PACIFIC OUTBREAK MANUAL

Pacific Public Health Surveillance Network (PPHSN)

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Acknowledgements

This manual has been developed by the Pacific Public Health Surveillance Network (PPHSN). PPHSN is a voluntary network of countries and organisations dedicated to the promotion of public health surveillance and appropriate response to the health challenges of 22 Pacific island countries and areas.

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Contents

Introduction

It is important to recognise infectious disease outbreaks so that control measures can be taken to stop them. Some diseases that cause outbreaks can cause serious illness and deaths if they are not rapidly brought under control. An effective surveillance system can provide early warning of disease outbreaks. Responding effectively will reduce the spread and impact of the disease.

Purpose of the manual

This manual is meant to be a practical guide for health-care workers in the Pacific for the management of infectious diseases of public health importance. Expert advice should always be sought if an outbreak is detected.

Individual countries and areas are encouraged to adapt this manual to local conditions – for example by including local testing protocols, local treatment recommendations, forms, etc. It is also suggested that a country's or territory's 'notifiable diseases' list be attached to this document, with instructions on the local requirements for notification of these diseases.

The clinical management guidelines given in this manual are **not** intended to be complete or to substitute for sound clinical judgment. Always consult additional resources if needed. Specific guidelines are referred to where applicable and additional resources are listed in Appendix 1.

Structure of the manual

The manual is divided into three sections plus nine appendices.

Section 1 provides general information on responding to disease outbreaks as well as guidelines on the urgency of response.

Section 2 contains guidelines for core *syndromic surveillance* conditions. Syndromic surveillance is based on reporting of clinical syndromes, such as 'diarrhoea' or 'fever and rash' rather than laboratory-confirmed specific diseases, such as salmonellosis or measles.

For more information on syndromic surveillance, refer to:

http://www.spc.int/phs/pphsn/surveillance/Syndromic.htm

If you would like to register to receive the weekly PPHSN syndromic surveillance reports, send an email to:

FocalPointPPHSN-CB@spc.int

PacNet is a forum for communication regarding public health incidents, including those of international concern.

Section 3 contains disease specific guidelines.

For each condition, the following headings are usually given:

- **Name of syndrome / disease**
- **Public health priority**
  - Urgent: Diseases marked as Urgent must be notified and investigated with 24 hours
  - High: Diseases marked as High must be investigated within 2 working days
  - Routine: Diseases marked as Routine must be investigated within 3 working days
- **Case definition** (defines what should be counted as a case and what should not, for surveillance purposes only)
- **Number of cases required to trigger a notification and investigation**

- **Description of clinical signs and symptoms**
- **Infectious cause(s)** (where there is a specific known or likely cause)
- **Sources of infection (*reservoir*)**
- **How the disease is spread (*transmission*)**
- **Incubation period**
- **Period of infectiousness**
- **Clinical management**

RESPONSE PROCEDURE:

- **Infection control**
- **Reporting**
- **Investigation**
- **Specimens** (method for collecting samples for testing)
- **Public health management of cases**
- **Management of contacts**
- **Prevention**
- **Other diseases with similar signs and symptoms**
- **Additional resources** (clinical management, additional response guidance, etc.)

The appendices contain the International Health Regulations (IHR, 2005) Decision Instrument, infection control guidelines and a list of additional resources. They also contain definitions of terms that may not be familiar to you. The terms you will find in the glossary (Appendix 8) are in *italics* in the text.

Section 1: General guideline for response to outbreaks

What is an outbreak?

An outbreak is an unexpected increase in the number of cases of an illness. It is when the number of actual cases is more than the number of expected cases in a specific population in a specific period of time.

Therefore the number of cases needed before it is considered to be an outbreak is different for different diseases and in different regions and countries. Whether it is an outbreak or not also depends on the number of cases that are normally seen in a population, taking into account factors such as the season, whether there has been an increase in the size of the population, whether there has been a change in the surveillance system (e.g. an increase in the number of reporting sites or recent training of health professionals on disease surveillance). For example, a large country will at a given time always have some cases of respiratory infection, and most vector-borne diseases will be more common during the rainy season when there are more mosquitoes around. So it is necessary to know how many cases of a disease are normally expected in a specific area at specific times of the year. This normal level of disease is known as the 'baseline'.

For some diseases, a single case can be considered an outbreak requiring urgent action (such as acute flaccid paralysis or suspicion of measles or cholera), while others require an increase above a certain *threshold* level before further investigation is needed (such as influenza-like illness).

How are outbreaks detected?

Outbreaks can be detected through syndromic or routine surveillance, through reporting by health professionals or through informal reports (rumours) from other agencies and individuals. All reports of disease outbreaks should be taken seriously, verified and promptly investigated in order to implement appropriate control measures. Syndromic surveillance and laboratory reports are examples of indicator-based surveillance, whereas an unusual event in the community (like unexplained deaths in one village) reported by a health worker or in the media is an example of event-based surveillance.

Responding to a report of a disease outbreak

Each Pacific island country or area should have its own response team to investigate and manage an outbreak. This response team should have a link to the national EpiNet Team, which is the response arm of the Pacific Public Health Surveillance Network (see Appendix 2 for an outline of the roles and responsibilities of EpiNet teams).

The response to any reported outbreak should always consist of the following steps:

1. Confirm the outbreak
2. Try to establish a diagnosis (though a specific diagnosis is not needed to conduct an outbreak investigation)
3. Make a case definition
4. Find cases and obtain information
5. Make a line list
6. Describe cases and interpret the data
7. Implement control measures
8. Communicate findings

These steps do not always occur exactly in this order. For example, implementing control measures should begin as soon as possible (initial control measures are usually general – for example boiling water and washing hands; the outbreak investigation will help to focus the control measures) and communication should be an ongoing process.

Before starting an outbreak investigation it is important to understand the area in which you will be working. This includes the geography, the politics, whether there has already been some media coverage of the reported outbreak and whether there are any cultural or ethnic sensitivities. You must also identify important stakeholders (local health department, local senior health worker, community leader etc.) and determine if you need special approvals to travel or work in the area of the reported outbreak.

1. Confirm the outbreak

Verifying the information about the outbreak is an important first step in the investigation since sometimes reports of outbreaks can be based on incorrect information, incorrect reporting or rumours. Also, an increase in cases of disease may be due to a change in season or an increase in the size of the population and may not be a true outbreak. Make sure that the reported cases really exist, that they have the same syndrome or disease, and that the rise in cases is not a result of, for example, an increase in the number of surveillance reporting sites, a change in a laboratory test or a laboratory mistake.

Once it has been confirmed that there is a likely increase in cases of a certain disease, an outbreak investigation (and response) team should be convened.

2. Try to establish a diagnosis

Cases may be detected through syndromic surveillance, clinical diagnosis of disease or local laboratory testing. It is impossible to test for all possible diseases, so talking with health workers to better understand the likely diseases – and which diseases to test for – is a critical step. Talking with laboratory staff is important to ensure that the correct samples are collected and samples are stored and transported appropriately. Specialised testing may be required in a *reference laboratory* overseas. The PPHSN LabNet is able to provide advice about appropriate collection of specimens and laboratories. See the final page of the LabNet catalog for contact details of laboratory specialists who will be able to assist.

http://www.pphsn.net/Services/LabNet/intro.htm

3. Make a case definition

An outbreak case definition needs to be developed in order to identify cases associated with the outbreak. If a case definition is not stated and used, different health-care workers will have different ideas about what a case is. This can be a serious problem as it will lead to patients with different diseases being counted as ‘cases’. The outbreak case definition is specific to the outbreak you are investigating. The outbreak case definition is different from the more general case definitions used for surveillance purposes.

The outbreak case definition should be developed and used by everyone involved in the outbreak investigation. The outbreak case definition should be simple, clear and able to be consistently used by everyone involved in the investigation, from health workers to outbreak response teams and data entry staff. One of the challenges is to decide on a case definition that is not too sensitive (including false cases) and not too specific (excluding real cases).

The case definition should include information about:

- person – age, gender
- place – school, village, province, island
- time – period of time in which the illness has occurred
- clinical features – this will usually include a description of signs and symptoms and may include laboratory results

Sometimes an outbreak case definition needs to be changed during an outbreak investigation. This is usually because more information is received.

Example of outbreak case definitions:

- Typhoid outbreak situation
  A case is: any person, living in district X of island X who presents to a health-care facility between X date to present date with fever for 3 or more days, plus one or more of the following: feeling bad, severe headache, dry cough, loss of appetite, abdominal pain, constipation, diarrhoea, or rose spots on the trunk.
- Rotavirus outbreak situation
  A case is: any child aged 0–5 years, on island X who has had sudden onset of diarrhoea between X date to present date.

4. Find cases and obtain information

It is possible to enhance the existing surveillance system by informing health centres, hospitals, laboratories and the community about the outbreak and encouraging people who are sick to come forward. You can request that the staff record cases that meet the case definition by filling in case notification forms and then you can use this information to start a line list. The staff at the clinics and hospitals will be busy managing patients, so if you ask them to spend time collecting information it is **very** important that it is collected and used. Making time to conduct site visits, if practical, often reveals important information that may not be obvious through telephone conversations or reviewing a line list.

Information on the cases can be collected using a standardised questionnaire (see sample, Appendix 9) and should include demographic information such as age, gender, address and telephone number as well as clinical information (date of onset of illness, signs and symptoms, hospitalisation), laboratory results and possible exposures (food consumption history, environmental exposure etc.). Interviewing cases about what may have caused their illness is important. The information to collect depends on the outbreak and may include a travel history, immunisation history or detail about their profession. Epidemiologists can assist with developing questionnaires and asking the right questions.

Depending on the outbreak, it may also be important to interview *contacts*.

5. Make a line list

The key information collected should be displayed in a line list. Each case is recorded on one line, with a unique identifier (such as a case ID number). An example of a line list is presented in Table 1.

A line list can be collected on paper or in a computer program like Excel.

				Demographics			Signs and symptoms			Lab
ID	First name	Last name	Report date	Sex	Age	Onset date	X	Y	Z	Positive
1	Kelepi	Fatani	06/12/13	M	36	04/12/13	Yes	Yes	Yes	Yes
2	Isileli	Koula	06/12/13	M	68	04/12/13	Yes	No	Yes	Yes
3	Sone	Tatafu	05/12/13	M	37	02/12/13	Yes	No	Yes	Yes
4	Lia	Nalatu	07/12/13	F	22	05/12/13	No	No	No	NA
5	Teo	Lopeti	08/12/13	M	34	07/12/13	Yes	Yes	No	Yes

Table 1: Example of a line list

6. Describe cases

Once you have a line list you can start to describe the outbreak. This is called *descriptive epidemiology*. For every outbreak it is always necessary to describe the cases by **person, place, time and clinical features.**

- **Person** refers to information about the patients, such as sex, age group, occupation and so on. All this information will help find clues that explain the outbreak. It may be possible to calculate the number of cases per unit of population (the attack rate), which can give us information to identify groups that are at higher risk (e.g. men or women, children or adults) (Figure 1).

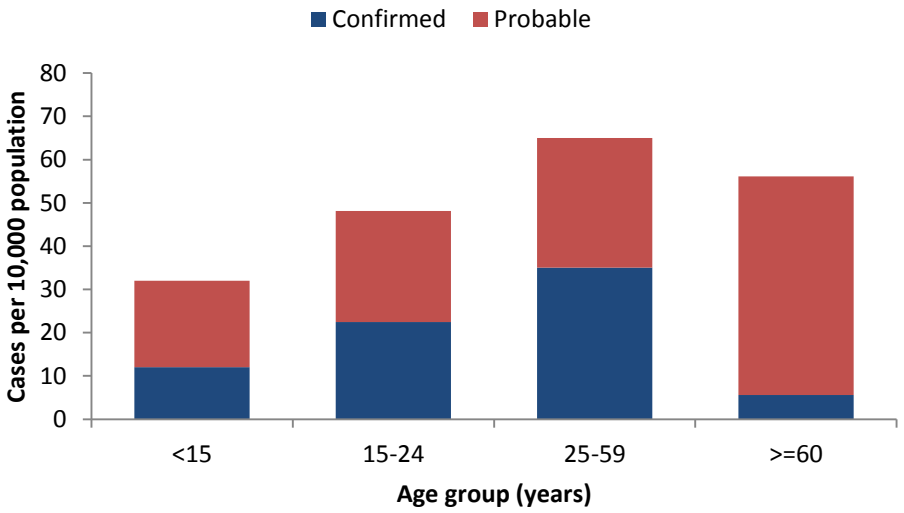


Figure 1: Distribution of confirmed and probable cases by age group

- **Place** involves describing the cases by place. This is often where the patients live, but it may also be where they have become unwell or been exposed. Sometimes it's a good idea to put the cases on a map as it may provide useful information about the source of an illness (Figure 2).

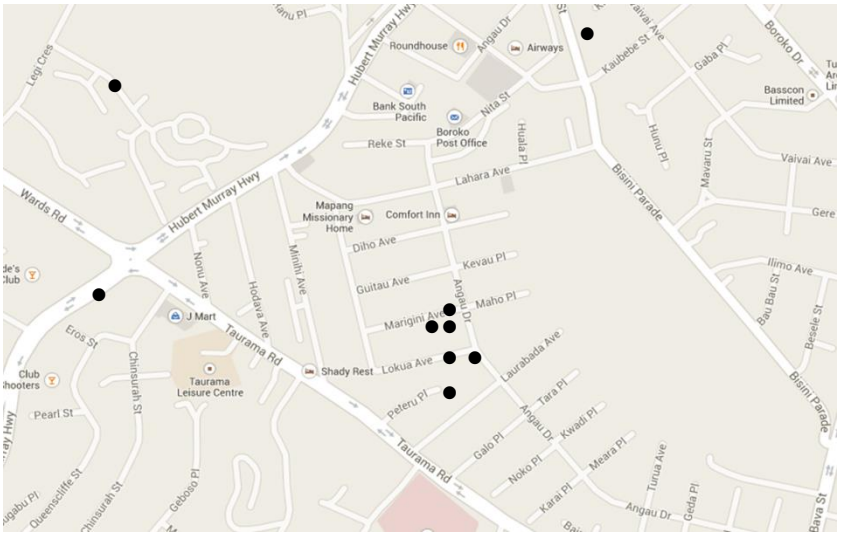


Figure 2: An example of a spot map

- **Time** means date and time of onset of illness, but if that is not available, date of diagnosis or presentation may be used. It is very useful to draw an epidemic curve, which shows the number of cases by time of onset. The x-axis (horizontal axis, across the bottom) shows a measure of time, for example hours, days, weeks or months. The y-axis (vertical axis, down the side) shows the number of cases for each measure of time (see Figure 3 as an example). Time is also used to describe when exposure to risk factors may have occurred.

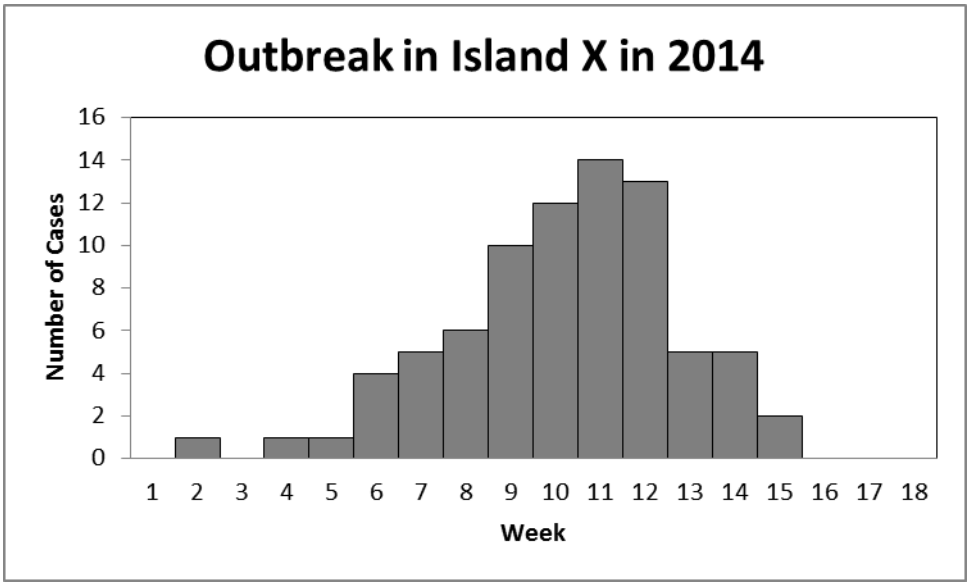


Figure 3: Epidemic curve showing the number of cases over time

- **Clinical features** are the signs and symptoms related to the cases, and laboratory results if available.

After describing and analysing the information from the line list, you can start to come up with some ideas about the cause or source of the outbreak, and risk factors that may make some members of the population more vulnerable to infection. This is called hypothesis generation. This requires a thorough knowledge about the diseases that occur in the region – for example, which age groups are usually affected, what are the incubation periods, modes of transmission and symptom profiles. Missing important clues from the outbreak descriptive epidemiology is a common mistake. Always

review your descriptive epidemiology with experienced physicians in-country and medical epidemiologists from regional agencies.

Once you have developed an idea (hypothesis) of what is causing the outbreak, you will be in a better position to undertake the most appropriate tests to confirm the cause of the outbreak. Tests may include water quality testing, food specimen testing and/or collection and testing of people's biological specimens (e.g. *nasopharyngeal* swab, sputum, stool).

In some cases an attempt to test an idea (hypothesis) is made using *analytical epidemiology.* This usually involves undertaking a cohort or case-control study. Epidemiologists may be required to assist at this stage. Entire textbooks are written about analytic epidemiology, so it is not possible to cover in this manual. For most outbreaks it is not necessary to have knowledge about analytic epidemiology in order to investigate and respond appropriately.

7. Implement control measures

As mentioned previously, control measures should be implemented as soon as possible. They are often more general to begin with (e.g. respiratory or hand hygiene education, health promotion) and become more specific as more information about the cause of the outbreak is identified.

Control measures may be taken if there is a suspected **source** (removing suspected food from sale, closing a restaurant, chlorinating a water source), **mode of transmission** (vector control, community education messages, hand hygiene measures) or a vulnerable **population** (immunisation, *prophylaxis*). The number of cases of illness should decrease once control measures are in place. Continued surveillance to identify a decrease in the number of cases will help to assess whether your control measures have been effective.

8. Communication

During the course of an outbreak investigation, it is essential to communicate information on the outbreak to those involved in the response, including senior health staff, clinicians, laboratories, decision-makers and other disciplines and sectors. This ensures a coordinated response and keeps decision-makers informed of the situation.

To manage the information needs, it is a good idea to produce a simple one or two-page situation report for every day of the outbreak. The situation report should provide information about the outbreak and what is being done to respond. The report may also include an analysis of what you think may happen next and include a section where addition resource needs (extra staff, extra specimens sent) are outlined.

It is also important to advise not only the national senior staff but also health professionals in other Pacific island countries and areas about the potential threat, and to encourage preparedness. The PPHSN PacNet forum is designed for communication regarding public health emergencies, including those of international concern. It would be ideal to post a message quickly on PacNet, even before all the relevant information is available.

See Appendix 4 for a format that could be used for a situation report and for posting on PacNet.

At the completion of the outbreak investigation it is important to document the investigation and the actions taken by both the community and health workers. Include the key epidemiological findings and laboratory results as well as an evaluation of the outbreak investigation and response in reports aimed at health professionals. An evaluation should describe any important lessons learnt

and any recommendations for changes to the surveillance and response system with the aim of improving the process during future outbreaks.

Risk communication

Risk communication refers to communicating with the public. It saves lives and reduces illness. Every single public health intervention used during an outbreak will succeed or fail based on the way you communicate.

Effective communication can:

- help slow, stop or prevent outbreaks;
- maintain and build public trust in health authorities;
- help people overcome fear and anxiety;
- help people make informed decisions about how to protect themselves; and
- reduce the economic, social and political impact of an outbreak.

When an outbreak occurs or is suspected, information and health messages need to be rapidly communicated to the public to build trust, motivate behaviour change, and reduce fear and confusion.

It may be necessary to use several methods of communication in order to reach your target audience, i.e. those most at risk. Some common public risk communication methods include:

- media releases or interviews for radio, television or newspapers
- public talks at community gatherings (e.g. community meeting places, church)
- production and distribution of posters and other information

A spokesperson should be nominated early in the outbreak. This person should be a health professional who is respected and well known. Other well-known community people may also be nominated as spokespeople; however, it is essential that the information provided is consistent.

