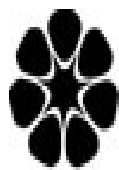




CENTRE FOR DISEASE CONTROL
NORTHERN TERRITORY

A Framework for Investigating Disease Outbreaks in the Northern Territory

September 2004



Northern Territory Government

Department of Health and Community Services

Prepared by the Centre for Disease Control

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PART 1. BACKGROUND

Introduction

Objectives of the document

This plan was developed by the Department of Health and Community Services (DHCS) Disease Control Program in consultation with the Environmental Health Program, Royal Darwin Hospital Emergency Department and Infection Control, the public and private laboratories providing services in the Northern Territory (NT) and Medical Entomology. Its purpose is to provide a framework for roles, tasks and lines of communication in the event of a major disease outbreak within the NT. Many of these issues are already well established in practice and this plan simply formalises and clarifies existing processes. It is intended to be a useful tool for new staff, and for regions of the NT where outbreaks may not occur frequently. While much of the national literature in Australia is relevant to our situation, many aspects of public health and clinical service delivery are unique to the NT. This plan is designed to be compatible with national practice and guidelines but also specific to our local needs. It is modelled on the scenario of a food-borne outbreak, but has a generic framework with appendices detailing relevant information for other specific outbreaks.

Related policy documents

There are several NT and national policies and plans which are relevant to these guidelines.

- National Communicable Diseases Surveillance Strategy <http://www.health.gov.au/pubhlth/publicat/document/ncdss.pdf>
- *Communicable diseases surveillance in the Northern Territory. Guidelines for the reporting of notifiable conditions.* Disease Control Program, NT Territory Health Services (now DHCS) 2000.
- *Crisis/Issue Communication Management and the Media* – Media Liaison NT DHCS.

For a full list of key references, useful websites and specific disease control protocols see appendix 1

Definitions

An outbreak in need of investigation and management can be defined in a number of ways:

- the occurrence of a disease in a population above that which would normally be expected at any given time or location;
- two or more cases of a disease which are linked to the same exposure even if the number is not more than expected;
- a single case of a rare disease or one which has very important public health consequences (eg measles, SARS) in need of urgent investigation and management.

Food and water-borne disease arise from contamination of drinking water and food and may also be directly transmitted from person to person.

Relevant agencies and their roles

This section gives a brief summary of the specific roles of different departments and organisations that relate to disease outbreaks. Note there may be some overlap of expertise, roles and available resources in each region of the NT. Negotiation and assigning of tasks will be required early in each situation.

Centre for Disease Control

Disease Control Program activities are coordinated through the Centre for Disease Control (CDC) in each NT health region. CDC Darwin has both an NT wide policy and operational role in the management of outbreaks in the NT.

In the pre-outbreak period:

- Keep the local outbreak plan up to date.
- Liaise with health care providers in the public and private sectors and the laboratories to monitor the incidence of communicable and other infectious diseases of public health importance.
- Determine the NT wide availability of essential public health drugs and the process by which they will be made available in an emergency.

During an outbreak

- Investigate suspected outbreaks of disease to determine the size of the outbreak, the population at risk, the route(s) of transmission, contributing factors and methods of control and prevention.
- Provide health alerts and expert medical advice on communicable diseases to decision makers, health professionals, Emergency Services personnel and the public.
- In collaboration with the DHCS Media Unit communicate communicable disease risk to the media and to the general public directly.
- Liaise closely with other appropriate agencies throughout the period at risk.

After an outbreak

- Monitor disease trends following the outbreak, and analyse and report on epidemiological data.
- Conduct an audit and evaluation.

Environmental Health

In the pre-outbreak period:

- Formulate policy and standards to control food, water-borne or other environmental related illness including, where required, amendment of legislation.
- Investigate instances of potential food, water-borne or other environmental related illness.
- Detect and notify potential food, water-borne or other environmental outbreaks to CDC surveillance program.
- Coordinate food recalls.
- Advise on the potential public health risks arising from drinking water supplies, tanks, swimming pools, spas, recreational waters or flood waters.

- Advise on procedures to minimise the risk to public health from water-borne hazards.
- Investigate potential sources of water contamination in conjunction with the appropriate responsible agency (eg Power and Water Authority, Mining Companies, Community Councils).
- Monitor and implement control measures for the control of vector-borne disease in collaboration with Medical Entomology Branch.
- Detect and notify failures of environmental health systems (eg water supplies) that threaten the public health.

During an outbreak

- Jointly investigate food-borne, water-borne or other environmental outbreaks with CDC surveillance program.
- Coordinate appropriate environmental sampling such as food or water for clusters of gastrointestinal illness or other outbreak investigations, and where appropriate, collect clinical specimens.

After an outbreak

- Provide advice and assistance to prevent further incidents of contamination after an incident of food, water or other environmental contamination has been recognised. This includes the enforcement of relevant Public Health Legislation where appropriate.

Note: These roles vary by region and placement within the structure of environmental health services of DHCS. In Alice Springs urban environmental health services are provided by the Town Council.

Medical Entomology

Provide expert services in preventing, investigating and controlling vector-borne outbreaks including:

- endemic arboviruses such as Murray Valley Encephalitis and Ross River Virus disease
- illnesses not currently present in the NT but which may be imported such as dengue fever, malaria, or Japanese encephalitis
- others such as scrub typhus

Medical Entomology Branch covers the entire NT and should be notified of potential outbreaks from all regions. They liaise with Environmental Health and other agencies in each region such as town councils to arrange appropriate action.

Other DHCS Agencies

Laboratories

Provide laboratory testing and expert advice about specimens such as:

- specific requirements for collection and transport of specimens
- estimated time frame for results
- interpretation of results
- identify and address increased resources (staff, reagents to handle increased laboratory needs)

Media Unit and Corporate Communication Liaison DHCS

- Liaise with CDC to develop a Communications and Media Plan, identifying the objective of the communication, the audiences and key messages. This plan may incorporate distribution of media alerts, 1800 phone numbers, TV and radio flash announcement, facts sheets and website.
- Keep Media Emergency Network (National) informed.

Hospitals

Emergency Departments

- Early identification of outbreaks.
- Initial clinical investigations and collection of specimens.
- Individual case management.

Infection Control

- Provide advice about prevention of disease transmission to staff and other patients.
- Provide advice about patient isolation and transmission based precautions relevant to the specific disease through infection control policy.
- Occupational health and safety such as staff immunisation programs.
- Monitor infections in the hospital and nosocomial infections in a pre-outbreak period to detect any potential outbreaks.
- Investigation of outbreaks within a hospital.

Community based health service providers

Rural and Remote Service Providers

Health services in remote communities are provided either by Community Controlled Health Services (CCHS), DHCS or by the local council with DHCS support. In all regions, community health centres are staffed by resident registered nurses and/or Aboriginal Health Workers. Some communities (mainly those with a CCHS) have resident doctors. District Medical Officers (DMOs) in the Alice Springs, Darwin Rural and Katherine Regions provide clinical and public health services to communities without a resident doctor. In the Barkly and East Arnhem regions these clinical services are provided by Hospital Medical Officers.

During an outbreak, clinical care, specimen collection and contact tracing would be provided by local service providers in consultation with the investigation team. Early communication is essential. Roles and tasks need to be negotiated in each setting depending on the available expertise and support. If community wide treatment is required for outbreak control this may have major cost and resource implications.

Urban Aboriginal CCHS

Aboriginal CCHS exist in all major NT towns. Generally, clinical care, specimen collection and contact tracing would be provided by the health service in consultation and cooperation with the investigation team. Roles and tasks would be negotiated with each service affected by an outbreak.

