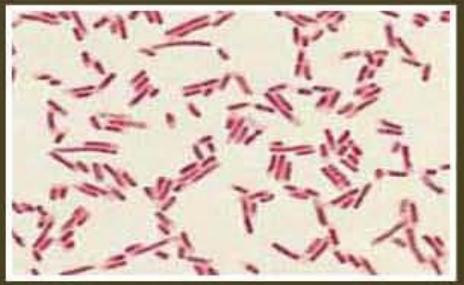
JABATAN KESIHATAN NEGERI PAHANG

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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FOREWORD

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. Meliodosis 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[1,6]. This is probably due to a higher prevalence of the bacteraemic form in Pahang (92% vs. 46% in Australia)[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)[1].

3.0 MODES OF TRANSMISSION

Infection is acquired from:

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

4.0 HIGH RISK GROUPS

It has been recognised that *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)[1,3]
ii. Chronic lung disease, chronic renal failure, liver disease[1,3]
iii. Other conditions that cause immune suppression i.e. corticosteroid therapy, Thalassemia, Human Immunodeficiency (HIV) infection, Systemic Lupus Erythematosus, malignancy, alcoholism[1,3]

Some occupational groups are at a higher risk to contract the disease, for example workers in the agricultural sectors[1].

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[6]. Latent intervals as long as 62 years have been reported in natural melioidosis[9]. Asymptomatic infection is also common as evidenced by positive serology in up to 50% of healthy adults in endemic countries [10,11,12].

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[13], while a study in Hospital Tengku Ampuan Afzan Kuantan, community acquired pneumonia attributed to melioidosis was seen in 13% of the cases[1].

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[3].

Rare presentations such as pyopericardium, mycotic aneurysm, psoas abscess and periorbital cellulitis[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 MELIOIDOSIS

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[15,16,17]. Diabetes mellitus , hematologic malignancies , aplastic anaemia ,thalasaemia , chronic renal failure, nephrotic syndrome, rheumatic heart disease and hepatitis A were the reported underlying diseases found in children with melioidosis [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. [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 %[15].

Localised infection (without septicaemia) is common in childhood melioidosis, especially involving the head and neck region[15]. In Thailand, 40% of the localised melioidosis were due to unilateral suppurative parotitis [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[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[23]. Septicaemia and disseminated infection occurs rarely in localised melioidosis [24]. In contrast to disseminated and septicaemic melioidosis, the prognosis for localised infection is generally good in children[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)

SPECIMEN	CONTAINER	VOLUME	REMARK
Blood	Blood culture bottle	8-10ml for adult 1-3ml for paediatric	• Send to laboratory immediately • Do not refrigerate • Mandatory for all suspected melioidosis
Respiratory samples e.g. sputum	Sterile container	Not applicable	• Send to laboratory immediately • In case of delay, keep at 4-8^{o}C and send within 24 hours

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^{o}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)

SPECIMEN	CONTAINER	VOLUME	REMARK
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^{o}C freezer while waiting for transportation to IMR.

Note: (a) Interpretation of IFAT result:

Positive : $\geq$ 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)

SPECIMEN	CONTAINER	VOLUME	REMARK
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^{o}C freezer while waiting for transportation

Sputum	Sterile container	Not applicable	• Send to the lab immediately • In case of delay, store at 4^oC-8^oC • Transport to referral lab in ice
Pus/swab	Stuart transport medium	Not applicable	• Store at 4^oC-8^oC refrigerator while waiting for transportation • Transport to referral lab in ice
Urine	Sterile container	>1 ml	• Store at 4^oC-8^oC 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
vii. 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 ANTIBIOTICS[26,27,28]

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[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[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 :
    - weight and appetite
    - temperature
    - CXR for those who presented with pneumonia\
    - Ultrasound/CT scan for those who presented with multiple/single abscesses in the liver and spleen
    - TWBC/ESR / CRP
    - 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 spleenic 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 ≥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[34].
- 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[34,35]. 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, Amoicillin/Clvulanic acid (Augmentin) can be use for prophylaxis.
- People in endemic areas are advised to consume chlorinated water or boiled water[34,35].
- Proper disposal of dead animals or livestock[34,35].

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[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 sign 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[34].

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[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[34,35].
iv. People in endemic areas are advised to consume chlorinated water or boiled water[34,35].
v. Proper disposal of dead animals or livestock[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.

