



Epidemiology Division

Outbreak Response Unit

BACKGROUND

The Outbreak Unit of the Epidemiology Division is tasked with providing technical support for all aspects of communicable disease outbreaks and control in the nine provinces in South Africa with special emphasis on optimizing the role of laboratory services during outbreaks. The unit works in close collaboration with the provincial and national Departments of Health to ensure a comprehensive outbreak response and the development of systems for early outbreak detection and improved reporting. In addition, close partnerships with the NHLS diagnostic laboratories and reference units of the NICD aims to deliver appropriate laboratory diagnostic services during outbreaks and specialised diagnostic tests as required.

The Outbreak Unit is a member of the National Outbreak Response Team (NORT) and assists with the development of provincial and national guidelines for priority communicable diseases. In addition, we participate actively in training public health and laboratory personnel.

ACTIVITIES, HIGHLIGHTS AND ACHIEVEMENTS

KEY OUTBREAKS IN 2007

The unit has worked in partnership with the provincial and national Communicable Disease Control directorates, SA-FELTP and NICD reference units in responding to several key outbreaks in 2007. Our role in these outbreaks may include, but is not limited to, the following:

- Outbreak detection and reporting
- Field investigation
- Development of clinical and laboratory guidelines
- Management of laboratory data and interpretation of results
- Recommendations for control

FOOD-BORNE DISEASE OUTBREAKS

Several food-borne disease outbreaks were reported and investigated in 2007. Notification of such outbreaks remains a challenge and it is likely that food-borne disease incidents are significantly under-reported. These outbreaks have primarily been associated with inadequate storage and handling of foods provided at

large community gatherings and/or institutions. There are numerous challenges associated with investigation of these incidents which include failure to collect adequate clinical and environmental specimens.

In January 2007 a diarrhoeal outbreak was reported at a secondary school hostel in Upington, Northern Cape Province. Of the 136 children who ate a lunch meal at the hostel, 26 (19%) presented to the local clinic with watery diarrhoea, abdominal cramps, nausea and vomiting within approximately 8 to 16 hours of ingestion. Stool samples were obtained from all cases (n=26) and 17/26 (65.4 %) tested positive for *Clostridium perfringens* enterotoxin A. No food samples were available for testing but inspection of the premises revealed inadequate cold storage of foods and poor food hygiene practices.

In February 2007 a large outbreak of diarrhoeal disease was reported at a church gathering in Bekkersdal, Gauteng Province. An estimated 80 people reported illness after attending a church function where food including a sheep was prepared communally using various ingredients and utensils supplied by community members. The first case presented within 5 hours of ingestion. Diarrhoea and abdominal cramps were the predominant symptoms. A total of 49 patients were assessed at health care facilities and 22 of these were admitted. At least 7 additional cases were admitted to hospital in a neighbouring province. Two deaths in a 9-year-old female and a 72-year-old female were reported. Only 3 stool samples were obtained from cases and were negative on bacterial culture. One of these tested positive for *C.perfringens* enterotoxin A. Suitable food samples were not obtained for testing. Forensic toxicology tests were also performed on available clinical samples.

In November, a large food-borne outbreak was reported during a 3-day training course. Of the 141 adults who ate meals provided at the course, a total of 38 cases (27%) presented with watery diarrhoea and abdominal cramps within 5-12 hours of consumption. Six patients required admission and there were no deaths. Food samples were only available from one implicated meal and were tested for food-borne pathogens and bacterial toxins. Analysis revealed the presence of *Bacillus cereus* and *Staphylococcus aureus* in samples but total counts could not be performed. Toxin testing for *S.aureus* and *B.cereus* (diarrhoeal toxin) were negative. Unfortunately no clinical specimens were received for testing from this outbreak.

A number of outbreaks in families were also reported in 2007 in relation to the misidentification of edible plants resulting in ingestion of toxic plant substances.

Several challenges have arisen during the investigation of these outbreaks in South Africa. Clinical and food specimens are frequently not obtained or inappropriate tests are requested and resources for a full epidemiological investigation are limited.

DIARRHOEAL DISEASE OUTBREAKS

Several large outbreaks of diarrhoeal disease occurred in 2007 in relation to probable contamination of municipal water sources. In Hopetown, Northern Cape Province a total of 142 cases of watery diarrhoea were reported from September 23rd 2006 to February 2007. Stool samples were obtained from 54 cases (38%). Diverse pathogens were detected including *Shigella flexneri* (n=12), diarrhoeagenic *E.coli* (n=2), *Giardia lamblia* (n=2), rotavirus (n=3), adenovirus (n=1) and norovirus (n=1).

