



Case-area targeted interventions to rapidly contain the spread of cholera: a prospective observational study in the Democratic Republic of the Congo

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Introduction

The risk of cholera outbreaks spreading rapidly and extensively is substantial. Case-area targeted interventions (CATI) are based on the premise that early detection can trigger a rapid, localised response in the high-risk radius around case-households to reduce transmission sufficiently to extinguish the outbreak or reduce its spread, as opposed to relying on resource-intensive mass interventions. Current evidence supports intervention in a high-risk spatiotemporal zone of up to 200 m around case-households for 5 days after case presentation. Médecins Sans Frontières (MSF) started delivering CATI to people living within these high-risk rings during outbreaks in the Democratic Republic of the Congo in April 2022. We present the results of a prospective observational study designed to evaluate the CATI strategy, measuring effectiveness, feasibility, timeliness, and resource requirements, and we extract operational learnings.

Methods

Between April 2022 and April 2023, MSF delivered the holistic CATI package in five cholera-affected regions. The package incorporated key interventions combining household-level water, sanitation, and hygiene measures, health promotion, antibiotic chemoprophylaxis, and single-dose oral cholera vaccination (OCV). We conducted a survey in each ring roughly 3 weeks after the intervention to estimate coverage and uptake of the different components. We measured effectiveness by comparing cholera incidence in the first 30 days between rings with different delays from primary case presentation to CATI implementation, using a Bayesian regression model and adjusting for covariates such as population density, age, and access to water and sanitation.

Ethics

This study was approved by the MSF Ethics Review Board, the Comité National d'Éthique de la Santé de the Democratic Republic of the Congo, and the London School of Hygiene & Tropical Medicine Institutional Review Board.

Results

During the study, four MSF operational sections implemented 118 CATI rings in five sites. The median number of households per ring was 70, the median OCV coverage was 85%, and the median time from presentation of the primary case to CATI implementation and to vaccination was 2 days and 3 days, respectively. These characteristics varied widely across sites and between rings. No secondary cases were observed in 81 (78%) of 104 rings included in the analysis, and we noted a (non-significant) decreasing trend in the number of secondary cases with decreasing delay to CATI implementation, e.g. 1.3 cases [95% CrI 0.01–4.9] for CATI implementation starting within 5 days from primary case presentation, and 0.5 cases [0.03–2.0] for CATI starting within 2 days.

Conclusion

Our results show that rapid implementation of CATI with vaccination is feasible in complex contexts. The number of secondary cases was low when CATI was implemented promptly. This highly targeted approach may be an effective strategy to quickly protect people most at risk and is resource-efficient if implemented early to extinguish localised outbreaks before they require mass interventions.

Conflicts of interest

All authors declare no competing interests.