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APPENDICES

Appendix 1

SUMMARY OF MELIOIDOSIS CLINICAL PRESENTATIONS IN ADULT

Common presentations

Community acquired pneumonia

Pneumonia with abscesses involving single or multiple organs

Septicaemia

Other presentations

Soft tissue infection: cellulitis, fasciitis, skin abscess/ulcer

Intra abdominal: single or multiple abscesses in the liver, spleen, kidney or pancreas

Bone and joint infection: osteomyelitis, septic arthritis

Genitourinary: prostatic abscess

CNS infection: cerebral abscess, meningoencephalitis,

encephalomyelitis

Facial: suppurative parotitis

Ocular infection: conjunctival ulcer, hypopyon, orbital cellulitis

Asymptomatic

Asymptomatic sero-conversion

Appendix 2

SUMMARY OF MELIOIDOSIS CLINICAL PRESENTATIONS IN CHILDREN

Common presentations

- Community acquired pneumonia
- Pneumonia with abscesses involving single or multiple organs
- Septicaemia

(Patient may not have any co-morbidity)

Other presentations

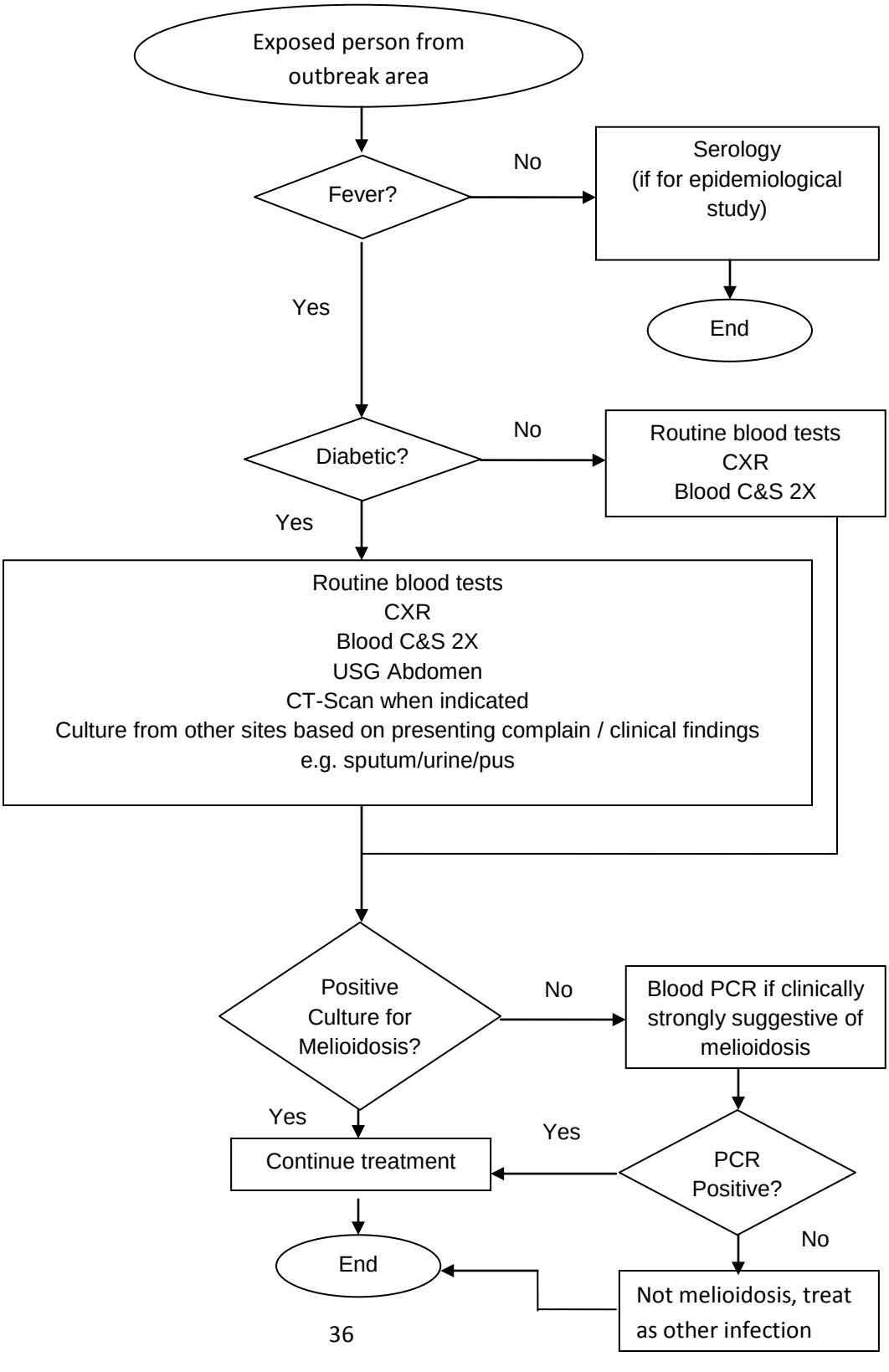
- Pharyngocervical melioidosis (similar to URTI manifestations)
- Head and neck : suppurative parotitis , lymphadenitis
- Soft tissue : cellulitis, skin abscess/ulcer
- Intra abdominal: abscesses in the liver, spleen, kidney or pancreas
- Bone and joint : osteomyelitis, septic arthritis , pyomyositis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

Asymptomatic

asymptomatic seroconversion

Appendix 3

ALGORITHM FOR LABORATORY INVESTIGATIONS DURING OUTBREAK



Appendix 4

SUMMARY OF ANTIBIOTICS FOR MELIOIDOSIS IN ADULT

PHASES AND DURATION	PREFERRED THERAPY	ALTERNATIVE THERAPY	ADJUNCT THERAPY AND OTHER DRUGS
Intensive/Induction Phase At least 2 weeks. 4-8 weeks for deep infection	IV Ceftazidime 100-200mg/kg/day (usual dose for adult 2gm tds)	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	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: <40 kg, 160/800 mg q12h; 40 to 60 kg, 240/1,200 mg q12h; >60 kg, 320/1,600 mg q12h)* + Folic acid 5 mg daily To consider G-CSF for severe cases within 72 hours of admission
Eradication Phase 5 months (NOTE: This regimen can be for primary use in superficial infections)	Oral Co-trimoxazole 3-4 tab bd PLUS Oral Doxycycline 100 mg bd	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)	Folic acid 5 mg daily for patient on Co-trimoxazole

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].

