Application of Modeling to Optimize Medical Counter Measures to Reduce the Risk of Social Disruption from a Terrorist/Criminal Attack in Restaurants in Kolkota, India

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Abstract: Endemic outbreaks of shigellosis are sporadic in communities throughout the world. With the emergence and increasing prevalence of multi-drug resistant species of Shigella there is cause for concern. Added to the concern of localized and national outbreaks, is the threat posed by terrorist/criminal release of multi-drug resistant Shigella into food supplies or establishments. Because of the threat Shigella poses to communities a model was developed for the U.S. Department of Defense and the Biomedical Advanced Research and Development Authority for to provide optimal medical counter measures (MCM) to preclude civil disruption.

Keywords: Shigella, infectious disease, bioterrorism, preventive medicine, medical counter measures

I. Introduction

Shigelllosis is of increasing concern throughout the world because of multi-drug resistance among many species and subtypes. In Kolkata, India, 81% of Shigella spp. isolates were multi-drug resistant [1]. Although Shigella spp. are endemic, outbreaks can pose significant health risks to local populations and across nations. For example, major outbreaks occurred in India of S. dysenteriae during 1984 and 1985 and 2003, S. flexneri outbreaks in 2005 and recently, S. sonnei, during 2009/2010, which were foodborne [1, 2]. The U.S. Centers for Disease Control and Prevention list Shigella species as a Category B terrorist weapon and as a serious food-borne threat.

II. Case Report and Discussion

Shigella species have been used as biological weapons and in crimes, resulting in hospitalizations of patients [3]. Even the infection of only one food establishment can have serious ramifications. In Kerala, India, 60% of 300 attendees of a wedding were infected, and 150 persons were infected after eating in a Madrasa in Maharashtra [1]. Because of the threat Shigella poses to communities a model was developed for the U.S. Department of Defense and the Biomedical Advanced Research and Development Authority for the city of Los Angeles, providing optimal medical counter measures (MCM) to preclude civil disruption should contamination of multiple restaurants occur. Civil disruption from terrorist attacks has led to the development of military strategies to assist should a weapon of mass destruction be released [4]. As there are over 4,200 food establishments in Kolkata; the threat from a terrorist/criminal attack on restaurants is unfortunately real. The growing threat from multi-drug resistant strains of Shigella increases its importance. Fortunately, preventive measures such as setting up hand-washing stations, chlorinating water, etc. can assist public health officials in containing the spread of Shigella. As can be seen from the S. dysenteriae outbreak on St. Martin, early preventive measures would have greatly reduced the impact of shigellosis on the community [2]. Because of the importance of shigelllosis within communities, the bioagent transmission and environmental modeling system (BioTEMS) was utilized to formulate the optimum time frame for deployment of MCM should a terrorist/criminal release of Shigella occur in restaurants in Kolkata. Delay beyond this critical point may reduce the effectiveness of public health efforts and prolong a Shigella outbreak.
Application Of Modeling To Optimize Medical Counter Measures To Reduce The Risk Of Social Unrest From Terrorist/Criminal Release Of Shigella Species

Figure 1. Point Of Recommended Medical Counter Measures (MCM) To Reduce Severe Risk (SR) Of Civil Unrest From Terrorist/Criminal Release Of Shigella Species

Acknowledgements

Assistance in gathering patient reaction to pathogen infections by physicians and scientists from the Afro European Medical Research Network, Switzerland and the World Health Organization, Sierra Leone Office is greatly appreciated. The views and opinions expressed in the document do not necessarily state or reflect those of the Department of Defense or the United States Army Reserve.

References