Trust is the key principle of outbreak communication. Without this trust, the public will not believe, or act on, the health information that you give them. Trust is built through the following steps:

1. Announcing early: Let people know what is going on as soon as possible. Tell the public of a real or potential health risk. It does not matter if you do not have all the answers. Late announcement will break the trust in the health authorities' ability to manage the outbreak. See Appendix 3 for a first announcement template.
2. Don't hide anything: Keep the public up to date. If there is nothing new to say, keep reinforcing key messages so people stay safe. Aim for total honesty. Promise and deliver regular briefings. Keep detailed records of decision-making meetings, and communicate not only decisions, but how you made those decisions.
3. Listening: Tell the truth fast and then listen. Trust cannot be maintained if you do not know what people are hearing, thinking and feeling. Listen to understand the public's objections, to identify points of confusion, and to respond to concerns whether you believe they are rational or not.
4. Planning: You should not wait until there is an outbreak to start thinking about how to communicate with the public and other stakeholders. It is useful to develop a generic outbreak communication plan so that when an outbreak occurs, the plan can be quickly used.

See Appendix 3 for more information on risk communications challenges and other outbreak communication resources.

Reporting responsibility: public health emergency of international concern

Under the International Health Regulations (IHR 2005), any suspected disease outbreak which is considered to be a potential public health emergency of international concern (PHEIC) is required to be reported as soon as possible to the World Health Organization (WHO). Confirmation of the details of the outbreak is not necessary.

For assistance on what may count as a potential PHEIC, see the IHR Decision Instrument in Appendix 5 and discuss with the national IHR Focal Point. You may also informally talk to a staff member of WHO for assistance.

Conditions requiring immediate response

The following are **guidelines**. Certain places that experience endemic levels of one of the diseases below may need to adjust their response *threshold* to suit local conditions (for example, if there are 10 cases of dengue every month, a response may not be needed until 15 or 20 cases are detected in a single month – each site must determine their own threshold for action).

1. Single cases

- acute fever with rash
- acute flaccid paralysis / polio
- measles
- rubella (German measles)
- meningococcal disease
- typhoid fever
- cholera
- dengue (in areas where there normally is no dengue fever, one case should lead to an immediate response)
- ciguatera fish poisoning

2. Clusters of cases

(**Important note**: these numbers are provided as **examples only**; they should be adapted to the local situation and the number of cases normally seen in an area)

- **5** or more linked cases of diarrhoea
  (**3** or more linked cases if diarrhoea is bloody (i.e.dysentery))
- **5** or more linked cases of influenza-like illness (ILI)
- **2** or more linked cases of severe acute respiratory infection
- **2** or more linked cases of epidemic hepatitis
- **2** or more linked cases of leptospirosis

3. Any serious event resulting in an unusually high number of cases with similar or severe symptoms

Depending on the disease, linked cases are considered to be cases from the same family, area or village, institution (for example school) or gathering or with some similar exposure.

Section 2: Response guidelines for core syndromic surveillance conditions

Acute fever and rash (AFR)

Surveillance for acute fever and rash (AFR) was started to detect possible measles outbreaks at an early stage. You cannot know for sure if a patient with AFR has measles or another illness (see below for a list). This is why a blood sample needs to be taken as soon as possible and sent to a laboratory to test for measles antibodies.

Public health priority

Urgent

Case definition

Person of any age who presents with *acute* fever illness with acute non-*vesicular* rash

Number of cases required to trigger a notification and investigation: One

Description of signs and symptoms

Fever and a rash that is non-vesicular (not blisters) that appears some days after the onset of the fever.

Infectious cause(s)

- measles virus (this is the most important reason we look for cases of AFR)
- other diseases that may cause AFR (see below for a list)

Sources of infection (*reservoir*)

Disease specific – see Section 3

How the disease is spread (*transmission*)

How the disease is spread is disease specific but all cases of AFR should be assumed to be highly infectious unless you know the cause and that it is not easily spread.

Incubation period

Disease specific – see Section 3

Period of infectiousness

Assume the patient is highly infectious and place in isolation until a diagnosis is made. For patients with suspected dengue, a long lasting insecticidal net (LLIN) should be used.

Clinical management

Isolate the case from others. Paracetamol rather than aspirin should be used for fever in patients under 18 years of age and for those with suspected dengue. Specific treatment will depend on the cause.

RESPONSE PROCEDURE

Infection control

All cases of AFR should be managed as suspected measles cases until laboratory testing for measles is negative or another diagnosis is made. This means they should be assumed to be highly infectious and isolated in hospital using STANDARD and AIRBORNE precautions (see Appendix 6).

The patient should be given a mask to wear and kept away from other patients as much as possible.

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case of measles.
- Ensure that the hospital HBAS (WHO Hospital-Based Active Surveillance) coordinator is informed.
- Begin a line list for suspected outbreaks.

Investigation

Investigation of clusters should occur before establishing a diagnosis. In single cases, priority should be given to figuring out a diagnosis and searching for additional cases.

Specimens

Blood samples should be collected and tested as soon as possible to confirm a diagnosis. If fever of 38°C/100.4°F is present, blood *culture* should be performed. Rapid tests should be used if available e.g., for dengue or leptospirosis. If possible a *paired sample* is important.

The filter paper method (dried blood spot) is becoming increasingly available to test for dengue, leptospirosis and chikungunya. Please check with a LabNet contact person about logistics and protocols for this method.

Public health management of cases

Refer to the HBAS Information Folder and the Acute Fever and Rash Case Investigation Form.

http://www.pphsn.net/surveillance/HBAS/Pacific_HBAS_Information_Folder-July2005.pdf

http://www.pphsn.net/surveillance/HBAS/AnnexB2-AFR_Case_Investigation_Form.pdf

http://www.pphsn.net/surveillance/HBAS/AnnexC2-AFR_Laboratory_Request_Form.pdf

Information should be collected on:

- the case's age, sex and where they live
- place, time, source and type of immunisations
- clinical details, including date of beginning of symptoms
- lab test results
- contact with other cases or travelers and travel history
- whether the case attends a school or other group setting

Management of contacts

Contact management will depend on the diagnosis, but contacts with symptoms should be isolated until a diagnosis is made.

Prevention

Refer to disease-specific guidelines – see Section 3.

Important diseases that may cause these symptoms (not a complete list)

- measles

- rubella
- other viral rashes, such as parvovirus B19, coxsackie A, roseola
- dengue
- leptospirosis
- chikungunya
- zika virus
- drug reaction
- meningococcemia

Additional resources

WHO Western Pacific Region. Measles Elimination Field Guide 2013.

http://www.wpro.who.int/immunization/documents/measles_elimination_field_guide_2013.pdf

Influenza-like illness (ILI)

Influenza-like illness (ILI) syndromic surveillance is recommended so that outbreaks can be detected early and new viruses can be detected quickly. New influenza viruses can cause large *pandemics* and also more serious disease than the viruses that circulate every year.

Public health priority

Routine

Case definition

- Measured fever of ≥ 38 C°; or self-reported fever*
- AND cough;
- AND with onset within the last 10 days

*See glossary for further definition of fever

Note: the case definition for ILI was modified in September 2015 in line with WHO surveillance standards.

Number of linked cases required to trigger a notification and investigation: depends on the local situation

The number of linked cases required to trigger a notification may depend on the situation. For example: regular syndromic surveillance for ILI can provide valuable information on the usual number of cases of disease. Staff experienced with syndromic surveillance for ILI will be able to identify an increase above this normal level and trigger a notification. Where no ILI has been detected for some months, an early notification of 2 or 3 linked cases can provide early warning of an outbreak about to happen. A small number of severe or unusual cases or cases associated with sick animals or birds should trigger an immediate notification and investigation.

Description of signs and symptoms

In addition to meeting the case definition, people with ILI may have any of the following symptoms: runny nose, headache, muscles aches and sneezing.

Infectious cause(s)

- influenza virus
- parainfluenza virus
- many other viruses and bacteria

Sources of infection (*reservoir*)

- humans, animals and birds (for influenza)
- several suspected animals (for SARS [severe acute respiratory syndrome])

How the disease is spread (*transmission*)

Mainly person to person transmission; less commonly from mammals (such as pigs) and birds to humans

Incubation period

The most common causes of ILI have an incubation period of 1–3 days. This may be longer depending on the cause.

Period of infectiousness

Variable depending on cause of infection

Clinical management

Isolate the case from others at home by having them sleep in a separate room or in a room by themselves in hospital if possible. Antiviral treatment is recommended for people at risk of severe disease if influenza is suspected. Antibiotic treatment should be considered if there is evidence of pneumonia.

RESPONSE PROCEDURE

Infection control

STANDARD plus DROPLET precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a cluster of cases.
- Contact an animal health authority immediately if disease is linked to exposure to sick animals.
- Begin a line list of cases.
- SARS is REQUIRED to be reported to the WHO under the IHR 2005.
- Human influenza caused by a new subtype **is required to** be reported to the WHO under the IHR 2005 (see Appendix 5).

Investigation

Investigation of clusters of severe disease is recommended. Seek advice from WHO.

Specimens

Swabs from the back of the nose or throat should be collected and tested for influenza (and respiratory syncytial virus [RSV] where available) by a variety of methods, including immunofluorescence microscopy, *polymerase chain reaction (PCR)*, and viral *culture*. If specimens are being collected in a remote location where refrigeration of specimens is not available or being sent to a *reference laboratory*, swabs should be placed in 95%–100% ethanol for shipping; alternatively, if dry ice is available, swabs can be placed in *viral transport medium* (VTM), immediately deep-frozen on dry ice, and shipped. Check with a LabNet contact person about the correct type of specimen to collect according to your location and which laboratory will receive your specimens.

Rapid tests for influenza viruses are also available but may not be very accurate.

Sputum cultures should be obtained for any cases with pneumonia and cultured.

In an outbreak, swabs may be required only for the initial cases. Suggest discussion with WHO, SPC or CDC.

Public health management of cases

Cases should be advised to isolate themselves from others to avoid spreading disease. They should be educated about hand hygiene, respiratory hygiene (not coughing/sneezing on others and avoiding other peoples' coughs/sneezes) and social distancing.

Management of contacts

Secondary cases may occur in close contacts of cases. Provide information about preventing infection, the symptoms that may develop and what people should do if they develop symptoms.

Prevention

- Immunisation is the most effective measure against influenza.
- Practice good hand hygiene.

- Practice good respiratory hygiene.
- Stay away from people who are obviously sick.

Important diseases that may cause these symptoms (not a complete list)

- influenza viruses
- SARS viruses
- respiratory syncytial virus (RSV)
- parainfluenza viruses
- other respiratory viruses
- *Streptococcus pneumoniae* and other bacterial pneumonias
- fungal pneumonias
- tuberculosis
- *Coxiella burnetii* (Q fever)
- *Middle Eastern Respiratory Syndrome Coronavirus* (MERS)
- inhaled toxins

Additional resources

While ILI is a common illness in Pacific island countries and is usually caused by influenza viruses and a broad range of other viruses, there is a need to remain aware of possible unusual causes. See Severe Acute Respiratory Infection in Section 3 for further information.

The weekly surveillance report from PPHSN contains information on ILI reports:

http://www.pphsn.net/surveillance/Syndromic.htm

WHO maintains an influenza surveillance and monitoring website with up-to-date information:

http://www.wpro.who.int/emerging_diseases/Influenza/en/index.html

Diarrhoea

Public health priority

High

Case definition

Three or more loose or watery stools in 24 hours

Number of linked cases required to trigger a notification and investigation: The number of linked cases required to trigger a notification may vary according to the circumstances and will depend on the size of the population and how often this condition is seen/reported. Regular collection of syndromic surveillance data will assist in setting a *threshold* for action. If diarrhoea contains visible blood (dysentery), 3 or more linked cases should trigger an investigation.

Infectious causes

Agent	Incubation Period	Clinical Features	Reservoir	Transmission
Staphylococcus aureus toxin	0.5–8 hours	Abdominal cramps, vomiting and diarrhoea	Humans	Person to food
Bacillus cereus toxin	0.5–6 hours (vomiting) 6–24 hours (diarrhoea)	Malaise, vomiting and/or diarrhoea	Environment	Food
Vibrio cholerae	Few hours – 3 days	Watery diarrhoea	Humans, shellfish	Food, water
Vibrio parahaemolyticus	4–30 hours	Nausea, vomiting, abdominal cramps and diarrhoea	Shellfish	Food
Clostridium perfringens toxin	6–24 hours	Abdominal cramps, diarrhea and nausea	Shellfish	Food
Norovirus	24–48 hours	Nausea, vomiting, abdominal cramps, diarrhea, fever	Humans, shellfish	Person to person, food
Rotavirus	24–72 hours	Nausea and vomiting	Humans	Person to person
Salmonella	6–72 hours	Headache, fever, abdominal cramps, diarrhoea and nausea	Poultry, eggs, animals	Food, animal to person
Shigella	1–3 days	Bloody diarrhoea, abdominal cramps, fever	Humans	Person to person
Campylobacter	1–10 days	Fever, nausea, abdominal cramps and diarrhoea (sometimes bloody)	Poultry	Food, water
Cryptosporidium	1–12 days	Diarrhoea, abdominal cramps	Animals, humans	Water
Escherichia coli (STEC/EHEC)	3–4 days	Diarrhoea (often bloody), abdominal cramps	Cattle, humans	Food, person to person
Giardia lamblia	7–10 days	Abdominal cramps, diarrhoea	Humans, water	Person to person, water

Table 2: Sources, transmission and clinical features of different causes of diarrhoea

Period of infectiousness

Usually only while a person has symptoms or for a short time after symptoms stop. Some diseases can be spread without a person having symptoms.

Clinical management

Assess whether (and how severely) the patient is dehydrated. Oral rehydration is usually all that is needed, however intravenous fluids may be needed in cases of severe dehydration.

Children in particular are at high risk of severe dehydration from diarrhoea.

Antibiotics are always recommended for dysentery (bloody diarrhoea). Antibiotic choice depends on local antibiotic resistance patterns, but either ciprofloxacin or cotrimoxazole are usually good choices.

For other causes of diarrhoea, rehydration is the only treatment required (rehydration fluids can be made using the following recipe: 6 level teaspoons of sugar and ½ teaspoon of salt in 1 litre of safe water. Alternatively, use one packet of oral rehydration solution (ORS) mixed in 1 litre of safe water). For normal diarrhoea, medications are only given if the patient is very severely ill or if the laboratory finds an organism requiring antibiotic or anti-parasitic therapy.

RESPONSE PROCEDURE

Infection control

STANDARD precautions. Where patient is in nappies/diapers or incontinent, add CONTACT precautions (see Appendix 6).

Reporting

- Contact the Director of Public Health (or equal authority) on the same day if there is a suspected cluster.
- Begin a line list of cases.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under the IHR 2005 is required.

Investigation

An environmental investigation should begin if common exposures between cases are identified. For example, cases all ate the same food, drank from the same water supply or attend the same school.

Specimens

Stool specimens should be requested in patients with a history of **any** of the following:

1. bloody diarrhoea
2. fever for more than 2 days
3. severe watery diarrhoea
4. severe dehydration
5. if a cluster is identified

Collect 5–10 grams (a 'thumbnail' quantity) of fresh stool in a plastic screw-top container and immediately send to the laboratory. Delays should be limited, preferably to less than 2 hours. Otherwise place the specimen in Cary-Blair medium and refrigerate until the specimen can be shipped.

Blood should be collected for *culture* if the patient has a fever >38°C/100.4°F.

Public health management of cases

Cases should be interviewed to identify links to specific foods, water supply and possible sources of infection – for example a restaurant or school. An environmental investigation should begin if a possible source is identified.

Arrange for the collection of stool specimens.

The case should be informed about the kind of infection and the method of transmission. Tell the case and their caregivers about the importance of hand washing, particularly after going to the toilet or changing nappies/diapers and before handling food. A person with diarrhoea should not prepare food for other people for at least 24 hours after their symptoms resolve.

Management of contacts

Secondary cases may occur in household members who are exposed to the faeces or vomit of cases. Provide information about hand washing and what to do if they develop symptoms.

Prevention

- providing safe water
- hand washing
- safe disposal of stool
- safe latrines

Clinics should give clear messages on effective food hygiene, like the 'Five keys to food safety' (see Appendix 7):

- keep clean
- separate raw and cooked food
- cook food thoroughly
- keep food at safe temperatures
- use safe water

Resources

The weekly surveillance report from PPHSN contains information on diarrhea reports:

http://www.pphsn.net/surveillance/Syndromic.htm

Prolonged fever

Public health priority

High

Case definition

Any fever lasting 3 or more days

Number of cases required to trigger a notification and investigation: Three, if cases are linked

Infectious cause(s)

- *Salmonella* Typhi
- *Leptospira* bacteria
- dengue virus
- malaria
- influenza
- rickettsial infections (scrub typhus, typhus etc.)
- other bacteria or virus

Sources of infection (*reservoir*)

Depends on the cause

How the disease is spread (*transmission*)

Depends on the cause

Incubation period

Depends on the cause

Period of infectiousness

Patients are more likely to be infectious while they have fever, although the exact period of infectiousness will depend of the cause of fever.

Clinical management

If it is possible that the patient has typhoid fever or leptospirosis, then antibiotics should be given immediately according to local treatment protocols.

Patients should be given paracetamol for fever. Oral rehydration is usually enough to manage dehydration, but patients should be managed in a hospital if they have signs of severe dehydration.

RESPONSE PROCEDURE

Infection control

STANDARD precautions (see Appendix 6). If a respiratory infectious disease is suspected, DROPLET precautions should also be used.

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected cluster.
- Begin a line list for suspected outbreaks.

Investigation

Investigation of clusters should occur before establishing a diagnosis. In single cases, priority should be given to figuring out a diagnosis and searching for additional cases.

Specimens

Blood samples should be collected and tested to confirm a diagnosis. Blood *culture* should be performed. Rapid tests should be used if available. Stool specimens should be collected for suspected typhoid cases.

The filter paper method (dried blood spot) is becoming increasingly available to test for dengue, leptospirosis, chikungunya and zika in remote locations. Please check with a LabNet contact person about logistics and protocols for this method.

Public health management of cases

Information should be collected on:

- the case's age, sex and where they live;
- clinical details, including date of first symptom;
- lab test results;
- contact with other cases or travelers and travel history; and
- whether the case attends a school or other institution.

Management of contacts

Secondary cases may occur in household members who are exposed to the faeces or vomit of cases or exposed to the same source. Provide information about hand washing, symptoms to look out for and what to do if they develop symptoms.

Prevention

Refer to specific diseases guidelines – Section 3.

Important diseases that may cause these symptoms (not a complete list)

- typhoid
- dengue
- leptospirosis
- pneumonia
- secondary bacterial infections
- malaria
- many other causes

Section 3: Response guidelines for additional outbreak-prone syndromes and specific diseases

Acute flaccid paralysis (AFP) / polio

Public health priority

Urgent

Suspected case definition

All children under 15 years with acute flaccid paralysis (AFP), including those considered to have *Guillain-Barre syndrome*, or persons at any age diagnosed as suspect paralytic polio cases.

Confirmed case definition

Any person in whom a poliovirus is isolated from an appropriate clinical specimen (e.g., stool, cerebrospinal fluid [CSF], or oropharyngeal secretions), with confirmatory typing and sequencing performed by a recognised *reference laboratory.*

Number of suspected cases required to trigger a notification and investigation: One

Description of signs and symptoms

Nearly all (99%) polio infections are subclinical (have no symptoms) or give only a vague fever illness. Cases with paralysis may begin with fever, feeling bad, headache and nausea, followed by muscle pain or stiffness, and then partial or complete paralysis in one or more limbs. There are decreased or absent tendon reflexes in the affected limbs and no sensory loss. Onset is usually sudden and paralysis does not usually equally affect both sides of the body. Up to 10% of paralytic cases in an epidemic die, usually due to paralysis of the respiratory muscles.

Infectious cause(s)

Poliovirus 1, 2 and 3

Sources of infection (*reservoir*)

Humans, particularly those who have no symptoms; there is no long-term *carrier* state

How the disease is spread (*transmission*)

Transmission is from person to person, mainly *faecal-oral*.

Incubation period

Usually 7–14 days, but can vary from 2 days to a month

Period of infectiousness

Virus can be found in the throat for about a week and in faeces for up to 6 weeks, but cases are most infectious a few days before and after the start of symptoms.

Clinical management

Refer the patient immediately to hospital. Management is supportive only, but may require mechanical ventilation.

