from Katutura Hospital (Fig. 21). When representatives of the MHSS confirmed that there were plans to establish a neonatal referral center for the Erongo region in Swakopmund, it was decided that the equipment would be transferred to Swakopmund Hospital.

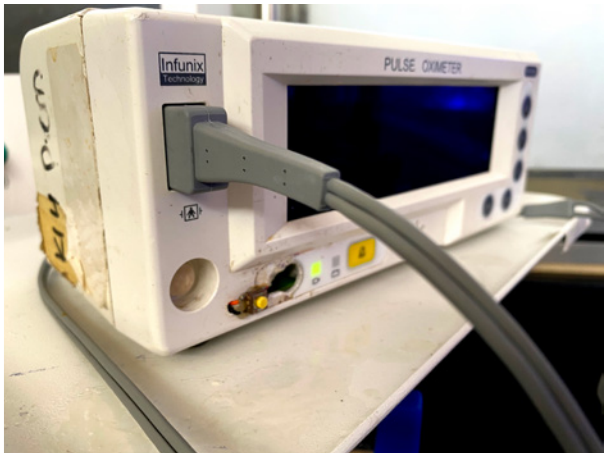

Fig. 19. Lack of leadership: the neonatal unit at Katutura Hospital has not made any progress over the past years (left: inadequate equipment for intubation; right: malfunctioning pulse oximeter).

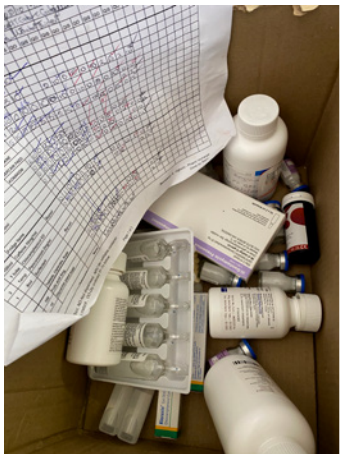

Fig. 20. Lack of leadership: the neonatal unit at Katutura Hospital has not made any progress over the past years (storage of medications).

Fig. 21. The Pumani® bubbleCPAP devices were removed from Katutura Hospital (black boxes); they will be brought to Swakopmund in January 2023.

4. VISITING A VERY SPECIAL PATIENT IN GOBABIS

On November 20, 2022, Prof. Thomas M. Berger drove to Gobabis (approximately 200 km east of Windhoek) to visit Quintolina (Queenie) de Wetta and her family. She had been born on January 9, 2018, with a so-called heteropagus malformation (Fig. 22–24).

Fig. 22. Pauline de Wetta with her daughter Quintolina in 2019 at Windhoek Central Hospital.

Fig. 23. Queenie at the age of 13 months: heteropagus malformation (a type of conjoined twinning in which a partially formed defective twin is attached to an otherwise normal twin.)

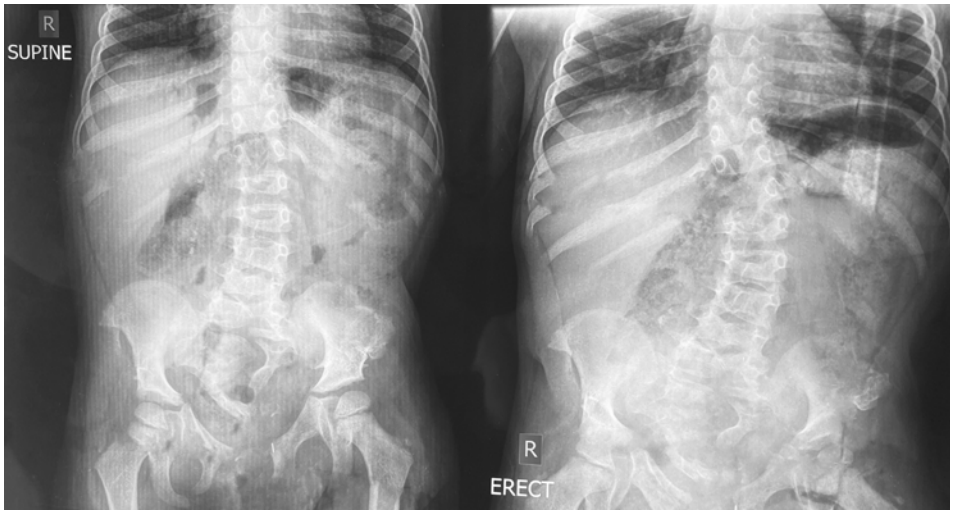

Fig. 24. Abdominal X-ray of the patient with heteropagus malformation.

In 2019, she had undergone several complex surgical procedures at the University Children's Hospital in Zurich. It was very nice to see that she had recovered well and was able to walk and play with the other children (Fig. 25, 26). She will still require long-term medical follow-up to optimize her outcome: she continues to have urinary incontinence, and, based on some medical reports, her left kidney had not been growing normally.

