GUIDELINES FOR CLINICAL AND PUBLIC HEALTH MANAGEMENT OF MELIOIDOSIS IN PAHANG
STATEMENT OF INTENT

This guideline is meant to be a guide for clinical and public health practice, based on the best available evidence at the time of development. Adherence to this guideline may not necessarily guarantee the best outcome in every case. Every health care provider is responsible for the management of his/her patient based on the clinical picture presented by the patient and the management options available locally.

REVIEW OF THE GUIDELINE

This guideline is to be reviewed after 3 years or sooner if new evidence becomes available.

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12th Floor, Wisma Persekutuan
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Pahang
Melioidosis is a rarely reported disease. It is endemic in tropical Australia and South East Asia countries. In Malaysia, although melioidosis cases have been reported, the actual disease burden is unknown since it is not notifiable under the Prevention and Control of Communicable Diseases Act 1988 (Act 342).

Melioidosis is endemic in Pahang. A study done in 2003 showed that the incidence rate was 6.1 per 100,000 population. In July 2010, an outbreak of melioidosis and leptospirosis co-infection was reported among people who were involved in the search and rescue operation of a drowning victim at Lubuk Yu, Maran recreational area, which resulted in eight fatalities. In view of the fact that this melioidosis is endemic in Pahang and also carries a high mortality rate, a standard and uniform guideline is essential to serve as a guide for healthcare personnel managing the disease.

The Pahang State Health Department with the cooperation of the Kulliyah of Medicine, International Islamic University Malaysia has taken the initiative to produce a comprehensive guideline which is applicable to both clinical and public health management of melioidosis. This document was prepared with contributions from a multidisciplinary group of healthcare professionals from the two departments above. I would like to express my gratitude to all of them for their commendable effort and their sincere commitment in developing this guideline. I would also like to thank all the reviewers who have given their opinion and feedback based on their expertise and experience for the improvement of this guideline.

As with other diseases, I believe there would be new evidence and development regarding melioidosis in future; hence, any constructive comments and feedback from the experts and implementers from at all levels are deeply appreciated in order to further improve this guideline.

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GUIDELINE DEVELOPMENT AND OBJECTIVES

Melioidosis is a rarely reported disease. Therefore not many clinical trials were done and very few systemic reviews are available. There are many articles on the management of melioidosis with various treatment strategies but limited guidelines regarding public health measures. Since the disease is endemic in Pahang and carries high mortality among people with co-morbidities such as diabetes mellitus, a standard and uniform guideline is timely needed.

We reviewed all articles on clinical trials, one database systemic review (Cochrane), case series, expert opinions, author’s recommendation, published and unpublished Pahang melioidosis registry data, recent data on Lubuk Yu melioidosis outbreak in July 2010, discussion among health professionals who were involved in Lubuk Yu outbreak, interviews of patients and their family members. We only review English articles due to difficulty in finding melioidosis articles in other languages. There is no methodology in the selection process to decide which articles is the best during the development of this guideline.

The guideline development task force consisted of two general physicians, a chest physician, an infectious disease paediatrician, a clinical microbiologist, a family medicine specialist, five public health physicians and an environmental health officer.

Objectives
The objectives of the guideline are:

1. To create awareness on melioidosis among healthcare personnel in Pahang. The health professionals include doctors (public and private), microbiologist, science officers (microbiology and biochemist), EHOs, nurses, assistant medical officers, AEHOs and medical laboratory technologist.
2. To guide medical personnel in the diagnosis and treatment of melioidosis in order to reduce its mortality rate particularly in Pahang. The target is 20% reduction by 2015.
3. To guide public health personnel on the prevention and control measures of melioidosis outbreak.
4. To establish a proper and comprehensive database in order to determine the burden of melioidosis in Pahang.
HEALTH QUESTIONS

i. Melioidosis is common in Pahang and mortality remain high, why?
ii. Presentations can mimic other infections and the diagnosis may be missed
iii. Early diagnosis is important for early treatment and to reduce mortality
iv. How to confirm the diagnosis? What tests are available?
v. There are many antibiotic regimes which need to be standardised
vi. Which antibiotics to be used in Pahang?
vii. In view of high relapse rate, what is the best antibiotic and duration to be used during intensive and eradication phase
viii. Leptospirosis and Scrub typhus are common in Pahang and patient may be co-infected. What should be done?
ix. Is there a role of prophylactic antibiotic?
x. Is there any vaccine available?
xi. For how long and what need to be done during follow up?
xii. Melioidosis outbreak is rare. What are the public health actions?
xiii. What is the case definition?
xiv. The importance of melioidosis surveillance.

TARGET POPULATION

This guideline is applicable in the management of melioidosis in children, adolescents and adults.

TARGET GROUP

This guideline is meant for all health care professionals involved in managing patients with melioidosis and undertaking control and preventive measures which includes: medical officers, general practitioners, family medicine specialists, general physicians, paediatricians, pharmacists, public health physician, EHO, AEHO, nurses and assistant medical officers.

TRAINING

All health care personnel in Pahang will be given training on this guideline.
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1.0 INTRODUCTION

Melioidosis is caused by the gram-negative bacillus, *Burkholderia pseudomallei*. It is one of the common infections in Pahang state, and data from the Pahang melioidosis registry indicate that this infection is endemic in rural and FELDA settlements in Pahang and Terengganu\(^1\).

The clinical presentation is variable. It includes severe community-acquired pneumonia, septicaemia, abscess or abscesses in various organs, septic arthritis and skin lesions\(^2\). The gold standard of diagnosis is bacteriological culture. The overall mortality from this infection remains extremely high despite recent advancement in its treatment\(^1,2,3\).

There was an outbreak of melioidosis and leptospirosis co-infection in Lubuk Yu, Maran, Pahang in July 2010 resulting in eight fatalities. All of them were diabetics.

2.0 EPIDEMIOLOGY OF MELIOIDOSIS

Melioidosis is endemic in Malaysia\(^1,3\) Thailand\(^4\), Singapore\(^5\) and Australia\(^6\). A recent study in Pahang has shown the incidence of this infection is comparable with that in northern Thailand\(^4\) which is 6.1 per 100,000 populations per year\(^1\).

Melioidosis is a disease involving all age groups but commonly occurs in people between the ages of 40 to 60 years\(^1\) and is related to farming. The two commonest modes of transmission are inhalation of contaminated dust (this explains an increased number of melioidosis cases during the rainy season\(^1,4,6\)) and direct entry of the organism into the blood stream via very minor wounds or skin abrasions. In Malaysia and Singapore, melioidosis commonly occurs in patients with diabetes mellitus (57-74\% of cases)\(^1,3,5\).

Mortality due to melioidosis is extremely high especially in the bacteraemic form. The overall mortality of bacteraemic melioidosis approaches 100\% if untreated, but can be reduced to 37-54\% with optimal management and aggressive intensive care. Localised
Melioidosis has a much lower mortality rate (4-5%). In Pahang, the overall mortality rate was 54% compared to 19% in Australia\textsuperscript{1,6}. This is probably due to a higher prevalence of the bacteraemic form in Pahang (92% vs. 46% in Australia\textsuperscript{1,6}) as well as lack of awareness among doctors regarding the appropriate treatment of melioidosis (only 52% of culture-confirmed cases in that study received appropriate antibiotic)\textsuperscript{1}.

3.0 MODES OF TRANSMISSION

Infection is acquired from:

i. Inhalation of contaminated dust particles\textsuperscript{1,3,4,6}
ii. Direct contact with contaminated soil and water through penetrating wounds, existing skin abrasions, burns\textsuperscript{3,4,7}
iii. Aspiration of contaminated water\textsuperscript{4,8}
iv. Ingestion of contaminated water\textsuperscript{3}.

4.0 HIGH RISK GROUPS

It has been recognised that \textit{B.pseudomallei} behaves as an opportunistic pathogen. Exposure to the organism is widespread yet disease is not that common, occurring predominantly in those with underlying predisposing conditions suggesting that susceptibility of the host is an important factor.