RESPONSE PROCEDURE

Infection control

STANDARD plus CONTACT precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case.
- Ensure the HBAS coordinator is informed.
- Begin a line list for suspected outbreaks.

Polio is **required** to be reported to WHO under the IHR 2005 (see Appendix 5).

Investigation

Identification of a single case of AFP should prompt an investigation. A thorough search for other cases in the area where the case lives is recommended. Contact WHO, SPC or CDC for guidance.

Specimens

- Collect 5–10 g of fresh stool from the patient (a 'thumbnail' quantity).
- Use plastic screw-top container and place in the fridge, not freezer.
- Follow standard packing and shipping procedure. Maintaining the cold chain (0–8°C) is essential.

Public health management of cases

Refer to the HBAS Information Folder and the Acute Flaccid Paralysis Case Investigation Form.
Information should be collected on:

- the case's age, sex and where they live;
- place, time, source and type of any polio immunisations;
- clinical details, including date of first symptoms, complications, and if the case has any disease that affects the immune system;
- laboratory test results;
- contact with other cases or travelers, travel history and persons at risk for polio; and
- whether the case attends a school or other institution.

Management of contacts

Immunisation of close contacts is recommended.

Where it is felt to be necessary by the national Expanded Programme on Immunisation (EPI) coordinator, after consultation with experts, or where poliovirus is isolated from an AFP case's stool, all children below five years of age on the affected island should receive 2 drops of oral polio vaccine (OPV), regardless of their immunisation status. Occasionally the national EPI coordinator will extend the age group for immunisation.

If poliovirus is isolated, then a second round of OPV immunisation should be performed four weeks after the first round.

Prevention

Immunisation is the most effective method of prevention of polio.

Differential diagnosis (not a complete list)

- paralytic polio
- Guillain-Barre syndrome
- non-polio enteroviruses may rarely cause a paralytic illness
- other (rare) infections, such as parasitic spinal infections
- tumours
- toxins
- stroke

Additional resources

PPHSN Website http://www.pphsn.net/Surveillance/HBAS.htm

Chikungunya

Public health priority

High

Suspected case definition

Acute onset of fever >38.5°C AND severe arthralgia/arthritis not explained by other medical conditions AND residing in or having visited epidemic areas, having reported transmission within 15 days prior to the onset of symptoms

Confirmed case definition

Isolation of the virus or detection of chikungunya-specific antigen or antibodies in blood by an advanced laboratory test

Number of cases required to trigger an investigation: One confirmed case, if there is no known outbreak already under investigation

Description of signs and symptoms

Fever, arthralgia (often in the hand, wrist and ankle joints), backache and headache; many patients also develop a short-lived *maculopapular* rash

Infectious cause(s)

Chikungunya virus

Sources of infection (*reservoir*)

Humans serve as the chikungunya virus reservoir during epidemic periods. During inter-epidemic periods, a number of vertebrates have been implicated as reservoirs. These include rodents, birds, and other vertebrates. The exact nature of the reservoir status in the Pacific has not been documented.

Chikungunya virus is transmitted from one human to another by mosquitoes of the *Aedes* genus. These bite during the day, but mostly during the early morning and the evening.

How the disease is spread (*transmission*)

By the bite of infected mosquitoes. People with chikungunya should be cared for under bed nets so that a mosquito cannot bite them and then carry the infection to another person.

Incubation period

From 2–12 days, usually 4-8 days

Period of infectiousness

No evidence of direct person-to-person transmission. Humans are infectious to mosquitoes for about five days after onset of illness.

Clinical management

Treatment is symptomatic and paracetamol is the drug of choice. Avoid aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs), as a common differential diagnosis is dengue fever. Mild forms of exercise and physiotherapy are recommended in recovering persons.

Refer cases with any of the following to a higher health-care centre: pregnancy, low urine output, hypotension, bleeding disorders, confusion, evidence of meningism (neck stiffness + intolerance to bright light + headache), persistent fever of more than one week's duration, and extremes of age – persons above 60 years and infants (below one year of age).

During a confirmed *epidemic*, it is not imperative that all cases have laboratory investigations.

All suspected cases should be kept under mosquito nets during the febrile period.

Communities in the affected areas should be educated about the mosquito control measures to be adopted in hospital premises and houses (Appendix 7).

RESPONSE PROCEDURE

Infection control

STANDARD precautions; plus, a long-lasting insecticidal net should be placed over patients so that mosquitoes cannot bite them and then transmit the disease to others.

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case in an area with no endemic disease.
- Begin a line list of cases.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Investigation of clusters should start before making a diagnosis. In suspected single cases, priority should be given to figuring out a diagnosis and searching for additional cases.

Specimens

A blood specimen should be collected in a red-top blood tube for testing of chikungunya antibodies or testing for chikungunya virus. This specimen should be refrigerated and standard packing and shipping procedure should be followed. Rapid tests are also available.

The filter paper method (dried blood spot) is becoming increasingly available to test for chikungunya in remote locations. Please check with a LabNet contact person about logistics and protocols for this method.

Public health management of cases

Cases should be interviewed to identify possible place of exposure so that control measures can be carried out and to identify further cases.

Management of contacts

Persons living in the area where a patient is thought to have been infected should be told of the risk of being bitten by chikungunya-infected mosquitoes, and should be asked to do mosquito control including clean-up of mosquito breeding sites (things that collect water, such as coconut shells, tyres, cans) and employ measures for personal protection, such as mosquito repellent sprays and bed nets (see Appendix 7).

Prevention

Preventing mosquito bites is the best way to prevent infection.

Differential diagnosis (not a complete list)

- leptospirosis
- dengue
- Zika
- malaria
- meningitis

- rheumatic fever

Additional resources

WHO Guidelines on Clinical Management of Chikungunya Fever. 2008. SEA-CD-180

http://www.wpro.who.int/mvp/topics/ntd/Clinical_Mgnt_Chikungunya_WHO_SEARO.pdf

Cholera

Public health priority

Urgent

Suspected case definition

Severe dehydration or death from *acute* watery diarrhoea in a patient aged 5 years or more

Confirmed case definition

Isolation of toxigenic (i.e., cholera toxin-producing) *Vibrio cholerae* O1 or O139 from stool or vomitus. Serologic evidence of recent infection is also highly suggestive

Number of suspected cases required to trigger a notification and investigation: One

Description of signs and symptoms

Most cases have no symptoms or have mild diarrhoea. In severe cases there is quick onset of a large amount of painless diarrhoea ('rice water' stools), occasional vomiting, rapid dehydration and shock. The death rate is high (20%–30%) without correct treatment.

Infectious cause(s)

Vibrio cholerae

Sources of infection (*reservoir*)

Humans and occasionally shellfish; *Vibrio cholerae* is an environmental bug found in saltwater and salty water bodies at low numbers, with increases by humans during epidemics

How the disease is spread (*transmission*)

Drinking contaminated water, or eating food from unsafe water or contaminated by a person with cholera; for example shellfish or fruits and vegetables washed with contaminated water

Incubation period

Usually 2–3 days (occasionally from hours to 5 days)

Period of infectiousness

Usually only while diarrhoea lasts and for a few days after symptoms stop, but occasionally for a couple of months

Clinical management

Assess whether (and how severely) the patient is dehydrated. Immediate rehydration with oral rehydration solution (6 level teaspoons of sugar and ½ teaspoon of salt in 1 litre of safe water) or one packet of oral rehydration solution (ORS) mixed in 1 litre of safe water) is the most important treatment.

If dehydration is severe, intravenous fluids (Ringer's lactate/Hartmann's solution/normal saline) should be administered. Seek expert advice regarding volume, rate and need for potassium in intravenous fluids in severe dehydration.

Antibiotics should be given to cases with severe dehydration only.

RESPONSE PROCEDURE

Infection control

STANDARD plus CONTACT precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health or equal authority on the same day.
- Begin a line list of cases.
- Cholera is **ALWAYS** required to be assessed using the decision instrument (see appendix) to determine whether notification to WHO under the IHR 2005 is required.

Investigation

An epidemiological and environmental investigation should begin if cholera is identified in an area not known to have cholera. Seek advice from the Director of Health and other agencies such as WHO, SPC or CDC.

Specimens

5–10 g of fresh stool (about a 'thumbnail' size) in a plastic screw-top container should immediately be sent to the laboratory for stool *culture* of *Vibrio cholerae*.

Public health management of cases

Cases should be interviewed about their exposures including:

- contact with other people with diarrhoea;
- water sources;
- eating of seafood, particularly shellfish; and
- travel to a cholera-affected area.

The case should be told about the type of the infection and how it is transmitted. Highlight the importance of hygienic practices, particularly hand washing after going to the toilet. The case should be told not to work and to avoid food preparation and caring for others while he or she has symptoms.

Management of contacts

People at risk of infection are those who live with someone with cholera, those who shared food or drink with someone with cholera, or those who have eaten/drunk from a contaminated food/water source. Tell contacts of the risk of infection and tell them to watch for signs or symptoms of cholera for 5 days after contact with a sick person or exposure to a contaminated source. Contacts should be told to seek medical care if symptoms develop.

Contacts should also be contacted every day for 5 days to identify new cases early and to reduce spread.

Prevention

- providing safe water
- hand washing
- safe disposal of stool
- safe latrines
- immunisation

Clinics should give clear messages on effective food hygiene, like the 'Five keys to food safety' (see Appendix 7):

- keep clean
- separate raw and cooked food
- cook thoroughly
- keep food at safe temperatures
- use safe water

There is a cholera immunisation but its use in outbreak situations is still under investigation.

Differential diagnosis (not a complete list)

Occasionally, other diarrhoeal disease may present with lots of watery diarrhoea, but it is rarely as severe as cholera.

Additional resources

Cholera outbreak: assessing the outbreak response and improving preparedness: http://www.who.int/cholera/publications/OutbreakAssessment/en/

WHO: First steps for managing an outbreak of acute diarrhoea:

http://www.who.int/topics/cholera/publications/en/first_steps.pdf

PPHSN. Outbreak preparedness and control: Cholera:

http://www.pphsn.net/Outbreak/Cholera.htm

The Treatment of Diarrhoea. A manual for physicians and other senior health workers. WHO 2005:

http://www.who.int/maternal_child_adolescent/documents/9241593180/en/

Ciguatera fish poisoning

Public health priority

High

Suspected case definition

One or more of: nausea, vomiting or diarrhoea, **and** neurologic signs, within 24 hours of eating reef fish

Confirmed case definition

Ciguatera diagnosis is usually based on the clinical and epidemiologic features. Though rarely done, it can be confirmed for a person with a clinically compatible illness after eating reef fish, by detection of ciguatoxin in consumed fish by an approved testing method.

Number of suspected cases required to trigger a notification and investigation: One, if there are classic neurological symptoms (because others may be at risk for eating the same fish)

Description of signs and symptoms

Nausea, vomiting and/or diarrhoea. Ciguatera poisoning has neurologic symptoms such as numbness and tingling, ataxia (unsteady movement and staggering walk) and temperature reversal (cold things feel burning hot on the skin).

Infectious cause(s)

Ciguatera is caused by naturally occurring toxins in reef fish.

Sources of infection (*reservoir*)

Problems are encountered with many fish types, including barracuda, snapper, coral trout, Spanish mackerel, red emperor, wrasse, reef cod, sturgeon, trevally, kingfish, grouper and amberjack.

How the disease is spread (*transmission*)

Food-borne

Incubation period

Less than 1 hour to 24 hours

Period of infectiousness

There is no convincing evidence of person-to-person transmission. It can only be transmitted by eating fish.

Clinical management

Ciguatera is treated supportively and with intravenous mannitol or other osmotic diuretics. Seek expert advice.

RESPONSE PROCEDURE

Infection control

STANDARD precautions (see Appendix 6).

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a cluster of cases.
- Start a line list.

Investigation

An environmental investigation should begin if the same fish has been eaten by others, so that other patients can be found and any remaining fish discarded.

Specimens

There are no widely available tests for human ciguatera. Leftover fish can be tested for ciguatera toxin, but in most cases this is not necessary or practical.

Public health management of cases

Cases should be interviewed to identify possible links to specific foods and sources of infection, for example a restaurant or a shared fish meal. An environmental investigation should begin if a source is identified, and any leftover fish should be discarded.

Management of contacts

Further cases may occur in people who were exposed to the same meal as the case. Provide information about what to do if they develop symptoms.

Prevention

- Avoiding eating large fish from certain reef areas is the only way to prevent ciguatera fish poisoning. Check with local authorities to determine which fish in your area present the highest risk.
- Public communication to inform people of the risk.

Differential diagnosis (not a complete list)

- blowfish poisoning
- neurotoxic shellfish poisoning
- paralytic shellfish poisoning
- botulism
- organophosphate pesticide poisoning

Additional resources

Ciguatera Fish Poisoning: Treatment, Prevention and Management. 2008. Friedman, M.A. Mar. Drugs 6:456–479:

www.mdpi.com/1660-3397/6/3/456/pdf

WHO Ciguatera Poisoning: Questions and Answers:

www.searo.who.int/entity/emergencies/documents/guidelines_for_health_emergency_ciguatera_qa.pdf

Ciguatera Field Reference Guide:

http://www.spc.int/coastfish/index.php?option=com_content&Itemid=30&id=340

Dengue

Public health priority

High

Urgent: if a new serotype is suspected or cases of severe dengue are identified

Suspected case definition

An *acute* fever illness that lasts more than 2 days with **two or more** of the following:

- anorexia and nausea
- aches and pains
- rash
- low white blood cell count
- tourniquet test positive
- warning signs

Warning signs include:

- abdominal pain or tenderness;
- persistent vomiting;
- mucosal bleeding;
- liver enlargement >2 cm;
- clinical fluid accumulation;
- lethargy, restlessness; and
- laboratory: increase in haematocrit at the same time as a rapid decrease in platelet count.

Confirmed case definition

Isolation of dengue virus or detection of dengue-specific antigen or antibodies in tissue, blood, CSF or other body fluid by an advanced laboratory test

Number of linked cases required to trigger an investigation: Two (in an area with no endemic or known epidemic dengue)

Description of signs and symptoms

An *acute* fever illness of at least 2 days duration with symptoms as described in the case definition. Infants and persons under 15 years may have a vague fever illness with a *maculopapular* (raised spots) rash.

Dengue with **warning signs** such as abdominal pain or tenderness, persistent vomiting, fluid buildup, bleeding from mucous membranes, lethargy or restlessness requires strict observation and medical treatment.

Severe dengue is characterised by:

- low blood pressure;
- rapid or weak pulse;
- slow capillary refill;
- cold, clammy skin;
- no urine output; and
- signs of bleeding.

Infectious cause(s)

There are four types of dengue virus (numbered 1 through 4), which all cause dengue fever.

Sources of infection (*reservoir*)

Humans. Dengue virus is transmitted from one human to another by mosquitoes of the *Aedes* genus. These bite during the day, but mostly during the early morning and the evening.

How the disease is spread (*transmission*)

By the bite of infected mosquitoes. People with dengue fever should be cared for under bed nets so that a mosquito cannot bite them and then carry the infection to another person.

Incubation period

From 3 to 14 days, usually 7–10 days

Period of infectiousness

Not directly transmitted person to person, but a person can infect a mosquito while they have a fever, usually 3–5 days. Mosquitoes remain infectious for life and are able to infect many other humans.

Clinical management

There is no specific treatment for dengue. Clinical management includes managing fever with paracetamol (not aspirin or NSAIDs) and enough fluid replacement. Refer to WHO Dengue Guidelines for diagnosis, treatment, prevention and control.

Preventable deaths from dengue typically occur early in epidemics among patients who are cared for by clinicians who do not have experience managing patients with dengue. In-service training of clinicians using the WHO Dengue Guidelines should be undertaken **urgently**. Early recognition and correct treatment of dengue shock syndrome is essential to prevent deaths.

RESPONSE PROCEDURE

Infection control

STANDARD precautions; plus, a long-lasting insecticidal net should be placed over patients so that mosquitoes cannot bite them and then transmit the disease to others.

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case.
- Begin a line list of cases.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Investigation of a cluster should start before making a definite diagnosis. In single cases, priority should be given to figuring out a diagnosis and searching for additional cases.

Specimens

A blood specimen should be collected in a red-top blood tube for testing of dengue antibodies or testing for dengue 'NS-1 antigen' by rapid diagnostic test (RDT). In the first five days of a dengue illness, antigen testing by RDT is the most appropriate test. If a patient has a negative rapid test in the first five days following the onset of their symptoms, they should have a repeat test after five days of illness. If this test is still negative, then consideration must be given to other causes of the illness. This specimen should be refrigerated and standard packing and shipping procedure should be followed.

The filter paper method (dried blood spot) is becoming increasingly available to test for dengue in remote locations. Please check with a LabNet contact person about logistics and protocols for this method.

Public health management of cases

Cases should be interviewed to identify possible place of exposure so that control measures can be carried out and to identify further cases.

Management of contacts

Persons living in the area where a patient is thought to have been infected should be told of the risk of being bitten by dengue-infected mosquitoes, and should be asked to do mosquito control including clean-up of mosquito breeding sites (things that collect water, such as coconut shells, tyres, cans) and employ personal protection measures, such as mosquito sprays and bed nets (see Appendix 7).

Prevention

Preventing mosquito bites is the best way to prevent infection.

Differential diagnosis (not a complete list)

- leptospirosis
- typhoid fever
- Chikungunya
- Zika

Many other infectious and non-infectious causes

Additional resources

WHO Dengue Guidelines for Diagnosis, Treatment, Prevention and Control: http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf

Epidemic hepatitis

Public health priority

Urgent

Suspected case definition

An *acute* illness with sudden beginning of symptoms and either jaundice (yellow skin or eyes, or dark urine) or elevated liver enzymes in laboratory testing

Confirmed case definition

Immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) or hepatitis E virus (anti-HEV) positive. Other less common methods are available.

Number of cases required to trigger a report and investigation: 2 or more cases linked by person, place and time

Description of signs and symptoms

The usual clinical presentation is *acute* fever, feeling bad, loss of appetite, nausea and abdominal discomfort, followed a few days later by dark urine and jaundice. Symptoms usually last several weeks.

Infectious cause(s)

Hepatitis A virus (HAV), hepatitis E virus (HEV)

Sources of infection (*reservoir*)

Humans

How the disease is spread (*transmission*)

Hepatitis A/E are transmitted almost entirely by *faecal–oral* transmission. It may occur through contamination of food resulting from poor food handling practices, faecal contamination of drinking water or eating shellfish (for example oysters) from polluted waters. There is some evidence that hepatitis E may also be transmitted by animals, in particular pigs.

Incubation period

15–50 days, usually 28–30 days

Period of infectiousness

From the last half of the incubation period to a few days after beginning of symptoms; usually no longer infectious after 1 week of jaundice

Clinical management

Supportive care only

RESPONSE PROCEDURE

Infection control

STANDARD plus CONTACT precautions (see Appendix 6)

Reporting

- The Director of Public Health (or equal authority) should be contacted immediately to report a cluster of cases.
- Begin a line list of cases.

- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Information about exposures during the period 15 to 50 days before beginning of jaundice should be sought. This should include information about:

- household and sexual contacts who have had an illness that seems like hepatitis;
- restaurants where the case has eaten;
- social gatherings where the case has eaten;
- all sources of drinking water;
- eating of raw or partially cooked shellfish;
- attendance or employment at child care centres by case or household contacts;
- water exposure (for example swimming);
- exposure to sewage, or failed sewage disposal systems; and
- a search for other cases, particularly in family members of children linked to school or child care environment.

Specimens

A blood specimen should be collected in a red-top blood tube for *serologic testing* of hepatitis A virus antibody, hepatitis E antibody, hepatitis B panel, and possibly for hepatitis C testing. This specimen should be refrigerated and standard packing and shipping procedure should be followed.

Public health management of cases

The case and caregiver should be informed about the type of the infection and how it is transmitted. Education should include information about hygienic practices, particularly hand washing before preparing food and eating, and after going to the toilet.

Cases should also be told not to prepare or handle food to be eaten by other people during the infectious period.

Management of contacts

The following is a general list of persons considered to be contacts if exposed to infectious cases:

- all immediate family, household members and sexual partners
- all persons who ate uncooked food that was prepared by the case
- all persons who look after cases who are in nappies/diapers

Contacts should be advised to seek medical care if they develop jaundice. They should be given advice about hygiene, in particular hand washing with soap and water after using the toilet.

In some settings, emergency immunisation with hepatitis A vaccine may be needed. Immunoglobulin (a special type of blood transfusion) is used only for extremely high-risk contacts. Seek expert advice.

