

Can point-of-care ultrasound support tuberculosis diagnosis in children? The experience of MSF in Guinea-Bissau

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Introduction

Tuberculosis (TB) is an important cause of morbidity and mortality in children and over 50% of childhood TB remains undiagnosed every year. As microbiological confirmation is low (<30%), the majority of cases in low and middle-income countries are diagnosed on clinical grounds. Point-of-care ultrasound (POCUS) is a non-invasive bedside tool, and TB-focused POCUS has been validated for diagnosis of TB in adults with HIV. We aimed to describe the performance and findings of TB-focused POCUS for children with presumptive TB at a tertiary care hospital in Guinea-Bissau, a setting with a high burden of HIV, malnutrition and TB.

Methods

This observational study took place at Simão Mendes hospital in Bissau, from July 2019 to April 2020. Patients aged between 6 months and 15 years with presumptive TB underwent clinical and laboratory assessment, with at least one sample analysed with GeneXpert Ultra, and unblinded clinician-performed POCUS evaluation. POCUS was used to assess for subpleural nodules (SUN's), lung consolidation, pleural effusion, pericardial effusion, ascites, liver and splenic focal lesions, and abdominal lymph nodes. Presence of any of these signs prompted a POCUS-positive result. Images and clips were evaluated by an expert reviewer and, if discordant, by a second expert reviewer.

Ethics

This study was approved by the MSF Ethics Review Board (ERB) and by the Guinea-Bissau Ministry of Health ERB.

Results

A total of 139 children were enrolled, with 62 (45%) female and 55 (40%) aged under 5 years. HIV infection and severe acute malnutrition (SAM) were found in 59 (42%) and 83 (60%) of patients, respectively. Confirmation of TB was achieved in 27 (19%); 62 (45%) had unconfirmed TB, and 50 (36%) had unlikely TB. Children with TB were more likely to have a POCUS positive result (83/89; 93%) as compared to children with unlikely TB (17/50; 34%). The most common POCUS signs in TB patients were: lung consolidation (51; 57%), SUN's (49; 55%), pleural effusion (27; 30%), and focal splenic lesions (25; 28%). In children with confirmed TB (n=27), POCUS sensitivity was 85.2% (95% confidence interval (CI) 67.5-94.1). In those with unlikely TB (n=50), specificity was 66% (95%CI 2.2-77.6). Unlike HIV infection, SAM was associated with higher risk of positive POCUS. Cohen's kappa coefficient for concordance between field and expert reviewers ranged from 0.6 to 0.9 depending on the POCUS sign, while overall POCUS concordance was 0.8.

Conclusion

We found high prevalence of any POCUS sign in children with TB, as compared to children with unlikely TB. POCUS positivity was independent of HIV status, but not of nutritional status. POCUS concordance between field and expert reviewers was moderate to high. TB-focused POCUS could potentially play a supportive role in the diagnosis of TB in children.

Conflicts of interest

None declared.



Laura Moretó Planas is an Internal Medicine and Infectious Disease specialist from Barcelona who holds a Master's in International Health. She has been working for MSF for the last nine years, where she has supported HIV, tuberculosis, and chronic hepatitis programmes in the field. She has also been responsible for coordination of programmes and, since 2017, worked within headquarters as a HIV, tuberculosis, and hepatitis referent for MSF. She is also the principal investigator of an operational research study titled "Evaluation of innovative tools to improve tuberculosis diagnosis in children".