Appendix 5

SUMMARY OF ANTIBIOTICS FOR MELIOIDOSIS IN CHILDREN

PHASES AND DURATION	PREFERRED THERAPY	ALTERNATIVE THERAPY
Intensive/Induction Phase At least for 2 weeks. (4-8 weeks for deep seated infection)	IV Ceftazidime 50mg/kg/dose 8 hourly	IV Imipenem **OR** Meropenem 25mg/kg/dose 6 - 8 hourly (may be considered in life threatening cases)
Maintenance therapy For a total of 20 weeks	Oral Amoxycillin (20 mg/ kg/dose) / Clavulanate - 8 hourly doses	For children > 8 years old : Co-trimoxazole (TMP 8mg/kg/day and sulfamethoxazole 40mg/ kg/day) **PLUS** Doxycycline (4mg/kg/day in 2 divided doses)

Appendix 6

SUMMARY FOR FOLLOW UP (PAEDIATRIC)

PHASE	FOLLOW-UP INTERVALS	PLACE
During maintenance therapy	1 – 2 monthly	Hospital with paediatrician or visiting paediatrician
After completion of treatment :		
Presence of long-term complications or co-morbidity	Interval and duration as clinically indicated.	Hospital with paediatrician or visiting paediatrician
Asymptomatic with absence of co-morbidity	4 – 6 monthly for 2 years	Hospital with paediatrician or visiting paediatrician
	6 – 12 monthly for 3 years	Nearest Klinik Kesihatan with medical officer

Borang: Health 1 Rev.2005

NOTIFIKASI PENYAKIT BERJANGKIT YANG PERLU DILAPORKAN

(Seksyen 10, Akta Pencegahan Dan Pengawalan Penyakit Berjangkit 1988)

A. MAKLUMAT PESAKIT

1. **Nama Penuh** (HURUF BESAR):

Nama Penjaga (Ibu/Bapa/Penjaga):
(Jika belum mempunyai Kad Pengenalan diri)

2. No. Kad Pengenalan Diri / Dokumen Perjalanan
(Untuk Bukan Warganegara)
☐ Sendiri ☐ Penjaga

No. Daftar Hospital / Klinik: Nama Wad:_____ Tarikh Masuk Wad: / /

3. Kewarganegaraan:
Warganegara:
☐ Ya Keturunan:
Sukuketurunan:
(Bagi Q'Asli, Pribumi Sabah/Sarawak)
☐ Tidak Negara Asal:
Status Kedatangan: ☐ Izin ☐ Tanpa Izin ☐ Penduduk Tetap

4. Jantina: ☐ Lelaki ☐ Perempuan

5. Tarikh Lahir: / /

6. Umur: ☐ Tahun ☐ Bulan ☐ Hari

7. Pekerjaan:_____
(Jika tidak bekerja, nyatakan status diri)

8. No. Telefon: ☐ Rumah ☐ Tel. Bimbit ☐ Pejabat
(Untuk dihubungi)

9. Alamat Kediaman

10. Alamat Tempat Kerja / Belajar:

B. DIAGNOSIS PENYAKIT

☐ 1. *Acquired Immune Deficiency Syndrome(AIDS)*
☐ 2. Batuk Kokol
☐ 3. Campak
☐ 4. *Chancroid*
☐ 5. Demam Denggi
☐ 6. Demam Denggi Berdarah
☐ 7. Demam Kuning
☐ 8. Difteria
☐ 9. Disenteri *(Semua Jenis)*
☐ 10. *Ebola*
☐ 11. *Gonorrhoea*
☐ 12. *Human Immunodeficiency Virus Infection(HIV)*
☐ 13. Keracunan Makanan
☐ 14. Kolera
☐ 15. Kusta *(Multibacillary)*
☐ 16. Kusta *(Paucibacillary)*
☐ 17. Malaria - *(Falciparum)*
☐ 18. Malaria - *(Malariae)*
☐ 19. Malaria - *(Vivax)*
☐ 20. Malaria - *(Lain-lain)*
☐ 21. Penyakit Tangan, Kaki dan Mulut
☐ 22. *Plague - (Bubonic)*
☐ 23. *Plague - (Pneumonic)*
☐ 24. Poliomielitis (Akut)
☐ 25. *Rabies*
☐ 26. *Relapsing Fever*
☐ 27. Sifilis -*(Acquired)*
☐ 28. Sifilis - *(Congenital)*
☐ 29. Tetanus *(Neonatorum)*
☐ 30. Tetanus *(Lain-lain)*
☐ 31. Tifus - *(Scrub)*
☐ 32. Tifoid - *(Paratyphoid)*
☐ 33. Tifoid - *(Salmonella typhi)*
☐ 34. Tuberkulosis - (Pul. - S/Kahak Negatif)
☐ 35. Tuberkulosis - (Pul. - S/Kahak Positif)
☐ 36. Tuberkulosis - (Lain-lain *Pulmonari)*
☐ 37. Viral Ensefalitis - *(Japanese)*
☐ 38. Viral Ensefalitis - *(Alpah)*
☐ 39. Viral Ensefalitis - *(Lain-lain)*
☐ 40. *Viral Hepatitis A (Akut)*
☐ 41. *Viral Hepatitis B (Akut)*
☐ 42. *Viral Hepatitis C (Akut)*
☐ 43. *Viral Hepatitis (Lain-lain) - (Akut)*
☐ 44. *Lain-lain* _____