Prevention

- providing safe water
- hand washing
- safe disposal of stool
- safe latrines

Clinics should give clear messages on effective food hygiene, like the 'Five keys to food safety' (see Appendix 7):

- keep clean
- separate raw and cooked food
- cook thoroughly
- keep food at safe temperatures
- use safe water

Differential diagnosis (not a complete list)

- acute hepatitis B
- acute hepatitis C
- hepatitis D
- leptospirosis
- infectious mononucleosis (glandular fever)
- toxins

Additional resources

WHO. Hepatitis A. WHO/CDS/CSR/EDC/2000.7:

http://www.who.int/csr/disease/hepatitis/HepatitisA_whocdscsredc2000_7.pdf

CDC. Hepatitis A Information for Health Professionals:

http://www.cdc.gov/hepatitis/hav/

WHO. Hepatitis E. WHO/CDS/CSR/EDC/2001.12:

http://www.who.int/csr/disease/hepatitis/HepatitisE_whocdscsredc2001_12.pdf

CDC. Hepatitis E Information for Health Professionals:

http://www.cdc.gov/hepatitis/HEV/

Leptospirosis

Public health priority

High

Suspected case definition

An *acute* fever illness with headache AND muscle aches (often leg muscle), associated with ANY of the following symptoms/signs:

- swelling or blood in the whites of the eyes
- no urine or very little urine production
- jaundice
- cough, coughing up blood and breathlessness
- bleeding (from the intestines or lungs)
- meningeal irritation (severe headache, not liking bright lights, neck stiffness)
- irregular heart beat or heart failure
- skin rash

Confirmed case definition

Isolation of *Leptospira* bacterial from a clinical specimen; OR demonstration of *Leptospira* bacteria in a clinical specimen by immunofluorescence OR confirmatory testing showing seroconversion or a four-fold increase in the titre of paired sera specimens from a *reference laboratory*.

Number of linked cases required to trigger an investigation: Two

Description of signs and symptoms

Leptospirosis cases can have a highly variable clinical presentation, but usually present with fever, headache, severe muscle aches and red eyes.

Infectious cause(s)

Leptospira bacteria

Sources of infection (*reservoir*)

Leptospirosis occurs in wild and domestic animals, mainly rats, dogs and pigs, and humans become infected after exposure to water that contains the urine of these animals.

How the disease is spread (*transmission*)

Mainly through contact of broken skin with water or soil contaminated with the urine of infected animals. (Infections may occur in people exposed to flood water/puddles/waterfalls.)

Incubation period

From 4 to 19 days, usually 10 days

Period of infectiousness

Only very rarely transmitted from person to person. It is much more likely that people from the same group become ill because they have been exposed to the same contaminated water source.

Clinical management

Management of fever with paracetamol and fluid replacement (oral or intravenous) are recommended for any patient with fever. Antibiotics are recommended for all patients. Refer to national treatment protocols. Doxycycline or benzyl penicillin are usually good options.

RESPONSE PROCEDURE

Infection control

STANDARD precautions

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected cluster.
- Begin a line list of cases.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Where a common source is found from a number of cases of leptospirosis, an environmental investigation should begin.

Specimens

A blood specimen should be collected in a red-top blood tube for testing for antibodies. This specimen should be refrigerated and standard packing and shipping procedure should be followed. Two blood samples collected 10–14 days apart are recommended to detect antibody rise. Testing in *Reference laboratories* can detect specific varieties of leptospirosis. Rapid tests are also available.

The filter paper method (dried blood spot) is becoming increasingly available to test for leptospirosis in remote locations. Please check with a LabNet contact person about logistics and protocols for this method.

Public health management of cases

Cases should be interviewed to identify possible environmental exposures so that control measures can be carried out and to find further cases.

Management of contacts

It is very rare for leptospirosis to be spread from person to person.

Persons who may have been exposed to the same environmental source as the patient should be told to seek medical advice if they get sick.

Prevention

Protective clothing (for example boots, gloves) should be worn, particularly if the skin is broken, when in contact with possibly infected soil or water (for example when working in a pig pen).

Differential diagnosis (not a complete list)

- dengue
- influenza
- typhoid fever
- meningitis
- acute hepatitis

Additional resources

WHO. 2003. Human leptospirosis: guidance for diagnosis, surveillance and control:

http://www.who.int/csr/don/en/WHO_CDS_CSR_EPH_2002.23.pdf

CDC: Leptospirosis www.cdc.gov/leptospirosis/index.html

Malaria

Public health priority

High

Suspected case definition

Fever for 3 or more days in a patient living in, or returning within 12 months from, an area where malaria is *endemic*

Confirmed case definition

Detection of malaria parasites in thick or thin blood smears; OR detection of parasite DNA in a blood sample using *polymerase chain reaction (PCR)*

Number of linked cases required to trigger an investigation: One (for places where malaria is not endemic); to many (depending on the threshold, for endemic areas). In the Pacific, only Papua New Guinea, Solomon Islands and Vanuatu are considered endemic for malaria.

Description of signs and symptoms

The most serious malarial infection, *falciparum* malaria, may present in many ways, including one or more of the following: fever, chills, sweats, loss of appetite, nausea, fatigue, headache, muscle and joint pain, cough and diarrhoea. Anaemia and/or enlarged spleen often develop after some days. If not treated properly, the disease may progress to severe malaria, which may include: *acute* brain damage (cerebral malaria), severe anaemia, jaundice, kidney failure (black-water fever), low blood sugar, trouble breathing, and shock. Severe malaria is a possible cause of coma and other neurologic symptoms in any traveler recently returned from a tropical area. Prompt treatment of *falciparum* malaria is essential, even in mild cases, since permanent injury may rapidly appear; death rates among untreated children and non-immune adults can reach 10%–40% or higher.

The other human malarias, *vivax*, *malariae* and *ovale*, are not usually life-threatening. Illness may begin with vague symptoms and a slowly rising fever lasting several days, followed by a shaking chill and rapidly rising temperature, usually accompanied by headache and nausea and ending in a great deal of sweating. After a fever-free period, the cycle of chills, fever and sweating recurs daily, every other day or every third day. An untreated attack may last from a week to a month or longer and be combined with extreme fatigue, anaemia and enlarged spleen. Repeated attacks may occur.

Infectious cause(s)

Four types of parasites – *P. falciparum*; *P. vivax*; *P. ovale*; *and P. malariae*. In the Pacific, only *P. falciparum* and *P. vivax* are known to exist.

Sources of infection (*reservoir*)

Humans

How the disease is spread (*transmission*)

By the bite of infected *Anopheles* mosquitoes. Most *Anopheles* mosquitoes feed at night. People with malaria should be cared for under mosquito nets so that a mosquito cannot bite them and then carry the infection to another person.

Incubation period

9–14 days for *P. falciparum*. 12–18 days for *P. vivax* and *P. ovale*; and 18–40 days for *P. malariae*

Period of infectiousness

Not directly transmitted person to person. Humans may infect mosquitoes as long as infectious parasites are in the blood; this varies with parasite species and with response to treatment.

Untreated or incorrectly treated patients may be a source of mosquito infection for several years in *malariae*, up to five years in *vivax*, and generally not more than one year in *falciparum* malaria; the mosquito remains infectious for life.

Clinical management

Once a diagnosis of malaria is made, the patient should be treated immediately with a safe and effective (one that works even if there is resistance to some drugs in the area) antimalarial medicine. To avoid severe malaria, which is often fatal, effective treatment should be started within 24 hours after onset of symptoms.

Refer to WHO Guidelines for the Treatment of Malaria:
http://www.who.int/malaria/publications/atoz/9789241547925/en/index.html

RESPONSE PROCEDURE

Infection control

STANDARD precautions; plus, a MOSQUITO NET should be placed over patients so that mosquitoes cannot bite them and then transmit the disease to others (see Appendix 7)

Reporting

If you are in a non-endemic country:

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case.
- Begin a line list of cases.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Investigation of a cluster should occur even before a diagnosis is confirmed. In single cases, priority should be given to figuring out a diagnosis and searching for additional cases.

Specimens

Blood should be collected from the patient for a blood smear and microscopy. Rapid tests are also available.

Public health management of cases

Cases should be interviewed to identify possible places of exposure so that control measures can be carried out and to identify further cases.

Management of contacts

Persons living in the area where a patient was infected should be told of the risk of being bitten by mosquitoes with malaria. Tell them about ways to prevent mosquito bites (see Appendix 7).

Prevention

Because most *Anopheles* mosquitoes feed at night, the most important prevention is the use of (long-lasting-insecticide-treated) bed nets at night in malaria areas. Other key measures include mosquito control, and regular preventive treatment of malaria in pregnant women. (For a more in-depth discussion of malaria control strategies, see 'Additional resources' at the end of this section).

Differential diagnosis (not a complete list)

- dengue virus
- leptospirosis
- typhoid fever
- viral and bacterial meningitis

- hepatitis
- influenza
- tuberculosis
- many other infectious and non-infectious causes

Additional resources

WHO Guidelines for the Treatment of Malaria:
http://www.who.int/malaria/publications/atoz/9789241547925/en/index.html

Measles

Public health priority

Urgent

Suspected case definition

1. Any person with fever, **and** *maculopapular* (raised red, non-blistering) rash, **and** either cough or runny nose or *conjunctivitis*

Or

2. Any person in whom a clinician suspects measles infection

Confirmed case definition

Culture of measles virus from a clinical specimen; OR detection of measles by PCR; OR significant rise in serum measles antibodies in paired sera; OR positive serologic test for measles IgM antibodies

Number of cases required to trigger a notification and investigation: One

Description of signs and symptoms

Measles is a highly contagious disease caused by the measles virus, starting with a high fever, cough, red eyes and runny nose. On the 3rd to 7th day, a whole-body non-blistering *maculopapular* rash starting on the head appears. Malnourished children may develop severe disease.

Infectious cause

Measles virus

Sources of infection (*reservoir*)

Humans

How the disease is spread (*transmission*)

Airborne through sneezing, coughing or talking/singing, or by contact with secretions. Measles is one of the most contagious diseases.

Incubation period

Usually 10 days; range is 7–18 days

Period of infectiousness

From just before the first symptoms of any kind start until 4 days after the appearance of rash

Clinical management

A patient should be considered highly infectious until four days after appearance of rash and should be isolated as for tuberculosis (TB). Any child hospitalised with fever and rash should be isolated on admission. Paracetamol rather than aspirin should be used for fever in patients under 18 years of age. A serious complication of measles is blindness in patients who are vitamin A deficient. Consideration should be given to providing a vitamin A supplement in patients at risk of vitamin A deficiency, including those patients who are malnourished.

RESPONSE PROCEDURE

Infection control

STANDARD, CONTACT and AIRBORNE precautions are to be used for suspected and confirmed cases of measles (see Appendix 6).

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case.
- Ensure the HBAS coordinator is informed.
- Begin a line list for suspected outbreaks.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Actively searching for other cases that were in contact with the case should continue for at least 2 incubation periods (about 1 month).

Specimens

Blood must be collected for all suspected cases and tested for measles antibodies. PCR for measles can be performed on blood, swabs from the back of the nose or urine.

Public health management of cases

Refer to the HBAS Information Folder and the Acute Fever and Rash Case Investigation Form.

- Laboratory diagnosis should be attempted in the first cases found.
- Cases should not participate in group activities (including school/preschool/child care/work) from beginning of symptoms until 4 days after beginning of rash and should stay home (unless isolated in hospital). Cases should avoid contact with people who are not immune, in particular pregnant women.
- Ask hospitals and health centres to report new cases promptly.
- During an outbreak it is usually only necessary to send specimens from the first 5 cases of fever and rash.

Management of contacts

- Contacts are considered to be anyone who shared a room with the case.
- Unimmunised contacts should be immunized
- Keep unimmunised contacts out of school for 18 days after their last contact with the infectious case.
- Ask contacts to be alert for signs and symptoms of acute fever and rash and advise those who develop symptoms to call ahead, if possible, before seeking medical advice (so as to avoid common waiting areas in health centres or hospitals and spreading the infection).

Where it is felt to be necessary by the national Expanded Programme on Immunisation (EPI) coordinator, measles immunisation may be given in an affected area. A single dose of measles vaccine will be given to a target age-group whether they have been immunised or not.

Any measles outbreak should be used as a chance to promote catch-up immunisation of unimmunised children in the affected area.

Prevention

High immunisation rates in the community prevent outbreaks of measles.

Differential diagnosis (not a complete list)

- rubella
- scarlet fever
- infectious mononucleosis (glandular fever)
- dengue

Additional resources

WHO Western Pacific Region. 2013. Measles Elimination Field Guide.

http://www.wpro.who.int/immunization/documents/measles_elimination_field_guide_2013.pdf

URL found doesn't work

WHO. 2013. Pocket book of hospital care for children. 2nd edition:

http://www.who.int/maternal_child_adolescent/documents/child_hospital_care/en/index.html

Refer to the HBAS Information Folder, the Acute Fever and Rash Case Investigation Form. and the laboratory request form:

http://www.pphsn.net/surveillance/HBAS/Pacific_HBAS_Information_Folder-July2005.pdf

http://www.pphsn.net/surveillance/HBAS/AnnexB2-AFR_Case_Investigation_Form.pdf

http://www.pphsn.net/surveillance/HBAS/AnnexC2-AFR_Laboratory_Request_Form.pdf

Meningococcal disease

'Meningococcus' is another name for the bacterium *Neisseria meningitidis*. Invasive meningococcal disease includes meningococcal meningitis, meningococcal septicaemia (meningococcaemia) or both.

Public health priority

Urgent. Invasive meningococcal disease is a medical and public health emergency.

Suspected case definition

Sudden fever AND

One or more of the following symptoms: drowsiness, irritability or fussiness, intense headache, leg pain, vomiting, a stiff neck, sensitivity to bright lights and a reduced level of consciousness

OR

A skin rash that spreads rapidly and begins as reddish/purplish spots (petechial or purpuric rash) that does not fade when pressed under the bottom of a glass (the tumbler test).

Probable case definition

A clinically compatible illness AND close contact with a laboratory confirmed case within the previous 60 days.

Confirmed case definition

Culture of meningococcus from a normally sterile body site. This includes blood or cerebrospinal fluid (CSF), or, less commonly, joint, pleural (around the lungs), or pericardial (around the heart) fluid, or fluid from the *purpuric* lesions of the rash.

DNA detection by PCR from a sterile site also confirms meningococcus but is not widely available.

Definition of an outbreak

An outbreak of meningococcal disease is defined as ≥3 confirmed or probable cases of meningococcal disease of the same serogroup in ≤3 months in the same geographical area, resulting in primary disease attack rate of ≥10 cases/100,000 persons.

Number of cases required to trigger a notification and investigation: One

Description of signs and symptoms

Acute fever with neurological signs/symptoms is concerning because it may be associated with bacterial meningitis, including meningococcus infection.

Invasive meningococcal disease typically presents with fever, vomiting, headache, muscle and joint pain and drowsiness. Symptoms may appear quickly and rapidly progress. Patients may present shocked. Infants with meningitis frequently present with non-specific symptoms such as fever, irritability, lethargy, poor feeding, vomiting and diarrhoea, and the fontanelle may be full. Findings suggestive of meningococcal infection include confusion, leg pain, light sensitivity (photophobia which occurs > 12 hours after symptom onset), rash (occurs > 12 hours) and neck pain/ stiffness (occurs >12 hours). Early warning sign of meningococcal disease include leg pains and cold hands and feet, despite having a fever. Development of coma and shock may be rapid.

A *petechial* or *purpuric* rash is present in most, but not all, patients with invasive meningococcal disease but occur late (12-36 hours after symptom onset). A blanching rash does not exclude meningococcus. In the early stages of the disease, the rash may not be present or may be different. If present, it may be only a few tiny red/purple spots located in a place such as the groin or feet.

The death rate may be more than 50% without treatment and is still 5%–10% with rapid and appropriate antibiotic and supportive treatment.

Infectious cause(s)

Neisseria meningitidis bacteria. The groups that cause disease are A, B, C, W135, X and Y.

Sources of infection (*reservoir*)

Humans. Meningococcal bacteria are carried in the nose and throat of people without symptoms (*carrier*s).

How the disease is spread (*transmission*)

Respiratory droplets. Transmission usually occurs between very close contacts, in other words, household or kissing contacts.

Incubation period

3–4 days (ranging from 2 to 10 days)

Period of infectiousness

Patients are considered contagious until 24 hours after starting the correct intravenous antibiotics.

Carriage of meningococcus is common; about 10% of the population carry the meningococcus bacteria in their nose and throat at any point in time.

Clinical management

Meningococcal disease can be fatal and should always be viewed as a medical emergency. Admission to a hospital or health centre is necessary. If possible, patients should be isolated until 24 hours after antibiotics have started. If isolation is not possible, droplet precautions should be used until 24 hours after antibiotics have been started.

Specimens

If possible, blood *cultures* should be collected in all cases of suspected meningococcal disease before starting antibiotics. If possible, patients with symptoms of meningitis should have a lumbar puncture (spinal tap) to obtain CSF as soon as possible, if it is safe to do so. CSF should be *cultured* for meningococcus and other bacterial causes of meningitis. Antibiotics should not be delayed while waiting for lumbar puncture.

Specimens should also be sent for identification of serogroup, in order to guide control measures at the community level (e.g. if it is a serogroup that could be prevented by an immunisation).

Treatment

- IV antibiotics should be given as soon as meningococcal disease is suspected (if IV access cannot be obtained within 15 minutes, IM administration is warranted)
- If possible collect blood cultures prior to antibiotic administration
- Ceftriaxone IV/IM or Cefotaxime IV is the first choice antibiotic (to also cover *Streptococcus pneumoniae* and *Haemophilus influenzae* type b in unimmunised children). If unavailable, use penicillin IV/IM.
- Other investigations should not delay antibiotic therapy.

Some antibiotics, including penicillin, do not reliably clear nasopharyngeal carriage of meningococci so appropriate clearance antibiotics must also be used (see national standard treatment guidelines).

Pre-admission treatment for all ages is an immediate dose of IV/IM benzylpenicillin for suspected meningococcal infections

- Adults and children aged ≥10 years 1.2 g
- Children aged 1 - 9 years 600 mg
- Children aged under 1 year 300 mg

RESPONSE PROCEDURE

Infection control

STANDARD and DROPLET precautions (see Appendix 6)

Droplet precautions should be strictly applied for at least 24 hours after starting intravenous treatment with antibiotics.

Reporting

- The national Director of Public Health (or equal authority) should be contacted immediately to report any case meeting the case definition.
- Begin a line list of cases.
- Use the IHR Decision Instrument (See Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Investigation of single cases of meningococcal disease should start immediately to find other cases and manage contacts (see below).

Public health management of cases

Information should be collected on:

- The patient's age, sex and where they live;
- Clinical details, including date of first symptoms;
- Lab test results;
- Close contacts; and
- Whether or not the case attends a school or other group setting.

Management of contacts

- The contacts most at risk of meningococcal disease are other members of the household of a case of invasive meningococcal disease. The risk is greatest during the first week after the case is detected and falls rapidly thereafter.
- The focus of contact tracing is to identify close contacts for preventive antibiotics. All close contacts, including household contacts, children and staff in childcare centres, children sharing rooms, boarding schools and intimate (kissing) partners in the 7 days before onset of the case's symptoms, should be identified and given information about the signs and symptoms of meningococcal disease. Other close contacts include passengers seated immediately adjacent to the case during long distance travel (>8 hours duration) by aeroplane, train, bus or other vehicle.
- Contacts should be told to seek medical care if they develop symptoms.
- The antibiotic rifampicin may be given to all close contacts who were in contact with the case within 7 days of onset to remove the bacteria in their nose and throat.
- Rifampicin will not treat the infection in a person who may already be developing the disease. It is to stop the carriage and possible further spread of the bacteria. If a contact who has received a clearance antibiotic such as rifampicin develops symptoms of meningitis or septicaemia they become a case, and will still require intravenous antibiotics.
- Rifampicin should not be given in pregnancy. Substitute ceftriaxone 250 mg (age >12 year)

intramuscularly as a single dose.
- Conduct surveillance for secondary cases among close contacts for 48 hours by contacting them once a day and asking if they have symptoms.

Prevention

- Overcrowding of young people and children in schools, barracks and colleges should be avoided.
- Meningococcal vaccine is available in some countries for prevention and in outbreak control of some serogroups of meningococcus.

