Technology & Innovation in Pediatric ICUs: An Emerging Look at Africa

Speakers:
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Hans-Jörg Lang
Welcome to this episode of the pediatric intensive care Awareness Week podcast series, which is run by the World Federation of Pediatric Intensive Critical Care Societies. In this series, teams from different global regions share their experience with a special focus on how technology and innovation can help to improve the care of critically ill children. My name is Hans-Jörg Lang. I'm working for the Heidelberg Institute of Global Health and the humanitarian organization Alima. It's an honor for me to host today's conversation, which highlights the remarkable efforts of clinical teams working in Sub Saharan Africa. I would like to welcome Mrs. Marah Issiatu, a senior nurse and matron working at the Ola During Children's Hospital in Freetown, Sierra Leone, West Africa. We also have Prof Archippe Birindwa. He is a senior pediatrician working on a pediatric unit in Bukavu, South Kivu in the east of the Democratic Republic of the Congo. We also have Prof Diavolana Andrianarimanana, a senior pediatrician and hospital director of the Center Hospitalier Universitaire Mahajanga in Madagascar. So welcome to you, Diavolana. In this podcast, our colleagues will share their challenges they face in their countries and within their working environments, but more importantly, we aim to highlight their resilience, courage and professional expertise, as well as their remarkable potential for innovation and problem-solving capacity. Before we start some background information, despite considerable advances in global child health in 2023 still more than 4.8 million children died before the age of five years. Many of these tragic losses resulted from severe infections, like respiratory infections, severe malaria, diarrheal diseases, sepsis. Most of these deaths or conditions are preventable and or treatable. In addition, a large number of these under five death are linked to undernutrition, and around 40% of them occur in the neonatal period. Importantly, maternal health is critical for disability free neonatal survival, yet maternal morbidity and mortality remain unacceptably high in many resource-limited settings. Most maternal deaths are preventable and treatable, for example, caused by severe infections,

sepsis, postpartum hemorrhage. This also underscores the need to integrate reproductive health into essential critical care approaches, including a strong focus on adolescent health. Globally, around 1.5 million children and young people between the age five and 19 years died in the year 2023 causes, again, are severe infections, but also injuries like road traffic accidents, exposure to violence and conflict, important causes of morbidity and mortality in this age group are also communicable diseases, sickle cell disease, HIV, TB. Children and young people in low resource settings face exceptionally high mortality risks due to socioeconomic challenges and humanitarian crisis, the African continent in this context, bears a disproportionate burden of disease. While improving living conditions and public health measures like vaccinations, malaria prevention. Access to essential emergence in critical care is another important element of improving child health. Strengthening referral pathways from communities to peripheral health facilities to district regional hospitals plays an important role in this context. Some regions across Africa confront additional dramatic challenges, such as ongoing health emergencies. As an example, Eastern Congo is currently experiencing an mpox epidemic, while being exposed as well to the impacts of conflicts and a large number of internally displaced populations, particularly in the provinces South Kivu and North Kivu. In Sierra Leone, for instance, the impacts of the civil war over two decades ago, along with the devastating effects of Ebola outbreak between 2014 and 16, still shapes both the health system and socio-economic conditions. In many countries, climate change further compounds these challenges. Example, in Madagascar, the country is facing increasing frequency and severity of tropical storms altered rainfall patterns and threats to food security and infrastructure. Addressing these complex challenges requires multi sectorial approaches to mitigate, respond to and prepare for the diverse threats facing the regions. In this podcast series, we will focus on access to essential pediatric critical care services, an important component of universal health care coverage as outlined by the United Nations Sustainable Development Goals. We are delighted to welcome our colleagues today. First sister Mara Hisiatu from Freetown, Sierra Leone, Dr Archippe Birindwa from Bukavu in South Kivu province, Democratic Republic of Congo, and Professor Diavolana Andrianarimanana from Mahajanga, Northwestern Madagascar. Thank you all for joining us. Let's start in Freetown Sierra Leone's sister Mara. Could you please describe the current situation in Sierra Leone and share some of the key challenges you and your team face in providing essential critical care for sick children in an urban setting in West Africa? So over to you, sister Mara,