Among the predisposing conditions or diseases include:

i. Diabetes mellitus (the most common predisposing factor whereby more than 74% of patients with melioidosis in Malaysia were diabetic)\textsuperscript{1,3}
ii. Chronic lung disease, chronic renal failure, liver disease\textsuperscript{1,3}
iii. Other conditions that cause immune suppression i.e. corticosteroid therapy, Thalassemia, Human Immunodeficiency (HIV) infection, Systemic Lupus Erythematosus, malignancy, alcoholism\textsuperscript{1,3}

Some occupational groups are at a higher risk to contract the disease, for example workers in the agricultural sectors\textsuperscript{1}. 

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5.0 CLINICAL PRESENTATIONS

The incubation period is usually 1-21 days (mean of 9 days) but can be as long as months and even years. Latent intervals as long as 62 years have been reported in natural melioidosis. Asymptomatic infection is also common as evidenced by positive serology in up to 50% of healthy adults in endemic countries.

There is a wide range of clinical presentation. It may present acutely with rapid progression and death, or run a chronic and relapsing course.

Pneumonia: Pneumonia is the commonest presentation with or without multiple abscesses namely in the liver, spleen and prostate. Pneumonia, multiple organ involvement and septicaemia of unknown origin have been associated with higher mortality. Reported data revealed 20% and 7% of pneumonia cases in Thailand and Singapore respectively were due to melioidosis, while a study in Hospital Tengku Ampuan Afzan Kuantan, community acquired pneumonia attributed to melioidosis was seen in 13% of the cases.

Septicaemia: Overwhelming sepsis is a serious presentation. There will probably be evidence of a primary local inflammation corresponding to the route of infection (e.g. most likely pneumonia, skin or soft tissue infection is also possible). Metastatic foci of infection are established rapidly during bacteraemia, particularly in the lungs (multifocal pneumonia, which may cavitate), liver, spleen and kidneys (multiple abscesses), skin and soft tissues (cellulitis, pustules), bones and joints, lymph nodes and prostate, although any site may be affected.

Pyrexia of unknown origin: The fever is usually high-grade and swinging. Bacteraemia may be present intermittently, and deep-seated visceral abscesses (especially in the liver, spleen, kidney and prostate) should be diligently sought.

Musculoskeletal melioidosis: Musculoskeletal involvement including septic arthritis is also a common presentation. Septic arthritis and occult abscesses could also occur anytime during the course of treatment.
Rare presentations such as pyopericardium, mycotic aneurysm, psoas abscess and periorbital cellulitis\textsuperscript{3,6,14} have also been reported.

For summary of melioidosis clinical presentations in adult, please refer to Appendix 1.

5.1 WHEN TO SUSPECT ACUTE MELIODOISIS

i. A patient residing and/or working in an endemic area (e.g. Jengka, Maran, and Jerantut) and other sporadic areas in Kuantan, Temerloh, Lipis, Rompin, Pekan and FELDA settlements.

ii. A patient with diabetes mellitus.

iii. A patient with a high-grade fever - either acute or prolonged.

iv. History of exposure to contaminated environment (dust, soil or water).

v. Progressive pneumonia (CXR deteriorating within a few hours or 2-3 days) not responding to commonly-used antibiotics. The involvement of the lung carries a mortality rate of more than 50%.

vi. The presence of hepatomegaly and/or splenomegaly – suggestive of multiple abscesses. If clinically there is no evidence of hepatosplenomegaly, an abdominal ultrasound should be done to confirm or exclude abscesses.

5.2 WARNING SIGNS:

- Acute high-grade fever
- Systemic symptoms (nausea, poor appetite, lethargic),
- Symptoms of pneumonia such as cough, either productive or non-productive.
- Difficulty in breathing

Are important symptoms and it is an indication of severe disease where patient may deteriorate progressively especially in diabetic patient. These cases should be discussed with physician.
5.3 CLINICAL PRESENTATIONS IN CHILDREN

Co-morbidity is less common in children with melioidosis. Predisposing illnesses were reported in 10% to 20% of the infected children\textsuperscript{15,16,17}. Diabetes mellitus, hematologic malignancies, aplastic anaemia, thalassaemia, chronic renal failure, nephrotic syndrome, rheumatic heart disease and hepatitis A were the reported underlying diseases found in children with melioidosis\textsuperscript{16,17}.

Similar to adults, infected children may present as an acute septicaemia with foci of infection in the lungs (most common), liver, spleen or other organs. Rapid progressions into shock and high mortality rate have been frequently reported in children with melioidosis septicaemia.\textsuperscript{18,19,20,21} A study on paediatric melioidosis in Pahang showed septic shock occurring in 38.4% of the septicaemic children. All was associated with pneumonia, and the mortality rate was 80%\textsuperscript{15}.

Localised infection (without septicaemia) is common in childhood melioidosis, especially involving the head and neck region\textsuperscript{15}. In Thailand, 40% of the localised melioidosis were due to unilateral suppurative parotitis\textsuperscript{19,22}. The parotid abscess may spread to contiguous structures causing facial nerve paralysis, periorbital cellulitis and conjunctivitis. Pus discharging from the Stensen’s duct and ear may be seen. Other localised melioidosis reported in children are soft tissue abscesses, septic arthritis, osteomyelitis and pyomyositis\textsuperscript{17}.

Pharyngocervical melioidosis presents with clinical manifestations similar to upper respiratory tract infections caused by other infective agents. Fever and sore throat are the common features with or without cervical lymphadenopathy. Definitive diagnosis requires culture confirmation from throat or pus swabs\textsuperscript{23}. Septicaemia and disseminated infection occur rarely in localised melioidosis\textsuperscript{24}. In contrast to disseminated and septicaemic melioidosis, the prognosis for localised infection is generally good in children\textsuperscript{25}.

For summary of melioidosis clinical presentations in children, please refer to Appendix 2.
6.0 INVESTIGATIONS

6.1 RADIOLOGICAL INVESTIGATIONS

i. Chest X-ray
ii. USG abdomen
iii. CT Scan where indicated such as for cerebral abscess. For the purpose of the registry and research, it is required that an abdominal CT scan be done to diagnose prostatic abscess.

6.2 LABORATORY INVESTIGATIONS

i. Routine tests: FBC, UFEME, renal and liver functions, blood sugar
ii. Blood cultures 2X (at 2 different sites at the same time before antibiotic given)
iii. Urine culture
iv. Cultures from abscess, joint aspirate, CSF, sputum or throat swab where indicated.
v. PCR for blood, body secretion and urine may also be indicated.

In the event of an outbreak, please follow the algorithm for laboratory investigations during outbreak as in Appendix 3.

6.3 COLLECTION AND TRANSPORTATION OF SAMPLE FOR DIAGNOSIS OF MELIOIDOSIS

6.3.1 CULTURE (to follow proper aseptic technique procedure)

<table>
<thead>
<tr>
<th>SPECIMEN</th>
<th>CONTAINER</th>
<th>VOLUME</th>
<th>REMARK</th>
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</table>
| Blood                     | Blood culture bottle    | 8-10ml for adult 1-3ml for | • Send to laboratory immediately  
|                           |                         | paediatric                 | • Do not refrigerate  
|                           |                         |                            | • Mandatory for all suspected melioidosis                             |
| Respiratory samples e.g. | Sterile container       | Not applicable             | • Send to laboratory immediately  
<p>| sputum                    |                         |                            | • In case of delay, keep at 4-8°C and send within 24 hours             |</p>
<table>
<thead>
<tr>
<th>Specimen</th>
<th>Container</th>
<th>Volume</th>
<th>Remark</th>
</tr>
</thead>
</table>
| Pus      | Sterile container | 3ml    | • Send to laboratory immediately  
|          |            |        | • Do not refrigerate |
| Tissue   | Sterile container | Not applicable | • Send to laboratory immediately  
|          |            |        | • Do not refrigerate  
|          |            |        | • Do not add formalin |
| Wound swab | Stuart or Amies Transport Media | Not applicable | • Send to laboratory immediately  
|          |            |        | • Do not refrigerate |
| Urine    | Sterile container/boric acid container | 25ml for boric acid container For paediatric patient and adult that cannot produce 25ml of urine, use sterile container | • Send to laboratory immediately  
|          |            |        | • In case of delay, refrigerate at 4-8°C if using sterile container. Specimens containing boric acid do not need to be refrigerated |
| CSF      | Sterile container | 3-5 ml | • Send to laboratory immediately  
|          |            |        | • Do not refrigerate |

Note: All culture specimen of suspected melioidosis case from district hospital must be sent to HoSHAS or HTAA.