Differential diagnosis (not a complete list)

- *Streptococcus pneumoniae* meningitis
- *Haemophilus influenzae* b meningitis (where immunisation rates are low)
- viral meningitis ('aseptic meningitis') – caused by a variety of viruses
- fungal meningitis
- *Mycobacterium tuberculosis* meningitis
- certain drugs and toxins

Additional resources

Invasive Meningococcal Disease CDNA National Guidelines for Public Health Units (Australia) http://www.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-IMD.htm

Guidance for public health management of meningococcal disease in the UK. Health Protection Agency Meningococcus and Haemophilus Forum. Updated March 2012.

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/322008/Guidance_for_management_of_meningococcal_disease_pdf.pdf

Pertussis (whooping cough)

Public health priority

High

Suspected case definition

Cough illness lasting ≥2 weeks, with at least one of the following symptoms:

- fits of coughing, OR
- 'whoop' when breathing in, OR
- vomiting after coughing fits.

Confirmed case definition

Culture of *Bordetella pertussis* bacteria from a clinical specimen; OR PCR positive for pertussis; OR a coughing illness in a person with a link by time, person, place to a lab-confirmed case.

Number of linked cases required to trigger an investigation: Two

Description of signs and symptoms

The first coughing stage has a slow beginning, with an irritating cough that gradually becomes coughing fits, usually within 1–2 weeks, and lasts for 1–2 months or longer. Coughing fits are characterised by repeated violent cough; each fit has many coughs without breathing in and can be followed by a classic crowing or high-pitched 'whoop' when breathing in. Coughing fits are often followed by vomiting. Infants under 6 months, immunised children, teenagers and adults often do not have the typical whoop or coughing fits. The final stage is a recovery stage.

The number of deaths in immunised populations is low. Most deaths occur in infants under 6 months, often in those too young to have completed primary immunisation. In non-immunised populations, especially those with malnutrition and many gastrointestinal and respiratory infections, pertussis is among the most deadly diseases of infants and young children. Complications include pneumonia, collapsed lung, fits, brain swelling, weight loss, hernias and death; pneumonia is the most common cause of death.

Cases occurring in immunised persons suggest declining *immunity* from previous immunisations.

Infectious cause(s)

A bacterium called *Bordetella pertussis*

Sources of infection (*reservoir*)

Humans only

How the disease is spread (*transmission*)

Transmission is by the respiratory droplets of an infected person. Pertussis is very contagious: almost all unimmunised contacts may become infected.

Incubation period

Average 9–10 days; range is 6–20 days

Period of infectiousness

Very infectious in the early coughing stage and at the beginning of the coughing fits stage (first 2 weeks). Infectiousness gradually decreases and is gone in about 3 weeks, even though the patient still has a cough. When treated with the right antibiotics, patients are no longer infectious after 5 days of treatment.

Clinical management

A macrolide antibiotic for 5–7 days will shorten the time the case is infectious, and may reduce the severity of symptoms if given **very** early. Clarithromycin and azithromycin are better tolerated, if available, than erythromycin.

RESPONSE PROCEDURE

Infection control

STANDARD plus DROPLET precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected cluster of cases.
- Begin a line list of cases.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Investigation of clusters should start even before a diagnosis is made. In single cases, priority should be given to figuring out a diagnosis and searching for additional cases. Obtaining information on immunisation history is key for management of contacts.

Specimens

Swabs from the back of the nose or throat (*nasopharynx*) should be collected during the coughing and early coughing fit stages, and placed on Cary-Blair medium for shipment to a reference laboratory for *culture* or PCR testing.

Two blood samples may be obtained for serologic diagnosis – one when the patient is sick and one when they are better – but they are not as good as respiratory specimens.

Public health management of cases

In the first 3 weeks that they are coughing, pertussis patients can pass the illness to others. They are not infectious after 5 days of treatment with antibiotics. Patients should take antibiotics for at least 7 days, even when they feel better. Patients with suspected pertussis who do not receive antibiotics should keep away from others for 3 weeks from the start of the cough or until the cough stops. It is extremely important that they stay away from infants who have not been fully immunised against pertussis.

Management of contacts

Administration of post-exposure prophylaxis to asymptomatic household contacts within 21 days of onset of cough in the index patient can prevent symptomatic infection. Consider giving asymptomatic close contacts a 5–7day course of erythromycin, clarithromycin or azithromycin. This is very important in households where there is an infant <1 year old or a pregnant woman in the last 3 weeks of pregnancy (to prevent the newborn from infection).

Children living in the same house as the case may be excluded from schools, day care centres and public gatherings for 21 days after last exposure if they are not fully immunised. Once cases and contacts have received 5 days of a minimum 7-day treatment with the right antibiotics, they do not need to be excluded. All contacts must have their immunisation status reviewed and brought up to date (note that this will not prevent them from getting sick in the current outbreak).

Prevention

Immunisation is the basis of pertussis control. In an outbreak setting, a faster immunisation schedule may be considered for people who are not fully immunised who have not yet been exposed. For advice, consult WHO, SPC or CDC.

Differential diagnosis (not a complete list)

- bacterial (particularly *Mycoplasma*) pneumonia
- respiratory syncytial virus (RSV) infection
- other infectious causes of upper respiratory disease

Additional resources

CDC. 2005. Recommended Antimicrobial Agents for the Treatment and Postexposure Prophylaxis of Pertussis:

http://www.cdc.gov/mmwr/pdf/rr/rr5414.pdf

Rubella (German measles)

Public health priority

High

Suspected case definition

1. Any person with fever, **and** maculopapular (non-blistering) rash **and** either joint pain or swelling, enlarged lymph glands, or red eyes*

OR

2. Any person in whom a clinician suspects rubella infection.

* If a person has fever and maculopapular (non-blistering) rash and red eyes, they also meet the case definition of measles; in this case, measles should be urgently ruled out (for example with laboratory testing) before a diagnosis of rubella can be made.

Confirmed case definition

Culture of rubella virus from a clinical specimen; OR rubella positive by PCR; OR significant rise in rubella IgG antibodies in paired sera; OR positive serologic test for rubella IgM antibodies

Number of cases required to trigger a notification and investigation: One

Description of signs and symptoms

The usual clinical presentation of rubella is a mild fever illness with a maculopapular (non-blistering) rash all over the body. Children usually present with few or no other symptoms, but teenagers and adults may have early symptoms of low fever, headache, feeling bad, mild runny nose and conjunctivitis (red eyes). Swollen neck glands are common and occur 5 to 10 days before the rash.

A disease called 'congenital rubella syndrome' occurs in almost all children born to mothers who are not immunised and get rubella while they are pregnant.

Infectious cause(s)

Rubella virus

Sources of infection (*reservoir*)

Humans

How the disease is spread (*transmission*)

Contact with mucus from the nose or throat. Droplet spread.

Incubation period

Usually 14–17 days; range is 14–21 days

Period of infectiousness

For about 1 week before and at least 4 days after the appearance of rash. Rubella is a highly infectious disease.

Clinical management

A patient should be considered highly infectious until 4 days after appearance of rash and should be isolated. Any child hospitalised with fever and rash should be isolated on admission. Paracetamol rather than aspirin should be used for fever in patients under 18 years of age.

RESPONSE PROCEDURE

Infection control

STANDARD and DROPLET precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case.
- Ensure the HBAS coordinator is informed.
- Begin a line list for suspected outbreaks.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Active searching for other cases should continue for at least 2 incubation periods.

Specimens

Blood must be collected for suspected cases and tested for rubella antibodies (after measles has been ruled out).

Public health management of cases

Refer to the Hospital-Based Active Surveillance Information Folder and the Acute Fever with Rash Case Investigation Form.

- Laboratory tests should be requested for the first cases.
- Ask hospitals and health centres to report new cases promptly.
- During an outbreak it is usually only necessary to send specimens from the first 5 cases of fever and rash. Discuss with WHO, SPC or CDC.
- Cases should not attend group settings (including school/preschool/child care/work) from beginning of symptoms until 7 days after appearance of rash and should stay home (unless isolated in hospital). Cases should avoid contact with susceptible persons, in particular pregnant women.

Management of contacts

- Contacts are considered to include anyone who shared a room with the case. Unimmunised contacts should be immunised.
- Exclude unimmunised contacts from school or other group settings.
- Ask contacts to be alert for signs and symptoms of acute fever and rash and advise those who develop symptoms to call ahead, if possible, before seeking medical advice (so as to avoid common waiting areas in health centres or hospitals).
- Particular attention should be paid to the detection of rubella in pregnant contacts.
- Any rubella outbreak should be used as an opportunity to promote catch-up immunisation of unimmunised children on the affected island.

Prevention

High immunisation rates in the community prevent outbreaks of rubella.

Differential diagnosis (not a complete list)

- measles
- dengue

Additional resources

Rubella in Pregnancy. Society of Obstetricians and Gynaecologists of Canada:
http://sogc.org/guidelines/rubella-in-pregnancy/

WHO Rubella site
http://www.who.int/topics/rubella/en/

Severe acute respiratory infection (SARI)

Public health priority

High, if there is a cluster of cases or a new influenza virus circulating

Case definition

An acute respiratory infection with:

- History of fever* or measured fever of ≥ 38 C°;
- AND cough;
- AND with onset within the last 10 days;
- AND requires hospitalization.

*See glossary for further definition of fever

Note: the case definition for SARI was modified in September 2015 in line with WHO surveillance standards.

Number of linked cases required to trigger a notification and investigation: Two

Description of signs and symptoms

In addition to meeting the case definition, people with SARI may also have sore throat, runny nose, headache, muscle aches, sneezing, chest pain and pleurisy (chest pain when inhaling).

Infectious cause(s)

- influenza viruses
- respiratory syncytial virus (RSV)
- pneumococcus (*Streptococcus pneumonia*) and other causes of bacterial pneumonia
- SARS-associated coronaviruses

Sources of infection (*reservoir*)

- Humans, animals and birds (for influenza)
- Several suspected animals (for SARS)

How the disease is spread (*transmission*)

Mainly person-to-person transmission. Less commonly from mammals, such as pigs, and birds to humans.

Incubation period

The most common causes of severe acute respiratory illness have an incubation period of 1–3 days. It may be longer depending on the cause.

Period of infectiousness

Variable depending on cause of infection

Clinical management

Patients with suspected pneumonia should be treated with antibiotics according to the local treatment protocols. Isolate the case from others if possible.

RESPONSE PROCEDURE

Infection control

STANDARD plus DROPLET precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a cluster of cases.
- Contact an animal health authority immediately if disease is linked to exposure to sick animals.
- Begin a line list of cases.
- Human influenza caused by a new subtype **is required** to be reported to WHO under the IHR 2005 (see Appendix 5)

Investigation

Investigation of clusters of severe disease is recommended. WHO will also have specific outbreak investigation recommendations if there is a new influenza strain infection circulating. Seek advice from WHO.

Specimens

Swabs from the back of the nose or throat (nasopharyngeal) should be collected and tested for influenza (and RSV where available) by a variety of methods, including immunofluorescence microscopy, polymerase chain reaction, and viral *culture*. If specimens must be sent to a reference laboratory, nasopharyngeal swabs should be placed in 95%–100% ethanol for shipping; alternatively, if dry ice is available, swabs can be placed in viral transport medium (VTM), immediately deep-frozen on dry ice, and shipped.

Rapid tests for a variety of influenza viruses are also available but may not be very accurate. Sputum cultures should be obtained for any cases with pneumonia and cultured – consult WHO, SPC or CDC for assistance.

Public health management of cases

Cases should be isolated from others to avoid spreading disease. They should be educated about hand hygiene, respiratory hygiene (not coughing/sneezing on others and avoiding other peoples' coughs/sneezes) and *social distancing*.

Management of contacts

Secondary cases may occur in close contacts of cases. Provide information about preventing infection, symptoms and what to do if they develop symptoms.

Prevention

- Immunisation is the most effective measure against seasonal influenza and pneumococcus.
- Practice good hand hygiene.
- Practice good respiratory hygiene.
- Stay away from people who are obviously sick.

Other important diseases that may cause these symptoms (not a complete list)

- bacterial pneumonia (for example caused by *Streptococcus pneumoniae*)
- influenza viruses
- respiratory syncytial virus (RSV), especially in very young children
- tuberculosis
- SARS viruses
- inhaled toxins

Tuberculosis

Refer to the national TB guidelines for your country.

Public health priority

High

Suspected case definition

Cough lasting ≥2 weeks; OR 2 or more of the following symptoms, without another diagnosis:

- coughing up blood
- difficulty breathing
- chest pain
- fevers/chills
- night sweats
- extreme tiredness or weakness
- loss of appetite
- unexplained weight loss

Case definition

Confirmed: A patient with *Mycobacterium tuberculosis* identified from a clinical specimen by culture; OR detection of *M. Tuberculosis* by PCR (i.e. Xpert MTB/RIF)

Definite: In countries with sputum smear testing only, a pulmonary case with one or more smears positive for acid fast bacilli is also considered to be a definite case provided that a functional external quality assurance (EQA) programme exists in the laboratory.

Number of linked cases required to trigger an investigation: One

Description of signs and symptoms

If untreated, about 65% of patients with active tuberculosis die within 5 years, most of these within 2 years.

The classification of TB for treatment purposes is based mainly on whether there are bacteria in the sputum. If the sputum smear is positive for tuberculosis bacteria, the patient is highly infectious.

Fatigue, fever, night sweats and weight loss may occur early or late in the disease. Symptoms of cough, chest pain, bloody sputum and hoarseness are found in advanced stages. X-rays of the chest show typical changes in the lungs.

TB in the lung occurs more commonly (70%) than TB in areas of the body outside the lung (30%). Children and people with poor immune systems, such as people with HIV infection, have a higher risk of TB outside the lung, but lung disease remains the most common type worldwide. TB disease may affect any organ or tissue.

Infectious cause(s)

Mycobacterium tuberculosis complex (includes *Mycobacterium tuberculosis* and *Mycobacterium bovis*).

Sources of infection (*reservoir*)

Humans are the primary sources of infection for *M. tuberculosis*.

Other animals, particularly cattle, are occasionally responsible for human tuberculosis, These are usually infections of *Mycobacterium bovis*. This is rare in the Pacific.

How the disease is spread (*transmission*)

Transmission is by AIRBORNE spread via droplets, usually spread through coughing, singing or sneezing by a patient with lung or throat disease. Patients with smear-positive, cavitary lung disease and laryngeal disease are the most contagious.

M. bovis may also be transmitted by ingestion of raw milk, although this is rare in the Pacific.

Incubation period

As short as 2 weeks, but tuberculosis usually becomes *latent* and can emerge at any time later in life (5% chance in first 2 years, 5% lifetime chance thereafter).

Period of infectiousness

The period of infectiousness of TB is ongoing in the absence of treatment.

- The infectious period for outbreak investigations is usually considered to begin 3 months prior to first symptoms, a positive sputum smear, or chest x-ray evidence of TB. If the patient has no symptoms and has a negative sputum smear and a normal chest x-ray, the infectious period begins 1 month prior to diagnosis.
- The infectious period usually ends after 2 weeks of correct treatment AND the patient's symptoms have started to resolve. It must be noted, however, that the infectious period can extend to slightly longer than 2 weeks, depending on the bacterial load when first diagnosed.

Children under 5 with TB are generally not considered infectious. TB outside the lung or throat is generally not considered infectious.

Clinical management

Tuberculosis treatment consists of a combination of antibiotics taken for 6 months (sometimes longer) using a standardised regimen. Treatment of TB is usually provided by directly observed therapy (DOT), whereby a health-care worker or other trained person observes the TB patient swallowing their drugs.

In the case of someone with suspected multi-drug resistant TB (MDR-TB) it is often best to wait until a proper sputum specimen can be collected before starting drug therapy, so drug susceptibility testing (DST) results can inform treatment. However, if a patient is very sick, *empirical treatment* can be given while awaiting culture and DST results and a rapid molecular-based test should also be requested from the reference laboratory.

It is likely that there is under-reporting and under-detection of MDR-TB in the Pacific Islands due to the limited capacity of some to perform culture and drug susceptibility testing (DST). Antibiotic resistance should be managed with advice from experts in TB clinical case management.

TB treatment is further complicated by HIV/TB co-infection in some areas. Seek expert advice.

RESPONSE PROCEDURE

Infection control

Immediate AIRBORNE precautions (see Appendix 6) are required when a patient is **suspected** of having tuberculosis (DO NOT WAIT FOR A POSITIVE SPUTUM SMEAR!). A patient can then be removed from isolation after 2 to 3 weeks of DOT and lessening of their symptoms.

Sputum must be collected in a disposable container, with a lid that can be closed tightly. Laboratory specimens should be well sealed with no contamination of the outside of the container and transported immediately to the laboratory in a sealed bag.

See also 'Public health management of cases'.

Reporting

- Report to national TB programme manager within 48 hours of diagnosis.
- Contact the Director of Public Health (or equal authority) within 1 day to report a suspected case of multi-drug resistant TB.
- Begin a line list of cases if a cluster of cases is suspected.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

If resources allow, contact tracing can be implemented after every sputum smear positive TB diagnosis. It is important to look for other cases among contacts and to assess who might have active TB disease or latent TB infection. In addition, when a child is diagnosed with TB – particularly a child under 5 years of age – it is likely that they have been infected by a close contact. Therefore an investigation can take place to identify the source case. Finding and treating new infections early is crucial to prevent further cases. This is particularly critical for cases of drug-resistant disease.

Specimens

The main method of diagnosis of TB is sputum smear microscopy. Patients should be taught how to provide a good sample (i.e. instruct the patient to breathe in deeply 2–3 times, cough deeply from the chest and spit sputum into the sputum container, rather than just saliva from the mouth). Sputum can be stained locally by the acid-fast method. Children under 5 years of age often cannot produce enough sputum so a bronchial aspirate may be needed.

Different countries have different protocols about whether all suspected cases should have a specimen collected for culture, so refer to national guidelines.

At a minimum, it is recommended that the following cases have a specimen sent for culture and drug susceptibility testing (DST) at a reference laboratory:

- At the beginning of treatment
  - All previously treated patients
  - Symptomatic close contacts of a proven MDR-TB case
  - People who develop TB after known exposure to a patient with documented MDR-TB
  - All new TB patients in countries where the level of MDR-TB in new patients is >3%
  - HIV positive patients with active TB
- During treatment
  - New and previously treated TB patients who remain sputum smear positive at month 3 (i.e. for new TB patients who have had the intensive phase extended for a month, and at the end of the intensive phase for previously treated TB patients)
  - New and previously treated TB patients who are sputum smear positive at month 5 or later of treatment (i.e. categorised as treatment failure)

TB in other sites in the body requires advanced sampling techniques – seek expert advice.

Public health management of cases

When a patient with suspected infectious TB is admitted to the hospital, the patient must be isolated in a single room, ideally in a negative pressure room if available. If there is no negative pressure room, the patient should be put in a room by themselves with the windows open.

AIRBORNE precautions must be taken. A P2 or N95 mask should be worn by all health-care workers and all visitors entering the room, with appropriate education on fit testing of masks. Infectious

patients need to wear a surgical mask when leaving their rooms to walk in the hospital grounds or during transport.

It is advised that children and babies do not visit infectious cases.

People with infectious TB must be isolated from people with weak immune systems until they are no longer infectious. It is preferable that staff members with weak immune systems (e.g. those with diabetes, HIV) not work on wards where there are cases of infectious TB.

There are no restrictions on the movement of patients with non-respiratory TB, or those on treatment with negative sputum smears.

Once diagnosed, a TB patient must be reported to the national TB programme and registered in the national TB register.

The basis of effective TB treatment is the administration of a standardised regimen of quality assured drugs given by directly observed therapy. This means that all cases are physically observed to take (swallow, inject) their TB medications every day. This is important for all cases, but especially important for TB patients receiving re-treatment regimens and for those who have drug-resistant TB.

For additional information about TB case management, refer to 'Additional Resources' at the end of this section.

Management of contacts

The closer the contact and the longer the duration of exposure, the higher the risk of being infected with *M. tuberculosis*. Close contacts are persons who share the same air space in a household or other small environment for a long period (days or weeks, not minutes or hours) with a person with lung or throat TB disease.

In addition to close contacts, the following persons are also at higher risk for exposure to and sickness from infection. Persons listed below who are also close contacts should be top priority.

- people with signs and symptoms of TB
- health-care workers
- age <5 years
- age >50 years
- conditions that weaken the immune system
  - AIDS
  - diabetes
  - drugs that weaken the immune system (for example steroids)
  - some cancers

All close contacts of an infectious TB case who were exposed within the infectious period (see above) should be screened for tuberculosis. This should include questioning about whether they have symptoms of tuberculosis and whether they have been immunised against TB. People with symptoms should have full screening for TB including sputum smear microscopy, tuberculin skin testing (if available and if indicated by national TB guidelines), chest and physical examination and chest x-ray. Those patients who have no symptoms should have skin testing to look for disease. All skin tests should be repeated 8–12 weeks after the initial test.