Marah Issiatu

Thank you very much. Hans, actually, despite the war we had 20 years ago and after that, in 2014 and to 2016 we had the Ebola outbreak, we have been managing to provide essential

services, especially to our critically ill kids. However, we have challenges. Since the free healthcare initiative was launched in 2010 we had high influx of cases visiting our facility to access care and to just give some few statistics. In 2023 we had well over 18,000 cases visiting our facility, and among this, we had inpatient admission of well over 13,000 and in 2024 there was an increase, and we had well over 24,000 cases visiting our facility. And among this 24,000 we have well over 14,000 cases being admitted. And actually this year, from 31st of March to the first of April, around 8am to 4pm we had well over we've seen well over 100 cases children. And among these 100 children seen, we had 25 been admitted, and 75 seen as an outpatient cases and then sent home. Actually, due to this high influx of cases needing an emergency care, our staff are in most of the time, burn out, and they are psychologically stressed, and most of these cases present with infectious diseases like malaria, pneumonia, malnutrition and then sepsis. So these are our challenges for now.

Hans-Jörg Lang
You also mentioned that your unit in Freetown also had some infrastructure challenges, like electricity supply. Can you give us some more details, and how did that affect the care of critically ill children.

Marah Issiatu
Yeah, before this time, our facility was getting our power supply from the national supply system, but there are some challenges with that, especially when we have critically ill children on oxygen, CPAP and those monitors, etcetera. So due to these challenges, the MHS, in collaboration with partners, brought the ideology of using our generator, and so they procured generator. Because the generator is operating on a daily basis, so there are issue with maintenance, there are issue with breakdown. But however, we are so happy now we have 24-hour supply of electricity use in the solarized system that we are now using.

Hans-Jörg Lang
So that's very interesting, that stabilizing your electricity system can then obviously improve quality of care, especially if it comes to reliable oxygen supply, function of other biomedical equipment. You mentioned that you receive a large number of children from Freetown, but even maybe from up-country. Yeah. Can you tell us a bit more about the challenges that families or parents of critically ill children face in an urban setting like Freetown when trying to access health care for their critically ill children?

Marah Issiatu

Yeah, Freetown, of course, is the urban setting, and we have cases coming from the far east, although the hospital is situation in the eastern end of preterm. We have also cases coming from the far west, with speed cases, and at times we have traffic jam due to the road network, and there are difficulties. They face a lot of difficulty, especially when children are critically ill and need emergency intervention. So most of these cases, by the time they arrive at the hospital, is a problem. So even those also that are coming from the district, from the rural setting, being that is the, is the national we, we are, we are operating. I am in the National Hospital for pediatrics. By then, it was the only referral hospital. But now we have one now that has been recently constructed. So we have also cases. Trying to access this facility from the rural setting also has challenges with transportation issue and then the distance coming from the far rural setting to the urban setting in Freetown in order to access care. So at times, most of these children by the time they arrive as a problem.

Hans-Jörg Lang

So, this is very interesting for our listeners. So usually if parents try to access a health center or district hospital or even the larger urban health facilities, parents will have to organize their own transport. There may be traffic jams and there's cost for the transport sister Marah, do you have an ambulance system? And can you tell us a bit more about what works well and what are the challenges with the ambulance system in Sierra Leone?

Marah Issiatu

Like for the ambulance system now, because of this issue we had with the road network referral system, So now we have names that is managing the ambulance system in order to convey critically ill children within Freetown, which is the the capital city, and even from the district hospitals. Before this time, they had challenges, like with the issue of saying fear and other things. But for now, as recently as yesterday and last week, the issue of fear now is a bit better.