6.3.2 SEROLOGY- IFAT Titre (IgM antibody)

<table>
<thead>
<tr>
<th>Specimen</th>
<th>Container</th>
<th>Volume</th>
<th>Remark</th>
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| Blood    | Plain bottle | 3 – 5 ml for adult 1-3 ml for paediatric | -Send to laboratory immediately  
|          |            |        | - In the lab, specimen must be centrifuged at 3500 rpm for 5 minute. Then, transfer the |
serum into screw-cap tube
- Store in -20°C freezer while waiting for transportation to IMR.

Note: (a) Interpretation of IFAT result:

Positive: > 1:80 (in endemic area if patient is asymptomatic, a titre of as high as 1:160 may not be significant but patient need to be followed up).

(b) All specimens are analysed in IMR.

6.3.3 MOLECULAR DIAGNOSIS (PCR-RT)

<table>
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<tr>
<th>SPECIMEN</th>
<th>CONTAINER</th>
<th>VOLUME</th>
<th>REMARK</th>
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</table>
| Blood    | EDTA bottle | 3-5 ml for adult 1 ml for paediatric | • Send to referral laboratory immediately in ice  
• In case of expected delay in transportation, please collect blood in plain bottle |
| Blood    | Plain bottle | 3-5 ml for adult 1 ml for paediatric | • Send to laboratory immediately  
• In lab, centrifuged the specimen at 3500 rpm for 5 min. Then, transfer the serum into screw-cap tube.  
• To send 1 ml of serum for adult and at least 0.2 ml for paediatric to the referral lab in ice (cold chain).  
• Store in -20°C freezer while waiting for transportation |
<table>
<thead>
<tr>
<th>Sample Type</th>
<th>Container Type</th>
<th>Volume</th>
<th>Storage Instructions</th>
</tr>
</thead>
</table>
| Sputum      | Sterile container | Not applicable | - Send to the lab immediately  
- In case of delay, store at 4°C-8°C  
- Transport to referral lab in ice |
| Pus/swab    | Stuart transport medium | Not applicable | - Store at 4°C-8°C refrigerator while waiting for transportation  
- Transport to referral lab in ice |
| Urine       | Sterile container | >1 ml | - Store at 4°C-8°C refrigerator while waiting for transportation  
- Transport to referral lab in ice |

Note: To consult State Physician before ordering the test.

Each sample should be properly labelled. Completed laboratory request form and specimen should be sent as early as possible to the nearest hospital. This test is done in IMR.

### 6.4 ENVIRONMENTAL SAMPLING

Personal Protective Equipment (PPE) such as gloves, boots and mask must be used during sampling procedure.

#### 6.4.1 SOIL SAMPLE

i. Use spade, small gardening shovel or scoop  
ii. Tools need to be cleaned thoroughly between samples - wash with clean water, remove all the debris, spray with 70% alcohol and then let it dry before use  
iii. Collect 100g of soil sample at depth of 30cm during dry season or surface soil during rainy season  
iv. Samples to be taken in duplicate (each site)
v. Put in the sterile zip-locked bags  
vi. Label accordingly and record the site sampled  
vi. Place in a box (ice not required)  
viii. Complete laboratory request form and specimen should be sent to MKAK Sungai Buloh within 48 hours

6.4.2 WATER SAMPLE

i. Collect 100 ml of stagnant water (from suspected pool of water) into sterile screw capped containers  
ii. Label accordingly and record the site sampled  
iii. Place in a box (ice not required)  
iv. Complete laboratory request form and specimen should be sent to MKAK Sungai Buloh within 48 hours

7.0 TREATMENT

7.1 GENERAL TREATMENT

i. Correction of fluids, electrolytes and acid-base imbalances.  
ii. Insulin therapy for diabetic patients.  
iii. Pulse oximetry or arterial blood gases monitoring in severely ill cases when patients may require respiratory support.  
iv. I & D or drainage of abscess. Patient with liver abscesses larger than 5 cm x 5 cm should be referred to an interventional radiologist or surgeon for drainage.  
v. Standard precaution procedures for infection control should be implemented in the care of these patients.

7.2 ANTIBIOTICS26,27,28

7.2.1 INTENSIVE THERAPY

Life threatening melioidosis

- IV Meropenem (25mg/kg/dose; usual dose for adult: 1 gm TDS) for at least 2 weeks. May substitute Meropenem with Imipenem (50mg/kg/day; usual adult dose 1gm tds).
• May add an adjunct antibiotic; Co-trimoxazole (Trimethoprim-Sulphamethoxazole) 3-4 tab bd + Folic acid 5 mg daily.
• To consider G-CSF within 72 hours of admission

Others melioidosis

• IV Ceftazidime (100 mg/kg a day; usual dose for adult, 2 gm TDS)
• To consider G-CSF within 72 hours of admission

Localized superficial melioidosis

• Oral Augmentin (Amoxycillin/Clavulanate) 2 tab (500/125) tds for 12-20 weeks.

7.2.2 ERADICATION THERAPY

i. Oral Co-trimoxazole (Trimethoprim 8mg/kg/day and Sulfamethoxazole 40mg/kg/day) and Doxycycline (4 mg/kg/day in 2 divided doses per day) (Usual dose 2-4 tab Co-trimoxazole BD and Doxycycline 100mg BD) are the standard oral combination regimen and should be administered for a total of 20 weeks.

OR

ii. Augmentin (Amoxycillin/Clavulanate 2 tab) tds, is an alternative and can be used in pregnant women and those allergic to Co-trimoxazole (for the same duration).

For summary of antibiotics for melioidosis in adult, please refer to Appendix 4.
7.2.3 TREATMENT IN CHILDREN\textsuperscript{29,30}

**INTENSIVE THERAPY**

For at least 2 weeks (may need to extend 4-8 weeks in deep seated infection)

i. IV Ceftazidime 50mg/kg/dose 6 - 8 hourly

**OR**

ii. IV Imipenem or Meropenem 25mg/kg/dose 6 - 8 hourly
(may be considered in life threatening cases).

**ERADICATION THERAPY**

For a total of 20 weeks Oral Amoxycillin (20 mg /kg/dose) / Clavulanate - 8 hourly

**ALTERNATIVE MAINTENANCE THERAPY FOR CHILDREN ABOVE 8 YEARS**

Co-trimoxazole (TMP 8mg/kg/day and sulfamethoxazole 40mg/kg/day) PLUS Doxycycline (4mg/kg/day in 2 divided doses)

In addition, localized melioidosis with abscess formation should be treated with incision and drainage.

For summary of antibiotics for melioidosis in children, please refer to Appendix 5.

7.2.4 POST EXPOSURE PROPHYLAXIS\textsuperscript{28,31,32}

There is no human study however there were recommendations for accidental laboratory exposures and preparedness for bioterrorism. It is a must to handle all procedures involving Burkholderia pseudomallei in a biosafety laboratory cabinet class II. Co-
trimoxazole 2-4 tab bd for 3 weeks within 24 hours of high probability of exposure may be considered. Amoxicillin/Clavulanic acid can be use for prophylaxis for those can’t tolerate Co-trimoxazole.

Note: Leptospirosis and scrub typhus are common in the above mentioned endemic areas. Therefore leptospirosis or scrub typhus co-infection is possible. Doxycycline should be added to anti-Melioidosis antibiotics if co-infection is strongly suspected.

7.2.5 VACCINE

Currently there is no vaccine available.

7.3 PREVENTING SPREAD

Person-to-person spread of these infections is negligible. Therefore there is no specific treatment or advice required for secondary contacts. There is no requirement to isolate the infected patients.

