XDR Typhoid Outbreak in Hyderabad – Tools for Containment and Management

Typhoid remains a serious health issue in middle and lower middle income countries of Africa and South Asia. More than 90% of enteric fever-related morbidity and mortality is reported from Asia, and studies from some Asian countries have shown that incidence of typhoid fever is highest among children aged <15 years.[1,2] In addition to the high disease burden, multi-drug antimicrobial resistance in *Salmonella Typhi (S. typhi)* is a growing threat. Strains resistant to chloramphenicol, trimethoprim-sulfamethoxazole, and ampicillin (Multi Drug Resistant; MDR) are endemic in many Asian and sub-Saharan African countries. Pakistan has high rates of both multidrug resistant typhoid (60%) and fluoroquinolones resistant (>90%) *S.typhi* infection however resistance to 3rd generation cephalosporin remained less than 1% until November 2016.[3,4] The Extensively drug resistant (XDR) *S. typhi* is resistant to 5 classes of antibiotics including (chloramphenicol, trimethoprim-sulfamethoxole, ampicillin, flour quinolones and Cephalosporin). XDR typhoid was first identified in Hyderabad city of Sindh province in November 2016. The outbreak has now spread to other cities in Sindh particularly large numbers are being reported from Karachi. To date, more than 2,000 cases of XDR typhoid have been reported in Karachi, and there may be more, as typhoid is often underestimated due to few people with typhoid having their blood cultured, the 60% sensitivity of this diagnostic test and known underreporting. Testing of drinking water samples from the affected communities revealed faecal contamination in more than 60% of the water samples. Similarly, *S. typhi* DNA was detected in some of the drinking water samples.

In response to this outbreak, a mass immunization campaign using typhoid conjugate vaccine (TCV) was initiated in Hyderabad, Pakistan. The age distribution of cases was important in the context of the choice of the intervention strategy to control the outbreak. Historically, typhoid vaccines (Vi polysaccharide) have had only modest efficacy, a short duration of protection, and could not be administered to children <2 years of age. However, TCV has shown good immunogenicity and can safely be given to children =6 months of age and was recently prequalified by WHO.[5] We determined that a wide-scale TCV campaign offered the most cost-effective and rapid approach to interrupting transmission of this dangerous newly emerged XDR *S.Typhi*. This is the first example of vaccination at a mass scale being implemented for the control of an outbreak of extremely drug resistant typhoid. The number of cases of typhoid in Hyderabad has significantly decreased since the start of the vaccination. Mass immunization for the control of this outbreak in Hyderabad led to the approval of typhoid conjugate vaccine in routine immunization in Pakistan and will be introduced in 2019.

Health education and awareness activities were also initiated with the help of community health workers. Pamphlets were developed and translated in local languages Sindhi and Urdu and circulated door-to-door with the help of community mobilizers and community health workers. In addition, we also educated the polio workers and provided them these pamphlets and handbills to distribute during polio campaigns. Messages on hand hygiene, water boiling, cleaning of raw vegetables/fruits and personal hygiene were delivered door-to-door during the polio immunization campaigns.

The high number of cases and the challenge of limited therapeutic options required an immediate response to limit the damage and prevent the further spread of XDR typhoid. Continuing medical education (CME) sessions were organized for the paediatricians and general practitioners of Hyderabad to inform them about the XDR typhoid outbreak, operational definitions to identify suspected typhoid cases were developed and guidelines for treating XDR typhoid cases were shared. Strong emphasis was laid on confirmation of diagnosis using blood culture and sensitivity and serologic tests such as typhidot were discouraged at all platforms.

To conclude, the lessons and experiences gained during the outbreak investigation and control interventions in Hyderabad provide a useful roadmap for the scaling-up of typhoid control strategies in Karachi and other cities.

References

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