

(1) Submission ID#1528483

Laboratory capacity building for identification and characterization of bacterial meningitis pathogens in high-risk countries within the meningitis belt of sub-Saharan Africa

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Background

Laboratory capacity building is an integral part of the global road map to defeat meningitis by 2030. A robust laboratory infrastructure is critical for prompt and accurate identification of the pathogen causing meningitis outbreaks, especially in the meningitis belt, where historically countries are at highest risk for outbreaks of meningitis. We describe our activities from 2017 to 2023, with a network of 11 National Reference Laboratories (NRLs) in the meningitis belt on key areas to improve and maintain laboratory capacity for meningitis diagnosis.

Aim/Methods

We highlight the impact of laboratory capacity strengthening in 11 countries in the meningitis belt in the following domains: laboratory staff training and competency (from national to sub-national levels); laboratory procurement and equipment maintenance; specimen collection and transport; receiving and accessioning specimens; sample testing; analysis; reporting and interpretation; quality control programs and supervisory visits.

Results

Centers for Disease Control and Prevention's (CDC) Bacterial meningitis laboratory (BML) training programs with NRLs have led to 16% average knowledge gain from pre-test (58%) to post-test (74%) scores and subsequent cascade training to sub-national laboratories. Introduction of the triplex direct real-time PCR assay in 2020 has improved the overall test efficiency, resulting in improved turn-around-time and decreased

laboratory test costs by approximately 1/3. Furthermore, countries who participated in the CDC-BML External Quality Control Program have maintained passing scores above 80% for confirmatory testing of bacterial meningitis pathogens following enrollment in program.

Conclusions

We have highlighted measurable improvement that continues to be observed in laboratory capacity building programs, specifically for the 11 countries in the meningitis belt. Through strong partnerships supporting country's national and sub-national reference laboratories significant improvements to meningitis disease diagnosis and surveillance have been made. Additionally, building laboratory capacity provides necessary tools for rapid response to outbreaks in high-risk countries and prevention strategies that can be applied globally.