7.4 FOLLOW UP

7.4.1 ADULT

In view of the recalcitrant nature of this infection and its tendency to relapse, long-term follow-up is required. Patients should be monitored clinically and radiologically for the resolution of focal infection. Patients may be followed-up regularly for at least up to 5 years following recovery. Patients should be warned that there may be a lifelong risk of relapse, and should be told to alert health care staff as to their previous history if they subsequently develop a severe febrile illness.

PROTOCOL DURING FOLLOW UP

A. During eradication phase 20 weeks

- Review every 8 weeks
- Check the diabetic control
• Review patient response:
  o weight and appetite
  o temperature
  o CXR for those who presented with pneumonia
  o Ultrasound/CT scan for those who presented with multiple/single abscesses in the liver and spleen
  o TWBC/ESR/CRP
  o If patient developed prolonged fever (5 days or more), check patient compliant and need to do blood culture and sensitivity

B. Follow up after eradication phase

• At least for 5 years (majority of patients are diabetics and they will be followed up for life for their diabetes)
• Interval of follow up 6 monthly
• Look for evidence of relapses e.g. prolonged fever, acute pneumonia, musculoskeletal abscesses, liver and splenic abscesses.

7.4.2 CHILDREN:

The total duration of follow-up for children who remain asymptomatic, without co-morbidity or long-term complications is 5 years. During maintenance therapy patients need to be reviewed monthly or every 2 months. After completing the maintenance phase follow-ups may be done every 4 to 6 months. The review should be in a hospital with paediatrician or district hospital with visiting paediatrician, for the first 2 years.

Subsequently, the follow-ups may be continued at the nearest health centre with medical officer, 6-monthly to yearly for another 3 years. Clinical assessment is done during follow-up to monitor for antibiotic adherence, disease relapse and late complications of the affected system/organ as follow:

• Recurrent symptoms and signs of melioidosis
• Late complications of the affected organ e.g. seizures, neurodevelopment delay or regression, joint deformity, chronic lung disease etc.

For summary for follow up (paediatric), please refer to Appendix 6.

8.0 MELIOIDOSIS SURVEILLANCE

Currently there is no melioidosis surveillance in Pahang or Malaysia since this disease is not notifiable under the provision of Prevention and Control of Communicable Disease Act 1988. Therefore, the actual burden of melioidosis in Pahang is not known.

5.1 OBJECTIVES OF MELIOIDOSIS SURVEILLANCE

i. To estimate the burden of the disease  
ii. To detect disease outbreaks

8.2 CASE DEFINITION

Melioidosis is difficult to distinguish from a number of other diseases on clinical grounds alone. History of possible exposure is paramount to aid clinical diagnosis. Laboratory diagnosis is needed to confirm melioidosis when the disease is suspected on clinical grounds. Investigations including culture, PCR and serology should be sent.
8.2.1 CLINICAL CASE DEFINITION:

Person having:

i. Fever and/or

ii. Pneumonia and/or

iii. Single or multiple abscesses and other evidence of infections

AND predisposing factors especially diabetes mellitus

AND history of exposure to high risk activities/occupational hazards, such as agriculture, mining, construction, fresh-water recreation and camping.

Note: In children, predisposing factors may not be present.

8.3 CASE CLASSIFICATION:

i. **Suspected case**: Any case that is compatible with clinical case definition.

ii. **Probable Case**: Any suspected case with IFAT IgM $\geq 1: 80$.

iii. **Confirmed case**: Any suspected case with positive culture or positive PCR or a four-fold rise in serological titre.

8.4 NOTIFICATION

This disease is not notifiable under the provision of Prevention and Control of Communicable Disease Act 1988. In order to obtain the actual disease burden and outcome in Pahang, the Pahang State Health Department Director has instructed that melioidosis must be notified administratively using a notification form (Appendix 7) and registered in the Pahang melioidosis registry.

All **confirmed** cases of melioidosis must be notified. Cases must be investigated using the melioidosis investigation form (Appendix 8). All **outbreaks** must be reported within 24 hours to the Pahang State Health Department/National Crisis Preparedness and Response Centre (CPRC), Disease Control Division by e-mail, text-messaging (SMS) and facsimile using the BKP/WABAK/01/2005 form (Appendix 9).
An outbreak is defined as more than one confirmed case of melioidosis with an epidemiological link within the incubation period (21 days). During an outbreak, the district health office should investigate all the cases. However, the suspected cases and probable cases need not be notified.

Refer to Flow Chart in Appendix 10 for the management of cases or outbreak.

### 8.5 PAHANG MELIOIDOSIS REGISTRY

All confirmed cases must be notified to the nearest district health office. Cases must be investigated by using the melioidosis investigation form (Appendix 8). The investigation form must be completed by the district health office as well as the hospital that manages the case. The AEHO at district health office must merge the information. This information must then be entered into the Pahang melioidosis registry which is kept in the district health office. Since follow up on cases by clinician would take up to 5 years to complete, the district health office must ensure the follow up information are updated regularly in the registry.

### 9.0 PUBLIC HEALTH MANAGEMENT

#### 9.1 MANAGEMENT OF SPORADIC CASES

##### 9.1.1 Notification

All confirmed cases must be notified to the nearest district health office using a notification form (Appendix 7).

##### 9.1.2 Investigation

All notified cases must be investigated. Case investigation must be done using the investigation form (Appendix 8). History of movement of the case during the incubation period including activities or occupational exposure must be established to determine possible
source of infection. All other persons who are likely to be exposed to the common source must be identified and their health status must be assessed.

9.1.3 Case registration

All confirmed cases diagnosed in any hospital in Pahang must be registered in the Pahang melioidosis registry.

9.1.4 Prevention and control measures

Based on the investigation, preventive and control measures need to be taken where necessary. It may vary according to source and the nature of infection. Environmental surveillance is not necessary. For occupationally-acquired infections, appropriate personal protective equipment must be recommended.

Health education needs to be given to the cases and all exposed persons regarding:

i. the disease
ii. mode of transmission, and
iii. preventive and control measures as follows:

- To seek early treatment.
- To avoid contact with soil or surface water in known endemic locations\(^3^4\).
- Should exposure is unavoidable, personal protective equipment such as gloves, masks and suitable clothing for exposure-prone occupations must be used especially for people with co-morbidities such as diabetes, pulmonary disease, renal disease and other chronic diseases\(^3^4,^3^5\). Cotrimoxazole 2-4 tab bd may be use for prophylaxis within 24 hours of exposure for a total duration of 3 weeks. If allergic to Co-trimoxazole, Amoxicillin/Clvulanic acid (Augmentin) can be use for prophylaxis.
- People in endemic areas are advised to consume chlorinated water or boiled water\(^3^4,^3^5\).
- Proper disposal of dead animals or livestock\(^3^4,^3^5\).
9.2 MANAGEMENT OF OUTBREAKS

All outbreaks or any unusual event that is suspected to be an outbreak of melioidosis must be reported within 24 hours to the nearest district health office.

9.2.1 Investigation

All outbreaks and unusual event must be investigated. Case investigation must be done by using the investigation form (Appendix 8). History of movement of the case during the incubation period including activities or occupational exposure must be established to determine possible source of infection. Any epidemiologically-linked events that lead to an outbreak must be established to determine possible source of infection. All other persons who are likely to be exposed to the common source must be identified and their health status must be assessed. Algorithm for laboratory investigation is carried out as in Appendix 3.

9.2.2 Operation Room

An operation room must be set up in the event of an outbreak. Please refer to the Infectious Diseases Outbreak Rapid Response Manual\textsuperscript{36} for details. The district outbreak committee must be alerted and activated if necessary.

9.2.3 Case registration

Confirmed cases must be registered in the Pahang melioidosis registry.

9.2.4 Prevention and control

Based on the investigation, necessary preventive and control measures need to be taken. It may vary according to source and the nature of infection. Preventive measures must be based on knowledge of the groups at particular risk of infection and the local epidemiological factors.
9.2.4.1 Active Case Detection

All persons who are exposed to the common source must be identified and their health status must be assessed. Anybody who develops signs and symptoms of the disease must be referred to the nearest health facility as soon as possible for further management.