Hans-Jörg Lang

Thank you very much. Sister Marah. So now let's move to Bukavu in the Democratic Republic of Congo. Doctor Archippe, we are very glad that you can join us from South Kivu, the eastern part of DRC of Congo, would you describe a current situation in eastern Congo in South Kivu? What are the main challenges you and your team are facing at the moment? So please over to you. Dr Archippe,

Archippe Birindwa

Thank you very much Doctor Hans for this opportunity. Of course, I'm the one of doctors in the South Kivu province. I'm a pediatrician working in Bukavu, in the South Kivu province, in the eastern part of the Democratic Republic of Congo. Bukavu, as you know, is also the home of the Nobel Prize Dr Mwege, gynecologist who works at Panzi, as you know, the South Kivu is one of the province that is facing to the war. Whoever the health system is in our province is under immense strain. Even before the current crisis, we were already dealing with very high children and maternal mortality rate due to the limited access to the essential health service and a fragile infrastructure. Now we are facing multiple overlapping emergencies. The first there is the outbreak of Mpox, which has been affecting a large part of the Democratic Republic and near growing countries in additions over the past year, several area in Ituri, North Kivu and other place we had the Ebola virus outbreak, and now we have had also epidemic like Morbillivirus near near us here in Rwanda. And on top of this, we are exposed to an armed conflict, the resurgence of the M 23 rebel movement has lead to massive displacement of people, violence, sexual violence and serious human rights violation. 1000s of people have been forced to flee their homes. Many arrived injured, traumatized and urgent need of care. We are seeing many critical illness, ill children, men with severe respiratory infection, severe diarrhea, severe malaria, sepsis and malnutrition as a complicating factor. Recently, we treated children with measles, very concerning, as this could mean that vaccination coverage among vulnerable population is insufficient. Our pediatric teams also care for children with Mpox infections, many of these children can become critical ill with respiratory complication like shock also and digression and bacterial serum infections, especially malnourished children can develop severe Mpox disease. Many patients are left with squarely, some complication like ophthalmology problems, skin lesion. We also treat, in our hospital, newborn infected with mpox. All of these very sick children need a sensory pediatric critical care measures such as supplemental oxygen and non invasive respiratory support like bubble CPAP and other kind of treatment, like for the shock, for severe anemia and other neurology complications. And we had also a high number of injured children, adolescent and mothers care that needs surgery because of the war, as you know, and here the big problem is to access to oxygen, ventilation and also the blood transfusions. Just recently, I had personal experience that relate to that really shocked me. I was leaving for a meeting when two bombs exploded near an ambulance in Bukavu center, and I was just across the place, we suddenly had round 20, a dozen of wounded patients. I was obliged to remove the bed from the ambulance and to put patients inside in order to bring them to the hospital. That was very, very tough. That's the situation in in eastern part of the Democratic Republic of Congo for now

Hans-Jörg Lang

It's remarkable to hear about the incredible work you and your clinical team are doing to provide regular healthcare for sick children, all while managing an ongoing mpox epidemic. On top of this, there's armed conflict in South Kivu with a large number of internally displaced populations. Now let's move to Madagascar. Prof Diavolana, could you please explain the particular challenges and situations you are facing in your country regarding the care of critically ill children? So please over to you. Dia,

Diavolana Koecher
Thank you. Hans. I am Diavolana Koecher. I'm a pediatrician, and I work at the University Hospital in Mahajanga on the eastern coast of Africa is one of the fourth biggest islands in the world. And today, in 2025 we are 31 million people. Despite considerable improvement over the last years, our child and maternity mortality rates is still gradually high. So there are challenges. Some solutions were put in place but the one of our challenges is that our country is a big island. It's not easy for the long distances, but separate homes from health centers, especially during cyclones So during the rainy season, because we have dozens of cyclones every year. And this is a challenge, because there are damage, damaging our infrastructure, the road infrastructure every year. We have to build again, and especially for hospital infrastructure and the enrichment of health.

Hans-Jörg Lang
Can you tell us more about the difficulties of populations in Madagascar to access health care for critically ill children?