The Divisions of General Practice

The Top End Division of General Practice and the Central Australian Division of Primary Health Care provide support to GPs and other independent primary care providers. This includes:

- Liaison and policy development relating to issues of community based primary health care.
- Rapid email/fax notification system to practices for distribution of health alerts.

All communication to GPs concerning communicable disease issues and outbreaks should be made via the Divisions.

General Practitioners (GPs)

- Initial notification and management of clinical cases.
- Enhanced surveillance, active case finding and management during outbreaks.

Urban Community Care Centres (DHCS)

As major immunisation providers in the NT, Community Care Centres have an important role in outbreak prevention and control through:

- Provision of post exposure prophylaxis such as immunoglobulin to contacts of hepatitis A, or measles immunisation and immunoglobulin to non immune contacts of a case, to prevent or control outbreaks of these diseases.
- Provision of information and education in relation to management and prevention of further cases.

Other Government Agencies

Power and Water Corporation (PAWC)

- Uses the National Health and Medical Research Council's Australian Drinking Water Guidelines as a reference for the supply of safe drinking water.
- Provides and monitors water supplies in urban areas and major Aboriginal communities.
- Maintains sewerage and treatment systems in major urban communities and a number of smaller urban and remote Aboriginal communities.
- Investigates outbreaks that potentially could be water-borne or related to sewage disposal in cooperation with Environmental Health and Disease Control.
- PAWC provides water supplies from bores to many communities throughout the NT.
- Detects and notifies failures of environmental health systems (eg water supplies) that threaten the public health.

Note: In most remote communities, Community Councils are employed as agents by PAWC to provide day to day maintenance and monitoring of water, sewerage and power supplies.

Department of Infrastructure Planning and Environment (DIPE)

- Sets environmental protection standards of all natural waters in the Northern Territory including waste management and pollution control.

Australian Quarantine Inspection Service (AQIS)

- Routinely test a proportion of commercially imported food for quality.
- Inspect privately imported food for quality.
- Inspect vessels for importation of diseases or disease vectors that may be a threat to public health.

PART 2. OUTBREAK INVESTIGATION

Conceptual framework for outbreak investigation

- Verify the diagnosis and determine the aetiology of the disease
- Confirm the existence of the outbreak
- Develop a case definition, start case finding and collect information on cases
- Describe the outbreak in terms of person, place and time and generate hypotheses
- Test hypotheses using an analytic study
- Do necessary environmental or other studies to supplement epidemiological study
- Draw conclusions to explain causes or determinants of the outbreak based on all available evidence
- Develop and recommend/implement control measures with all relevant agencies as soon as possible
- Develop a communication strategy targeting the health sector and general public
- Evaluation of process and report writing

Stages of outbreak investigation - summary

1. Initial action (potential outbreak identified)

Verify the diagnosis

Confirm the outbreak and develop a working case definition

Form an investigation team

Arrange logistic support

Consider the level of investigation required

Consider whether the outbreak is of national significance

Consider the need to request help

Establish a communication strategy

2. Subsequent action

Epidemiological Tasks

Environmental Health Tasks

Public Health Action

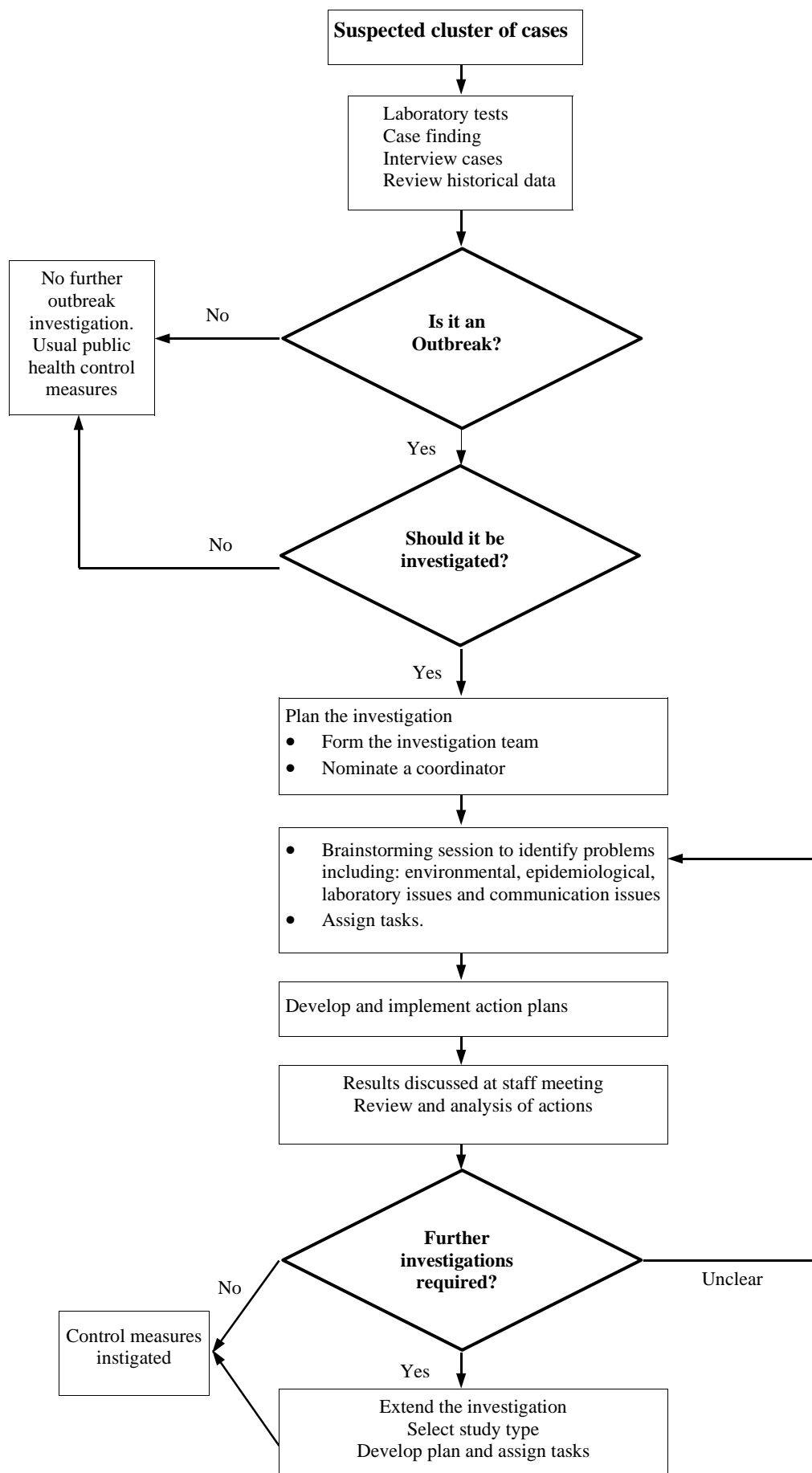
3. Completion – Learning from the experience

Audit and evaluation

Opportunities

Reports

Figure 1. A flow diagram summarising the decision making processes required in outbreak investigations (See appendix 2 for examples of a food-borne and a meningococcal outbreak).



Initial action

Verify the diagnosis

Review the clinical case details and laboratory results of known cases

Attempt to answer the following questions.

What are the clinical features common to those with the illness?
Are there supportive laboratory results?
Are features of the illness consistent with the same aetiological diagnosis?
How many people have the illness?
Are they related by person, place or time?
For a specific diagnosis, what is its expected incidence according to surveillance data?
Is the source or mode of transmission known?
Is there an early intervention that could halt the outbreak?

- Interview the informant to ascertain case numbers by time, place and person and gather all available information on the nature of the disease. Construct an epidemic curve and plot on a map the geographic location of cases.
- If possible, where a definitive diagnosis is available, compare case numbers in the recent defined period against historical data for the same time period.
- Contact the laboratory to establish what investigation results are available and what investigations are under way. Ensure that the laboratory is aware of any specimens coming and will process them as a matter of urgency. Determine an estimated time of specimen arrival and when preliminary and definitive results are to be expected.