9.2.4.2 Passive Case Detection

All nearby health facilities must be informed to be on high alert for cases coming to seek treatment among the exposed group. They should be managed by Medical Officer, and the District Health Office must be informed.

9.2.4.3 Treatment of case

All cases must be given prompt treatment according to this guideline.

9.2.4.4 Environmental investigation

Environmental surveillance must be done. Appropriate samples should be taken and this could include soil and water. Please refer to section 6.3 for details on sampling procedure.

9.2.4.5 Personal protective equipment

For prevention of occupationally-acquired infections, appropriate personal protective equipment must be recommended.

9.2.4.6 Management of contaminated area or source of infection

Closure of the contaminated area or infection source under CDC Act 1988 may be carried out if deemed necessary to prevent further transmission.

Alert public or users regarding the possible hazards that can arise from the contaminated area. Health hazard warning signage needs to be erected by the management authority of the centre in areas found to be contaminated through environment risk assessment. Suggested format of the signage is as attached (Appendix 11).
9.2.5 Health Education

The main preventive measure for melioidosis is to create awareness about the disease and its prevention. This can be done through educational awareness campaigns in various media such as electronic, print, websites. Health education materials includes poster, pamphlet etc.

Health education need to be given to cases, all exposed persons and the community. Health education must emphasize on the disease, mode of transmission and preventive measures as follows:

i. Seek early treatment. Advise people who have been exposed to possible contaminated water or soil source either through occupation or recreational activities to seek immediate medical treatment if developed symptoms within the incubation period.

ii. Avoid contact with soil or surface water in known endemic locations\textsuperscript{34,35}.

iii. Use personal protective equipments such as glove, mask, boots and suitable clothing for exposure prone occupation or recreational exposure especially for people with co-morbidities such as diabetes, pulmonary disease, renal diseases and other chronic diseases\textsuperscript{34,35}.

iv. People in endemic areas are advised to consume chlorinated water or boiled water\textsuperscript{34,35}.

v. Proper disposal of dead animals or livestock\textsuperscript{34,35}.

9.2.6 Documentation and report

In outbreaks which are likely to be of public interest, dissemination of information especially to media must be done through proper channel and in accordance to the existing instruction from the Ministry of Health. All activities during the outbreak should be adequately documented and the report should be disseminated so that further outbreak can be handled more effectively.

A daily progress report of the outbreak must be sent to the Pahang State Health Department. A final outbreak report must be sent within
one month from the day the outbreak is declared over. This report will be forwarded to the Crisis Preparedness and Response Centre (CPRC) Ministry of Health.
10. REFERENCES

3. Puthucheary SD, Parasakthi N, Lee MK. Septicaenic Melioidosis: a review of 50 cases from
8. Pruekprasert P, Jitsurong S. Septicaemic Melioidosis following near-drowning. Southeast Asian J
   Trop Med Publ Hlth 1991; 22: 276-8
9. Ngauy V, Lemeshev Y, Sadkowski L, Crawford G. Cutaneous Melioidosis in a man who was
   taken as a prisoner of war by the Japanese during World War II. J Clin Microbiol 2005; 43:970-2
10. Yap BH, Chan YC, Ti TY, et al. Serodiagnosis of Melioidosis in Singapore by the indirect
11. Finkelstein RA, Atthasampunna P, Chulasamaya M. Pseudomonas (Burkholderia) pseudomallei
    in Thailand, 1964-1967: geographic distribution of the organism, attempts to identify cases of
    pseudomallei in normal blood donors and suspected cases of Melioidosis in Malaysia. Southeast
    Dis J 1998; 17:77-80.
    1991; 337:1290-1
APPENDICES
## SUMMARY OF MELIOIDOSIS CLINICAL PRESENTATIONS IN ADULT

<table>
<thead>
<tr>
<th>Common presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community acquired pneumonia</td>
</tr>
<tr>
<td>Pneumonia with abscesses involving single or multiple organs</td>
</tr>
<tr>
<td>Septicaemia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft tissue infection: cellulitis, fasciitis, skin abscess/ulcer</td>
</tr>
<tr>
<td>Intra abdominal: single or multiple abscesses in the liver, spleen, kidney or pancreas</td>
</tr>
<tr>
<td>Bone and joint infection: osteomyelitis, septic arthritis</td>
</tr>
<tr>
<td>Genitourinary: prostatic abscess</td>
</tr>
<tr>
<td>CNS infection: cerebral abscess, meningoencephalitis, encephalomyelitis</td>
</tr>
<tr>
<td>Facial: suppurative parotitis</td>
</tr>
<tr>
<td>Ocular infection: conjunctival ulcer, hypopyon, orbital cellulitis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asymptomatic sero-conversion</td>
</tr>
</tbody>
</table>
# SUMMARY OF MELIOIDOSIS CLINICAL PRESENTATIONS IN CHILDREN

<table>
<thead>
<tr>
<th>Common presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Community acquired pneumonia</td>
</tr>
<tr>
<td>• Pneumonia with abscesses involving single or multiple organs</td>
</tr>
<tr>
<td>• Septicaemia</td>
</tr>
<tr>
<td>(Patient may not have any co-morbidity)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pharyngocervical melioidosis (similar to URTI manifestations)</td>
</tr>
<tr>
<td>• Head and neck: suppurative parotitis, lymphadenitis</td>
</tr>
<tr>
<td>• Soft tissue: cellulitis, skin abscess/ulcer</td>
</tr>
<tr>
<td>• Intra abdominal: abscesses in the liver, spleen, kidney or pancreas</td>
</tr>
<tr>
<td>• Bone and joint: osteomyelitis, septic arthritis, pyomyositis</td>
</tr>
<tr>
<td>• Neurological: facial palsy, cerebral abscess, meningoencephalitis, encephalomyelitis</td>
</tr>
<tr>
<td>• Ocular infection: conjunctivitis, orbital cellulitis</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>asymptomatic seroconversion</td>
</tr>
</tbody>
</table>
ALGORITHM FOR LABORATORY INVESTIGATIONS DURING OUTBREAK

Exposed person from outbreak area

Fever?

Serology (if for epidemiological study)

No

Yes

Diabetic?

Routine blood tests

CXR

Blood C&S 2X

No

Routine blood tests

CXR

Blood C&S 2X

USG Abdomen

CT-Scan when indicated

Culture from other sites based on presenting complain / clinical findings e.g. sputum/urine/pus

Positive Culture for Melioidosis?

Blood PCR if clinically strongly suggestive of melioidosis

No

Yes

Continue treatment

PCR Positive?

Yes

End

No

Not melioidosis, treat as other infection

End
## SUMMARY OF ANTIBIOTICS FOR MELIOIDOSIS IN ADULT

<table>
<thead>
<tr>
<th>PHASES AND DURATION</th>
<th>PREFERRED THERAPY</th>
<th>ALTERNATIVE THERAPY</th>
<th>ADJUNCT THERAPY AND OTHER DRUGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensive/Induction Phase</strong> At least 2 weeks. 4-8 weeks for deep infection</td>
<td>IV Ceftazidime 100-200mg/kg/day (usual dose for adult 2gm tds)</td>
<td>IV Meropenem 25mg/kg/day (usual adult dose 1 gm tds and 2 gm tds for CNS infection) OR IV Imipenem 50-60mg/kg/day (usual adult dose 1 gm tds) infusion over 40-60 minutes</td>
<td>To consider Co-trimoxazole bd (Trimethoprim/Sulphamethoxazole 320:1600mg) for severe infection and for deep focal infection: bone, joint, prostate and neurological if patient.* (Body weighty: &lt;40 kg, 160/800 mg q12h; 40 to 60 kg, 240/1,200 mg q12h; &gt;60 kg, 320/1,600 mg q12h) + Folic acid 5 mg daily To consider G-CSF for severe cases within 72 hours of admission</td>
</tr>
<tr>
<td><strong>Eradication Phase</strong> 5 months</td>
<td>Oral Co-trimoxazole 3-4 tab bd PLUS Oral Doxycycline 100 mg bd</td>
<td>Oral Amoxicillin / Clavulanic acid 2 tab of 500/125mg tds (For pregnancy or for those cannot tolerate the preferred regimen but the relapse rate is high)</td>
<td>Folic acid 5 mg daily for patient on Co-trimoxazole</td>
</tr>
</tbody>
</table>