Diavolana Koecher
For the access for healthcare for severe ill children, in the beginning with the transport, even the Ministry of Health put in place an ambulance system, because now we have in each district an ambulance for transport is difficult in rainy season because of climate change impact, bringing every year, dozens of stronger cyclones. And these cyclones are on one hand, they are damaging roads, practical access for severe ill children to the infrastructure. But on the other hand, there is also the cyclone damaging the health infrastructure, and it happens every year. And unfortunately, we see that with the climate change problem, the Cyclones are getting stronger every year.

Hans-Jörg Lang
Can you describe some other challenges Madagascar is facing in relation to climate change-related events?

Diavolana Koecher
We are facing drought, it's like on the east side of the country, on the coast of the Indian Ocean, there is this rain bringing diseases like diarrhea and malaria. But on the other hand, in the south west of Madagascar, we have droughts, long time with no rain, and this has an impact on agriculture and food safety for the children. And when we are getting ill, especially in the south western or Madagascar, we do have this and this malnutrition have an impact on the critically ill children

Hans-Jörg Lang
Yeah. Thank you very much. Diavolana, and I know that you recently published a paper in the British Medical Journal regarding increasing numbers of HIV infections in Madagascar. Can you tell us briefly something about this emerging problem in Madagascar.

Diavolana Koecher
This is an emerging problem in Madagascar, because, you know, during the COVID 19, every program was a little bit suffering because all they thought was with COVID. But after the epidemic we saw the rise of HIV cases, and this is seen especially in the north in the South West region as far as systematic HIV testing in the children suffering malnutrition, and this is a challenge, a more challenge for the country.

Hans-Jörg Lang
So thank you very much, Prof Diavolana for these important information. So as we have heard, Madagascar, similar to what has been shared by colleagues from Sierra Leone and the Democratic Republic of Congo, faces considerable health system challenges which often make it difficult for families to access essential critical care. In addition, Diavolana also highlighted how climate change-related events are having a severe impact on the population's living conditions, food security, as well as road and health system infrastructure. We also heard a varying rise in new HIV infections in Madagascar, particularly among young people, with growing implications for mother-to-child transmission. So all this highlights the need for international solidarity fair economic systems that allow countries like Madagascar and Sierra Leone and Congo to invest in stronger health systems, sustained funding of UN agencies like WHO is also important to support resilience, capacity building and epidemic preparedness, importantly, implementing climate change adaptation measures require significant funding, especially for countries that are severely affected by climate change and yet have historically contributed minimally to global carbon emissions and other environmental stresses. Under the

framework such as the European Green Deal and international climate negotiations, industrialized countries have a responsibility to provide substantial support to vulnerable countries. Now let's return to Sierra Leone sister Mara. Could you please share with us some of your team's problem-solving approaches? We would like to hear more about your training programs, both at the undergraduate and postgraduate level. So over to you, please, Sister Marah.

Marah Issiatu
So, actually a significant initiative has been taken to enhance pediatric healthcare through innovative program like the specialized training program for nurses and doctors. So the doctors, we have a pediatric training program in country, and it was initiated by partners five years ago in order to reduce our child and infant mortality. Also for the nursing training program, we have the post basic unit and nursing troop program also initiated by one of our partners in collaboration with Ministry of Health, which is actually one year program that is specifically for nurses working at the special care baby Unit across Sierra Leone. So the first cohort graduated, and they were selected from regional hospitals, and the next cohort was from the District Hospital. Hopefully the third cohort also will be selected, and they will start a training again in May. So also, there is the emergency charge and assessment and treatment training program certified by WHO, and that one also when nurses are being trained in order how to exactly know how to care for emergency cases, accessing our facility and to be able to track them well and then intervene immediately.

Hans-Jörg Lang
Sister Marah, this is very important. So you mentioned the WHO recommended ETAT training, emergency, triage, assessment and treatment. Yeah, interestingly, Sierra Leone decided to adapt the ETAT training to the specific needs in your country. Can you tell us a bit more about the additions you made to ETAT, like your pediatric critical care training program.

