

SPUTUM VOLUME PREDICTS SPUTUM MYCOBACTERIAL LOAD DURING THE FIRST 2 WEEKS OF ANTITUBERCULOSIS TREATMENT

Student: Mariam Karinja

Supervisor: Tonya Esterhuizen / Sven Friedrich

Disease severity in patients with pulmonary tuberculosis is associated with mycobacterial sputum load. To ascertain whether reduced sputum production during treatment is a useful clinical sign of improvement, we analyzed the mycobacterial loads of 5,552 sputum samples collected from 439 newly diagnosed sputum smear-positive tuberculosis patients who participated in six 14-day studies of antituberculosis treatment.

Sputum volumes were categorized as low (<6 ml), medium (6 to 10 ml), or large (>10 ml), and mycobacterial load was measured by the time to positivity in liquid culture and the CFU counts on solid culture. The association of sputum volume with mycobacterial load was estimated with multiple linear regression models adjusted for repeated measures.

The predictor variables were sputum volume category, treatment day, specific

study, and the interaction of sputum volume category and treatment day.

Mycobacterial load was significantly associated only with the day on treatment and sputum volume, which tended to decrease with ongoing treatment. With the volume held constant, each day on treatment decreased the log CFU by 0.082 ($P < 0.001$) and increased the time to positivity (TTP) by 1.04 h ($P < 0.001$). From low to medium and from medium to large sputum volumes, the log CFU/ml increased by 0.265 ($P < 0.003$) and 0.490 ($P < 0.001$), respectively, and the TTP decreased by 1.17 h ($P < 0.001$) and 1.30 h ($P < 0.001$), respectively, for a given day of treatment.

The variability of the sputum load measurements increased with the day of treatment and lower sputum volumes. The significant association of sputum volume and mycobacterial load validates decreasing sputum production as a clinical sign of improvement during early antituberculosis treatment.