



Initial civilian laboratory response

Banda Aceh, the capital of Indonesia's Aceh Province, was the closest major city to the epicentre of the earthquake and subsequent tsunami that devastated large parts of southeast Asia on 26 December 2005.

Australian military and civilian personnel were among the first aid groups to arrive in Banda Aceh to assist the Acehnese and the Indonesian authorities in their relief efforts. A 25-member medical-surgical team (code-named ECHO-1) from South Australia was sent to Banda Aceh on 5 January. A 25-member medical-surgical team (code-named ECHO-1) from South Australia was sent to Banda Aceh on 5 January to relieve the New South Wales team initially deployed after the tsunami. At 18:00 on the following day (designated in this article as 0:00 hours), Adelaide's Institute of Medical & Veterinary Science (IMVS) was requested to provide three staff to establish a diagnostic microbiology laboratory to

- support the ECHO-1 team.
- complement the Australian Defence Force field laboratory, which mainly provided biochemistry and haematology testing.
- assist with the public health effort in Banda Aceh.

A laboratory team (code-named ECHO-2) comprising a clinical microbiologist, a senior scientist and a scientist with parasitology experience was formed.

This deployment not only provided a unique opportunity to help the people of Banda Aceh but also represented a huge challenge to establish a microbiology laboratory quickly at a distant site in the middle of a natural disaster. Decisions had to be made on the type of work to be performed, the target organisms for detection, and the equipment and consumables to be taken.

Infectious disease epidemics (e.g. diarrhoeal illnesses, malaria, measles) can account for the great proportion

**Bruce Winter,
Richard Turnbull,
Cathy Engler,
Ivan Bastian***

* Corresponding author
Infectious Diseases Laboratories
Institute of Medical & Veterinary Science
PO Box 14, Rundle Mall
Adelaide, SA 5000
Tel: (08) 8222 3291
Fax: (08) 8222 3543
E-mail: ivan.bastian@imvs.sa.gov.au

of preventable morbidity and mortality after a disaster¹. The ECHO-2 team therefore planned for the investigation of epidemic diseases to account for 70% of their workload and that the clinical investigation of individual patients should account for 30%. The equipment and consumables were therefore selected accordingly.

Several factors limited the volume of equipment and consumables that could be taken. The team was assigned three pallets on the Hercules transport to Banda Aceh. The ECHO-2 team also had to provide their own refrigeration for their consumables (e.g. pre-prepared agar plates). Finally, the three staff could only perform a limited number of tests per day and were instructed to plan to work in Banda Aceh for approximately 3 weeks.

Hence, the ECHO-2 team planned for the following daily workload: 40 malaria investigations, 20 dengue tests, 30 enteric investigations, five 'sterile site' tests (e.g. CSF or blood culture) and 20 standard microbiology tests (e.g. wound swabs, sputum). Table 1 summarises the final list of equipment and consumables transported with the ECHO-2 team to Banda Aceh.

The ECHO-2 team received incredible assistance from people within and outside IMVS to prepare for this deployment. For example, IMVS staff worked throughout the weekend of 8-9 January to collect and pack the inventory; six refrigerators were

bought from a local electrical retailer, and the commercial media manufacturer made and delivered additional media at short notice. The RAAF air movements section from Edinburgh base collected ECHO-2 team's three pallets on Sunday morning (+62:00 hours) and transported them to RAAF Richmond outside Sydney.

The three team members travelled from Adelaide to Sydney on a commercial flight on the morning of Monday 10 January, joined their freight at RAAF Richmond and flew via Darwin to RAAF Butterworth in Malaysia, arriving at 07:00 on 11 January (+113:30 hours). Unfortunately, the ECHO-2 team was then stranded at RAAF Butterworth for the next 2 days because of excessive air traffic in Banda Aceh and other problems. The team took this opportunity to produce laboratory worksheets and proforma result forms.

The ECHO-2 team finally arrived in Banda Aceh on the morning of Thursday 13 January and was transported in two trucks to Fakinah Hospital, a former private hospital occupied by the Australian medical teams in the south-east of the city. The first test, a blood culture, was processed that evening (+171:00 hours or 7.1 days after the deployment was requested).

The ECHO-2 laboratory team worked in Banda Aceh for the following 2 weeks. During this time, the ECHO-1 medical-surgical team was relieved by a Queensland group (code-named FOXTROT), including another microbiology scientist. Eighty microbiology investigations, 31 malaria films and antigen tests, and three dengue serology tests were performed. The results will be described in detail in another article in this publication².

The microbiology team undertook many other duties, including maintaining the tetanus and rabies immunoglobulin/toxoid stocks, organising a clean-water supply for the hospital, and arranging for an Australian Defence Force unit to



remove hospital waste and to build an incinerator.

Several factors contributed to the successful deployment of the Australian microbiology laboratory. The work of the advance parties and the establishment of the Australian medical team at Fakinah Hospital provided the best possible circumstances for the emergency deployment of a microbiology laboratory. The inventory was nearly perfect. The team members worked very well together and had relevant previous experience that proved most useful. In particular, one team member had worked in emergencies in Rwanda and Cambodia.

Most importantly, this deployment received incredible support from IMVS staff members, other companies, other individuals, and from fellow aid workers in Banda Aceh. In addition, ready mobile telephone communications were also important. The team was able to consult colleagues about laboratory procedures and results, and was reassured to know that experts, such as the Public Health Laboratory Network (PHLN) were 'only a phone call away'.

Communications were also perversely the main weakness of the deployment. The ECHO-1 team was reliably informed that a municipal electricity supply had been re-established in Banda Aceh. This information proved very useful in planning for the deployment. However, other information was not available and the relieving teams were often unable to communicate with teams currently 'in the field' prior to deployment. This lack of communication resulted in some resources being needlessly or inappropriately deployed.

In addition, the inventory included some media recommended by international authorities for the detection of gastrointestinal pathogens (e.g. bismuth sulphite plates) but, with a short shelf-life, these media proved impractical due to delays in transport. The absence of large refrigeration facilities at transit points also complicated the transportation of media, vaccines and other degradable consumables.

Despite these minor problems, this deployment of an Australian microbiology laboratory to assist the Banda Aceh relief effort was a major success. The Australian

laboratory was the only fully-functional clinical microbiology service in Banda Aceh during January 2005. The laboratory serviced the Australian teams at Fakinah Hospital and provided diagnostic services to the International Red Cross hospital and other organisations. The Indonesian authorities and the World Health Organization (WHO) also relied upon the laboratory for public health microbiology investigations during the early stages of the tsunami relief effort.

Acknowledgement

The authors thank the individuals and companies in Australia who made the speedy deployment of a microbiology laboratory possible, and the fellow aid workers, Indonesian colleagues and international organisations who assisted in the laboratory in Banda Aceh.

References

1. Waring SC & Brown BJ (2005). The threat of communicable diseases following natural disasters: a public health response. *Disaster Manage Response* 3:41-7.
2. Bastian I (2005). The microbiology of the tsunami. *Microbiology Australia* 4:165-166

Table 1. Team ECHO equipment and consumables.

Equipment
6 refrigerators
2 incubators
2 centrifuges
2 light microscopes
2 laptops
1 printer
Consumables
Collection & processing materials
> 3,000 pre-prepared agar plates
Stain reagents for malaria slides & Gram stains
Microbe identification kits and reagents
Malaria and dengue detection kits
Antibiotic susceptibility discs
Gowns, gloves, masks, sharps containers, disinfectants
Miscellaneous laboratory items and stationery
Tools, power cords, adapters



Team ECHO en route.