Marah Issiatu
Yeah, So ETAT is actually a life-saving training that was done for nurses, and because most of the cases accessing our facility, they come with them critically ill, most of them are emergency cases. So that one was done for nurses, and they were top notch in terms of Actually attending to emergency cases and stabilizing them. So when they were stabilized at the emergency department, in order for us to create room for other emergency cases coming in, we sent them to either the pediatric intensive care units, based on their conditions, or the high dependency unit. Nurses were trained on how to use the different equipment then to care for these cases

based on their condition. So by then, and since then, we are able now to actually discharge more cases, despite they come in with emergency cases. One, we use the ETAT approach certified by WHO to stabilize and then send to the critically ill wards for continuum of care by the critically ill nurses that we have trained. We had nurses first, the criteria for you to be trained on care of the critically ill trial is that you should have done ETAT. There is no way you can be chosen as a nurse to undergo the CCC training, which is the care of the critically ill child training, without doing the emergency trial and assessment and treatment training. So we have nurses now that are actually catering for critically ill children until they are discharged home.

Hans-Jörg Lang
Can you tell us a bit more on how the implementation of ETAT, that emergency, triage, assessment and treatment concept of WHO, with your critical care training, had an impact on patient circuit, on patient flow within your facility, starting from triage, the emergency department and so forth.

Marah Issiatu
Yes, so thank you, Hans. And before this time, actually, since we had the we launched the free healthcare initiative in 2010 there are a lot of cases. Of course, you heard from the statistics that I told you that we have a lot of cases visiting our facility to access care. So by then, nurses or health workers had limited knowledge in terms of tracing these cases, categorizing them into emergency priority and then non urgent cases. So but with the advent of emergency charge and assessment and treatment training, even if we are still having a lot of cases visiting our facility, we are able to categorize them into emergency cases that need immediate attention, and then also the priority cases and emergency cases, and then sending them to the various units, and also for conveying of cases from the emergency unit after they have been stabilized, thanks to partner. Also, they brought in the ideology of using a trolley and our emergency kit in order to convey cases. Before this time, we used to hold the children, those that are on O2 support, and then rush with them up to the emergency, the HDU, that is the high dependent unit of people. But for now, after they have been stabilized, we convey in them. Now we had our emergency trolley, which is a portable trolley, and then portable oxygen cylinders with the CPAP, portable CPAP machine.

Hans-Jörg Lang
So thank you very much, Sister Mara for this important information. So implementing emergency and critical care needs more than just training. It needs a multi disciplinary approach to improve processes within a health facility, within a health system that needs

nurses, doctors, hospital logisticians, administration and So forth. Now let's turn back to Bukavu , to Dr Archippe unit in South Kivu, Dr Archippe. Could you tell us more about your training programs in Bukavu, which you have been able to carry out despite the ongoing armed conflict, and additionally, your team is Actually developing specific expertise in the care of children with Mpox. So please over to you.

Archippe Birindwa
Thank you, Dr Hans for the question So concerning our residency program, we have for now five students who are doing their specialization in pediatrics. We have also a program related to nurse education so now to face to the situation for now, as you know, the eastern part of Democratic Republic of Congo is facing, for is facing on different epidemics, as you know, now we are running after mpox epidemic, which is very, very critical. And few months ago, we had also Ebola viruses and we also had measles epidemics. So one of the characteristic of our region it's to have a lot of kind of epidemics, which led us to have, or to need a strength center for the management of epidemics, when the national or national Ministry of Health could help and to try to run that kind of system. For the education our nurse, our resident, they are doing, I mean, like rounds in different sub unity of Pediatrics, emergency and malnutrition and critical care, and also outpatients, but we try to have the connection with other hospitals or other specialists in different places.

Hans-Jörg Lang
So thank you very much. Dr Archippe for this description of your residence program. Can you tell us a bit more about the conditions and clinical care residents are exposed to in your emergency department?

