

## **Notes from the field and perspectives to establish ultrasound as diagnostic modality for pediatric pneumonia and tuberculosis in rural Uganda**

This summer I travelled to Africa for the first time. Together with Dr Sabine Bélard, a pediatric resident with special training and interest in chest ultrasound and infectious diseases, we joined Imaging the World (ITW) for a week of ultrasound in Uganda. Imaging the World (a non-profit organization) has brought portable ultrasound machines to a few rural clinics in Uganda. The initial premise of Dr Kristen DeStigter, President and cofounder of ITW, was that basic prenatal ultrasound studies would enable midwives to differentiate pregnancies that could be safely delivered in the village versus the ones that needed special attention or referral to a higher level of care. Since 2009, a few midwives and clinicians have been trained to perform these ultrasound studies and this practice has significantly improved prenatal and perinatal care in these communities.

When you first arrive in Uganda, many things stand out: it is very green, the traffic is crazy, you can always smell burned wood because it is how most cook every day and, as a pediatric radiologist, I immediately noticed that children are everywhere. In fact, 50% of the population in Uganda is under 15 years of age. Let's look at more numbers:

*Uganda Population 2012 – 32.2 M*

*Expected population in 2020 – 44M*

*Ugandan population living in rural areas -84%*

*Total number of doctors in Uganda – 644*

*% of doctors in urban areas – 70%*

*Number of radiologists in Uganda – 34*

This means that more than 80% of Ugandans (rural) have access to only 30% of the medically trained health care providers. Also they are seen at primary health care facilities which mostly lack any imaging facilities. How about diseases in Uganda?

*Acute respiratory infections – cause 15% of all deaths in children under five years of age*

*HIV prevalence – around 7%*

*Tuberculosis incidence – 175/100000 annually*

*Paediatric tuberculosis – up to 20% of the tuberculosis case load*

We know that radiological evidence supporting the clinical diagnosis of acute pneumonia and tuberculosis is desirable for optimal patient management. Lung and mediastinal ultrasound for pneumonia and tuberculosis in children is a technique that may prove to be of special benefit in settings where chest x rays are not available. Moreover, ultrasound is particularly attractive for the pediatric population as children are more vulnerable to ionizing radiation. This is why “pediatric chest ultrasound in rural Uganda” is one of the new projects of ITW.

The trip to Uganda in August was one of many such trips to maintain quality control, to further educate the local ITW team and also to introduce this new project: pediatric ultrasound, especially chest, mediastinal and limited abdominal ultrasound for detection of acute pneumonia, pulmonary and extra-pulmonary TB.

Sabine and I, under the umbrella of Dr DeStigter, had the opportunity to perform pediatric ultrasound and to share our knowledge to local midwives and clinicians. We visited 2 health clinics where ITW already has established ultrasound facilities.



We performed pediatric ultrasound in 2 health clinics: one in Kamuli and one in Mubende districts

We initially spent 2 days at the rural health clinic of Nawanyago in Kamuli. This site was the ITW pilot site for fetal ultrasound. During these 2 days, Kristen, Sabine and I performed pediatric abdominal and chest ultrasounds on many children mostly presenting with cough and abdominal pain. Sister Angela, the heart and soul of this clinic, welcomed us with open arms. She follows pregnancies, performs fetal ultrasound and deliveries, consults with and treats patients. Until now, pneumonia diagnosis is solely based on her clinical evaluation since x-rays are not available. Hands-on teaching with Sister Angela was done during our visit. The concept of chest ultrasound was introduced.



Nawanyago health center



Sister Angela, myself and Dr DeStigter during a scanning session



Children from Nawanyago village



We then travelled to the Mubende Regional Referral Hospital. This government facility is one of 14 referral centers across Uganda. They provide emergency room services, outpatient and inpatient, obstetric and surgical services. A single radiologist covers this site with technologist assistance. Dr Matovu is a General Surgeon there, and is the Ugandan lead for ITW.



Outside Mubende  
Regional Referral Hospital

Dr B elard presented a teaching session on the technique of chest and mediastinal ultrasound as well as on FASH – Focused Assessment for HIV associated TB, to a very interested audience including Dr Matovu, the local radiologist, the radiology technologist and the midwives associated with ITW. It was very well received.



The rest of the day was spent performing abdominal and chest ultrasound studies in children with suspected and proven tuberculosis, malaria and HIV. We were teaching the radiologist, technologist and the midwives, who were able to get hands-on experience. We found many positive chest, mediastinal and abdominal findings in these patients. We used simplified, structured scanning protocols that could be adopted by the local ITW trainees.



Dr B elard conducting a hands-on scanning session at the Mubende Regional Referral Hospital

In our estimate, this short introduction was successful. We believe this technique may prove to be safe and effective to support the clinical diagnosis of acute pediatric chest infections and tuberculosis in a rural setting. Further work is now needed to better define the indications for these studies, to refine the protocols and to establish follow-up, teaching and quality control programs.

Overall our experience as a part of the ITW team in Uganda was very gratifying and humbling. We were honored to contribute to this project and we were humbled by the dedication and commitment of the local clinic and regional center staff to their patients' well-being, in the face of very limited resources.



Here is the beautiful group with whom we travelled. Dr DeStigter with the ITW team, a group of high school students were there for an enrichment program organised by ITW, a Philips representative for ultrasound machine evaluation and development and local midwives and clinicians. For more information, please visit: [imagingtheworld.org](http://imagingtheworld.org)

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