Public health implications of dengue in personnel returning from East Timor

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Abstract

In north Queensland the vector of dengue fever (*Aedes aegypti*) is present; hence any viraemic individual importing dengue has the potential to transmit the disease locally. In early 2000 approximately 2,000 personnel returned from East Timor to Townsville, north Queensland. Seven importations of dengue occurred and individual cases were viraemic for up to 6 days in Towns- ville. No subsequent local transmission occurred. There were 3 cases each of dengue type 2 and dengue type 3. One case could not be serotyped. A response, including mosquito control measures, was initiated in another 18 cases in which dengue fever was clinically suspected but which subsequently proved not to be dengue. The planning and processes undertaken to prevent local transmission of dengue in Townsville during an intense period are described. *Commun Dis Intell* 2000;24:365-368.

Keywords: dengue, type 2, type 3, flavivirus, Aedes aegypti*, East Timor, Queensland, viraemia, transmission, mosquito control*

Introduction

Dengue fever, although not endemic in the region, is an important public health concern in north Queensland which is considered 'receptive' because *Aedes aegypti*, the mosquito vector for dengue, is present.[1] Thus any importation of dengue (via a viraemic individual) could potentially result in local transmission, and initiate an outbreak.

Dengue fever is an acute febrile illness characterised by frontal headache, retro-orbital pain, myalgia, arthralgia and rash. An individual who has previously been infected with one dengue serotype and is subsequently infected with a different one can potentially suffer a severe form of illness characterised by circulatory failure or haemorrhagic manifestations (dengue haemorrhagic fever).

Since 1995 north Queensland has experienced 6 outbreaks of dengue, all in the Cairns/Port Douglas region or the Torres Strait (Dr Jeffrey Hanna, Queensland Health, Cairns; personal communication). Despite numerous importations to the region, Townsville (approximately 350 kilometres south of Cairns) has not experienced any local transmission since the dengue type 2 epidemic in 1992/3 during which approximately 750 cases were notified to the National Notifiable Diseases Surveillance System.[2] This number is likely to represent only a small proportion of the cases that actually occurred.[3] Therefore a significant number of Townsville residents are likely to have immune systems 'primed' by previous infection and further outbreaks of different dengue serotypes in Townsville could potentially result in severe disease or dengue haemorrhagic fever as described above.

In late 1999 the Tropical Public Health Unit (TPHU) was informed that personnel who had been in East Timor would soon be returning in considerable numbers to Townsville. The majority had been serving as part of the Australian Defence Force, but there were also a few aid workers, journalists and others. Because cases of dengue fever had been reported in East Timor in 1999,[4] a high level of importation of dengue into Townsville early in 2000 was anticipated. This report describes preparations made for, and the public health management of, the importations that did occur.

Methods

Planning for importations of dengue

Disease surveillance activities

Dengue fever is a notifiable disease in Queensland. While surveillance for many notifiable conditions is laboratory-based in the State, the public health implications of dengue fever mean that urgent notification on clinical suspicion (prior to laboratory results becoming available) is requested for dengue in north Queensland.

Clinical surveillance was enhanced by face-to-face meetings and written communication with Defence Force medical staff who were familiarised with the notification procedures with emphasis on early notification. Based on the accepted maximum viraemic period[5] and incubation period[6] for dengue, notification was requested for any cases developing a dengue-like illness within 12 days before, or 14 days after, arriving in Townsville from East Timor.

Medical practitioners in Townsville were also alerted to the situation by letter and reminded of the need for urgent notification of suspected cases.

Mosquito surveillance and control

Preventative measures aimed at reducing *Aedes aegypti* populations in high-risk areas are routine in north Queensland. In late 1999 prior to the arrival of returning personnel, and before the wet season, TPHU, local government and Defence Force staff held planning meetings. Additional mosquito control measures were undertaken including inspections and source reduction at Defence Force bases

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(where troops returning from East Timor were likely to be concentrated) and around other high risk areas (eg. hospitals).

Source reduction involved either removal of potential breeding sites for *Aedes aegypti* (eg. emptying containers holding water), or treatment of containers not easily emptied (eg. gully traps) with a residual larvicide.[7]

Education and awareness activities

Queensland Health's dengue fever pamphlets outlining information on the disease and dengue preventive measures were made available in large numbers for distribution by the Defence Forces to personnel prior to their departure for East Timor or return to north Queensland. The pamphlet was also made available to all general practitioners in Townsville.

Television advertisements on dengue fever emphasising measures residents can take to reduce the breeding of *Aedes aegypti* are routinely run in north Queensland during the wet season on a paid schedule; these were televised as usual with no additional paid advertising.

Responding to importations of dengue

Disease control activities

TPHU staff obtained a history from each suspected case of dengue as soon as possible after the notification. Details, including clinical information, residential addresses and other places visited by the case while potentially viraemic were obtained. To reduce the possibility of local transmission of dengue, patients were provided with information by the clinician and/or TPHU staff on mosquito bite avoidance during the day, including use of insect repellent and insecticide mats, and advice on measures to reduce mosquito breeding around the home.