Refer to national TB guidelines on TB contact tracing or to:

SPC. Guidelines for tuberculosis contact tracing in Pacific Island countries and territories. 2010:

http://www.spc.int/tb/en/publications/cat_view/66-technical-documents

Contacts with presumptive TB should be promptly referred to Public Health for investigation.

All contacts with *latent* TB infection (LTBI; positive skin test with no active disease) should be treated with isoniazid preventive therapy (IPT) where possible. Priority should be assigned to those at highest risk of progression from LTBI to TB disease:

- new infection in the past 2 years (i.e. skin test that has converted with negative to positive)
- children under 5 years of age
- persons older than 50 years
- persons with weak immune systems (e.g. HIV infection)

Prevention

The primary means of prevention for TB is proper identification of cases and their contacts, followed by appropriate and complete treatment and infection control. Other societal measures such as reducing crowding, improving nutrition, and so on, also greatly reduce TB transmission rates.

There is a vaccine for TB, called Bacillus Calmette-Guérin (BCG). It is used mainly because it prevents more serious forms of TB (e.g. meningitis) in children. It has no role in TB outbreak control.

Differential diagnosis (not a complete list)

- bacterial pneumonia
- pulmonary abscess
- cancers (especially lung, lymphoma)
- sarcoidosis
- histoplasmosis
- multiple other infectious and non-infectious conditions

Additional resources

WHO. 2012. Treatment of Tuberculosis: Guidelines: fourth edition:

http://whqlibdoc.who.int/publications/2010/9789241547833_eng.pdf

WHO. Guidelines for the Programmatic Management of Drug-Resistant Tuberculosis:

http://whqlibdoc.who.int/publications/2011/9789241501583_eng.pdf

CDC. 2005. Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health-Care Settings:

http://www.cdc.gov/mmwr/pdf/rr/rr5417.pdf.

and FAQs:

http://www.cdc.gov/tb/publications/guidelines/AdditionalFAQs.pdf.

CDC. Guidelines for the Investigation of Contacts of Persons with Infectious Tuberculosis:

http://www.cdc.gov/mmwr/pdf/rr/rr5415.pdf.

(see also associated Errata: http://www.cdc.gov/mmwr/pdf/wk/mm5450.pdf)

SPC. 2010. Framework to address multidrug-resistant tuberculosis in Pacific Island countries and territories:

http://www.spc.int/tb/en/publications/cat_view/66-technical-documents

NSW Health. Principles of Fit Checking - How to don and fit check P2 or N95 Masks:

http://www0.health.nsw.gov.au/resources/quality/hai/pdf/tool_protective2_presentation.pdf

Typhoid fever

This is a serious illness. It can lead to death in up to 20% of patients, if they are not treated with antibiotics. Antibiotics such as ciprofloxacin are very effective and usually save the life of a patient if they are given early enough.

Public health priority

Urgent

Suspected case definition

Fever for 3 or more days, plus one or more of the following: feeling bad, severe headache, dry cough, loss of appetite, abdominal pain, constipation, diarrhoea, or rose spots on the trunk

Confirmed case definition

Isolation of *Salmonella* Typhi bacteria from blood, stool, or other clinical specimen. Serologic evidence (antibodies) is not enough to confirm the diagnosis.

Number of cases required to trigger a notification and investigation: One

Description of signs and symptoms

Typhoid fever may vary from a mild illness with low fever and feeling bad, to a severe illness with continuous fever, diarrhoea or constipation, anorexia, severe headache.

Typhoid fever is very difficult to diagnose. Different patients can have a very different illness. The most constant symptom is the long-lasting high fever.

It is therefore very important to confirm the illness in a laboratory (blood or stool *culture*). Unfortunately, blood and stool *culture* are not perfect and may be positive in less than half of typhoid fever patients.

Infectious cause(s)

Salmonella Typhi

A similar (though often milder) disease, paratyphoid fever, is caused by *Salmonella* Paratyphi.

Sources of infection (*reservoir*)

Humans are the only reservoir for *Salmonella* Typhi. People can be *carrier*s for years, meaning that they are infectious but do not have symptoms.

How the disease is spread (*transmission*)

Transmission occurs through food and water polluted by the faeces of patients and *carrier*s. Contaminated shellfish, raw vegetables or fruit, and milk have all caused outbreaks. Food-handlers who are typhoid *carrier*s pose a major risk. Flies can also transmit bacteria from faeces onto food.

Incubation period

From 3 to 60 days, usually 8–14 days

Period of infectiousness

The patient's stool is infectious while the person has symptoms. Up to 5% of infected people become long-term asymptomatic *carrier*s.

Clinical management

All suspected cases of typhoid should be hospitalised. Check if the patient is dehydrated and give enough oral or intravenous fluid replacement to compensate for dehydration. Paracetamol should be used to manage fever in patients under 18 years of age. Antibiotics are required for all patients; the

choice of antibiotic depends on local patterns of antibiotic resistance. Ciprofloxacin is a good choice if available, as it is rapidly effective and is required for a shorter period than other antibiotics. Antibiotic choice may need to change once the laboratory has completed antibiotic sensitivity analysis.

RESPONSE PROCEDURE

Infection control

STANDARD precautions, and where patient is in nappies/diapers or incontinent, add CONTACT precautions (see Appendix 6)

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case.
- If there are 2 or more cases, begin a line list.
- Use the IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under IHR 2005 is required.

Investigation

Where a common source is identified from a number of cases of typhoid fever, an environmental investigation should begin. Single cases may need an investigation for the presence of a long-term *carrier* in a close contact, as resources allow.

Where there is evidence of a point source outbreak involving food or water:

- begin case finding and conduct investigation to determine exposure;
- test food handlers;
- ban and test suspect food/water; and
- look for possible environmental sources such as overflowing sewage.

Specimens

Blood and stool *culture*s should be performed to confirm the diagnosis. In an unwell person, a blood culture is most important as it is more likely to test positive sooner than a stool culture.

If there is suspicion that a contact is a long-term *carrier*, the collection of a stool sample or rectal swabs would be appropriate if resources allow.

Stool specimens should preferably be processed within two hours after collection. If there is a delay, the specimens should be stored in a refrigerator at 4°C or in a cool box with freezer packs, and should be transported to the laboratory in a cool box. Stool culture may increase the yield of culture-positive results by up to 5% in acute typhoid fever. If a stool sample cannot be obtained, rectal swabs inoculated into Cary-Blair transport medium can be used, but these are less successful.

Public health management of cases

- Cases should be interviewed to identify possible links to specific foods, water supply and potential sources of infection, for example a restaurant or school. An environmental investigation should begin if a source is identified.
- Arrange for the collection of stool specimens to make sure antibiotics have gotten rid of the bacteria. Three stool specimens should be collected more than 24 hours apart, at least 1 month after the onset of symptoms and at least 48 hours after antibiotics have ceased. All 3 specimens need to be tested because bacteria are not continuously shed in the stool.
- The patient should be told about the type of infection and the method of transmission. Emphasise the importance of hand washing, particularly after going to the toilet or changing nappies/diapers, and before eating or preparing food.
- *Carrier*s of *Salmonella* Typhi who are food handlers should be excluded from work until they are

treated and no more typhoid bacteria are found in their stool.

Management of contacts

- Close contacts should be told about the symptoms of typhoid fever and be advised to go to the health centre if they develop symptoms.
- Where mass-consumed food or drink is contaminated, complete a list of foods that could be the source (including milk and water supply) and ban all suspected foods that are still available. Ask about the origin, preparation and storage of suspected food and collect stool specimens from food handlers if needed.
- Antibiotic *prophylaxis* is not recommended.

Prevention

- providing safe water
- hand washing
- safe disposal of stool
- clean latrines/toilets

Clinics should give clear messages on effective food hygiene, like the 'Five keys to food safety' (see Appendix 7).

- keep clean
- separate raw and cooked food
- cook thoroughly
- keep food at safe temperatures
- use safe water

Differential diagnosis (not a complete list)

- dengue
- leptospirosis
- paratyphoid fever

Additional resources

WHO. the diagnosis, treatment and prevention of typhoid fever:

http://whqlibdoc.who.int/hq/2003/WHO_V&B_03.07.pdf

Zika

Zika is an emerging virus that has not been well characterized. On 1 February 2016, clusters of microcephaly cases and other neurological disorders related to Zika virus were declared a Public Health Emergency of International Concern (PHEIC) under the International Health Regulations 2005. The most updated information about Zika virus and related complications is available at www.who.int.

Public health priority

High

Suspected Case definition: A person presenting with rash and/or fever and at least one of the following signs or symptoms:

- arthralgia; or
- arthritis; or
- conjunctivitis (non-purulent/hyperaemic).

Note: Although fever may be present, most cases present with normal temperatures or with low grade fever <38 C.

Probable case definition: A suspected case with presence of IgM antibody against Zika virus and an epidemiological link.

Confirmed Case definition: A person with laboratory confirmation of recent Zika virus infection:

- presence of Zika virus RNA or antigen in serum or other samples (e.g. saliva, tissues, urine, whole blood); or
- IgM antibody against ZIKV positive and PRNT90 for ZIKV with titre ≥20 and ZIKV PRNT90 titre ratio ≥ 4 compared to other flaviviruses; and exclusion of other flaviviruses

Number of cases required to trigger an investigation: one confirmed case, if there is no known outbreak already under investigation

Description of signs and symptoms

Cases usually develop rash (typically maculopapular) often with low-grade fever, non-purulent conjunctivitis, headache, arthralgia, myalgia, oedema (hands and feet), and less frequently, retro-orbital pain, anorexia, vomiting, diarrhoea and abdominal pain. Zika virus disease is usually mild.

Recently there have been reports of serious neurological disorders related to Zika virus outbreaks. Microcephaly and other foetal malformations, in the presence of Zika virus, have been reported from a number of countries.

In the context of Zika virus circulation a number of countries have also reported an increase in incidence in Guillain-Barré syndrome (GBS), an ascending flaccid paralysis that can lead to respiratory failure and death. Although the link between Zika virus and these neurological conditions is not proven at the time of writing (March 2016), there is mounting evidence that Zika virus is the cause.

Laboratory diagnosis

Serological tests, such as enzyme-linked immunosorbent assays (ELISA), may confirm the presence of IgM and IgG anti-Zika antibodies. Detection of an increase in antibodies in paired sera is recommended. IgM antibody levels should be detectable between days 5-6 after illness onset. Serological cross-reactions with other flaviviruses such as dengue may occur and IgM results should be interpreted with caution in areas where multiple flaviviruses are circulating.

Practically, the current diagnostic tool for confirmation is RT-PCR to detect Zika virus RNA in body fluids, specifically serum, saliva, and urine. In summary:

- Serum: the standard biological sample used in most reference laboratories for detection of Zika virus RNA
- Saliva (oral swab): limited studies indicate better viral detection but not an enlarged window of detection compared to serum
- Urine: limited studies indicates an enlarged window of detection compared to serum with Zika virus RNA being detected >7 days post symptom onset

Unless serum samples are collected very early in illness course, false-negative results are likely. Not all reference laboratories will test all biological sample types, so verify with your specific laboratory before collection and shipment.

Infectious cause(s)

Zika virus

Sources of infection (*reservoir*)

The exact nature of the reservoir of Zika virus in the Pacific has not been documented.

In Africa and Asia, studies have detected evidence of past infection with Zika virus in various animals including non-human primates, zebra, elephants, water buffalo and rodents.

How the disease is spread (*transmission*)

Zika virus is likely to be transmitted by the bite of infected mosquitoes of the Aedes genus. These bite during the whole day, but mostly during the early morning and evening. People with Zika infection should be cared for under bed nets so that a mosquito cannot bite them and then carry the infection to another person. Non-mosquito transmission is possible, including by sexual intercourse and blood transfusion.

Incubation period

The exact incubation period has not been definitively determined but is likely to be similar to other flaviruses such as dengue (2-14 days).

Period of infectiousness

The infectious period has not been established but is believed to be short. It is likely that humans are infectious to mosquitoes for up to 5 days after onset of illness. There are number of reports of sexually transmitted Zika infection and transmission through transfused blood products has been reported.

During 5 days after onset of illness, suspected cases should not donate blood. It is advisable to use condoms or avoid sexual intercourse for several weeks.

Pregnant women:

- Should be advised not travel to areas of ongoing Zika virus outbreaks.
- Whose sexual partners live in or travel to areas with Zika virus outbreaks should ensure safe sexual practices or abstain from sex for the duration of their pregnancy

Clinical management

Treatment is symptomatic and paracetamol is the drug of choice. Avoid aspirin and NSAIDs as a common differential diagnosis is dengue fever. Mild forms of exercise and physiotherapy are recommended in recovering persons.

Refer cases to a healthcare centre or hospital, with the ability to provide a higher level of care, with any of the following: low urine output, hypotension, bleeding disorders, confusion, persistent fever

of more than one week's duration, or any neurologic symptom

During a confirmed *epidemic*, it is not necessary to test all cases.

Communities in the affected areas should be educated about the mosquito control measures to be adopted in hospital premises and houses (Appendix 7).

RESPONSE PROCEDURE

Infection Control

STANDARD Precautions; plus, a long lasting insecticidal net should be placed over patients so that mosquitoes cannot bite patients and then transmit the disease to other people.

Reporting

- Contact the Director of Public Health (or equal authority) immediately to report a suspected case in an area with no endemic disease.
- Begin a line-listing of cases.
- Use IHR Decision Instrument (see Appendix 5) to determine whether reporting to WHO under the IHR 2005 is required

Investigation

Investigation of clusters should start without waiting for laboratory confirmation. In suspect single cases, priority should be given to determining a diagnosis and searching for additional cases.

Specimens

Oral swabs. The saliva should be collected by moving the swabs in the mouth about 30 sec. Then return the swab in the dedicated paper bag or tube. Slightly open the bag or tube to let the swab dry. Close the bag or tube and store at 4°C until shipment. The swabs may be sent at room temperature. Examples of appropriate oral swabs are below.

Serum can also be collected to test for Zika virus RNA or antibodies. These samples require storage and shipping under freezing conditions and standard packing and shipping procedure should be followed. The filter paper method (Dried Blood Spot) may have lower sensitivity than other collection methods and is not currently recommended for Zika virus detection.

Urine collection - Mid-Stream Urine (MSU) samples to be collected in sterile MSU specimen bottle and send to lab.Specimen (in MSU bottle) to be stored at 2-8°C while awaiting transfer to FCCDC lab

Urine Storage- put 2 dry oral swabs in cup of urine until fully soaked, place soaked swabs in sterile bottle (red cap) and let it completely dry before closing cap. Label specimen bottle with patient details, place in biohazard bag and seal. Store sample at 2-8°C.

In the first 3-5 days after the onset of symptoms it is possible to detect viral RNA with RT-PCR assays.

Public health management of cases

Cases should be interviewed to identify where the possible site of mosquito exposure occurred so that control measures can be carried out to prevent further infections and to identify further cases.

Management of contacts

Persons living in the area where a patient is thought to have been infected should be told of the risk of being bitten by Zika-infected mosquitoes, and should be asked to do mosquito control including clean-up of mosquito breeding sites (things that collect water, such as coconut shells, tyres, cans) and provided with information about personal protection, such as mosquito repellent sprays and bed nets. See Appendix 7.

Prevention

Preventing mosquito bites is the best way to prevent infection.

Differential diagnosis (not a complete list)

- Chikungunya
- Leptospirosis
- Dengue
- Malaria
- Meningitis
- Rheumatic Fever
- Measles

Further resources

A zika application, or App, has been developed with useful up-to-date information.

• iOS

https://itunes.apple.com/en/app/who-zikaapp/id1090088404?mt=8

• Android https://play.google.com/store/apps/details?id=com.universaldoctor.zika

Emerging Infectious Diseases

An emerging infectious disease is one that has appeared in a population for the first time, or that may have existed previously but is rapidly increasing in incidence or geographic range.

Recent examples include Ebola virus disease (EVD), Middle East respiratory syndrome coronavirus (MERS-CoV) and Nipah virus.

Up to date information is available at the WHO Emerging Diseases website
http://www.who.int/topics/emerging_diseases/en/

Appendix 1

Additional resources

The references here are provided for information only. PPHSN does not specifically endorse any of the products listed here.

- Connolly, M.A. (ed). 2005. Communicable disease control in emergencies: a field manual. World Health Organization.
- Cook, G. and Zumla, A. 2008. Manson's Tropical Diseases, 22nd Edition. Saunders Books.
- Gilbert, D.N., Moellering, R.C. and Eliopoulos, G.M. 2010. Sanford Guide to Antimicrobial Therapy. Sanford.
- Heymann, D.L. (ed). 2015. Control of Communicable Diseases Manual 20th edition, An Official Report of the American Public Health Association. American Public Health Association.
- Hospital Infection Control Practices Advisory Committee. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. Available at: http://www.cdc.gov/hicpac/pdf/isolation/Isolation2007.pdf
- Mandell, G.L., Bennett, J.E. and Dolin, R. 2010. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 7th Edition. Elsevier Books.

Appendix 2

EpiNet teams – terms of reference

http://www.spc.int/phs/pphsn/publications/directory/EpiNet/IA16-EpiNet-TORs.pdf

These general terms of reference were presented at the Regional EpiNet Workshop held in Suva in September 2003. They can serve as an example for countries/areas that would like to clarify the role of the EpiNet teams.

The generic name 'EpiNet team' describes the core members of the communicable disease control teams, committees, task forces etc. in the Pacific island countries and areas. This name used for this team may differ.

Areas of expertise of the EpiNet team

Staff with skills in one or more of the following areas:

- notifiable disease data management
- clinical medicine
- laboratory
- field investigations
- environmental health
- public health management and supervision

Professionals with skills in other areas may also be part of the team (e.g. infection control, immunisation, health policy, disaster management, health promotion and communication).

Size of EpiNet teams

This is determined by individual countries. In many there are five individual nominees. However, in smaller countries, there are often two or three members only. Large countries may have somewhat larger teams. It is also possible to have replication of EpiNet teams at subnational level (e.g. state, province or division).

Role of EpiNet team members

Surveillance and response roles must be defined by, and in the context of, each country/territory. Besides coordinated surveillance and response field activities, the role of EpiNet is also to establish and maintain relevant surveillance and response protocols for PPHSN target diseases, including all technical and resource-related aspects of all operations.

Role proposed for EpiNet team members:

- to be the, or be part of any, official national (or subnational) surveillance and response team,
- to be prepared to mobilise in response to outbreaks or epidemics,
- to organise the multisectorial Task Force in order to respond to an outbreak or to advise the appropriate authorities on the proper composition of such a Task Force, and to be the technical body in such a Task Force,

- to advocate for political support for communicable and other disease control activities,
- to participate in and support a Pacific network of health professionals who communicate regularly, preferably by email and in a confidential forum, regarding surveillance and response to outbreak-prone communicable diseases: PacNet and PacNet-restricted (the latter subject to agreement from Directors of Health);
- whenever needed, to define clear communication channels to be used in-country, inter-state/country and with the other PPHSN members;
- to properly report outbreaks immediately (or in a timely way) to other health professionals in the country and to the other PPHSN members, using PacNet or PacNet-restricted;
- to develop, adapt and implement PPHSN guidelines, recommendations and strategic frameworks for the surveillance of and response to PPHSN target communicable diseases;
- to immediately investigate suspected outbreaks;
- to organise the public health measures to respond in a timely way to an outbreak; and
- to seek appropriate advice and technical support through PPHSN whenever needed.

As well, EpiNet team members should attend meetings related to the surveillance of and response to outbreak-prone communicable diseases and be among those considered by government, should opportunities arise, for further training in surveillance and response. (Nominations to meetings or training courses are always subject to the decision and discretion of the Ministry of Health or Department of Health.)

A Primary Focal Point should be designated in each EpiNet team. This person will be the contact person for PPHSN and will make sure the other members of the team are kept properly informed. This role can be delegated from time to time.

Appendix 3

First announcement press release template

A first announcement provides the public with all of the information they may need about the outbreak, especially at-risk populations. The first announcement must answer the questions "who, what, where, when, how (did this happen)". It should:

- Provide instructions or guidance, i.e. protective behaviours, what must people do if they suspect they are sick, and who they can call.
- Address the fear and concern of the public, especially if this is a high profile emergency and risk perception and fear is an issue
- Be clear how further information related to this event will be disseminated, e.g. press conferences daily at noon, situation reports on the web, and so on.
- Contact numbers or a hotline concerned parties can call.