Confirm the outbreak and develop a working case definition

- Make a case definition based on the symptoms and signs of the cases. Initially, this should aim to capture as many cases as possible while recognising there will also be some false positives (ie a *sensitive* rather than *specific* definition).
- The case definition should be framed in terms of time, place and person so clusters can be identified temporally, geographically and by the population at risk.

Form an investigation team

The team leader will be nominated by the Director of Disease Control in consultation with appropriate regional personnel. This person will provide public health expertise and direct the investigation.

The size and composition of the team will depend on the nature and extent of the investigation required. Additional team members may be required depending on the nature of the outbreak and available resources.

Minimum essential team members

- Public Health Officer
- Environmental Health Officer

Potential additional team members

- Microbiologist
- Infectious Diseases Physician
- Medical Entomologist
- Epidemiologist (MAE student)
- Media Manager
- Corporate Communications Manager
- Project officer(s)
- Administration officer(s)
- Delegated officer from Division of General Practice / Primary Health Care
- Delegated officer from relevant community health services
- Delegated officer from relevant agencies such as PAWC or AQIS

Arrange logistic support

- Determine the logistic requirements for the investigation such as additional staff, IT support, technical equipment such as that required for environmental sampling, public health drugs and vaccines.
- Consider the most appropriate place for the investigation team to be located.

Consider the level of investigation required

Levels of investigation can range from a simple case series and site inspection to large analytical epidemiological studies.

Factors to be considered include the nature and severity of the illness, the exposure and available control measures. If the disease is well defined and understood (eg measles) then further investigations may not be needed and appropriate control measures can be immediately implemented (see specific considerations, appendix 3). Alternative decisions may include planning an analytic study, or acquiring further data before considering whether an analytic study is needed.

Issues for consideration are summarised in Figure 2.

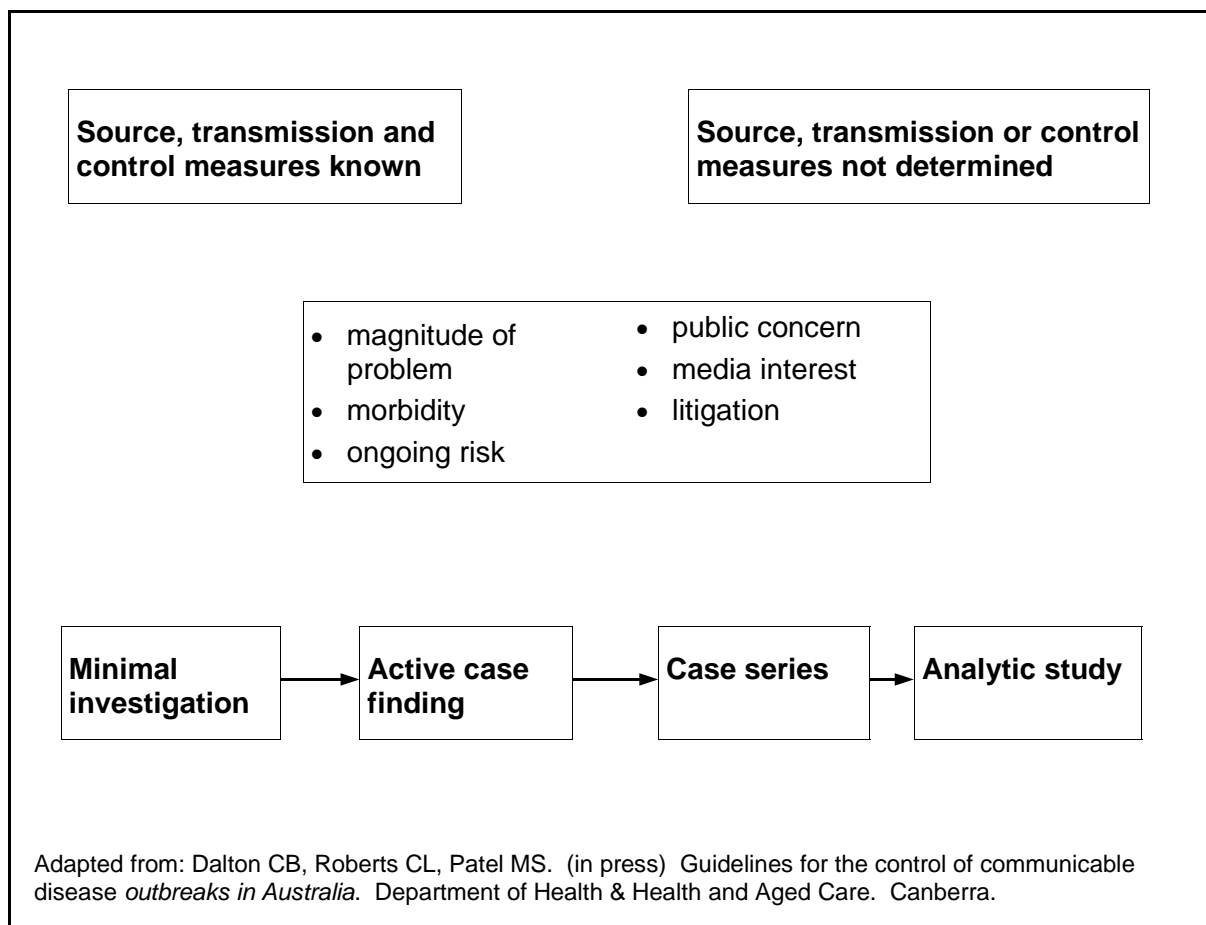
Consider whether the outbreak is of national significance

Certain outbreaks have national or international implications. The Communicable Diseases Network of Australia (CDNA) should be advised immediately of these. The CDNA may be able to assist in the investigation and management of the outbreak. The following criteria define such an outbreak.

Multistate involvement - Any outbreak involving people from more than one jurisdiction or having the potential to spread to other jurisdictions. Examples include outbreaks involving nationally distributed or imported foods, and arboviral and zoonotic diseases.

Exotic disease - The introduction or recognition of an exotic pathogen in Australia (e.g. rabies) or the potential introduction of an exotic disease (e.g. an outbreak of plague in a

Figure 2. Factors that could influence the extent of the outbreak investigation



country with high levels of travel contact with Australia). This would also include the detection of a case of a re-emerging infection such as polio.

Highly virulent or infectious organism - These would require technical expertise and collaboration across the nation, as well as national-level media releases.

Tourist resort or facility involvement - Outbreaks involving people at tourist resorts are of national significance because they may involve people from different jurisdictions or countries. Examples include legionellosis, measles, hepatitis A. Outbreaks on cruise ships or airlines would be included in this category.

Outbreaks affecting national/international events - Outbreaks affecting people involved in national or international events receiving intensive media coverage may be nationally significant, for example the Arafura or Masters Games. In addition, there may be widespread dispersal of infected persons nationally or internationally;

Demonstrated failure of routine public health practice - Outbreaks that cast doubt on nationally accepted standards of public health practice. For example, outbreaks associated with contaminated blood products or surgical equipment, defective vaccines, or failure of standard food safety processes.

Any illness suggestive of bioterrorism - Both the NT and Commonwealth governments will need to be informed.

Consider the need to request help

In some situations it will be appropriate to request assistance from other regions of the NT, from OzFoodNet or from the CDNA. This should be discussed with the Director of Disease Control - Darwin. See appendix 4 for NT contact details.

Note

- Darwin Disease Control is available for advice to all regions of the NT and may be able to arrange extra help if required.
- Contact 8922 8044 during business hours or 8922 8888 (RDH switchboard) after hours. See appendix 4 for further contact details by region.