Selain dari notifikasi bertulis, penyakit berikut perlu dinotifikasi melalui telefon dalam tempoh 24 jam iaitu:- Poliomielitis Akut, Kolera, Demam Denggi, Diptheria, Keracunan Makanan, Plague, Rabies dan Demam Kuning.

11. Cara Pengesanan Kes:
☐ Kes ☐ Kontak ☐ FOMEMA *
☐ Ujian Saringan _____

12. Status Pesakit:
☐ Hidup
☐ Mati - -

13. Tarikh Onset: - -

14. Ujian Makmal:
Nama Ujian: (I)_____
(II)_____ (III)_____
Tarikh Sampel Diambil: - -

15. Keputusan Ujian Makmal:
☐ Positif (_____)
☐ Negatif
☐ Belum Siap

16. Status Diagnosis:
☐ Sementara *(Provisional/Suspected)*
☐ Disahkan *(Confirmed)*
Tarikh Diagnosis - -

17. Maklumat Klinikal Yang Relevan:

18. Komen:

C. MAKLUMAT PEMBERITAHU

19. Nama Pegawai Perubatan:

20. Nama Hospital / Klinik dan Alamat:

21. Tarikh Notifikasi: - -

_____
Tandatangan Pegawai Perubatan

* Agensi Pemantauan Pemeriksaan Kesihatan Pekerja Asing(FOMEMA)

MELIOIDOSIS INVESTIGATION FORM

SECTION A: TO BE COMPLETED BY TREATING HOSPITAL

PERSONAL INFORMATION

1.00 **Date of registration** ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY

2.00 **RN** ☐☐☐☐☐☐☐☐☐☐

3.00 **Name** ☐

4.00 **New IC** ☐☐☐☐☐☐ - ☐☐ - ☐☐☐☐

5.00 **Other IC** ☐☐☐☐☐☐☐☐

6.00 **Date of birth** ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY

7.00 **Age** ☐☐ years/months/days*

8.00 **Gender** [1] ☐ Male [2] ☐ Female

9.00 **Race** [1] ☐ Malay [2] ☐ Chinese [3] ☐ Indian
[4] ☐ Orang Asli [5] ☐ Other

10.00 **Nationality** [1] ☐ Malaysian [2] ☐ Non-Malaysian
Specify: ☐

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 : _____

Address

12.01 ☐

12.02 ☐

12.03 Poscode ☐☐☐☐☐

12.04 City ☐

12.05 State ☐

13.00 **Tel (H)** ☐☐☐ ☐☐☐☐☐☐☐☐

14.00 **Tel (O)** ☐☐☐ ☐☐☐☐☐☐☐☐

15.00 **Tel (H/P)** ☐☐☐ ☐☐☐☐☐☐☐☐

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**

18.01	Unknown	[1] ☐	Yes	[2] ☐	No
18.02	Pulmonary	[1] ☐	Yes	[2] ☐	No
18.03	Liver	[1] ☐	Yes	[2] ☐	No
18.04	Spleen	[1] ☐	Yes	[2] ☐	No
18.05	Skin/Subcutaneous tissue	[1] ☐	Yes	[2] ☐	No
18.06	Musculoskeletal	[1] ☐	Yes	[2] ☐	No
18.07	Others	[1] ☐	Yes	[2] ☐	No

If others, please specify

_____

_____

19.00 **How the diagnosis was made**

19.01	Culture	[1] ☐	Yes	[2] ☐	No
19.02	Serology	[1] ☐	Yes	[2] ☐	No
19.03	Clinical	[1] ☐	Yes	[2] ☐	No
19.04	Others	[1] ☐	Yes	[2] ☐	No

If others, please specify

_____

Treatment History

		Intensive Phase	Dose	Duration
20.00	☑			
20.01		Ceftazidime		
20.02		Amoxycillin-clavulinic		
20.03		Cefoperazone-sulbactam		
20.04		Trimethoprim-sulfamethoxazole		
20.05		Tetracycline		
20.06		Imipenam		
20.07		Meropenam		
20.08		Ciprofloxacin		
20.09		Others (Specify:)		
20.10		Others (Specify:)		
20.11		Others (Specify:)		