Content Overview:

- Headline this is the primary message to the public.
- Describe the current situation in two-three sentences including the date and time of the event/case.
- Insert quote from an official spokesperson demonstrating leadership and concern for victims
- List actions/response currently being taken by the health authorities
- List actions/response that will be taken in the future.
- List information on possible reactions of public (e.g. we know that this is a public concern) and ways citizens can help (e.g. but what you can do is , if you feel ill call or go to your nearest hospital)
- Insert quote from an official spokesperson providing reassurance (e.g. we are doing all that we can, working with our partners to ensure this is contained.)
- List contact information, ways to get more information, and other resources.

The following template could be used:

[Insert logo]

FOR IMMEDIATE RELEASE

[HEADING]

[Date (City)]

[Text]

For further information, please contact:

Name
Title
Government Department
Telephone: (+000) 000 000
Email: xx@xx.xx.

For more information on [disease]:
[Links to health topics]

Appendix 3

Risk communication challenges in outbreaks

Dealing with rumours

Rumours can be very damaging to efforts to control an outbreak. They may give people the wrong information about how to protect themselves, or they may create distrust of public health officials (for example if there is a rumour that the government is lying to the public).

Rumours spread quickly and they must be dealt with quickly. The best way to control rumours is to prevent them by providing early and honest information. However, once rumours occur, do not ignore them. Do not ignore or make fun of people who believe a rumour.

Do not waste time trying to argue with the rumours. Instead, just tell the public that you are aware of the rumours, and then provide them with the truth.

Challenges to communication

- needing to communicate without yet having all the answers
- being uncomfortable with delivering bad news
- rumours
- maintaining a consistent message
- fear that the media will misrepresent bad or uncertain news
- concern the public cannot handle bad news or will panic
- communication breakdown among different agencies
- bad decisions resulting from poor communications
- situation changing rapidly

Common mistakes

- waiting until you have all the answers before starting communication
- over-reassurance – 'everything is under control'
- withholding bad news
- not telling people what to expect
- assuming that just providing facts is enough
- believing that if you ignore the problem, it will go away
- not listening to the public
- not admitting mistakes
- … not being human

Additional resources

WHO Outbreak communication guidelines
http://www.who.int/csr/resources/publications/WHO_CDS_2005_28en.pdf

Appendix 4

Situation report format for use on PacNet

Address the message to **pacnet@lyris.spc.int** and use the following suggested format:

Outbreak description

- causative (or suspected) agent
- number of cases: total, severe and fatal
- time/place/person:
  - period of time involved, daily or weekly incidence
  - geographical distribution and spread (where it started and its progress over time)
  - age and sex breakdown (and other if relevant, e.g. profession)
- case definition used and clinical details, if any
- diagnostic methods, number of samples tested, laboratory involved
- prevailing epidemiological pattern: endemic or epidemic, recent epidemiological history

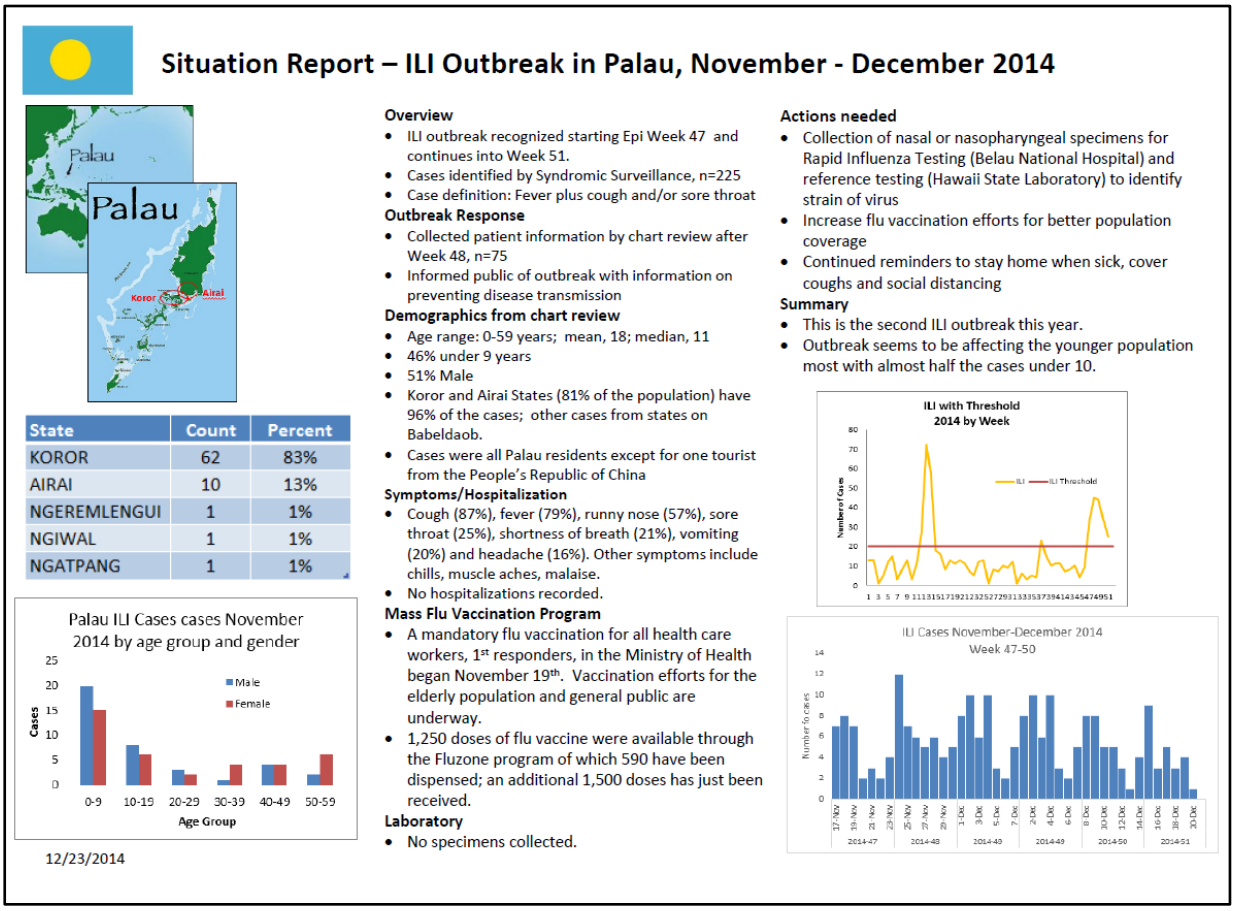
Measures taken or considered

- additional testing
- further investigation (source, risk factors)
- public health measures (e.g. immunisation strategy, patient and contact management, vector control, water and food safety)

Additional resources needed to confirm/monitor/control the outbreak (if any)

- reference laboratory assistance
- technical advice or assistance (e.g. regional epidemic situation, immunisation strategies, epidemiological expertise, guidelines for patient management or vector control, protocols for sample taking and shipment)
- material assistance (e.g. vaccines, drugs, bednets, insecticides, health promotion materials)

Examples of recent PacNet situation reports



Situation Report – ILI Outbreak in Palau, November - December 2014

State	Count	Percent
KOROR	62	83%
AIRAI	10	13%
NGEREMLENGUI	1	1%
NGIWAL	1	1%
NGATPANG	1	1%

12/23/2014

Overview
- ILI outbreak recognized starting Epi Week 47 and continues into Week 51.
- Cases identified by Syndromic Surveillance, n=225
- Case definition: Fever plus cough and/or sore throat

Outbreak Response
- Collected patient information by chart review after Week 48, n=75
- Informed public of outbreak with information on preventing disease transmission

Demographics from chart review
- Age range: 0-59 years; mean, 18; median, 11
- 46% under 9 years
- 51% Male
- Koror and Airai States (81% of the population) have 96% of the cases; other cases from states on Babeldaob.
- Cases were all Palau residents except for one tourist from the People's Republic of China

Symptoms/Hospitalization
- Cough (87%), fever (79%), runny nose (57%), sore throat (25%), shortness of breath (21%), vomiting (20%) and headache (16%). Other symptoms include chills, muscle aches, malaise.
- No hospitalizations recorded.

Mass Flu Vaccination Program
- A mandatory flu vaccination for all health care workers, 1st responders, in the Ministry of Health began November 19th. Vaccination efforts for the elderly population and general public are underway.
- 1,250 doses of flu vaccine were available through the Fluzone program of which 590 have been dispensed; an additional 1,500 doses has just been received.

Laboratory
- No specimens collected.

Actions needed
- Collection of nasal or nasopharyngeal specimens for Rapid Influenza Testing (Belau National Hospital) and reference testing (Hawaii State Laboratory) to identify strain of virus
- Increase flu vaccination efforts for better population coverage
- Continued reminders to stay home when sick, cover coughs and social distancing

Summary
- This is the second ILI outbreak this year.
- Outbreak seems to be affecting the younger population most with almost half the cases under 10.

Ministry of Health

Situational Report

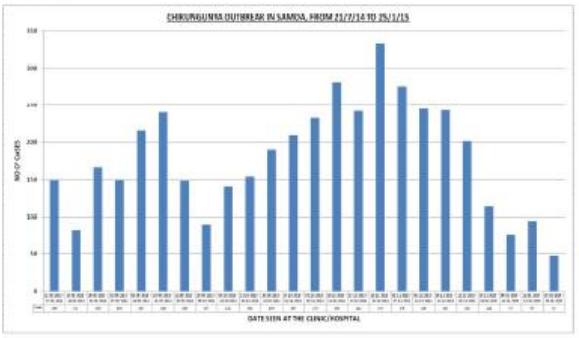
Issue 11 –30/01/15

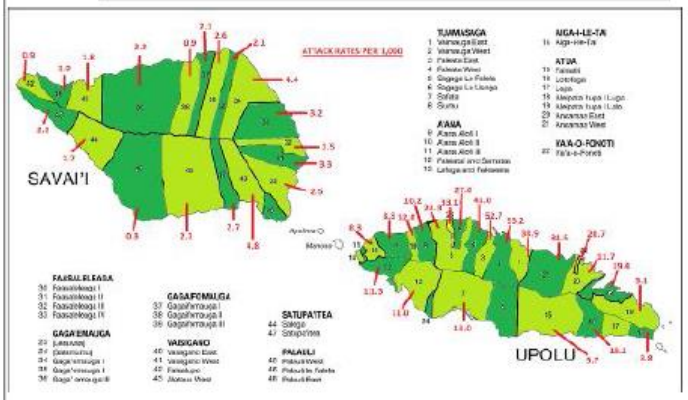
CHIKUNGUNYA OUTBREAK IN SAMOA

Over 27 weeks, we have seen a total of 4,431 cases (as of 25th January 2015). Attack rate of 23.6 per 1,000. 2.4% of Samoa's population have been infected (only those that present to the hospitals).

The case numbers continue to decline each week.

EPI-CURVE





CONTROL MEASURES

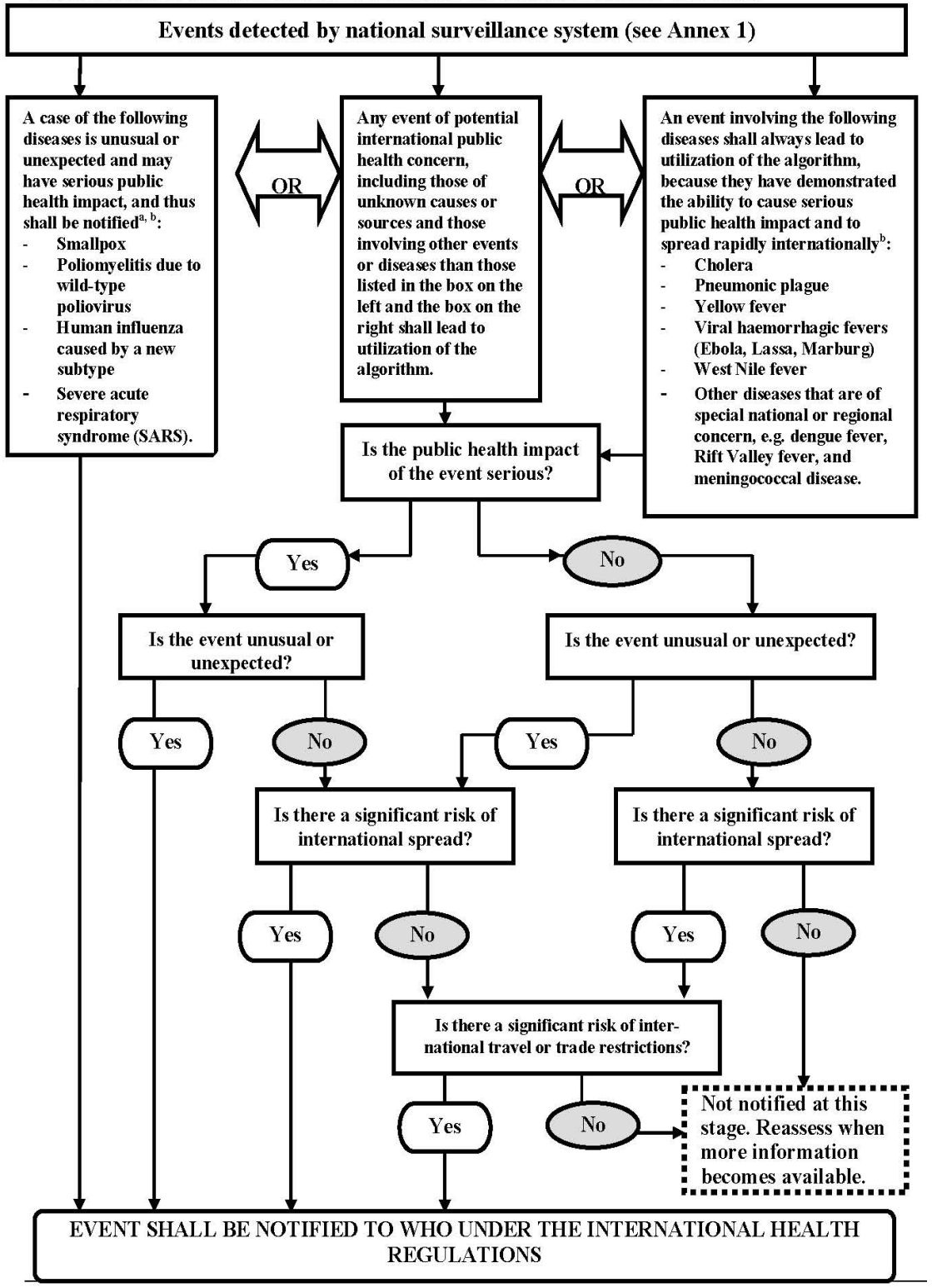
- Multi-media awareness programs e.g. television ads and targeted mass text messaging are continuing, with emphasis on source reduction
- Community mobilization on source reduction also continues
- Targeted peri-focal spraying will also resume shortly

Age group	Attack rate (per 1,000)
0-4	26.5
5-9	23.0
10-14	24.3
15-19	34.9
20-24	44.1
25-29	40.1
30-34	34.6
35-39	18.6
40-44	18.2
45-49	12.8
50-54	13.2
55-59	2.9
60-64	11.8
65-69	17.5
70-74	14.5
75+	11.6

Gender	No of cases
F	2454
M	1977
Grand Total	4431

Appendix 5

Decision Instrument for the Assessment and Notification of Events that may be a Public Health Emergency of International Concern



EXAMPLES FOR THE APPLICATION OF THE DECISION INSTRUMENT FOR THE ASSESSMENT AND NOTIFICATION OF EVENTS THAT MAY CONSTITUTE A PUBLIC HEALTH EMERGENCY OF INTERNATIONAL CONCERN

The examples appearing in this Annex are not binding and are for indicative guidance purposes to assist in the interpretation of the decision instrument criteria.

DOES THE EVENT MEET AT LEAST TWO OF THE FOLLOWING CRITERIA?

Is the public health impact of the event serious?	**I. Is the public health impact of the event serious?**
	1. *Is the number of cases and/or number of deaths for this type of event large for the given place, time or population?*
	2. *Has the event the potential to have a high public health impact?* THE FOLLOWING ARE EXAMPLES OF CIRCUMSTANCES THAT CONTRIBUTE TO HIGH PUBLIC HEALTH IMPACT: ✓ Event caused by a pathogen with high potential to cause epidemic (infectiousness of the agent, high case fatality, multiple transmission routes or healthy carrier). ✓ Indication of treatment failure (new or emerging antibiotic resistance, vaccine failure, antidote resistance or failure). ✓ Event represents a significant public health risk even if no or very few human cases have yet been identified. ✓ Cases reported among health staff. ✓ The population at risk is especially vulnerable (refugees, low level of immunisation, children, elderly, low immunity, undernourished, etc.). ✓ Concomitant factors that may hinder or delay the public health response (natural catastrophes, armed conflicts, unfavourable weather conditions, multiple foci in the State Party). ✓ Event in an area with high population density. ✓ Spread of toxic, infectious or otherwise hazardous materials that may be occurring naturally or otherwise that has contaminated or has the potential to contaminate a population and/or a large geographical area.
	3. *Is external assistance needed to detect, investigate, respond and control the current event, or prevent new cases?* THE FOLLOWING ARE EXAMPLES OF WHEN ASSISTANCE MAY BE REQUIRED: ✓ Inadequate human, financial, material or technical resources – in particular: – insufficient laboratory or epidemiological capacity to investigate the event (equipment, personnel, financial resources); – insufficient antidotes, drugs and/or vaccine and/or protective equipment, decontamination equipment, or supportive equipment to cover estimated needs; – existing surveillance system is inadequate to detect new cases in a timely manner.
	IS THE PUBLIC HEALTH IMPACT OF THE EVENT SERIOUS? Answer "yes" if you have answered "yes" to questions 1, 2 or 3 above.

Is the event unusual or unexpected?	**II. Is the event unusual or unexpected?**
	4. *Is the event unusual?* THE FOLLOWING ARE EXAMPLES OF UNUSUAL EVENTS: ✓ The event is caused by an unknown agent or the source, vehicle, route of transmission is unusual or unknown. ✓ Evolution of cases more severe than expected (including morbidity or case-fatality) or with unusual symptoms. ✓ Occurrence of the event itself unusual for the area, season or population.
	5. *Is the event unexpected from a public health perspective?* THE FOLLOWING ARE EXAMPLES OF UNEXPECTED EVENTS: ✓ Event caused by a disease/agent that had already been eliminated or eradicated from the State Party or not previously reported.
	IS THE EVENT UNUSUAL OR UNEXPECTED? Answer "yes" if you have answered "yes" to questions 4 or 5 above.

Is there a significant risk of international spread?	**III. Is there a significant risk of international spread?**
	6. *Is there evidence of an epidemiological link to similar events in other States?*
	7. *Is there any factor that should alert us to the potential for cross border movement of the agent, vehicle or host?* THE FOLLOWING ARE EXAMPLES OF CIRCUMSTANCES THAT MAY PREDISPOSE TO INTERNATIONAL SPREAD: ✓ Where there is evidence of local spread, an index case (or other linked cases) with a history within the previous month of: – international travel (or time equivalent to the incubation period if the pathogen is known); – participation in an international gathering (pilgrimage, sports event, conference, etc.); – close contact with an international traveler or a highly mobile population. ✓ Event caused by an environmental contamination that has the potential to spread across international borders. ✓ Event in an area of intense international traffic with limited capacity for sanitary control or environmental detection or decontamination.
	IS THERE A SIGNIFICANT RISK OF INTERNATIONAL SPREAD? **Answer "yes" if you have answered "yes" to questions 6 or 7 above.**

Risk of international restrictions?	
	IV. Is there a significant risk of international travel or trade restrictions?
	8. Have similar events in the past resulted in international restriction on trade and/or travel?
	9. Is the source suspected or known to be a food product, water or any other goods that might be contaminated that has been exported/imported to/from other States?
	10. Has the event occurred in association with an international gathering or in an area of intense international tourism?
	11. Has the event caused requests for more information by foreign officials or international media?
	IS THERE A SIGNIFICANT RISK OF INTERNATIONAL TRADE OR TRAVEL RESTRICTIONS? **Answer "yes" if you have answered "yes" to questions 8, 9, 10 or 11 above.**

States Parties that answer "yes" to the question whether the event meets any two of the four criteria (I-IV) above, shall notify WHO under Article 6 of the International Health Regulations.