Establish a communication strategy

Clear lines of communication are important to the timely recognition and management of outbreaks.

Early communication of the outbreak and the potential impact on the public and health services will assist planning, media communication, investigation and management of the outbreak.

Arrange times for regular updates of key personnel including all staff involved in the investigation or affected by the outbreak.

Nominate **one** media spokesperson to work with the media unit and coordinate for regular media updates.

Start a file and update it at least daily. Document minutes of meetings, decisions and actions taken. Keep phone diaries and document state of knowledge, analysis and actions as the outbreak evolves. This is important for monitoring daily progress of the investigation and because litigation may arise from the outbreak. Environmental Health have database templates suitable for progressive documentation of outbreaks.

Set up an electronic file accessible to all members of the team. This can be done within 24 hours by faxing an urgent request form to IT security. Access to the LAN may also need to be arranged for those who don't have it.

Consider who needs to be informed, including:

1. Assistant Secretary, Health Services
2. Microbiology laboratories
3. Media Unit and Corporate Communications (refer to CDC media protocol)
4. Community health service providers to areas affected by the outbreak including Community Care Centres, Community Controlled Health Services, and GPs via the Division of General Practice / Primary Health Care
5. Chief Health Officer and Chief Executive Officer DHCS
6. Managers of relevant policy and operational programs within DHCS
7. Hospitals including management, emergency department and infection control
8. Regional Disease Control and Environmental Health units
9. Pharmacists
10. Government agencies such as PAWC, AQIS, or DIPE
11. Legal support

Subsequent Action – Specific tasks in outbreak investigations

Outbreak investigations usually have several components which can be broadly grouped into the epidemiological and environmental investigations and the public health actions. These include specific tasks such as laboratory liaison, dissemination of health alerts and risk communication. Measures to control the disease should begin immediately: at the same time as the outbreak is investigated.

Epidemiological Tasks

Research the disease in question

- Fully inform the team as to the clinical, microbiological and epidemiological characteristics of the disease in question.
- Review existing literature for reports of other outbreaks or sporadic cases of the disease to learn about known suspected sources and effective management responses. For website addresses containing guidelines for investigating outbreaks and reports of outbreak investigations see appendix 1.

Refine the case definition and establish a database

- The case definition can be refined into laboratory confirmed, presumptive and suspect cases based on the certainty of the diagnosis.
- As more information is gathered, the spectrum of disease based on the range of symptoms and signs, and the natural history of the disease, including the estimated incubation period, can be determined.
- Develop draft questionnaire jointly with the Environmental Health Officer and pilot it before use. The Victorian Health Department website has guidelines and questionnaires for gastrointestinal illness: http://www.health.vic.gov.au/ideas/diseases/gas_ill_index.htm. An electronic format for modification is on the Disease Control Discussion database within lotus notes.
- Set up a database following local and/or departmental guidelines for the management of client-based information.

Case finding

- Begin active case finding for additional cases of disease by recruiting clinicians, emergency services workers, and other relevant personnel into the surveillance process.
- Interview all cases, including a 72 hour food history.
- It may be necessary to conduct surveys in the community. This can add the benefit of gathering environmental information to assist developing a hypothesis about the outbreak as well as beginning to implement control measures or environmental interventions (eg concerning hygiene, food handling)
- Plot the epidemic curve and geographic location of cases on a map daily.
- Ensure that you are notified of deaths attributed to the condition under investigation.
- Liaise with laboratory staff and infectious disease physicians to ensure that appropriate clinical specimens are collected. Ensure that an efficient system of specimen storage and transportation is established.

- Environmental Health and CDC should arrange collection of faecal or other specimens where appropriate. Pathology request forms and specimen containers can be delivered to cases by CDC staff to facilitate specimen collection.
- Most people will willingly provide necessary clinical samples. Occasionally, some people will be less cooperative. If absolutely necessary and as a last resort, the Notifiable Diseases Act contains provisions to oblige persons to undergo examination and testing if necessary to prevent the spread of disease.

Investigate the source of exposure

- Once the case definition has provided a starting point for the investigation, modify the questionnaire to include details relevant to the probable route(s) of transmission eg a detailed food history, vaccination history, occupational, environmental and personal risk factors, travel history, exposure to vectors.
- Interview all people thought to be exposed to a source of contamination, regardless of whether or not they developed symptoms and include a history of foods consumed at the time of exposure. Additional essential information to collect includes demographic, clinical and occupational details. Identify food handlers, child care workers, children in child care and aged care residents and carers.
- If the exposure is unclear, more detailed, innovative methods may be needed: eg open ended interviews or focus groups with cases, visiting their homes or going shopping with them.
- Analyse descriptive statistics. Calculation of attack rates and measures of association (Relative Risks or Odds Ratios) may provide all the information needed to determine the vehicles and route(s) of transmission.
- Undertake analytic studies (usually a case control study) if the descriptive statistical analysis fails to identify vehicle and route(s) of transmission. Analytic studies may be warranted even if the outbreak stops spontaneously in order to prevent a recurrence.
- Chapter 6 of Dalton et al *Guidelines for the control of communicable disease outbreaks in Australia* contains an excellent section about practical issues of conducting a case control study. A copy is with these guidelines on the Disease Control Discussion Database within Lotus Notes.

Environmental Health Tasks

- Perform a site inspection to investigate and identify potential environmental sources of the outbreak.
- It may be necessary to exclude food handlers from work using either the Food Act or the Notifiable Diseases Act. The Chief Health Officer will need to be involved to initiate this.
- Take environmental samples of food or water, including swimming pools and plunge pools where appropriate.
- Arrange voluntary surrender or seize suspect foods if there is a risk to public health.
- Organise immediate and long term remedial measures of identified problems.
- Contact the Health Department of State/Territory of origin of implicated food, following protocols of Food Standards Australia and New Zealand (FSANZ) where applicable (<http://www.foodstandards.gov.au/>).
- Contact Children's Services if a child care centre is involved.
- Contact AQIS if imported food is implicated.
- Advise Liquor Commission if a licensed premises is involved.

Public Health Action

- Develop appropriate disease prevention and health promotion messages for the public. Simple preventive measures and health promotion should be started as soon as possible on the basis of a clinical diagnosis of communicable disease. Implement appropriate control measures as soon as practicable with assistance from other experts eg, Environmental Health and Medical Entomology.
- Consider any legal issues that may arise and contact legal support for advice if there is any uncertainty. The key Acts are the Public Health Act, Notifiable Diseases Act and the Food Act and these can be found on the Northern Territory Government (NTG) web site <http://www.nt.gov.au> or the NTG intranet.
- Outbreak control may require action based on inconclusive but suggestive evidence if the risk is great (eg suspected common source outbreak).
- Coordinate risk communication with the team leader, CDC Director, Environmental Health, Media Liaison and community health staff.
- Refer to NT, national and international best practice guidelines as required.
- Maintain heightened surveillance until the incidence of disease has fallen to pre outbreak levels.
- In food-borne outbreaks, all food handlers should be educated about the need to report any symptoms and signs of enteric disease immediately. They should not work at least until the diarrhoea has stopped (see tables in Appendix 5). The Food Act and the Notifiable Diseases Act both contain provisions to oblige persons to undergo examination and testing and to cease work if necessary to prevent the spread of disease.

Completion – Learning from the experience

Audit and Evaluation (should be commensurate with the level of investigation and resources)

- Organise a debriefing session with all involved staff to review the team's response to the outbreak and identify policy or operational deficiencies. This will be an opportunity to discuss unanticipated events that should be written into future editions of outbreak plans, to reinforce what is already done well and to incorporate creative solutions to strategic plans.
- If necessary and resources permitting, a formal audit and evaluation of all or part of the response to the outbreak may be conducted.
- Give specific attention during the debriefing to the successes and failures of risk communication. This may involve a critical review involving media training professionals.
- Chapter 8 of Dalton et al *Guidelines for the control of communicable disease outbreaks in Australia* provides a useful step by step guide to conducting a structured review of an outbreak. See copy with these guidelines on the Disease Control Discussion Database within Lotus Notes.