In Limpopo Province 140 cases of watery diarrhoea were reported in September 2007. Testing of municipal water revealed evidence of faecal contamination which was the likely source of the outbreak.

In December 2007, two large diarrhoeal outbreaks occurred in Delmas and Standerton, Mpumalanga Province both of which were linked to unsafe drinking water. In Delmas, over 1500 cases of watery diarrhoea were reported from October 22nd to December 2007. Of the 173 stool samples received, 63 (36.4%) were positive for a stool pathogen.

Preliminary analysis of 657 cases suggest the majority of reported cases are in the age group 0-5 years (n=117, 21%). There were no outbreak related deaths recorded.

A diverse group of pathogens were been isolated including *Shigella flexneri* (n=6), *Shigella sonnei* (n=3), *Shigella boydii* (n=1), *Salmonella* spp. (n=1), *Aeromonas hydrophila* (n=1), diarrhoeagenic *E.coli* (DEC) (n=28, EHEC=2), *Shistosoma mansoni* (n=3), *Giardia lamblia* (n=2), *Isospora belli* (n=1). Enteric viruses identified included adenovirus 40/41 (n=4), astrovirus (n=2), norovirus (n=3) and rotavirus (n=22). In 1993 and 2005 Delmas had large waterborne typhoid fever outbreaks and the water purification problems continue to pose a threat to human health in that region.

In Standerton, a total of 1152 cases of watery diarrhoea were reported from December 6th 2007 to January 7th 2007. Clinical features of cases included watery diarrhea, abdominal cramps and vomiting. Sixty three patients (17%) required hospital admission for investigation and management. A total of 103 stool specimens were received for bacterial culture, parasite, and enteric virus detection. Of these 25 (24%) were positive for one or more diarrhoeal pathogens. These included *Shigella flexneri* (n=5), *Shigella sonnei* (n=2),

Shigella boydii (n=10), *Shigella* spp (n=1), *Salmonella* spp (n=4), diarrhoeagenic *E.coli* (n=2) and rotavirus (n=2).

These outbreaks highlight the ongoing challenges of ensuring sustainable delivery of safe potable water to all South Africans.

VIRAL HAEMORRHAGIC FEVERS (VHFs)

The unit has been involved in the investigation and response to several cases of suspected and/or confirmed VHFs in 2007. These include:

- An imported Lassa Fever case from Nigeria in February 2007
- Crimean Congo haemorrhagic fever:-
 - One confirmed case in December 2007 from Prieska in the Northern Cape Province
 - Suspected CCHF cases investigated throughout the year



Dr Lucille Blumberg accompanied by FELTP students and members of the provincial and national Departments of Health carrying out an outbreak investigation in the field.

INSTITUTIONAL OUTBREAKS

Several institutional outbreaks were investigated and managed by the unit in 2007. These included:

- An outbreak of hepatitis A in an Institution for mentally challenged adults in April 2007. Six suspected cases and 3 laboratory confirmed cases were identified. Investigation revealed that these were likely due to a common source. Control measures included use of pooled immunoglobulin and measures to prevent person to person spread.
- An outbreak of hepatitis A from a crèche in Louis Trichardt, Limpopo Province September 2007. Seven laboratory confirmed cases presented with illness over a 12 day period from 30/9/07 to 12/10/07. Outbreak investigations indicated that all cases were linked to a crèche: two pupils, one teacher, two parents and a

sibling of a pupil. The source of the outbreak was not identified but was likely to have been a common exposure. Control measures included administration of pooled immunoglobulin to all pupils at the crèche as well as household contacts of the confirmed cases and health promotion with emphasis on hand washing and improvements in general hygiene.

- An outbreak of probable adenovirus at a crèche in Mossel Bay, Western Cape Province.
- An outbreak of primary varicella zoster infection in a psychiatric ward in Gauteng Province in November 2007.
- An outbreak of rubella in a primary school in Limpopo Province. Forty five cases of rash illness were reported in children age 5 -14 years in September 2007.

COMMUNITY-BASED RESPIRATORY DISEASE OUTBREAKS

Two large outbreaks of pharyngitis were investigated in 2007. Both of these were investigated by SA-FELTP fellows in partnership with the provinces and the Outbreak Unit. The first occurred in Groblershoop, Northern Cape Province in March 2007. A total of 124 cases were identified between March 1st and May 5th 2007. Of these, 54% of cases were in children <15 years of age. Throat swabs were obtained from 42 cases (33.8%) and three of these were positive for *S.pyogenes*. However these isolates were shown to be unrelated by *emm* typing conducted by RMPRU. (personal communication Brett Archer - SA-FELTP).