Appendix 6

Principles of infection control

See also PPHSN Infection Prevention and Control Guidelines:

http://www.pphsn.net/activities/picnet/IC-Guidelines.htm

Standard precautions

(All body fluids, except sweat, are regarded as potentially infectious.)

Hand-washing

- Wash hands after touching blood, body fluids, secretions and contaminated items, whether or not gloves are worn.
- Wash hands immediately after gloves are removed, between patient contacts and when working on different areas of the same patient to prevent cross-contamination of different body sites.
- Use a plain (non-antimicrobial) soap for routine hand washing.

Gloves

- Wear gloves (clean, non-sterile) when touching blood, body fluids, secretions, excretions, contaminated items, mucous membranes and non-intact skin. Change gloves between tasks on the same patient after contact with material that may have a high concentration of micro-organisms. Remove gloves promptly after use without touching non-contaminated surfaces and before going to another patient and wash hands immediately.

Mask

- Wear mask during procedures that are likely to create splashes or sprays of blood, body fluids, secretions and excretions.

Gown (or plastic apron)

- Wear a gown (clean, non-sterile) or plastic apron during procedures that are likely to create splashes or sprays of blood, body fluids, secretions and excretions. Remove as promptly as possible and wash hands immediately.

Patient-care equipment

- If equipment is soiled with blood, body fluids, secretions or excretions, prevent skin and mucous membrane exposures, contamination of clothing, and transfer of micro-organisms to other patients and environments. Ensure that reusable equipment is not used for the care of another patient until it has been cleaned or disinfected. Ensure that single-use items are discarded properly and not reused.

Environmental control

- Simple cleaning of environmental surfaces is sufficient unless there has been significant soiling by potentially infectious body fluids. If this is the case, disinfection is required.

Linen

- When soiled with blood, body fluids, secretions and excretions, handle, transport and process in a

method that prevents skin and mucous membrane exposure and contamination of clothing, so that transfer of micro-organisms to other patients and environments is prevented.

Occupational health and blood-borne infectious diseases

- Take care to prevent injuries when using needles, scalpels and other sharp instruments or devices; when handling sharp instruments after procedures; when cleaning used instruments; and when disposing of used needles. Never recap used needles, or use any other technique that involves directing the point of the needles from disposable syringes by hand, and do not bend, break or otherwise manipulate used needles by hand. Place used disposable syringes and needles, scalpel blades, and other sharp items in appropriate puncture-resistant containers, which should be located as close as practical to the area where the items are used.
- Use mouthpieces, resuscitation bags or other ventilation devices as an alternative to mouth-to-mouth resuscitation methods where the need for resuscitation is expected.

Contact precautions

Use with standard precautions.

Patient placement

- Place the patient in private room. When a private room is not available, place the patient in a room with a patient(s) who has active infection with the same micro-organism but with no other infection.

Gloves and hand-washing

- Wear gloves when entering the room. Change gloves after having contact with infectious material that may contain high concentrations of micro-organisms (faecal material and wound drainage). Remove gloves before leaving the patient's environment and wash hands immediately with an antimicrobial soap or waterless antiseptic. Afterwards ensure that hands do not touch potentially contaminated environments, to avoid transfer of micro-organisms to other patients or environments.

Gown (or plastic apron)

- Wear a gown (or plastic apron) (a clean, non-sterile gown is sufficient) on entering the room, when you anticipate that your clothing will have substantial contact with the patient or environment. Remove the gown before leaving the patient's environment. After removal, ensure that clothing does not contact potentially contaminated surfaces.

Patient transport

- Limit the movement and transport of the patient from the room to essential purposes and prevent soiling of the environment.

Patient-care equipment

- When possible, dedicate the use of non-critical patient-care equipment to a single patient (or cohort with the same infection). If equipment is shared, thoroughly clean and disinfect it.

Droplet precautions

Use with standard precautions.

Patient placement

- Ideally, place the patient in a private room. Keep the room doors closed and the patient in the room. When a private room is not available, place the patient in a room with patients who have active infection with the same micro-organism, but with no other infection.

Respiratory protection

- A person who is not immune should not enter the room of patients known or suspected to have the disease, if other immune caregivers (staff who have been vaccinated against the disease) are available. A standard surgical/medical mask should be worn.

Patient transport

- Limit the movement and transport of the patient from the room to essential purposes only and place a mask on the patient during transport.

Airborne precautions

Use with standard precautions.

Patient placement

- Place the patient in a negative-pressure isolation room. If no negative-pressure room is available, a private room with good external ventilation (open windows) may be used; keep people away from the window.
- Keep the room doors closed and the patient in the room.
- When a private room is not available, place the patient in a room with patients who have active infection with the same micro-organism, but with no other infection (this should be considered a last resort).

Respiratory protection

- For measles and varicella (chickenpox): A susceptible person should not enter the room of patients known or suspected to have the disease. Patient should be cared for by immune caregivers (staff who have been vaccinated against the disease or previously infected) available. Any susceptible persons who must enter the room should wear a correctly-worn mask at all times (for example P2 or N95).
- For tuberculosis: All staff members, visitors or caregivers who must enter the room should wear a correctly-worn mask at all times (for example P2 or N95).

Patient transport:

- Limit the movement and transport of the patient from the room to essential purposes only and then place an appropriate mask (for example P2 or N95 mask) on the patient.

Appendix 7

Information for patients and family

Use this advice for patients and family to prevent disease and stop transmission in the household and neighbourhood.

Food-borne disease

1. **Keep clean**
   - Wash your hands before handling food and often during food preparation
   - Wash your hands after going to the toilet
   - Wash and clean all surfaces and equipment used for food preparation
   - Protect kitchen areas and food from insects, pets and other animals

2. **Separate raw and cooked**
   - Separate raw meat, poultry and seafood from other foods
   - Use separate equipment and utensils such as knives and cutting boards for handling raw foods
   - Store food in containers to avoid contact between raw and prepared foods

3. **Cook thoroughly**
   - Cook food thoroughly, especially meat, poultry, eggs and seafood
   - Bring foods like soups and stews to boiling to make sure that they have reached 70^{o}C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer.
   - Reheat cooked food thoroughly

4. **Keep food at safe temperatures**
   - Do not leave cooked food at room temperature for more than 2 hours
   - Refrigerate promptly all cooked and perishable food (preferably below 5^{o}C)
   - Keep cooked food piping hot (more than 60^{o}C) prior to serving
   - Do not store food too long, even in the refrigerator
   - Do not thaw frozen food at room temperature

5. **Use safe water and raw materials**
   - Use safe water or treat it to make it safe
   - Select fresh and wholesome foods
   - Choose foods processed for safety, such as pasteurised milk
   - Wash fruits and vegetables, especially if eaten raw
   - Do not use food beyond its expiry date

See Figure 4: WHO poster on next page

http://www.who.int/foodsafety/publications/consumer/5keys/en/

Five keys to safer food

Keep clean

- Wash your hands before handling food and often during food preparation
- Wash your hands after going to the toilet
- Wash and sanitize all surfaces and equipment used for food preparation
- Protect kitchen areas and food from insects, pests and other animals

Why?

While most microorganisms do not cause disease, dangerous microorganisms are widely found in soil, water, animals and people. These microorganisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause foodborne diseases.

Separate raw and cooked

- Separate raw meat, poultry and seafood from other foods
- Use separate equipment and utensils such as knives and cutting boards for handling raw foods
- Store food in containers to avoid contact between raw and prepared foods

Why?

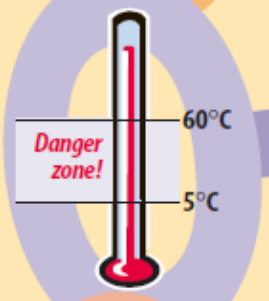
Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous microorganisms which may be transferred onto other foods during food preparation and storage.

Cook thoroughly

- Cook food thoroughly, especially meat, poultry, eggs and seafood
- Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer
- Reheat cooked food thoroughly

Why?

Proper cooking kills almost all dangerous microorganisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.



Keep food at safe temperatures

- Do not leave cooked food at room temperature for more than 2 hours
- Refrigerate promptly all cooked and perishable food (preferably below 5°C)
- Keep cooked food piping hot (more than 60°C) prior to serving
- Do not store food too long even in the refrigerator
- Do not thaw frozen food at room temperature

Why?

Microorganisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of microorganisms is slowed down or stopped. Some dangerous microorganisms still grow below 5°C.

Use safe water and raw materials

- Use safe water or treat it to make it safe
- Select fresh and wholesome foods
- Choose foods processed for safety, such as pasteurized milk
- Wash fruits and vegetables, especially if eaten raw
- Do not use food beyond its expiry date

Why?

Raw materials, including water and ice, may be contaminated with dangerous microorganisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Care in selection of raw materials and simple measures such as washing and peeling may reduce the risk.

Food Safety
World Health Organization

Knowledge = Prevention

Mosquito-borne disease

1. **Get rid of mosquito breeding sites.** This should be done at home, at work, at school, at clinics and hospitals, and at neighbours and relatives' homes if they cannot do it themselves (e.g. elderly people). Mosquito breeding sites are any containers that water can sit in for more than a couple of days. This includes: tyres, dishes left outdoors, coconut shells, buckets and drums used to collect rainwater and roof gutters. Some mosquitoes that transmit dengue, chikungunya and Zika are found inside houses so it is important to remove or cover any water sources such as pot plant saucers or water tanks as well.

2. **Avoid mosquito bites.** This can be done using mosquito repellent sprays, door and window screens, mosquito bed nets (especially for people who sleep during daytime like infants, night workers, and sick people) and fans. It is very important that anyone who has an infection passed on by mosquitoes is nursed under a bed net until they are no longer infectious – to stop new mosquitoes biting them and passing the infection on to other people

3. **Consult a doctor** if you or someone you know develops the symptoms of an illness like dengue, malaria or chikungunya (fever, muscle and joint pains, headaches). And don't take any aspirin-based medicine until you get seen at the clinic. If the health service can detect an outbreak of infection early, they will take extra steps to control the mosquito, so that we can stop other people getting the infection.

Appendix 8

Glossary

Acute

Starting suddenly. Opposite of 'chronic'.

Analytic epidemiology

Used to help identify the cause of an outbreak. Typically involves undertaking a study to test hypotheses developed using descriptive epidemiology.

Carrier (carriage)

A carrier is a person who shows no symptoms of disease but is able to infect others. Carriage is the condition of being a carrier.

Case definition

The signs and symptoms that are typical of a disease or condition, and help you decide who has that disease or condition and who does not.

Cluster

A group of patients with the same disease or condition, in the same time and place. The number of patients that make up a cluster depends on the disease.

Complication

A severe result of a disease.

Confirmatory testing

Laboratory testing, usually done at a '*reference laboratory'*, that proves the cause of the disease.

Conjunctivitis

Redness of the white part of the eye.

Contact

A person who has been exposed to an infectious case patient during the period when that case was infectious.

Culture

A test to grow the infectious micro-organism in the laboratory.

Demographics

The characteristics of a population. In epidemiology, this usually includes age, sex, place of residence etc.

Descriptive epidemiology

The process of systematically describing a health problem. In the setting of an outbreak investigation it involves describing person, place, time and clinical features. Descriptive epidemiology provides information to allow development of hypotheses to test using analytical epidemiology.

Differential diagnosis

A list of diseases that may cause similar signs and symptoms.

Disinfection

Using a cleaning method that kills infectious diseases. This includes disinfectants and autoclaving (steam disinfection).

Empirical treatment

Treatment given while waiting for test results to confirm the diagnosis, because a delay in treatment could harm the patient or others.

Endemic

A disease is said to be 'endemic' if it is normally expected to be found, in a particular group of people in a particular place at a particular time.

Epidemic (same as outbreak)

An increase in cases of a disease in a particular group of people at a particular place at a particular time, beyond what would normally be expected. A single case can be an epidemic if the disease is not normally found in the population.

Event-based surveillance

Surveillance for diseases by looking for or hearing about unusual events in the community (like unexplained deaths in one village) rather than counting cases of particular diseases at a health-care facility.

Faecal-oral transmission

Spread of a disease by tiny amounts of infected stool getting swallowed by another person, for example through food, water, or hands that are contaminated after a patient goes to the bathroom.

Fast breathing

1–2 months old	60 or more breaths/minute
2–12 months	50 or more breaths/minute
1 to 5 years	40 or more breaths/minute
6 to 12 years	30 or more breaths/minute
13 years to adult	20 or more breaths/minute

Fever

A temperature of 38 °C/100.4°F or higher. If no thermometer is available, fever or chills reported by the patient is also acceptable (however it is important to differentiate self-reported fever from feeling hot because of the weather).

Guillain-Barre syndrome

An *acute* neurologic (nerve-related) disorder in which patients experience numbness, tingling or pain and paralysis, usually starting at the ends of the arms and legs and working its way up.

Hypothesis generation

The process of thinking about what the cause of the outbreak might be. An hypothesis is an educated 'guess'.

IgM (IgM antibodies)

Antibodies that show that a patient has been infected relatively recently.

Immune/immunity

Being immune means that someone will not get an infection, even though they have been exposed to the micro-organism that causes the infection. Immunity comes in different ways for different

diseases, usually because you have received an immunisation or you have previously had the same infection (the opposite of '*susceptible'*).

Immunofluorescence microscopy

A laboratory technique in which a microscope is used to look at laboratory samples for that have been stained with certain dyes that light up when an infectious disease is present in the sample.

Incidence

The number of *new* cases of disease over a period of time in a certain place (different from '*prevalence*').

Incubation period

The period of time between exposure to infection and the beginning of symptoms.

Index case

The first case in a family or other defined group, e.g. village, to come to the attention of an investigator.

Infectious cause

Any cause of infection, e.g. virus, bacteria, fungus, protozoan or worm.

Infectious disease (communicable disease)

An illness caused by the spread of micro-organisms (bacteria, viruses, fungi or parasites) to humans from other humans, animals or the environment, including food and water.

Latent infection

An infection that is already present in a person, and capable of emerging or developing, but not now visible or symptomatic, e.g. many people have latent tuberculosis.

Linked by person, place and time

Multiple cases are linked by person, place and time when all of the following criteria are met:

- The patients had something in common with each other prior to the beginning of illness. For example they may have had direct contact (for example by touching or being in the same room) or had the same exposure (for example they ate the same food).
- The patients were in the same place (which can be defined very narrowly or broadly, depending on the situation) during the expected time of infection.
- The timing of the multiple patients' exposure (or disease) is close enough to one another to be believably related. The exact length of time that is 'close enough' will depend on the situation.

Lymphadenopathy

Enlargement of the lymph nodes.

Maculopapular

Skin rash where there is colour change (macule) which is raised (papule) above the normal surface of the skin, without blisters (different from '*vesicular'*).

Micro-organisms

The causes of infectious diseases; usually bacteria, viruses, fungi, protozoa or parasites.

Nasopharynx (nasopharyngeal)

The nasopharynx is the part of your body where your nasal passages meet your throat. It is reached through the nose when collecting nasopharyngeal swabs.

Outbreak (same as epidemic)

An increase in cases of a disease in a particular group of people at a particular place at a particular time, beyond what would normally be expected. A single case can be an epidemic if the disease is not normally found in the population.

Paired sample/sera

Two specimens of blood collected from the same person two weeks apart. Tests can be performed to see if there is a rise in antibodies to a particular infectious disease. This can help confirm the diagnosis if there is no rapid test or '*polymerase chain reaction (PCR)*' test available.

Pandemic

An epidemic or outbreak that has spread across a large region, such as multiple continents or even worldwide.

Period of infectiousness

Time in which an infected person can spread an infection to another person.

Petechiae (petechial)

Tiny red or purple blood spots on the skin that do not blanch (lighten in colour) under pressure.

Polymerase chain reaction (PCR)

A laboratory technique in which a patient's sample is analysed by looking for DNA or RNA from an infectious disease.

Prevalence

The total number of cases of disease at any given point in time in a certain place (different from '*incidence*')

Primary case

The individual who introduces the infectious disease into the family or group under study

Prophylaxis

Treatment of a patient who may have been exposed to an infectious disease but has not yet developed any symptoms, to prevent them from getting sick.

Purpura (Purpuric)

Red or purple spots that do not lighten under pressure. Larger than '*petechiae'*.

Reference laboratory

A laboratory that has the tools and skills needed to prove the diagnosis of an infectious disease. The PPHSN LabNet group has developed a catalogue of the reference laboratories for individual countries:

http://www.pphsn.net/Services/LabNet/intro.htm

Reservoir

The place in nature that an infectious disease comes from

Rule out

To decide that a certain infectious disease is *not* the cause of disease in a patient

Secondary cases

People infected by a '*primary case*'

Septicaemia

Bacterial blood poisoning

Serologic testing

Refers to the diagnostic identification of antibodies in the serum of a case that are formed in response to an infection (against a specific micro-organism). These tests are usually performed as '*paired samples*'. If you are unsure about whether to order serologic testing for a particular disease, contact a laboratory specialist from PPHSN LabNet.

Serotype

A group of bacteria or viruses classified together

Social distancing

Strategies to reduce the spread of some infectious diseases: keeping at least an arm's length distance from others and minimising gatherings

Susceptible

When a person is able to get sick from exposure to an infectious disease (the opposite of '*immune*')

Surveillance

The regular and systematic collection of information about the amount of disease in the community so that you can take action to control it

Syndromic

Diagnosis based on a group of symptoms (like fever and cough) rather than a specific infection (like influenza)

Threshold

The minimum number of cases of disease, above which you need to take action. For example, if there are normally 5–8 cases of a disease in one week, you may set a threshold of 10 or 20 cases to be the number which triggers an investigation. The threshold will be different for different diseases, and the threshold may be different in different places for the same disease.

Transmission

Refers to how an infection is transferred or spread in a community. Infectious diseases can spread in different of ways: through the air; from direct or indirect contact with another person, soiled objects, skin or mucous membrane, saliva, urine, blood and body secretions; through sexual contact; and through contaminated food and water.

Vesicular

A rash that has (usually clear) fluid-filled blisters

Viral transport medium (VTM)

A yellowish or pinkish liquid, usually in small tubes, used by the laboratory to preserve viruses so that they can be shipped to a reference laboratory

Appendix 9

Sample outbreak investigation summary form

This type of form could be used to summarise information from a health clinic or a community member to report to the public health team. It is not intended to replace a line list or a situation report.

Today's date:			Name of person completing form:					
Information on person reporting disease outbreak or event								
Last name:			First name:					
Address:								
Organisation/affiliation:								
Contact details:	Telephone (day):					Telephone (after hrs):		
Information on disease outbreak/event								
Name of village/locality:			Name of district/region:					
Description of the outbreak/event: (Describe the illness, how it was discovered, who is affected, outbreak increasing or declining, severity and duration of illness, birds or animals if involved)								
Main symptoms experienced by people affected: (Circle)								
Fever	Y	N	Diarrhoea (no blood)	Y	N	Cough	Y	N
Rash	Y	N	Diarrhoea (blood)	Y	N	Sputum (no blood)	Y	N
Headache	Y	N	Vomiting	Y	N	Sputum (blood)	Y	N
Muscle/joint pain	Y	N	Nausea	Y	N	Fast breathing	Y	N
Haemorrhage	Y	N	Jaundice	Y	N	Paralysis	Y	N
Fits	Y	N	Loss of consciousness	Y	N	Lethargy	Y	N
Other symptoms:								
Possible syndrome:								
Number of human cases suspected:	Adults:					Children:		
Date of first suspected case:			Date of most recent case:					
What do you think is causing the outbreak and why?								

The Pacific Public Health Surveillance Network

The Pacific Public Health Surveillance Network (PPHSN) is a voluntary network of countries and organisations dedicated to the promotion of public health surveillance and appropriate response to the health challenges of 22 Pacific Island countries and territories. Its first priorities are communicable diseases, especially the outbreak-prone ones. The network includes five services with specific operational targets:

1) the Pacific Syndromic Surveillance System for outbreak detection;
2) PacNet, the early warning system for the timely exchange of alerts and information on outbreak-prone diseases and overall communication;
3) LabNet, the three-tier network of public health laboratories for the verification and identification of pathogens;
4) EpiNet, the national and regional response teams for preparedness, response and capacity-building, and
5) PICNet, the regional network for infection control.

The goal of PPHSN is to improve public health surveillance and response in the Pacific Islands in a sustainable way.

It was created in 1996 under the joint auspices of the Pacific community and the World Health Organization.

To learn more visit the PPHSN website: www.pphsn.net