Opportunities

- Following an outbreak there is often heightened community interest in the public health issues surrounding the outbreak and opportunities for education, health promotion and prevention should be maximised.

Reports

- Written reports summarising the outbreak and outcomes of the investigation are essential to provide feedback to all stakeholders including local health staff.
- Prepare detailed reports for Departmental Heads in Disease Control, Environmental Health and other relevant departments.
- See appendix 6 for a framework for reporting investigations of enteric disease outbreaks.
- Outbreak reports should be stored within CDC in order to inform the response to future similar outbreaks.

Publication in public health journals is an important means of communicating issues and lessons from the outbreak to the wider public health audience. Decide which level of publication is appropriate, local (*NT Disease Control Bulletin*), national (*Communicable Diseases Intelligence* / peer reviewed journal) or international.

Appendix 1. Key References, Useful Websites and Protocols

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Whelan P, Van Den Hurk A. Medically important insects in the Northern Territory and how disasters may affect them. <i>NT Disease Control Bulletin</i> . 2003;10(1): 27-38.

Useful Websites

Centers for Disease Control

<http://www.cdc.gov>

The CDC website contains a large range of outbreak investigation reports and guidelines for the investigation of specific illnesses as well as links to training modules.

Commonwealth Dept Health and Ageing Communicable Diseases

<http://www.health.gov.au/pubhlth/strateg/communic/index.htm>

Communicable Diseases Australia

<http://www.cda.gov.au/>

Public Health Division of the Victorian Dept of Human Services

http://www.health.vic.gov.au/ideas/diseases/gas_ill_index.htm

Has a website with extensive guidelines for the investigation of gastro intestinal illness. This includes comprehensive questionnaires for single incidents and outbreaks which may be used as is or modified.

United Kingdom Health Protection Agency.

<http://hpa.org.uk>

The HPA website also contains a large range of outbreak investigation reports and guidelines for the investigation of specific illnesses.

List of forms (available on Disease Control lotus notes discussion database)

