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Point of Care Diagnostic Deployment and Targeted Treatment of Antimicrobial Resistant Non-Typhoidal Salmonella: a New Mathematical Model and Cost-Benefit Analysis

Invasive non-typhoidal Salmonella (NTS) is among the leading causes of blood stream infections in sub-Saharan Africa and other developing regions. Invasive NTS can be difficult to treat and have high case-fatality rates, in part due to emergence of strains resistant to broad-spectrum antibiotics. Furthermore, improper treatment contributes to increased antibiotic resistance and death. Point of care (POC) diagnostic tests that identify infection within a short time and differentiate between resistant and non-resistant NTS strains may improve patient outcomes and decrease resistance at the community level. We developed the first model for NTS dynamics in high-risk populations to analyze the potential advantages and disadvantages of POC diagnostic deployment and resulting impact for patients. Our analysis strongly supports the use of POC diagnostics coupled with targeted antibiotic use for all patients upon arrival in the clinic for optimal patient and public health outcomes. We show that even the use of imperfect POC diagnostics can significantly reduce both total costs and number of deaths as compared to no diagnostics. (Received October 02, 2017)