Archippe Birindwa
Thank you for the question. I can say one of the most cases that they are facing we have severe respiratory distress, that's a very common one, and now we have especially in cases of mpox, with some up airways of obstructions caused by some kind of secretion due to mpox viruses and some kind of lymphonodes, a that we have some hemodynamic instability among some cases when they have severe bacterial infections and also severe cases of malaria, which is very endemic in our region. Malnutrition is also one of the common disease in our hospital. And also we have a problem of the blood transfusions, and that is the most usually cases even that more than that one we have also a wounded patient by the war. For now, we receive a high number of patients related to the war, and some of them, they have the psychologic traumas. And also of them they have they need for emergency surgery. So by that,

we are trying to do our best to assist those people when we don't have the governmental assistance, because we don't have a health care system, which is supported by the government, each patient who comes in need has to pay for their management. That is very, very hard for patients when we are in the war and they don't have any kind of assistance.

Hans-Jörg Lang
Let's come back to the support of these populations. So since the M23 rebel movement is active in eastern Congo, more than 500,000 people have been displaced. Only since the beginning of 2025. Can you highlight which challenges these particularly vulnerable populations face in your province?

Archippe Birindwa
Okay, good. Thank you. I can. I can highlight that's four points. I mean direct exposure to violence that could affect children, young adults and old men. We have psychological trauma and disruption of family and social network, inadequate access to clean water, food and vector control, and severe limitation access to essential health care service, including pediatrics and maternal critical care as well as vital disease prevention measures.

Hans-Jörg Lang
You clearly outlined that displaced populations are facing particular and especially in the context of an mpox epidemic. In order to provide essential critical care. This context, access to medical oxygen is vital, whether it's for treating severely ill children, supporting pregnant mothers with complications, managing trauma cases, or ensuring safe surgery and anesthesia, oxygen concentrators provide a pragmatic option for decentralized oxygen supply. Could you tell us briefly how many oxygen concentrators you have in your hospital, for the operating theater, the emergency department, the pediatric unit and your mpox treatment unit?

Archippe Birindwa
Thank you, Dr Hans, this is one of the very complicated situation that we have for now, oxygen access. For now, we have only five oxygen concentrator, and that must help the emergency room theaters. And Mpox unit, neonatology, and also for pediatric intensive care. Also the electricity is one of the challenge, because to run also our generator, we need gasoline, and when you don't have the governmental support for that, either for the ambulance that should go to pick up some patient, if they call for the ambulance, they need to pay for that, which is very complicated when you are in the war.

Hans-Jörg Lang
Thank you very much, doctor. So providing essential pediatric critical care in a conflict zone and an ongoing mpox epidemic is incredibly challenging, and of course, we need clinical training, medical guidelines and all that. But to deliver essential pediatric critical care, we also need to strengthen health systems. That means investing in infrastructure, medical supply chains and others. All this can only work if the conflict in eastern DR Congo comes to an end. So thank you again. Dr Archippe. Now let's move to Madagascar again. Diavolana, could you share with us how your team is implementing training programs in your hospital in Mahajanga, but particularly also in other regions in Madagascar, for example, in the region of Alaotra-Mangoro, which is just east of the capital Antananarivo, over to you.

Diavolana Koecher
In terms of capacity building, we developed several university diploma programs for both nurses and doctors, including diplomas in pediatrics and emergency care and also in neonatology. In addition, for more than 30 years the Glasgow University has had national specialization system across various medical disciplines, including pediatric. These specialization programs often include external we have to send the resident for external fellowships, especially in France, but it could be in Canada, and myself, I was in Germany, and this provides valuable training opportunities for young professionals to gain experience abroad. However, in recent years, more and more of our doctors have been accepted to stay and practice, especially in France or in Mayotte, next door, after their fellowships. And this is becoming a serious challenge for us. It's a classic case of brain drain. So the Ministry of Health and our universities are trying to reverse this trend by improving opportunities for health professionals in Madagascar, for instance, by expanding research opportunities. But salaries need to be improved too to make staying more attractive, and this requires funding, and that remains quite difficult in the current economic climate, especially with the impact of global trade instability and international tariff challenges.

