EDITORIAL

Cholera: A Re-Emerging Infection

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There is a global resurgence of cholera[1]. It is becoming an increasingly important public health challenge as the number of countries affected by this infection continues to increase. The current seventh pandemic is caused by *V. cholerae* O1, biotype El Tor. This pandemic began in 1961 in Sulawesi, Indonesia and by 1966 has spread to other countries of Southeast Asia, Bangladesh, India, the former USSR, Iran and Iraq. The pandemic reached West Africa in 1970 and in 1991 affected South America where cholera had been absent for more than a century. This pandemic instead of abating is showing signs of further increasing. Nearly 120 countries had reported indigenous cases of cholera to WHO since 1991, and nearly half of those countries (including Malaysia) have reported cholera for at least five of the last eight years. In 1998, there was a dramatic increase in the number of cholera cases worldwide with the total number of cases almost twice that in 1997[2]. In Asia large increases in number of cases were reported from Afghanistan, India, Cambodia, Malaysia, Nepal and Sri Lanka. The number of cases of cholera in Malaysia from 1970 - 1998 is shown in Figure I.

It has been shown that the El Tor biotype is more likely to produce aymptomatic infection resulting in a higher proportion of carriers to cases. The strain also persists longer in the environment, multiply more rapidly following inoculation into foods, and produce a less than complete immunity when compared to the classical biotype. All this have important implications for the control of cholera.

In this issue of the Medical Journal of Malaysia, Norazah et al have demonstrated the presence of *Vibrio cholerae* O1 in aquatic environments in the country[3]. This has also been previously reported by another group of workers[4]. The existence of *Vibrio cholerae* (both the O1 and non-O1 serotypes) in aquatic environments has been known for some time. The organism persists indefinitely as a free-living organism associated with plankton (both phytoplankton and zooplankton)[5]. It is likely that plankton blooms are triggered by climatic changes like El Nino which causes warming of surface waters in the central Pacific Ocean. A single plankton copepod can carry up to 10^4 *Vibrio cholerae* organisms or about 10 times the infectious dose. During such a plankton bloom, if water is not adequately treated, several copepods may be ingested in a single glass of water. In addition, *Vibrio cholerae* can also bind to chitin, a component of crustacean shells and colonise the surfaces of algae and the roots of aquatic plants such as water hyacinths.

The persistence of *V cholerae* within the environment, for months and probably years, is due to its ability to enter a viable, nonculturable, dormant state where its requirements for nutrients and oxygen are much decreased. In this manner *Vibrio cholerae* can survive adverse decreases in temperature or changes in salinity. Though not culturable, the organism is still infectious. To detect the presence of such organisms non-culture methods have to be employed[6-7].

Recently it has been shown that *Vibrio cholerae* can also shift to a "rugose" form, associated with the production of an exopolysaccharide which promotes cell aggregation[8]. This form resists disinfectants such as chlorine with viable cells persisting for >30 min in 2 mg/L free chlorine. Rugose strains, if present in water supplies would be able to withstand chlorination and may therefore contribute to waterborne transmission of *cholera*.

On a global scale, cholera epidemics can be related to climate and climatic events, such as El Nino, as well as the global distribution of the plankton host. Remote sensing, with the use of satellite imagery, offers the potential for predicting conditions conducive to cholera outbreaks or epidemics[9].

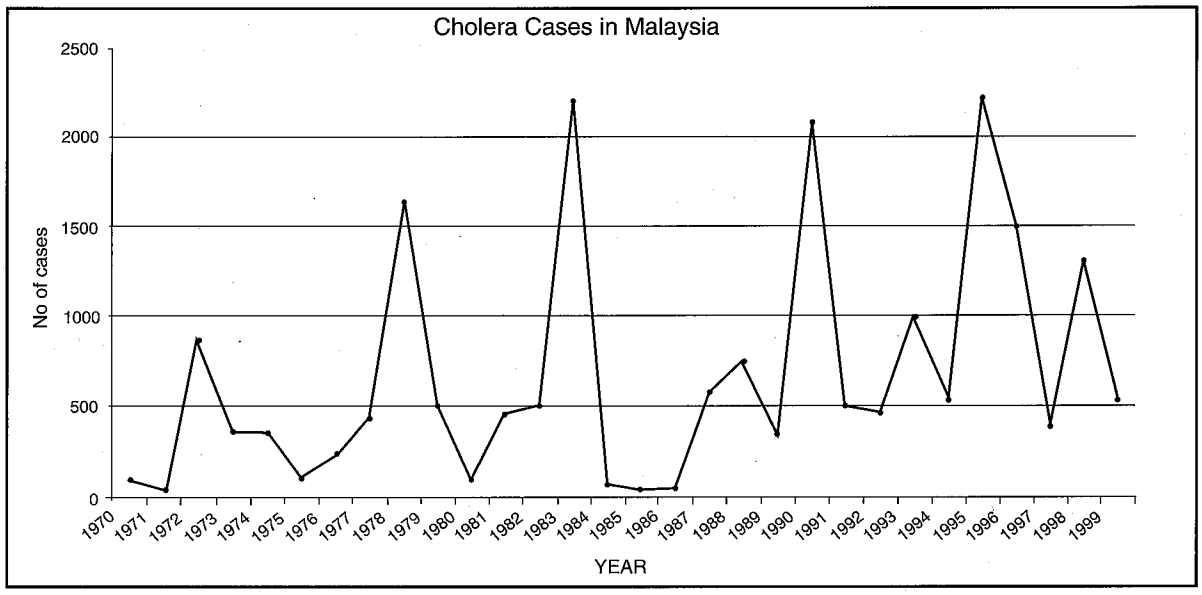

Fig. I: Total number of reported cases of cholera in Malaysia, 1970 - 1998 (Source : WHO)

The control of cholera in Malaysia remains a challenging problem. To prevent cholera the transmission of the organism to the host must be interrupted. There are three main modes of transmission. The classical mode is through water. The availability of potable water in most households in Malaysia today should make water-borne transmission an uncommon event.

The second mode is through contaminated food[10]. Foods are likely to be faecally contaminated during preparation, particularly by infected food handlers in an unhygienic environment. This is particularly true of street foods in Malaysia. The physicochemical characteristics of foods that support survival and growth of *Vibrio cholerae* include high-moisture content, neutral or an alkaline pH, low temperature, high-organic content, and absence of other competing bacteria. Contaminated rice (nasi lemak has been incriminated in several outbreaks in Malaysia), millet gruel, and vegetables have been implicated in several outbreaks. Other foods include fruits (except sour fruits), poultry, meat, and dairy products. The control of transmission of food-borne cholera in Malaysia will be a major challenge. There are no easy solutions as the problem of the control of street food is multi-faceted involving health, socio-behavioral, economic and political aspects. A multi-disciplinary approach and more importantly political will is required.

As the bacterium also persists in the estuarine environment raw seafood can be also be contaminated and serve as the third major vehicle for transmission. It is important to recognise this mode of transmission as control measures are different. Preventing seafood-associated cholera in the long term will depend on maintaining sewage-free harvest beds and improving sanitation in processing plants. In coastal areas where the organism persists in the environment, even in the absence of sewage contamination, education to discourage the consumption of raw or undercooked shellfish is needed. Thorough cooking provides the greatest security[11]. Preventing contamination of our seafood also has economic implications since Malaysia is an exporter of sea-food.

Cholera continues to be a major public health challenge in Malaysia. To adequately control the infection requires a thorough understanding of its modes of transmission and implementing a comprehensive programme which takes into account not only the health aspect but the social, economic, behavioral and political dimensions as well.

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