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Modelling the use of ciprofloxacin for epidemic response in the African meningitis belt
Dr Matt Coldiron, Epicentre, Médecins Sans Frontières

Antibiotic prophylaxis for contacts of cases of meningococcal meningitis is standard in high-income settings but has not been recommended during epidemics in sub-Saharan Africa. This is because there is little evidence for or against its use, and because of a desire to maintain focus on case management and implementing reactive vaccination campaigns.

During an epidemic in rural Niger in 2017, we performed a cluster-randomized trial of single-dose oral ciprofloxacin prophylaxis as an epidemic response. Limiting prophylaxis to household members of cases did not decrease overall attack rates during the epidemic, but village-wide distributions of ciprofloxacin reduced attack rates by 60%. A nested sub-study found no changes in antibiotic resistance patterns of enteric organisms before and after the trial.

Epidemic location and duration are unpredictable, so repeating the trial has not yet been possible. We have therefore explored the potential utility of antibiotic prophylaxis in modeling studies.

We used data from a 2015 outbreak in two districts of rural Niger where there was information about distribution of cases both among households and villages. During the epidemic, there was not significant clustering at household level, but there was at village-level. Up to one-third of cases could have been prevented using a village-wide prophylaxis strategy. Compared to reactive vaccination campaigns, reactive antibiotic prophylaxis is much more efficient. At current epidemic thresholds, over 4200 persons would need to be vaccinated to prevent one case, while only 1012 persons would need to receive a dose of ciprofloxacin to prevent one case.

Ongoing work is using case-based surveillance data from three countries which participated in the MenAfriNet project to explore different settings and possible differences between epidemic and non-epidemic periods.

Our work suggests that single-dose ciprofloxacin prophylaxis is more effective and efficient than reactive vaccination campaigns during meningococcal meningitis epidemics in the African meningitis belt.