Hans-Jörg Lang
Sister Marah mentioned who's ETAT emergency triage assessment and treatment program and training in essential pediatric critical care. Diavolana. Can you share your experience with implementing ETAT and essential critical care training in Madagascar? How has training contributed to strengthening the capacity of nurses general practitioners and pediatricians who provide this essential emergency and critical care, over to you.

Diavolana Koecher

Thank you. Madagascar is a very large island, and one of the major challenges is that many patients with during especially from rural areas during rainy season, we have difficulties to access health facilities. During the past few years, with guidance by the medical Schools and the society of the pediatric Madagascar. Pediatric Madagascar, with support from partners like the GHZ USH,and also from France and Germany, we did this training of trainers, and also we have done like a follow up with neonatal and pediatric stuff, involving our stakeholders from pediatric areas in our region to improve the health of very sick children.

Hans-Jörg Lang
Can you describe some key elements of this training and how the training of the trainer program worked? How you integrated regional and district health management teams, hospital directors, and also communities.

Diavolana Koecher

Thank you, Hans for this concrete example coming from the Alaotra-Mangoro region, home to about 1 million people in that region, which includes one regional and three district hospitals plus several peripheral health centers. We implemented the two-year training of trainers program. The aim was to build capacity among both nurses and doctors. In it attended essential critical care, including rational oxygen news and introduction of bubble CPAP for newborns and young children at hospital level. We used a variety of methods, including online modules onsite training and on the job, mentoring, all tailored to individual learning needs. At the same time, we're in a parallel to track to ensure long term sustainability. So crucially, this work was done in full collaboration with the Ministry of Health as well as the regional and district health authorities and hospital directors all actively supported the training team. We also made sure that local communities were informed and engaged. We had amazing younger nurses and doctors who are now driving these trainings. Another important aspect of the program was the evaluation of health facility readiness. This included training some hospital technicians in basic biomedical skills, such as the maintenance of oxygen concentrators and bubble CPAP systems and monitoring electricity systems. These evaluations revealed major bottlenecks, similar to what we've heard from Sierra Leone. So our priority is now the supply chain. And the Minister of Health has improved this supply chain for essential items by putting in place solar system energy, but it needs funds, so we are going on this way.

Hans-Jörg Lang

Regarding the content of ETAT training in essential peds critical care, how would you describe the link to maternal care? How important is it to combine and link child health and maternal health programs?

Diavolana Koecher
Thank you. It's a very important, I came because we, especially in the society, migrate to pediatric we worked all the time together with the in the field of the family directory in the Ministry of Health. So we are not only working for pediatric in the pediatric area, but also working with the Mother Child Health and one of the priority of the Minister of Health now is this combined maternal and child health, especially reducing mother mortality as the neonatal mortality and we developed like collaboration and monitoring of this collaboration in the neonatal staff in our region, where all stakeholders involved In Mother Child Health are discussing every two months, finding the bottleneck and searching together solutions. And it is also more important in the time now that there is an increasing HIV infection in the field of prevention of mother-to-child transmission of HIV, not only HIV, but also for syphilis and hepatitis B. So, this collaboration and this action, not only in the critically ill children and neonates, but also working together for the critically ill or against maternal hemorrhage, postpartum hemorrhage and so on to reduce maternal mortality.

Hans-Jörg Lang
Okay, So thank you very much for these descriptions of challenges and experiences from Sierra Leone, the Democratic Republic of Congo and Madagascar. Thanks to all our speakers, Sister Marah from Sierra Leone, Dr Archippe from Bukavu, South Kivu in Congo, and Prof Diavolana from Madagascar, thanks to our colleagues from the World Federation of Pediatric intensive and Critical Care society, And a special thanks to the team of OPENPediatrics associated with Boston Children's Hospital for their support to record this podcast. For more information and relevant links, please check the show notes which are associated with this podcast, thank you.