**Note:** All doses should be adjusted appropriately in patients with renal impairment. Prolonged intensive phase parenteral therapy is generally used for deep-seated infections such as osteomyelitis, multiple undrained abscesses, or CNS infection. *The combination regimen (adding on an adjunct antibiotic like Co-trimoxazole) results in a lower relapse rate but is associated with more adverse toxic effects. Many authors recommended an adjunct antibiotic for severe infection and/or deep focal infections.*³³
## SUMMARY OF ANTIBIOTICS FOR MELIOIDOSIS IN CHILDREN

<table>
<thead>
<tr>
<th>PHASES AND DURATION</th>
<th>PREFERRED THERAPY</th>
<th>ALTERNATIVE THERAPY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intensive/Induction Phase</strong></td>
<td>IV Ceftazidime 50mg/kg/dose 8 hourly</td>
<td>IV Imipenem</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>OR</strong> Meropenem 25mg/kg/dose 6 - 8 hourly (may be considered in life threatening cases)</td>
</tr>
<tr>
<td><strong>Maintenance therapy</strong></td>
<td>Oral Amoxycillin (20 mg/kg/dose) / Clavulanate - 8 hourly doses</td>
<td>For children &gt; 8 years old: Co-trimoxazole (TMP 8mg/kg/day and sulfamethoxazole 40mg/kg/day)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>PLUS</strong> Doxycycline (4mg/kg/day in 2 divided doses)</td>
</tr>
</tbody>
</table>
## SUMMARY FOR FOLLOW UP (PAEDIATRIC)

<table>
<thead>
<tr>
<th>PHASE</th>
<th>FOLLOW-UP INTERVALS</th>
<th>PLACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>During maintenance therapy</td>
<td>1 – 2 monthly</td>
<td>Hospital with paediatrician or visiting paediatrician</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>After completion of treatment :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of long-term complications or co-morbidity</td>
<td>Interval and duration as clinically indicated.</td>
<td>Hospital with paediatrician or visiting paediatrician</td>
</tr>
<tr>
<td></td>
<td>4 – 6 monthly for 2 years</td>
<td>Hospital with paediatrician or visiting paediatrician</td>
</tr>
<tr>
<td></td>
<td>6 – 12 monthly for 3 years</td>
<td>Nearest Klinik Kesihatan with medical officer</td>
</tr>
</tbody>
</table>
# Appendix 7

## A. Maklumat Pesakit

1. **Nama Pesakit**
   - **Nama Penuh** (Huruf Besar): 
   - **Nama Penghulu** (Bahasa): 
   - **Kod Pengesahan** (Jika belum mempunyai Kad Pengesahan): 
2. **No. Kad Pengesahan**
   - **No. Doktor Hospital / Klinik** 
   - **No. Doktor Perubatan**
   - **Nama Wan:** 
   - **Tarihh Mula Wan:** 
3. **Negeri Asal:**
   - **Status:** 
   - **Kedudukan:** 
   - **Jantina:** 
   - **Umur:** 
   - **Pekerja:**
4. **No. Telepon:**
   - **Alamat Kedudukan:**
      - **Rumah:** 
      - **Tel. Bimbit:** 
      - **Pejabat:**
5. **Alamat Tempat Kerja / Belajar:**

## B. Diagnosis Penyakit

1. **1. Acquired Immune Deficiency Syndrome (AIDS)**
2. **2. Statu Korean**
3. **3. Campak**
4. **4. Chikungunya**
5. **5. Demam Denggi**
6. **6. Demam Denggi Berdarah**
7. **7. Demam Kuning**
8. **8. Difteria**
10. **10. Ebola**
11. **11. Gesit**
13. **13. Kera**
15. **15. Kusta (Lamian)**
17. **17. Masalah Kedudukan**
18. **18. Penubuhan**
19. **19. Pekerja:**
20. **20. Umur:** 
21. **21. Tarihh Mula Umur:**

## C. Maklumat Pemberitahuan

1. **Nama Pengesahan Perubatan:**
2. **Nama Hospital / Klinik dan Alamat:**
3. **Tarihh Notifikasi:**

---

*Agensi Penyelidikan Keadaan Kesihatan Pekerja Asing (KESMA)*
## PERSONAL INFORMATION

1.00 Date of registration: 

2.00 RN: 

3.00 Name: 

4.00 New IC:  

5.00 Other IC: 

6.00 Date of birth: 

7.00 Age: years/months/days*

8.00 Gender:  

9.00 Race:  

10.00 Nationality: 

11.00 Occupation: 

### Current occupation. Choose only ONE answer.

#### Managerial and professional specialty occupations:

1. Executive, administrative, and managerial occupations
2. Professional specialty occupations

#### Technical, sales, and administrative support occupations:

3. Technicians and related support occupations
4. Sales occupations
5. Administrative support occupations, including clerical

#### Service occupations:

6. Private household occupations
7. Protective service occupations
8. Service occupations, except protective and household
9. Farming, forestry, and fishing occupations
10. Precision production, craft, and repair occupations

#### Operators, fabricators, and labourers:

11. Machine operators, assemblers, and inspectors
12. Transportation and material moving occupations
13. Handlers, equipment cleaners, helpers, and labourers

#### Others:

14. Housewife
15. Student
16. Not relevant (children)
17. Unemployed
18. Others. Please specify: 

## MELIOIDOSIS INVESTIGATION FORM

### SECTION A: TO BE COMPLETED BY TREATING HOSPITAL
## PAST HISTORY

16.00 **Previous melioidosis infection**
   
   [1] Yes  [2] No  *(If No, go to Question 23)*

17.00 **When was the previous infection?**  
   
   [ ] years/months/weeks/days* ago

18.00 **Organ involved**

<table>
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<tr>
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<tbody>
<tr>
<td>Unknown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary</td>
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<tr>
<td>Liver</td>
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<tr>
<td>Spleen</td>
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<td></td>
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<tr>
<td>Skin/Subcutaneous tissue</td>
<td></td>
<td></td>
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<tr>
<td>Musculoskeletal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
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</table>

If others, please specify


19.00 **How the diagnosis was made**

<table>
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<tbody>
<tr>
<td>Culture</td>
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<tr>
<td>Serology</td>
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<tr>
<td>Clinical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
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</table>

If others, please specify
### Treatment History

#### Intensive Phase

<table>
<thead>
<tr>
<th>Dose</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftazidime</td>
<td></td>
</tr>
<tr>
<td>Amoxycillin-clavulinic</td>
<td></td>
</tr>
<tr>
<td>Cefoperazone-sulbactam</td>
<td></td>
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<tr>
<td>Trimethoprim-sulfamethoxazole</td>
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<tr>
<td>Tetracycline</td>
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<tr>
<td>Imipenam</td>
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<td>Meropenam</td>
<td></td>
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<tr>
<td>Ciprofloxacin</td>
<td></td>
</tr>
<tr>
<td>Others (Specify: )</td>
<td></td>
</tr>
<tr>
<td>Others (Specify: )</td>
<td></td>
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<tr>
<td>Others (Specify: )</td>
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</tbody>
</table>

#### Maintenance Phase

<table>
<thead>
<tr>
<th>Dose</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin-clavulinic</td>
<td></td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td></td>
</tr>
<tr>
<td>Trimethoprim-sulfamethoxazole</td>
<td></td>
</tr>
<tr>
<td>Tetracycline</td>
<td></td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td></td>
</tr>
<tr>
<td>Others (Specify: )</td>
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</tr>
<tr>
<td>Others (Specify: )</td>
<td></td>
</tr>
<tr>
<td>Others (Specify: )</td>
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</tbody>
</table>

22.00 No antibiotic given

#### Underlying illnesses

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Diabetes mellitus</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol abuse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other immunocompromised state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>state (e.g. Steroid)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