		Maintenance Phase	Dose	Duration
21.00	☑			
21.01		Amoxicillin-clavulinic		
21.02		Chloramphenicol		
21.03		Trimethoprim-sulfamethoxazole		
21.04		Tetracycline		
21.05		Ciprofloxacin		
21.06		Others (Specify:)		
21.07		Others (Specify:)		
21.08		Others (Specify:)		

22.00 ☐ No antibiotic given

23.00 **Underlying illnesses**

23.01	Diabetes mellitus	[1] ☐ Yes	[2] ☐ No
23.02	Chronic renal failure	[1] ☐ Yes	[2] ☐ No
23.03	Alcohol abuse	[1] ☐ Yes	[2] ☐ No
23.04	Chronic lung disease	[1] ☐ Yes	[2] ☐ No
23.05	HIV/AIDS	[1] ☐ Yes	[2] ☐ No
23.06	Other immunocompromised state (e.g. Steroid)	[1] ☐ Yes	[2] ☐ No
23.07	Others	[1] ☐ Yes	[2] ☐ No

If others, please specify

_____

CURRENT MEDICAL HISTORY

24.00 **Date of admission:** ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY

25.00 **Clinical presentation**

25.01 Fever [1] ☐ Yes [2] ☐ No

25.02 Duration ☐☐ months/weeks/days*

25.03 Cough [1] ☐ Yes [2] ☐ No

25.04 Duration ☐☐ months/weeks/days*

25.05 Sputum [1] ☐ Yes [2] ☐ No

25.06 Sputum colour [1] ☐ White [2] ☐ Yellow

[3] ☐ Green [4] ☐ Others (Specify:)

25.07 Hemoptysis [1] ☐ Yes [2] ☐ No

25.08 Abdominal pain [1] ☐ Yes [2] ☐ No

25.09 Dysuria [1] ☐ Yes [2] ☐ No

25.10 Headache [1] ☐ Yes [2] ☐ No

25.11 Others [1] ☐ Yes [2] ☐ No

Specify _____

26.00 **Physical findings**

26.01 Blood pressure ☐☐☐ / ☐☐
SBP DBP

26.02 Pulse rate ☐☐ /min

26.03 Repiratory rate ☐☐ /min

26.04 Jaundice [1] ☐ Yes [2] ☐ No

26.05 Joint swelling [1] ☐ Yes [2] ☐ No

If YES, how many joints involved? ☐☐

26.06 Ulcer [1] ☐ Yes [2] ☐ No Specify : ☐☐☐☐☐☐☐☐☐☐

26.07 Cut/abrasion [1] ☐ Yes [2] ☐ No Specify : ☐☐☐☐☐☐☐☐☐☐

26.08 Hepatomegaly [1] ☐ Yes [2] ☐ No

26.09 Splenomegaly [1] ☐ Yes [2] ☐ No

26.10 Pleural effusion [1] ☐ Yes [2] ☐ No

26.11 Others [1] ☐ Yes [2] ☐ No

Specify _____

_____

_____

27.00 **Final clinical diagnosis**

27.01 Pneumonia [1] ☐ Yes [2] ☐ No

27.02 Soft tissue abscess [1] ☐ Yes [2] ☐ No

27.03 Septic arthritis [1] ☐ Yes [2] ☐ No

27.04 Osteomylitis [1] ☐ Yes [2] ☐ No

27.05 Prostatic abscess [1] ☐ Yes [2] ☐ No

27.06 Liver abscess [1] ☐ Yes [2] ☐ No

27.07 Splenic abscess [1] ☐ Yes [2] ☐ No

27.08 Meningoencephalitis [1] ☐ Yes [2] ☐ No

27.09 Brain abscess [1] ☐ Yes [2] ☐ No

27.10 Pyelonephritis/UTI/Perinephric Abscess [1] ☐ Yes [2] ☐ No

27.11 Others [1] ☐ Yes [2] ☐ No

Specify _____

_____

INVESTIGATION

28.00 **Investigation Findings**

28.01 Hb [ ][ ] . [ ] g/dL

28.02 WBC [ ][ ] x 1000/mL

28.03 Platelet [ ][ ][ ] x 1000/ mL

28.04 PT Patient [ ][ ] Control [ ][ ]

28.05 PTT Patient [ ][ ][ ] Control [ ][ ][ ]

28.06 INR [ ][ ] . [ ]

28.07 RBS [ ][ ] . [ ] mmol/L

UFEME

28.08 WBC [1] [ ] 1+ [2] [ ] 2+ [3] [ ] 3+ [4] [ ] 4+

28.09 RBC [1] [ ] 1+ [2] [ ] 2+ [3] [ ] 3+ [4] [ ] 4+

28.10 Protein [1] [ ] 1+ [2] [ ] 2+ [3] [ ] 3+ [4] [ ] 4+

28.11 Urea [ ][ ] mmol/L

28.12 Creatinine [ ][ ][ ] umol/L

Bilirubin

28.13 Conjugated [ ][ ][ ][ ] umol/L

28.14 Unconjugated [ ][ ][ ][ ] umol/L

28.15 Albumin [ ][ ][ ][ ] g/L

28.16 Globulin [ ][ ][ ][ ] g/L

28.17 AST [ ][ ][ ][ ] U/L

28.18 ALT [ ][ ][ ][ ] U/L

28.19 ALP [ ][ ][ ][ ] U/L

28.20 CXR

USG Abdomen (Looking for abscess)