Dengue investigation form

Doctor/hospital report of notifiable condition

Gastro Outbreak

Gastro Single Case

Hepatitis A investigation form

Hepatitis B investigation form

List of contacts for prophylaxis

Meningococcal Disease - Case Report Form

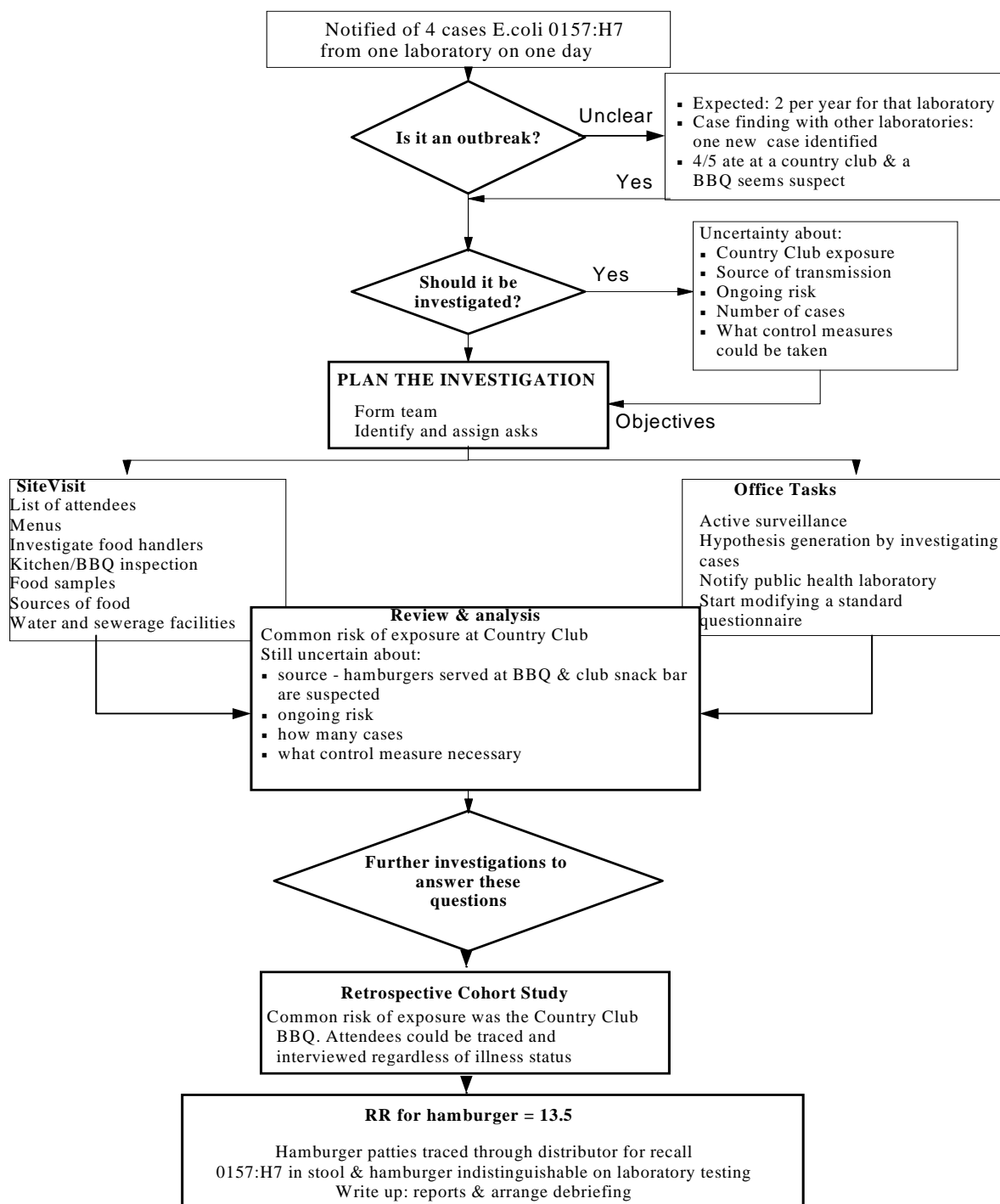
Rash illness investigation

Under 5s Enteric questionnaire

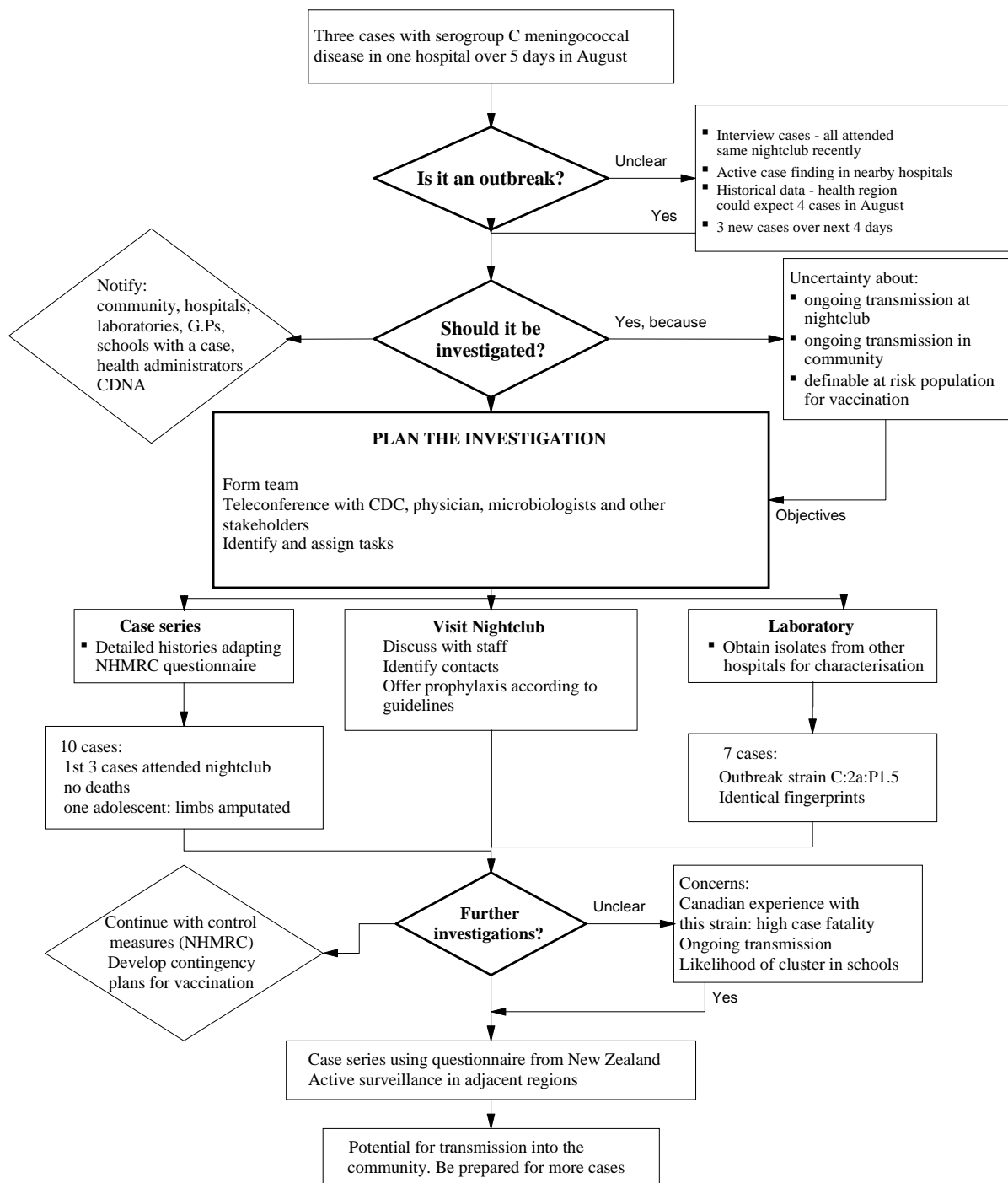
Policies, protocols & guidelines
Available on the Disease Control website http://www.nt.gov.au/health/cdc/cdc.shtml, the DHCS Intranet Site (under Public Health/Disease Control/Guidelines & Protocols) or by contacting your regional CDC
Acute post streptococcal glomerulonephritis Guidelines for the control of acute post-streptococcal glomerulonephritis (December 2002)
Anaphylaxis Management of anaphylaxis in the urban setting (April 2004) Management of anaphylaxis in the rural setting (April 2004)
Communicable Disease Surveillance in the NT Guidelines for the reporting of notifiable conditions (February 2000) Notifiable conditions to be reported by all clinicians in the NT (March 2000) - WALL CHART Notifiable conditions to be reported by all laboratories in the NT (March 2000) - WALL CHART
Diphtheria Guidelines for the control of diphtheria in the NT (March 2004)
Exclusion periods 'Time Out' – Recommended minimum periods of exclusion from school, pre-school and child care facilities for children or staff with, or exposed to, infectious diseases (March 1999) – WALL CHART
Gonococcal conjunctivitis Guidelines for the control of gonococcal conjunctivitis (January 2003)
Hepatitis A NT Hepatitis A vaccination policy and public health management guidelines (February 2000)
Hepatitis B NT Hepatitis B vaccination policy and public health management guidelines (June 2000)
Invasive haemophilus influenzae type b infections Refer to relevant section in the current edition of <i>The Australian Immunisation Handbook</i> (NHMRC)
Leprosy Guidelines for the Control of Leprosy in the NT (October 2002)
Lyssavirus - FLOW CHART Australian bat lyssavirus post-exposure prophylaxis (PEP) - (April 2000)
Malaria Guidelines for health professionals in the NT – 4th edition (June 2004)
Measles Communicable Diseases Network Australia New Zealand: Technical Report Series No 5 Guidelines for the control of measles outbreaks in Australia (July 2000) http://www.health.gov.au/pubhlth/publicat/document/cdi/tech5_m measles.htm
Meningococcal disease Guidelines for meningococcal meningitis/septicaemia chemoprophylaxis (December 1997) NHMRC - Guidelines for the control of meningococcal disease in Australia (June 2001) http://www.cda.gov.au/pubs/other/mening.htm
Nontuberculous Mycobacteria Guidelines for the Control of Nontuberculous Mycobacteria in the Northern Territory (October 2002)
Outbreak management A framework for investigating outbreaks in the Northern Territory (September 2004)
Pertussis Communicable Diseases Network Australia New Zealand: Technical Report Series No 1 Guidelines for the control of pertussis in Australia (November 1997) http://www.health.gov.au/pubhlth/strateg/communic/tech/pertus.htm
Scabies Healthy Skin Program - Guidelines for Community Control of Scabies and Skin Sores and Crusted Scabies in the NT (February 2003)
Smallpox The Guidelines for Smallpox Outbreak, Preparedness, Response and Management (2004). Australian Government Department of Health and Ageing. http://www.health.gov.au/pubhlth/publicat/document/metadata/smallpox.htm
Trachoma Guidelines for treatment of trachoma in the NT (1998)
Tuberculosis Guidelines for the control of tuberculosis in the NT (December 2002) The Central Australian Tuberculosis Control Program – TB Control Strategy (June 1997)
Vaccination Schedules Northern Territory Standard Childhood Vaccination Schedule, 1/3/03 Northern Territory Adult and Special Groups Vaccination Schedule 1/3/03

Appendix 2 Two examples of decision making in outbreak investigations

A) A foodborne outbreak



B) An outbreak of meningococcal disease



Adapted from: Dalton CB, Roberts CL, Patel MS. (in press) Guidelines for the control of communicable disease outbreaks in Australia. Department of Health & Health and Aged Care. Canberra.

Appendix 3 Specific considerations in other outbreaks

Vaccine Preventable Diseases

Measles is a vaccine preventable disease which is highly contagious. It can cause significant morbidity and mortality in very young, immunocompromised and/or malnourished children. Immunisation of susceptible contacts within 72 hour of exposure can prevent development of the disease (refer to the *Guidelines for the control of measles outbreaks in Australia* (July 2000) http://www.health.gov.au/pubhlth/publicat/document/cdi/tech5_measles.htm).

Pertussis (whooping cough) and *Haemophilus influenzae type b* disease are vaccine preventable diseases. Antibiotic prophylaxis to close contacts and to cases of pertussis and Hib can prevent further disease transmission (refer to the *Guidelines for the Control of Pertussis in Australia* <http://www.health.gov.au/pubhlth/strateg/communic/tech/pertus.htm> and *The Australian Immunisation Handbook 8th Edition 2003*).

Influenza. The need for a mass vaccination campaign should be considered in the context of all available epidemiological data, including age specific attack rates, the virulence of the flu strain, the likely duration of dislocation and the availability of the vaccine. Priority should be given to vaccinating emergency and relief staff and known influenza risk groups. Prophylactic antiviral agents should be considered, particularly in residential facilities such as nursing homes as vaccine induced immunity takes about two weeks to develop. In the case of pandemic influenza (refer to *A Framework for an Australian Influenza Pandemic Plan* (June 1999) <http://www.health.gov.au/pubhlth/strateg/communic/tech/influenza.htm>).