The second outbreak of pharyngitis was reported from Zoar, Western Cape Province in November 2007. A total of 241 cases were reported from October 29th 2007 to November 16th 2007. Throat swabs were obtained from only 10 patients (4%) and were negative for beta-haemolytic streptococci. One patient tested positive for adenovirus and one for influenza B virus (personal communication Charlene Jacobs SA-FELTP).

MALARIA

The epidemiology division was part of a national, provincial and WHO team to Limpopo in August 2007 to investigate the possible causes for the regular upsurges in reported malaria cases. There is no single factor found to be contributing to these upsurges. There is unstable transmission that makes the area epidemic prone but a well- functioning control programme would seem to contain most of these upsurges. Amongst the activities, IRS is the main strategy in place for prevention of malaria epidemics coupled with proper case management. The majority of the cases are local but there is a need to ensure cross-border collaboration. It is likely that multiple factors are coinciding to explain the episodes e.g. a vulnerable population, climatic influences supporting vector and parasite development and the presence of infected individuals.

INTERNATIONAL OUTBREAKS

The outbreak unit provides alerts for South Africans, assists with ensuring laboratory preparedness and provides support where required in response to international outbreaks. In 2007 this included information, alerts and or screening of imported cases related to the following outbreaks:

- Cholera in Mozambique
- Ebola haemorrhagic fever in DRC
- Marburg haemorrhagic fever, Uganda
- Human cases of avian influenza H5N1 and alerts regarding African countries reporting disease in poultry

AVIAN INFLUENZA (AI) AND PANDEMIC INFLUENZA PREPAREDNESS

The unit continues to play a role in national AI and pandemic influenza preparedness. In 2007 activities included:

- Distribution of regular AI situation reports to key health personnel
- Screening of suspected imported AI cases and liaison regarding decision making for laboratory testing conducted by the Influenza Reference laboratory at NICD.
- Training of Rapid Response Teams for Avian and Pandemic Influenza in collaboration with the national DOH. In 2007, the Free State, Mpumalanga, Western Cape, Northern Cape, and Eastern Cape provinces were trained.
- Assisting provinces in operationalising plans for pandemic preparedness
- In August 2007, the CDC organized a 'train the trainer' programme at NICD for rapid response teams for avian influenza outbreaks. Teams from 9 SADC countries comprising clinicians, veterinary personnel, laboratorians, communication specialists and infection control practitioners attended.



Training of rapid response teams for avian influenza: use of personal protective equipment.



Group photograph: avian influenza rapid response team training, August 2007.



Avian influenza inter-country discussion.

THE “OUTNET” PROGRAMME

This program is a laboratory based Outbreak Network for SA which was developed in 2005 and piloted in 2006 with the nomination and training (in collaboration with the SA-FELTP) of 9 provincial laboratory “OutNet” representatives. These individuals continue to act as the key points of contact for provincial public health staff and facilitate the role of the laboratory for detection and response to outbreaks in collaboration with the Outbreak unit at NICD. Regular updates and contact with these representatives is maintained via monthly teleconferences and direct contact during outbreaks.

LOCAL MEETINGS

Dr Ayanda Cengimbo. An institutional outbreak of hepatitis A. FIDSSA Congress, Spier, Cape Town, 28-31 October 2007. Poster presentation.

CORPORATE DATA WAREHOUSE

The Outbreak Unit continues to assist with the development of the epidemiological capacity of the corporate data warehouse with special emphasis on development of early warning systems and obtaining outbreak related data.

CAPACITY BUILDING

EPIDEMIC PREPAREDNESS AND RESPONSE (EPR) TRAINING

In 2007 the unit continued to assist the national and provincial Departments of Health in training provincial public health personnel and doctors in EPR with an emphasis on case management and appropriate laboratory diagnostic tests. These training events took place in several provinces including Western, Eastern and Northern Cape, Free State, Mpumalanga.

“CASE OF THE MONTH” SERIES

This is a laboratory capacity building activity that has been distributed on a quarterly basis to all NHLS laboratories in South Africa since 2005. The series aims to train staff in diagnostic laboratories in basic principles of epidemiology as applied to the role of the laboratory in communicable disease control. Over 350 NHLS staff regularly participated in this activity in 2007 for which they earn professional development credits.

TRAINING WORKSHOPS FOR THE INVESTIGATION OF FOOD-BORNE DISEASE OUTBREAKS

The unit partnered with national DOH in the development of materials for training provincial teams in the investigation of foodborne incidents. The first workshop was held in Limpopo province in November 2007 and will be rolled out to all provinces in 2008.

EXTERNAL LECTURES

The unit continues to lecture on communicable diseases as requested to external groups.