28.21 Liver abscess [1] [ ] Single [2] [ ] Multiple [3] [ ] Normal

28.22 Spleenic abscess [1] [ ] Single [2] [ ] Multiple [3] [ ] Normal

28.23 Kidney abscess [1] [ ] Single [2] [ ] Multiple [3] [ ] Normal

28.24 Prostate abscess [1] [ ] Single [2] [ ] Multiple [3] [ ] Normal

28.50 Other finding: _____

_____

_____

28.25 CT Scan

29.00 **Culture**

29.01	Blood	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
29.02	Tissue	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
29.03	Urine	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
29.04	Wound	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
29.05	Sputum	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
29.06	Stool	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
29.07	Others:						
	.....	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
	.....	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done
	.....	[1]	☐ Positive	[2]	☐ Negative	[3]	☐ Not done

30.00 **Sensitivity**

30.01	Ceftazidime	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.02	Augmentine	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.03	Bactrim	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.04	Tetracycline	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.05	Imipenam	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.06	Sulperazone	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.07	Gentamycin	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.08	Chloramphenicol	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done
30.09	Ciprofloxacin	☐ Sentitive	☐ Intermediate	☐ Resistance	☐ Not done

31.00 **Serology** [1] ☐ Done [2] ☐ Not Done

		1st specimen	2nd specimen
31.01	Mixed	1/ ☐☐☐☐	1/ ☐☐☐☐
31.02	IgM	1/ ☐☐☐☐	1/ ☐☐☐☐
31.03	IgG	1/ ☐☐☐☐	1/ ☐☐☐☐

32.00 **Polymerase Chain Reaction** [1] ☐ Positive [2] ☐ Negative [3] ☐ Not done

CURRENT TREATMENT

		Emperical Antibiotics (if applicable)	Dose	Duration
33.00				

		Intensive Phase	Dose	Duration
34.00	☑			
34.01	☐	Ceftazidime		
34.02	☐	Amoxycillin-clavulinic		
34.03	☐	Cefoperazone-sulbactam		
34.04	☐	Trimethoprim-sulfamethoxazole		
34.05	☐	Doxycycline		
34.06	☐	Imipenam		
34.07	☐	Meropenam		
34.08	☐	Ciprofloxacin		
34.09	☐	Others (Specify:)		
34.10	☐	Others (Specify:)		
34.11	☐	Others (Specify:)		

		Maintenance Phase	Dose	Duration
35.00	☑			
35.01	☐	Amoxicillin-clavulinic		
35.02	☐	Chloramphenicol		
35.03	☐	Trimethoprim-sulfamethoxazole		
35.04	☐	Doxycycline		
35.05	☐	Ciprofloxacin		
35.06	☐	Others (Specify:)		
35.07	☐	Others (Specify:)		
35.08	☐	Others (Specify:)		

Final Clinical Outcome

36.00
- [1] ☐ Discharge well
- [2] ☐ Dead
  - Date of death ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY
- [3] ☐ AOR Discharge
- [4] ☐ Transfer to hospital _____

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**
- [1] ☐ Suspected
- [2] ☐ Probable
- [3] ☐ Confirmed

37.05 **Type of case**
- [1] ☐ Sporadic
- [2] ☐ Outbreak

38.00 EXPOSURE HISTORY

38.01 **Date of onset** ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY

Movement History During Incubation Period

Date	Activity

38.02 **Type of exposure**
- [1] ☐ Occupational (specify) ☐
- [2] ☐ Recreational (specify) ☐
- [3] ☐ Accidental (specify) ☐
- [4] ☐ Unknown
- [5] ☐ Others (specify) ☐

Date of exposure ☐☐ DD ☐☐ MM ☐☐☐☐ YYYY

38.03 **Duration of exposure** ☐

38.04 **Mode of transmission**
- [1] ☐ Inhalation
- [2] ☐ Direct contact
- [3] ☐ Aspiration
- [4] ☐ Ingestion
- [5] ☐ Unknown
- [6] ☐ 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

40.01	**Active case detection**	[1]	☐ Done	[2]	☐	Not Done
40.02	**Passive case detection**	[1]	☐ Done	[2]	☐	Not Done
40.03	**Disinfection**	[1]	☐ Done	[2]	☐	Not Done
40.04	**Animal control**	[1]	☐ Done	[2]	☐	Not Done
40.05	**Closure of premise**	[1]	☐ Done	[2]	☐	Not Done
40.06	**Health education**	[1]	☐ Done	[2]	☐	Not Done