If others, please specify
### CURRENT MEDICAL HISTORY

#### 24.00 Date of admission:

| DD | MM | YYYY |

#### 25.00 Clinical presentation

- **25.01** Fever
  - [ ] Yes  [ ] No
- **25.02** Duration
  - [ ] months/weeks/days*
- **25.03** Cough
  - [ ] Yes  [ ] No
- **25.04** Duration
  - [ ] months/weeks/days*
- **25.05** Sputum
  - [ ] Yes  [ ] No
- **25.06** Sputum colour
  - [ ] White  [ ] Yellow
  - [ ] Green  [ ] Others (Specify: )
- **25.07** Hemoptysis
  - [ ] Yes  [ ] No
- **25.08** Abdominal pain
  - [ ] Yes  [ ] No
- **25.09** Dysuria
  - [ ] Yes  [ ] No
- **25.10** Headache
  - [ ] Yes  [ ] No
- **25.11** Others
  - [ ] Yes  [ ] No
  Specify

#### 26.00 Physical findings

- **26.01** Blood pressure
  - [ ] SBP / [ ] DBP
- **26.02** Pulse rate
  - [ ] /min
- **26.03** Respiratory rate
  - [ ] /min
- **26.04** Jaundice
  - [ ] Yes  [ ] No
- **26.05** Joint swelling
  - [ ] Yes  [ ] No
  *If YES, how many joints involved?*
- **26.06** Ulcer
  - [ ] Yes  [ ] No
  Specify:
- **26.07** Cut/abrasion
  - [ ] Yes  [ ] No
  Specify:
- **26.08** Hepatomegaly
  - [ ] Yes  [ ] No
- **26.09** Splenomegaly
  - [ ] Yes  [ ] No
- **26.10** Pleural effusion
  - [ ] Yes  [ ] No
- **26.11** Others
  - [ ] Yes  [ ] No
  Specify

#### 27.00 Final clinical diagnosis

- **27.01** Pneumonia
  - [ ] Yes  [ ] No
- **27.02** Soft tissue abscess
  - [ ] Yes  [ ] No
- **27.03** Septic arthritis
  - [ ] Yes  [ ] No
- **27.04** Osteomyelitis
  - [ ] Yes  [ ] No
- **27.05** Prostatic abscess
  - [ ] Yes  [ ] No
- **27.06** Liver abscess
  - [ ] Yes  [ ] No
- **27.07** Splenic abscess
  - [ ] Yes  [ ] No
- **27.08** Meningoencephalitis
  - [ ] Yes  [ ] No
- **27.09** Brain abscess
  - [ ] Yes  [ ] No
- **27.10** Pyelonephritis/UTI/Perinephric Abscess
  - [ ] Yes  [ ] No
- **27.11** Others
  - [ ] Yes  [ ] No
  Specify
## INVESTIGATION

### 28.00 Investigation Findings

<table>
<thead>
<tr>
<th>Test</th>
<th>Patient</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Platelet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PT</td>
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</tr>
<tr>
<td>PTT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RBS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urea</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Creatinine</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bilirubin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conjugated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unconjugated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Globulin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALT</td>
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<tr>
<td>ALP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CXR</td>
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</tbody>
</table>

### USG Abdomen

(Looking for abscess)

<table>
<thead>
<tr>
<th>Abscess</th>
<th>Single</th>
<th>Multiple</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
<tr>
<td>Spleenic</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
<tr>
<td>Kidney</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
<tr>
<td>Prostate</td>
<td>[1]</td>
<td>[2]</td>
<td>[3]</td>
</tr>
</tbody>
</table>

### Other finding:

|       |       |       |       |       |

### 28.25 CT Scan


### 29.00 Culture

<table>
<thead>
<tr>
<th>Test</th>
<th>Result 1</th>
<th>Result 2</th>
<th>Result 3</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td>Tissue</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td>Urine</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td>Wound</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td>Sputum</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td>Stool</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
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### 29.07 Others:

<table>
<thead>
<tr>
<th>Test</th>
<th>Result 1</th>
<th>Result 2</th>
<th>Result 3</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
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</table>

### 30.00 Sensitivity

<table>
<thead>
<tr>
<th>Antibiotic</th>
<th>Sensitivity</th>
<th>Intermediate</th>
<th>Resistance</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftazidime</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Augmentine</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Bactrim</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Imipenam</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Sulperazone</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Gentamycin</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Chloramphenicol</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td>Not done</td>
</tr>
</tbody>
</table>

### 31.00 Serology

<table>
<thead>
<tr>
<th>Antibody</th>
<th>1st specimen</th>
<th>2nd specimen</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mixed</td>
<td>1/</td>
<td>1/</td>
<td></td>
</tr>
<tr>
<td>IgM</td>
<td>1/</td>
<td>1/</td>
<td></td>
</tr>
<tr>
<td>IgG</td>
<td>1/</td>
<td>1/</td>
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</table>

### 32.00 Polymerase Chain Reaction

<table>
<thead>
<tr>
<th>Result 1</th>
<th>Result 2</th>
<th>Result 3</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Negative</td>
<td>Not done</td>
<td></td>
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</table>
### CURRENT TREATMENT

<table>
<thead>
<tr>
<th>33.00</th>
<th>Emperical Antibiotics (if applicable)</th>
<th>Dose</th>
<th>Duration</th>
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<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>34.00</th>
<th>Intensive Phase</th>
<th>Dose</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.01</td>
<td>Ceftazidime</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.02</td>
<td>Amoxycillin-clavulinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.03</td>
<td>Cefoperazone-sulbactam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.04</td>
<td>Trimethoprim-sulfamethoxazole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.05</td>
<td>Doxycycline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.06</td>
<td>Imipenam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.07</td>
<td>Meropenam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.08</td>
<td>Ciprofloxacin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.09</td>
<td>Others (Specify: )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.10</td>
<td>Others (Specify: )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.11</td>
<td>Others (Specify: )</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>35.00</th>
<th>Maintenance Phase</th>
<th>Dose</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.01</td>
<td>Amoxicillin-clavulinic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.02</td>
<td>Chloramphenicol</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.03</td>
<td>Trimethoprim-sulfamethoxazole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.04</td>
<td>Doxycycline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.05</td>
<td>Ciprofloxacin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.06</td>
<td>Others (Specify: )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.07</td>
<td>Others (Specify: )</td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.08</td>
<td>Others (Specify: )</td>
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### Final Clinical Outcome

<table>
<thead>
<tr>
<th>36.00</th>
<th>Discharge well</th>
<th>[1]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date of death</td>
<td>[4]</td>
</tr>
<tr>
<td></td>
<td>AOR Discharge</td>
<td>[5]</td>
</tr>
<tr>
<td></td>
<td>Transfer to hospital</td>
<td>[6]</td>
</tr>
</tbody>
</table>

**Signature:**

**Name and designation of reporting officer:**

**Date:**

DD MM YYYY
### Section B: To be completed by District Health Office

#### 37.00 Notification and Case Classification

- **37.01 Date of notification**: DD MM YYYY
- **37.02 Notification from**: 
- **37.03 Date of investigation**: DD MM YYYY
- **37.04 Case classification**: 
  - [ ] Suspected
  - [ ] Probable
  - [ ] Confirmed
- **37.05 Type of case**: 
  - [ ] Sporadic
  - [ ] Outbreak

#### 38.00 Exposure History

- **38.01 Date of onset**: DD MM YYYY

**Movement History During Incubation Period**

<table>
<thead>
<tr>
<th>Date</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **38.02 Type of exposure**: 
  - [ ] Occupational (specify)
  - [ ] Recreational (specify)
  - [ ] Accidental (specify)
  - [ ] Unknown
  - [ ] Others (specify)

- **38.03 Date of exposure**: DD MM YYYY
- **38.04 Mode of transmission**: 
  - [ ] Inhalation
  - [ ] Direct contact
  - [ ] Aspiration
  - [ ] Ingestion
  - [ ] Unknown
  - [ ] Others (Specify)

#### 39.00 Other Exposed Contacts

- **39.01 Number of contacts exposed**: 
- **39.02 Number of contacts examined**: 
- **39.03 Number of contacts with sign & symptoms**: 