Meningococcal disease

A single case of meningococcal disease constitutes a public health emergency. Aim to complete contact tracing for prophylactic antibiotics within 3 days of diagnosis of the index case. Chemoprophylaxis of eligible contacts is essential action and targeted immunisation may be appropriate in certain situations. Further information is available in the *Guidelines for the early clinical and public health management of meningococcal disease in Australia*. <http://www.cda.gov.au/pubs/other/mening.htm>.

Vector Borne Diseases

These diseases are transmitted to humans from vectors such as ticks or mosquitoes. Rapid action such as the trapping of mosquitoes may be required, particularly if there has been a case of mosquito borne illnesses not currently present in the NT but with the potential to be imported (dengue, West Nile Virus disease, malaria, or Japanese encephalitis). Mosquito borne diseases endemic to the NT include Murray Valley encephalitis (MVE), and Ross River Virus, Barmah Forest Virus and Kunjin Virus diseases. All confirmed cases of MVE require detailed epidemiological and entomological investigation. The Medical Entomology Branch (MEB) covers the entire NT and should immediately be notified of potential outbreaks from all regions. They liaise with agencies in each region such as Environmental Health or local government councils to arrange appropriate action. There is an important, formal relationship between the MEB and AQIS for surveillance and control of exotic vectors which includes a protocol for cooperative action in response to an importation of exotic mosquitoes.

Appendix 4. Contact Details

Darwin

	Business Hours	Who to contact	After hours	Who to contact
Centre for Disease Control	8922 8044	Public Health Officer on call	8922 8888	Doctor on call for Disease Control
Environmental Health				
Management and Policy	8922 7149	Director Environmental Health	0401 116 460	Director Environmental Health
Operations Darwin Urban	8922 7363	Environmental Health Manager	0401 116 033	Environmental Health Manager
Darwin Rural	8922 7481 8922 7334	Environmental Health Officer		
Laboratories				
Royal Darwin Hospital	8922 8034 8922 7741	Director Pathology Microbiology Registrar	0438 899 036 0401 116 067	Director Pathology or Microbiology Registrar
Mayne Diagnostics	8945 2377	Microbiologist	8945 2377 0417 907 162	Microbiologist
Medical Entomology	8922 8333 8922 8502	Senior Medical Entomologist Operations Manager	0417 856 731 8985 6532 8945 6673	Senior Medical Entomologist Operations Manager
Rural Public Health Services	8922 8888	District Medical Officer on call	8922 8888	District Medical Officer on call
Power and Water Authority	8924 5921	Manager Environmental Services	0401 119 565	Manager Environmental Services
AQIS	89992311			
Royal Darwin Hospital	89228888			
Emergency Department	8922 8888	Emergency Consultant on duty	8922 8888	Emergency Consultant on duty
Infection Control	8922 8045 8922 8428	Nursing Director Infection Control CNS Infection Control	8922 8888	Nursing Director Infection Control

Alice Springs Region

	Business Hours	Who to contact	After hours	Who to contact
Centre for Disease Control	8951 6906 8951 6907	Medical Officer Public Health Nurse	0401 110 142 8951 7777 8922 8888	CDC Medical Officer Alice Springs CDC Medical Officer Darwin
Environmental Health				
Alice Springs Urban	89500500	Manager Environmental Services	TBA	Manager Environmental Services
Alice Springs Rural	89517814	Manager Central Australia Environmental Health Unit	0411 447 723 89521309	Manager Central Australia Environmental Health Unit
Laboratories				
Hospital	8951 7749	Laboratory Manager	0408 804 801	Laboratory Manager
Mayne Diagnostics	8952 6633	Microbiologist	89807111- pager 89807	Microbiologist
Remote Services	8951 7808 8951 7586	Senior District Medical Officer Nursing Director Remote Services	0401 114 155 0401 110 165	Senior District Medical Officer Nursing Director Remote Services
Medical Entomology	8922 8333 8922 8502	Senior Medical Entomologist Operations Manager	0417 856 731 8985 6532 8945 6673	Senior Medical Entomologist Operations Manager
Alice Springs Hospital	8951 7777		8951 7777	

Barkly Region

	Business Hours	Who to contact	After hours	Who to contact
Centre for Disease Control	8962 4259	Public Health Nurse	0417 898 145 8962 4399	Public Health Nurse
Environmental Health	89624302 or satellite phone 0145115941	Environmental Health Officer	8962 4399	Environmental Health Officer
Laboratory	89624267			
Tennant Creek Hospital	8962 4399		8962 4399	

East Arnhem Region

	Business Hours	Who to contact	After hours	Who to contact
Centre for Disease Control	8987 0359	Co-ordinator Disease Control	0419 845 651 8987 3457	Coordinator Disease Control
Environmental Health	8987 0441 or satellite phone 0145116395 8987 0440	Environmental Health Officer	0429 815 019 8987 8575	Environmental Health Officer
Laboratories				
Hospital	8987 0254	Laboratory Manager	0418 827 566 8987 0211	Laboratory Manager
Mayne Diagnostics	8945 2377	Microbiologist	8945 2377 0417 907 162	Microbiologist
Medical Entomology	8922 8333 8922 8502	Senior Medical Entomologist Operations Manager	0417 856 731 8985 6532 8945 6673	Senior Medical Entomologist Operations Manager
Gove District Hospital	8987 0211		8987 0211	

Katherine Region

	Business Hours	Who to contact	After hours	Who to contact
Centre for Disease Control	8973 9042 8973 9049	Medical Officer Public Health Nurse	0429 700 702 8973 9211 0429 700 702	Medical Officer for Communicable Diseases
Environmental Health	8973 8411 or satellite phone 0145116412 8973 8767	Environmental Health Officer	8971 0448	Environmental Health Officer
Laboratories				
Hospital	8973 9358	Laboratory Manager	0418 805 665	Laboratory Manager
Mayne Diagnostics	8945 2377 8972 2539	Microbiologist	8945 2377 0417 907 162	Microbiologist
Medical Entomology	8922 8333 8922 8502	Senior Medical Entomologist Operations Manager	0417 856 731 8985 6532 8945 6673	Senior Medical Entomologist Operations Manager
Katherine District Hospital	8973 9211		8973 9211	

Appendix 5 Pathogens implicated in food-borne disease

Table 1. Predominantly upper gastrointestinal signs and symptoms (nausea & vomiting)

Aetiologic agent & illness	Source & transmission	Incubation	Period of communicability	Comments
<i>Bacillus cereus</i>	Raw plants of plant origin eg rice	0.5-5 hrs when vomiting predominates	N/A	If food is kept at ambient temperature for sufficient time, heat resistant spores germinate releasing pre-formed toxins into food. Illness only results if food contains sufficient enterotoxin
<i>Bacillus cereus</i> gastroenteritis	Ingestion of cooked food containing enterotoxin			
Norovirus (formerly Norwalk-like virus or small round structured viruses)	Human faeces or vomitus	0.5 to 3 days; usually 36 hrs	During acute stage of illness and up to 48 hrs after diarrhoea has stopped	Infected food handlers are often the source as virus readily spread by aerosolisation of vomitus & faecal-oral transmission
Norovirus gastroenteritis	Ingestion of faecally contaminated shell-fish ie oysters, clams			
<i>Staphylococcus aureus</i>	Organisms from nose, skin or lesions of food handlers contaminate food	1-8 hrs; usually 2-4 hrs	N/A	If food is kept at ambient temperature for sufficient time, <i>S. aureus</i> organisms multiply and produce pre-formed toxins in the food. Illness only results if food contains sufficient enterotoxin
Staphylococcal intoxication	Ingestion of food containing enterotoxin			

