

TB cough aerosol analysis in a Peruvian shantytown.

P Selvam, B Herrera, N Herrera, R Mimbela, J Alvarado, E Ramos, J Alva, J Franco, R Montoya, RH. Gilman, CA Evans.

Learning Objectives: The participants will be able to describe ways in which cough aerosols can be captured from patients and cultured for presence of mycobacterium tuberculosis and characterization of infectiousness in low-resource settings.

Background: Prior research indicates that tuberculosis (TB) patients exhibit great variability in their infectiousness. A study of patient cough aerosols in crowded endemic residential areas where most transmission occurs has not yet been carried out. This knowledge would allow for better targeted and more cost-effective means of reducing transmission in the world's high-burden communities. We examine two low-cost methods to collect cough aerosols; the Cough Bottle vessel, made from recycled bottles for \$0.40/unit; and a specially designed Petri dish Cough Plate for direct culture media inoculation.

Cough samples are collected in the homes of sputum microscopy confirmed TB patients in a shantytown community north of Lima, Peru. The study began in early 2007 and continues with addition of the Cough Bottle technique to the existing Cough Plate methodology. To date, 399 patients have been visited. The study is conducted within the framework of Prisma.

Design/Methods: This community-based research is conducted in cooperation with government health facilities. Each patient is visited periodically starting with the day of treatment initiation and each visit involves collection of patient cough aerosol samples using the Cough Bottle device and the Cough Plate. A questionnaire regarding cough-related symptoms and other patient details is administered at each visit. The cough aerosol samples collected in culture media are transported back to laboratory for processing and incubation. Culture readings are performed under a light microscope on a weekly basis to classify culture results.

Results/Outcomes: Though 56.7 percent (95% CI: 49.1 – 64.0) of patients were sputum microscopy positive, only 12.8 percent (95% CI: 8.3–18.6) produced infectious aerosols. Thirty percent (95% CI: 13.6–46.4) produced infectious aerosols when sputum bacterial load was high. The Cough Bottle method, more recently implemented in the study, has shown to have higher sensitivity than the Cough Plate.

Conclusion: Our study confirms the variability in infectiousness of TB patients. It is a pressing issue for the research community and public health providers to better understand infectiousness so that steps can be taken to prevent transmission. Our finding that high microbial load in sputum is related to production of infectious cough aerosols is informative, but there is more to the bigger picture and further insights from this study and others will be necessary in order to guide future prevention activities. Our findings also suggest that low cost technologies such as the Cough Bottle and Cough Plate can be used to identify infectious aerosol-producing patients in low-resource settings.

Partners: Johns Hopkins University School of Public Health; NGO Prisma, Lima, Peru; London School of Hygiene and Tropical Medicine; Universidad Peruana Cayetano Heredia; Innovation for Health and Development

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