40.00 **PREVENTION AND CONTROL MEASURES**

<table>
<thead>
<tr>
<th>40.01</th>
<th>Active case detection</th>
<th>[1] Done</th>
<th>[2] Not Done</th>
</tr>
</thead>
<tbody>
<tr>
<td>40.05</td>
<td>Closure of premise</td>
<td>[1] Done</td>
<td>[2] Not Done</td>
</tr>
</tbody>
</table>

41.00 **HEALTH EDUCATION ACTIVITIES**

<table>
<thead>
<tr>
<th>41.01</th>
<th>Number of health talks given</th>
</tr>
</thead>
<tbody>
<tr>
<td>41.02</td>
<td>Number of discussion session</td>
</tr>
<tr>
<td>41.03</td>
<td>Number of demonstration done</td>
</tr>
<tr>
<td>41.04</td>
<td>Numbers of pamphlets distributed</td>
</tr>
<tr>
<td>41.05</td>
<td>Numbers of posters disseminated</td>
</tr>
<tr>
<td>41.06</td>
<td>Number of banners fixed</td>
</tr>
<tr>
<td>41.07</td>
<td>Number of press conference</td>
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<tr>
<td>41.08</td>
<td>Number of community activities</td>
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</tbody>
</table>

42.00 **ENVIROMENTAL SAMPLING**

|-------|-------------------------|-------------|-------------|

---

49
## BORANG LAPORAN AWAL WABAK

<table>
<thead>
<tr>
<th>Sumber laporan wabak:</th>
<th>Tarih terima:</th>
</tr>
</thead>
</table>

### 1. Penyakit:

### 2. Tarikh Onset/ Masa

### 3. Tarikh/Masa Notifikasi:

### 4. Tempat Berlaku:

### 5. Definisi kes:

### 6. Bilangan orang terlibat:

<table>
<thead>
<tr>
<th>a) Status Kes</th>
<th>b) Kumpulan Umur</th>
<th>Jumlah Kes</th>
</tr>
</thead>
<tbody>
<tr>
<td>- bilangan terdedah:</td>
<td>- bilangan dirawat:</td>
<td>0-1 tahun</td>
</tr>
<tr>
<td>- Bilangan kes</td>
<td>- bilangan masuk wad:</td>
<td>&gt;1-5 tahun</td>
</tr>
<tr>
<td>i) suspect:</td>
<td>-bilangan mati:</td>
<td>6-18 tahun</td>
</tr>
<tr>
<td>ii) probable:</td>
<td></td>
<td>19-50 tahun</td>
</tr>
<tr>
<td>iii) confirmed:</td>
<td></td>
<td>&gt;50 tahun</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Jumlah keseluruhan</td>
</tr>
</tbody>
</table>

### 7. Gejala klinik: (secara ringkas yang merangkumi majoriti pesakit)

### 8. Hasil siasatan:

### 9. Tindakan pencegahan dan kawalan yang diambil:

### 10. Ulasan Pegawai Kesihatan Daerah:

### 11. Ulasan Pegawai Epidemiologi Negeri:

### 12. Pegawai Pelapor (Daerah)

- Nama:
- Jawatan:
- Alamat Pejabat:
- Tarikh:

### 13. Pegawai Penerima (Negeri)

- Nama:
- Jawatan:
- Alamat Pejabat:
- Tarikh:
NOTIFIKASI KES/ WABAK MELIOIDOSIS

Verifikasi dan validasi kes

Kes?

Ya: Ambil langkah pencegahan dan kawalan

Daftar Kes dalam Pahang melioidosis registry

Wabak?

Ya: Notifikasi wabak melalui telefon dan laporan awal melalui faks atau email ke JKN Pahang

No. Tel: 09-5165402
No. Fax: 09-5157670
e-mel: cdcpahang@phg.moh.gov.my

Tidak: Tamat

Notifikasi kes diterima

Tidak: Tamat

Ya: Hantar Laporan awal wabak (BKP/WABAK/01/2005) ke CPRC, KKM oleh JKN Pahang melalui faks atau email

No. Tel: 03-88810 600/700
No. Fax: 03-88810 400/500
e-mel: cprc@moh.gov.my
Hantar Laporan Harian/Progress report ke JKN Pahang untuk dibuat ulasan dan dihantar ke CPRC,KKM

Hantar Laporan akhir wabak ke JKN Pahang. JKN Pahang akan membuat ulasan dan dihantar ke CPRC,KKM

Tamat
RISIKO PENYAKIT BERJANGKIT

SUNGAI, KOLAM, AIR TERJUN DAN LUMPUR MUNGKIN DICEMARI BAKTERIA, VIRUS ATAU PARASIT DAN ANDA MUNGKIN BOLEH DIJANGKITI

ANDA TIDAK DIGALAKKAN UNTUK MENGUNJUNGI TEMPAT INI SEKIRANYA MEMUNYAI FAKTOR RISIKO BERIKUT:

1. Kencing Manis (Diabetes)
2. Penyakit Paru-Paru Kronik
3. Penyakit Buah Pinggang
4. Penyakit lain yang merendahkan daya tahan tubuh seperti Kanser, Jangkitan HIV dan mereka yang mengambil ubat steroid
5. Luka atau penyakit kulit

JANGAN MINUM AIR YANG TIDAK DIMASAK ATAU TIDAK DIRAWAT

JAGA KEBERSIHAN PERSEKITARAN. PERSEKITARAN YANG KOTOR MENGUNDANG KEHADIRAN HAIWAN PERUMAH YANG MENINGKATKAN RISIKO PENCERAMAN KUMAN

SEKIRANYA ANDA JATUH SAKIT SETELAH MENGUNJUNGI TEMPAT INI, SILA DAPATKAN RAWATAN DENGAN SEGERA

PESANAN OLEH:
PEJABAT KESIHATAN DAERAH .....................
GLOSSARY OF TERMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEHO</td>
<td>Assistant Environmental Health Officer</td>
</tr>
<tr>
<td>C&amp;S</td>
<td>Culture and Sensitivity</td>
</tr>
<tr>
<td>CDC</td>
<td>Communicable Disease Control</td>
</tr>
<tr>
<td>CRP</td>
<td>C-reactive Protein</td>
</tr>
<tr>
<td>CT</td>
<td>Computerized tomography</td>
</tr>
<tr>
<td>CXR</td>
<td>Chest X-Ray</td>
</tr>
<tr>
<td>EHO</td>
<td>Environmental Health Officer</td>
</tr>
<tr>
<td>ESR</td>
<td>Erythrocyte Sedimentation Rate</td>
</tr>
<tr>
<td>FBC</td>
<td>Full Blood Count</td>
</tr>
<tr>
<td>G-CSF</td>
<td>Granulocyte-Colony Stimulating Factor</td>
</tr>
<tr>
<td>HoSHAS</td>
<td>Hospital Sultan Haji Ahmad Shah</td>
</tr>
<tr>
<td>HTAA</td>
<td>Hospital Tengku Ampuan Afzan</td>
</tr>
<tr>
<td>I &amp; D</td>
<td>Incision and Drainage</td>
</tr>
<tr>
<td>IFAT</td>
<td>Indirect Fluorescent Antibody Titre</td>
</tr>
<tr>
<td>IgM</td>
<td>Immunoglobulin M</td>
</tr>
<tr>
<td>IMR</td>
<td>Institute of Medical Research</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
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<tr>
<td>MKAK</td>
<td>Makmal Kesihatan Awam Kebangsaan</td>
</tr>
<tr>
<td>PCR-RT</td>
<td>Polymerase Chain Reaction – Real Time</td>
</tr>
<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
</tr>
<tr>
<td>TWBC</td>
<td>Total White Blood Count</td>
</tr>
<tr>
<td>UFEME</td>
<td>Urine Full and Microscopic Examination</td>
</tr>
<tr>
<td>UIAM</td>
<td>Universiti Islam Antarabangsa Malaysia</td>
</tr>
<tr>
<td>USG</td>
<td>Urine Specific Gravity</td>
</tr>
</tbody>
</table>

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