Table 2. Predominantly lower gastrointestinal signs and symptoms (diarrhoea & abdominal cramps)

Aetiologic agent & illness	Source & transmission	Incubation	Period of communicability	Comments
<i>Bacillus cereus</i>	Raw plants of plant origin eg rice	8-16 hrs when diarrhoea predominates; mean 12 hrs	N/A	If food is kept at ambient temperature for sufficient time, heat resistant spores germinate releasing pre-formed toxins into food. Illness only results if food contains sufficient enterotoxin
<i>Bacillus cereus</i> gastroenteritis	Ingestion of cooked food containing enterotoxin			
<i>Campylobacter</i> spp.	Wide range animal faeces including domestic animals	2 to 7 days; usually 3 to 5 days	N/A	Person-to-person transmission is uncommon
Campylobacteriosis	Ingestion of inadequately cooked animal products especially poultry			
<i>Clostridium perfringens</i>	Most widespread of all bacteria in environment – found in soil & most animals	8-24 hrs; usually 10 hrs	N/A	If pre-cooked food is slowly cooled or inadequately reheated heat resistant spores germinate and multiply. Enterotoxin is released once ingested cells sporulate in intestine
<i>Clostridium perfringens</i> enteritis	Ingestion of inadequately pre-cooked foods especially meat meals, gravy food			
Enterohaemorrhagic <i>E.coli</i> (EHEC)	Animal faeces especially cattle	1 to 10 days; usually 2 to 5 days	Throughout the course of the illness; short excretion period	<i>E.coli</i> 0157:H7, 026, 0111, 0115, 0113 2-7% patients develop haemolytic uraemic syndrome
Enterohaemorrhagic <i>E.coli</i> diarrhoea	Inadequately cooked beef. Milk and vegetable/fruit products have also been implicated			
<i>Giardia lamblia</i>	Human & animal faeces	5 to 25 days; usually 7 days	Entire period of infection	Cysts are chlorine resistant & can be found in treated, unfiltered water supplies
Giardiasis	Ingestion of cysts in faecally contaminated water, and less commonly, contaminated food			

Table 2. Continued

Aetiologic agent & illness	Source & transmission	Incubation	Period of communicability	Comments
<i>Salmonella</i> spp.	Animal faeces esp poultry, reptiles	6-72 hrs; usually 12-36 hrs	Throughout the course of the illness; mean duration of excretion 5 weeks	Person-to-person transmission is not uncommon. Food handlers with salmonellosis may only return to work practices approved by EHO after diarrhoea has stopped
Salmonellosis	Ingestion of inadequately cooked food and raw foods eg poultry, sprouts, lettuce			
<i>Shigella</i> spp.	Human faeces	0.5 to 7 days; usually 1 to 3 days	During the acute infection; excretion may not cease until several months after onset of illness	Person-to-person transmission is very common. Food handlers with shigellosis may only return to work practices approved by EHO after diarrhoea has stopped
Shigellosis	Ingestion of ready to eat food contaminated by infected food handler			
<i>Vibrio parahaemolyticus</i> gastroenteritis	Ingestion of raw marine fish, crustacea, molluscan shellfish	4-96 hrs; usually 12 hrs	N/A	Immuno-compromised patients are most susceptible
<i>Yersinia</i> spp.	Animal faeces especially pigs	1 to 7 days	Excretion for duration of symptoms; usually 2-3 weeks with Rx but up to 3 months without Rx	
Yersiniosis	Faecal-oral transmission by eating or drinking contaminated food or water or by contact with infected persons or animals			

Table 3. Neurological signs and symptoms (visual disturbances, tingling and/or paralysis)

Aetiologic agent & illness	Source & transmission	Incubation	Period of communicability	Comments
<i>Clostridium botulinum</i>	Commonly found in environment & soil	2 hrs to 8 days; usually 18-36 hrs	N/A	Gastrointestinal symptoms may precede neurological symptoms
Botulism	Ingestion of low-acid food that has been inadequately heating during canning without subsequent adequate cooking			
Ciguatera poisoning	Ciguatoxin in fatty tissues in head and flesh of tropical marine fish eg barracuda, red snapper, parrotfish, grouper	3-5 hrs but may be longer	N/A	Gastrointestinal symptoms may precede neurological symptoms

Table 4. Generalised infection signs and symptoms (fever, chills and/or malaise)

Aetiologic agent & illness	Source & transmission	Incubation	Period of communicability	Comments
<i>Listeria monocytogenes</i>	Commonly found in environment & in faeces of many species of wild & domestic animals	3 to 70 days; usually 4 to 21 days	Mothers of infected neonates may shed the agent in vaginal discharges and urine for 7 to 19 days	Serious sequelae for pregnant women & elderly
Listeriosis	Ingestion of unpasteurised milk, contaminated soft cheese & vegetables			
Hepatitis A virus	Human faeces	15 to 50 days; average 25 to 30 days	Max infectivity during last 2 weeks of the incubation period & 7 days after jaundice onset	Prophylaxis with normal human immunoglobulin and/or hepatitis A vaccine
Hepatitis A	Faecal-oral transmission and through contaminated food eg shellfish, or contaminated water			

Table 5. Allergic-type signs and symptoms (facial flushing and/or twitching)

Aetiologic agent & illness	Source & transmission	Incubation	Period of communicability	Comments
<i>Proteus</i> spp.	Tuna, mackerel, Pacific dolphin, blue-fish, cheese	Few minutes to 1 hour	N/A	Histamine-like substance produced by <i>Proteus</i> spp.

Appendix 6. Guidelines for reporting investigations of enteric disease outbreaks

This is a framework for writing a report about an investigation of an enteric disease outbreak. The contents of reports will vary depending on the circumstances of each outbreak, and the items listed below should be considered but may not be relevant in all situations.

Introduction

- How you became aware of the outbreak
- Setting of the outbreak, including circumstances, people involved, place and time
- Objectives of the investigation

Methods

Environmental Investigations

- Site inspection including interviews with staff
- Type of specimens collected and methods of analysis

Epidemiological investigations

- Case definition
- How participants were recruited
- Clinical and laboratory investigations including type of specimens collected and methods of analysis
- How the questionnaire was developed and administered
- Statistical (descriptive and analytical) methods used to interpret the data

Results

Environmental Investigations

- What was observed at the site inspection
- What organisms were cultured

Epidemiological investigations

- Response rates
- Number of cases and attack rates (table of overall and age/gender specific if appropriate)
- Symptoms and duration and outcomes of illness
- Clinical investigation including laboratory results
- Incubation period including median and range, plotted on epidemic curve
- Statistical measures of association of illness with potential exposures (eg table of attack rates, relative risk or odds ratio of illness after ingestion of specific food items in both cases and non cases)
- Statistical measures of association of illness with potential risk factors (eg table of attack rates, relative risk or odds ratio of illness for age, gender, occupation or other potential risk factors in both cases and non cases)

Discussion

- Likely causative food item (or other exposure)
- Likely causative agent
- Risk factors for illness
- Public health action taken to control the outbreak and prevent future ones
- What issues arose

Conclusions and Recommendations

- To control this outbreak
- To prevent future outbreaks
- To improve future out break investigations

References and Acknowledgments

Adapted from *Guidelines for the investigation of gastrointestinal illness* – Attachment 15 (Full outbreak investigation report). Public Health and Development Division, Victorian Department of Human Services 1998. <http://hna.ffh.vic.gov.au/phd/9902113/>

For further information contact

Centre for Disease Control Darwin

Ph: 08 89228044

Fax: 08 89228310

www.nt.gov.au/health/cdc

OR

Your regional CDC

Alice Springs Ph: 08 89517550

Katherine Ph: 08 89739049

Nhulunbuy Ph 08 89870359

Tennant Creek Ph 08 89624259