Fig. 25. Visiting the De Wetta family in Gobabis (left: Pauline, Queenie's mother, right: Queenie can run!).

Fig. 26. Visiting the De Wetta family in Gobabis: Queenie and her friends.

5. FUTURE DIRECTIONS

5.1 Mission 2023-1

The 17th mission of NEO FOR NAMIBIA – Helping Babies Survive will take place in January and February 2022. Prof. Berger, his wife Sabine Berger, and her friend and colleague, Yvonne Fallet, will carry out that mission.

5.2 Ongoing motivation

NEO FOR NAMIBIA – Helping Babies Survive will continue and potentially expand its efforts. Most recent data from the World Bank and WHO demonstrates persisting large gaps in neonatal care between high and low- and middle-income countries. For example, in 2021, the neonatal mortality rate (defined as deaths occurring in the first month of life) was 2.7 per 1000 live births in Switzerland and 19.5 per 1000 live births in Namibia (Fig. 27). In addition, within Namibia, the neonatal mortality rates vary greatly between different regions: Khomas 11.8/1000 live births, Kavango 27.1/1000 live births, Caprivi 23.2/1000 live births (data from 2013).

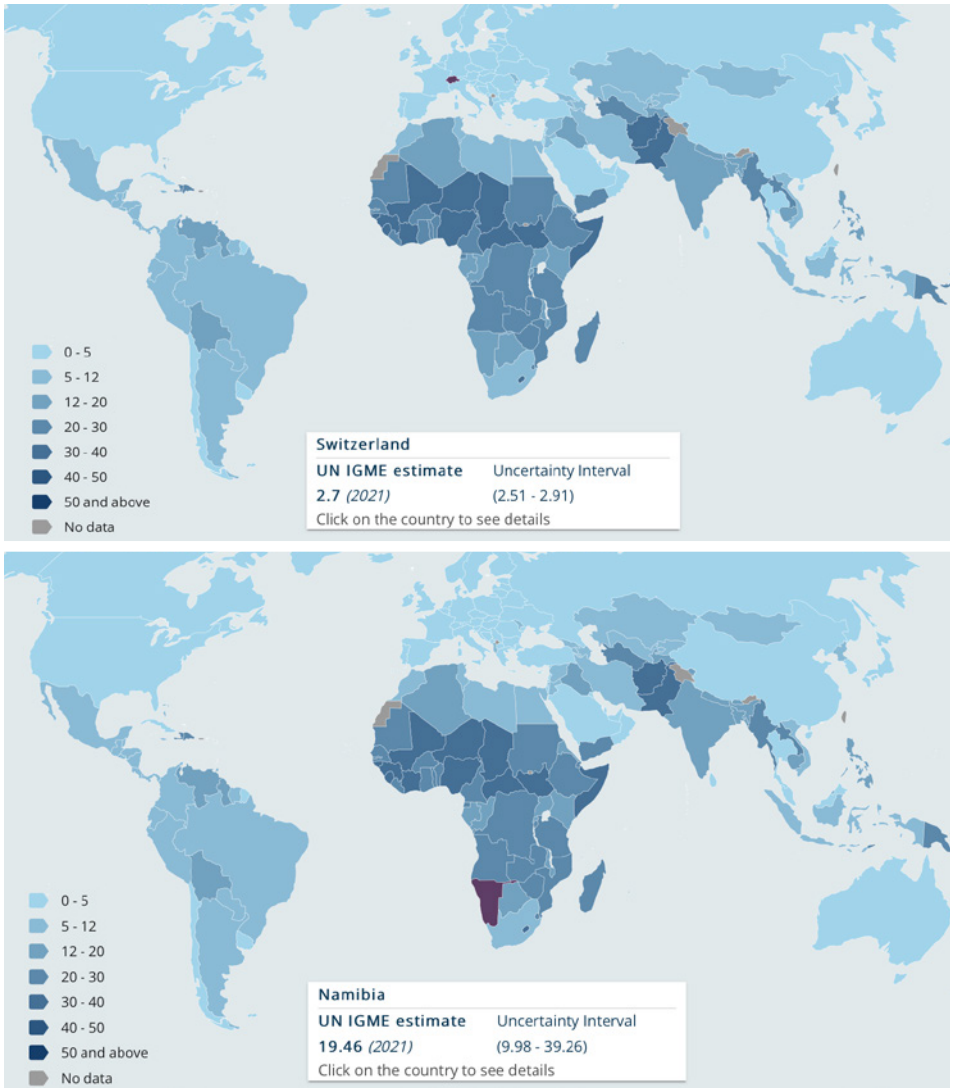

Fig. 27. Comparison of neonatal mortality rates between Switzerland and Namibia (most recent data, 2021; source: https://childmortality.org).

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