41.00 HEALTH EDUCATION ACTIVITIES

41.01	**Number of health talks given**	☐☐☐☐
41.02	**Number of discussion session**	☐☐☐☐
41.03	**Number of demonstration done**	☐☐☐☐
41.04	**Numbers of pamphlets distributed**	☐☐☐☐
41.05	**Numbers of posters disseminated**	☐☐☐☐
41.06	**Number of banners fixed**	☐☐☐☐
41.07	**Number of press conference**	☐☐☐☐
41.08	**Number of community activities**	☐☐☐☐

42.00 ENVIROMENTAL SAMPLING

42.01	**Number of water samples**	[1]	☐ Positive	[2]	☐	Negative	[3] ☐	Not done
42.02	**Number of soil samples**	[1]	☐ Positive	[2]	☐	Negative	[3] ☐	Not done
42.03	**Others (specify)**							
	☐	[1]	☐ Positive	[2]	☐	Negative	[3] ☐	Not done
	☐	[1]	☐ Positive	[2]	☐	Negative	[3] ☐	Not done

43.00 **COMMENTS BY INVESTIGATING OFFICER**

Signature :

Name and designation of reporting officer:

Date : DD MM YYYY

44.00 **COMMENTS BY SUPERVISOR**

Signature :

Name and designation of reporting officer:

Date : DD MM YYYY

45.00 **COMMENTS BY MEDICAL OFFICER OF HEALTH**

Signature :

Name and designation of reporting officer:

Date : DD MM YYYY

Appendix 9
BKP/WABAK/01/2005

BORANG LAPORAN AWAL WABAK

Sumber laporan wabak: Tarikh terima:

<table>
<tr><td colspan="6">1. Penyakit:</td></tr>
<tr><td colspan="2">2. Tarikh Onset/ Masa</td><td></td><td colspan="3">3. Tarikh /Masa Notifikasi:</td></tr>
<tr><td colspan="6">4. Tempat Berlaku:</td></tr>
<tr><td colspan="6">5. Definisi kes:</td></tr>
<tr><td colspan="6">6. Bilangan orang terlibat:</td></tr>
<tr><td colspan="2">a) Status Kes</td><td>b) Kumpulan Umur</td><td colspan="3">Jumlah Kes</td></tr>
<tr><td rowspan="6">-bilangan terdedah:

- Bilangan kes
i) suspect:

ii) probable:

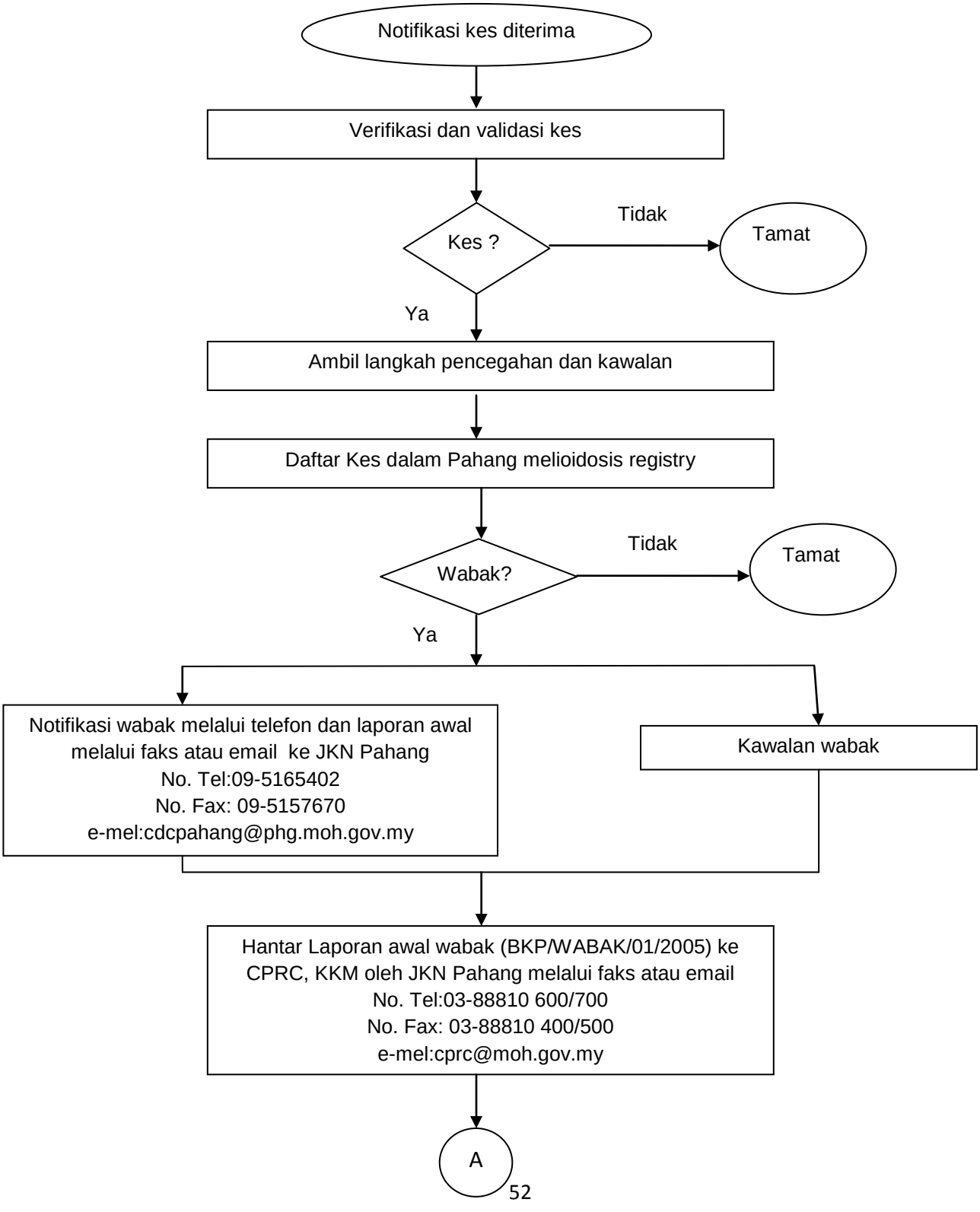
iii) confirmed:</td><td rowspan="6">- bilangan dirawat:

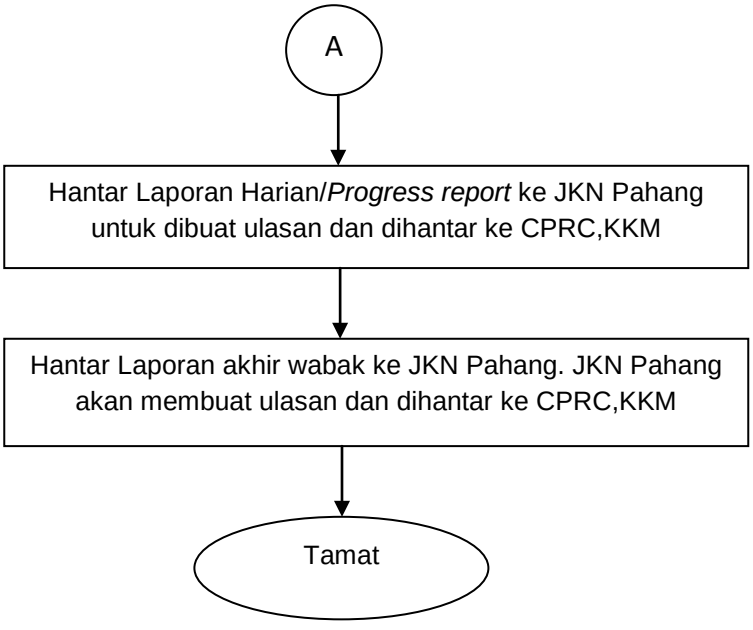
- bilangan masuk wad:

-bilangan mati:</td><td>0-1 tahun</td><td>Lelaki</td><td>Perempuan</td></tr>
<tr><td>>1-5 tahun</td><td></td><td></td></tr>
<tr><td>6-18 tahun</td><td></td><td></td></tr>
<tr><td>19-50 tahun</td><td></td><td></td></tr>
<tr><td>>50 tahun</td><td></td><td></td></tr>
<tr><td>Jumlah keseluruhan</td><td></td><td></td></tr>
<tr><td colspan="6">7. Gejala klinikal : (secara ringkas yang merangkumi majoriti pesakit)</td></tr>
<tr><td colspan="6">8. Hasil siasatan:</td></tr>
<tr><td colspan="6">9. Tindakan pencegahan dan kawalan yang diambil:</td></tr>
<tr><td colspan="6">10. Ulasan Pegawai Kesihatan Daerah:</td></tr>
<tr><td colspan="6">11. Ulasan Pegawai Epidemiologi Negeri:</td></tr>
<tr><td colspan="3">12. Pegawai Pelapor (Daerah)
Nama:
Jawatan:
Alamat Pejabat:
Tarikh:</td><td colspan="3">13. Pegawai Penerima (Negeri)
Nama:
Jawatan:
Alamat Pejabat:
Tarikh:</td></tr>
</table>

Appendix 10

CARTA ALIR PENGENDALIAN NOTIFIKASI KES/ WABAK MELIOIDOSIS




A
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

Appendix 11

HEALTH HAZARD WARNING SIGNAGE

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 MEMPUNYAI FAKTOR RISIKO BERIKUT :

1. Kencing Manis (Diabetis)
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 PENCEMARAN KUMAN

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

PESANAN OLEH:

PEJABAT KESIHATAN DAERAH .....

GLOSSARY OF TERMS

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

ACKNOWLEDGEMENTS

The task force members of this guideline would like to express their gratitude and appreciation to the following for their contributions:

- Panel of external reviewers who reviewed the draft
- The Dean of Kuliyyah Medicine, UIAM Kuantan
- Staffs of Maran District Health Office
- Staffs of CDC Unit , Pahang State Health Department
- Hospital Directors of HTAA and HoSHAS