Sera collected from suspected cases at the time of the first consultation were tested at local laboratories for dengue IgM by enzyme immunoassay (EIA). EIA-negative sera collected in the first 5 days of illness were referred to Public Health Virology, Queensland Health Scientific Services (QHSS), for reverse transcriptase polymerase chain reaction (RT-PCR) testing, and/or a second specimen was collected several days later for repeat EIA. Confirmatory testing included RT-PCR, virus isolation, or haemagglutination inhibition assay.

For each confirmed case the period of 'viraemia of public health importance'[8] in Townsville was calculated. This referred to the period the case was infectious to mosquitoes and so reflects the potential for transmission. It commenced on the day the case arrived in Townsville or the date of onset of illness (if symptoms began in Townsville). The end of the period was defined as the earlier of 2 dates: either 12 days after the onset of illness or the day of notification to TPHU (ie. the point at which control activities were implemented thereby reducing the risk of transmission).

Mosquito control measures

Mosquito control measures were undertaken if a case, suspected or confirmed, had apparently been viraemic in Townsville. Larval control involved source reduction in premises within 200m of any residence (and other premises) where the case had spent significant amounts of time while viraemic. Adult *Aedes aegypti* control involved interior insecticide spraying of premises within 100 m of the case.[7]

Results

Approximately 2,000 personnel returned from East Timor to Townsville in the first few months of 2000. Over a 5-week period in January and February 2000 there were 7 confirmed importations of dengue fitting the 'viraemic' time interval described to be of public health importance. Six cases were Defence Force personnel and 1 case was an aid worker. There were 3 cases each of dengue type 2 and type 3; one could not be serotyped. No subsequent transmission of dengue occurred in Townsville.

The delay in notification of cases ranged from 0 to 4 days. Three of the cases (43%) were notified by the medical practitioner on the day of consultation. In total 5 (71%) of the cases were notified within 48 hours. The 2 longer delays occurred because the patients were notified by the testing laboratory and not on clinical suspicion.

The combined total of days of 'viraemia of public health importance' in Townsville for the 7 cases was 21 days (range 0 to 6 days for individual cases). Three cases were already unwell on arrival, and 4 became unwell after arrival in Townsville.

In addition to the 4 confirmed cases, TPHU (in collaboration with local government staff) responded to18 other notified suspected cases. Of these, 4 eventually proved to be malaria and 4 had evidence of recent flavivirus infection but with a type not specified due to cross-reacting flavivirus antibodies; no specific diagnosis was determined for the other ten. Thirteen additional notifications were received in returning personnel who were dengue EIA IgM-positive but who were no longer viraemic upon arrival in Townsville. As they were of no public health significance, no specific action was taken in relation to these cases.

Discussion

Despite an intense period with multiple importations into this receptive area, no subsequent local transmission of dengue occurred in Townsville. Prior preparedness and close collaboration between TPHU, Defence Force and local government staff contributed to this outcome.

A management plan for dengue fever in north Queensland has been developed and recently revised.[9] This plan drew on the experience of those involved in management of cases and outbreaks of dengue both in north Queensland and overseas, including input from experts from the Centers for Disease Control and Prevention, USA and from Singapore. The plan describes the preventive and responsive strategies that are currently used to control dengue in north Queensland. Measures implemented in Townsville in late 1999 and early 2000 add support to the value of this dengue fever management plan.

The timeliness of notifications of clinically suspected importations of dengue was considerably better than that previously documented in north Queensland. Seventy-one percent of all notifications were received within 48 hours compared with only 26 per cent in a previous study.[8] This promptness reflects what can be achieved when patients consult informed medical practitioners who are well aware of the public health implications of dengue.

Because dengue is not endemic in north Queensland, the public health response to suspect imported cases reflects the need to minimise risk of local transmission. For example, the maximum period of viraemia (12 days) is used to define 'viraemia of public health importance' for each imported case even though it may commonly be a shorter period.[5] Likewise any case in which dengue fever is considered a possible diagnosis is responded to immediately.

This strategy meant that mosquito control measures were implemented in response to a considerable number of suspected cases that subsequently proved not to be dengue. Although this may be considered resource intensive, such a response is necessary. Awaiting laboratory results would have introduced unacceptable delays and allowed the proliferation and dispersal of *Aedes aegypti* mosquitoes with increased risk of local transmission.

Acknowledgments

The authors would like to thank the many people who were involved in the preparations and response including staff of the Tropical Public Health Unit Network, Townsville City Council, City of Thuringowa Council, Queensland Health Scientific Services (in particular Glenda Gilmore at Townsville General Hospital), medical staff at Lavarack Barracks Medical Centre and other Defence Force staff.

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