



CASE INVESTIGATION AND OUTBREAK MANAGEMENT FOR HEALTHCARE PERSONNEL: PERTUSSIS

**DISEASE CONTROL DIVISION
DEPARTMENT OF PUBLIC HEALTH
MINISTRY OF HEALTH MALAYSIA
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ABBREVIATIONS

AEHO	Assistant Environment Health Officer
CDC	Communicable Disease Control
C & S	Culture and Sensitivity test
DPT	Diphtheria – Pertussis - Tetanus vaccine
DTaP	Diphtheria - acellular Pertussis - Tetanus vaccine
IMR	Institute for Medical Research
MOH	Ministry of Health
NHPL	National Public Health Laboratory
PCR	Polymerase Chain Reaction Assay
VPD	Vaccine Preventable Diseases

Section1: Introduction

1.1 Background

Pertussis or whooping cough, a highly infectious respiratory tract infection was first identified in the 16th century. In 1906, Bordet isolated the causative organism of whooping cough, *Bordetella pertussis*.

It is an endemic disease, common among young children with outbreaks occur periodically. A marked decline has occurred in incidence and mortality rates during the past four decades primarily in communities where an active immunization programs are in placed and where good sanitation and hygiene practices as well as medical care are available.

Pertussis is one of the diseases covered by the Expanded Program on Immunization (EPI), with vaccinations given in the routine immunization service in the Western Pacific Region including Malaysia.

1.2 Epidemiology

Incidence of pertussis in Malaysia has been less than 1 per 100,000 populations for the past 15 years (figure 1). It is attributed by the good immunization coverage.

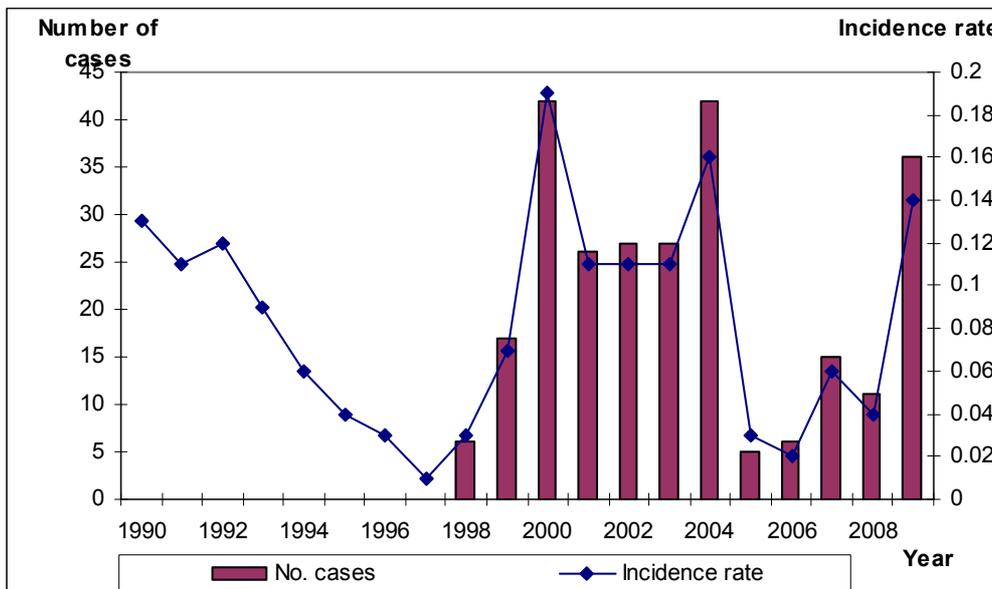


Figure 1: Number of pertussis cases in Malaysia, 1990 - 2009

Waning immunity leads to reservoir of susceptible adolescents and adults who may play a role in transmitting the pathogen to non-immunized children. Difficulty in diagnosing atypical presentation leads to problem in controlling pertussis

Section 2: Disease

2.1 Infectious agent

The disease is caused by *Bordetella pertussis*. It is a small aerobic gram-negative bacteria. Humans are the only host and reservoir.

Pertussis is highly contagious and is spread among people through respiratory droplets and by direct contact with fluids from the nose or mouth of infected people. People contaminate their hands with respiratory secretions from an infected person and then touch their own mouth or nose. In addition, small bacteria-containing droplets enter the air during coughing or sneezing of the infected person. People can become infected by breathing in these droplets.

The incubation period of the disease is 5 to 10 days (maximum is up to 21 days). The infectious period is at the beginning of the catarrhal period which is prior to cough onset and up to 21 days after the cough started. Antibiotics shorten the period of infectivity. When patient is on antibiotics, the infectious period is at the onset of cough until the 5th day of the 14 days of recommended antibiotic treatment.

Neonates and unimmunized infants are susceptible to pertussis, suggesting that maternal antibodies are insufficient to give protection against pertussis.

2.2 Clinical Presentation

The clinical course of the illness is divided into three stages: catarrhal, paroxysmal and convalescent (table 1). Infants are susceptible within the first week of life, when mortality from whooping cough is highest. In adolescents and adults, pertussis often presents like chronic bronchitis.

Table 1: Clinical course of pertussis

Stage	Manifestations	Duration
Catarrhal	<ul style="list-style-type: none"> • characterized by the insidious onset of coryza (runny nose), • sneezing, • low-grade fever, malaise, • mild conjunctival inflammation, and • a mild, occasional cough, similar to the common cold. The cough gradually becomes more severe but nonproductive 	Insidious onset Gradually worsening symptoms, lasted about 1 to 2 weeks
Paroxysmal	<ul style="list-style-type: none"> • Coughing spells with inspiratory whoop, • The whoop is often absent in infant under 6 month of age, teenage and adult • post-tussive gagging/vomiting/cyanosis <p>In infants younger than six months (especially those younger than four weeks): apnea, bradycardia, prolonged cough, poor feeding, no paroxysms.</p>	2 to 4 weeks. Weight loss, leukocytosis, and lymphocytosis are common
Convalescent	Gradual resolution of symptoms but recur with respiratory infections	Several weeks to months

2.3 Physical findings

- Fever is typically absent in all patients with pertussis.
- Physical examination contributes little to the diagnosis of uncomplicated pertussis,
- Most patients do not have signs of lower respiratory tract infection.
- Conjunctival hemorrhages and facial petechiae which is the result of intense coughing are common.

2.4 Differential diagnosis

- Mycoplasma infection
- Chlamydia infection
- Respiratory Syncytial Virus (RSV) infection
- Adenovirus infection

Summary of Clinical Manifestations and complication of pertussis is as shown in figure 2.

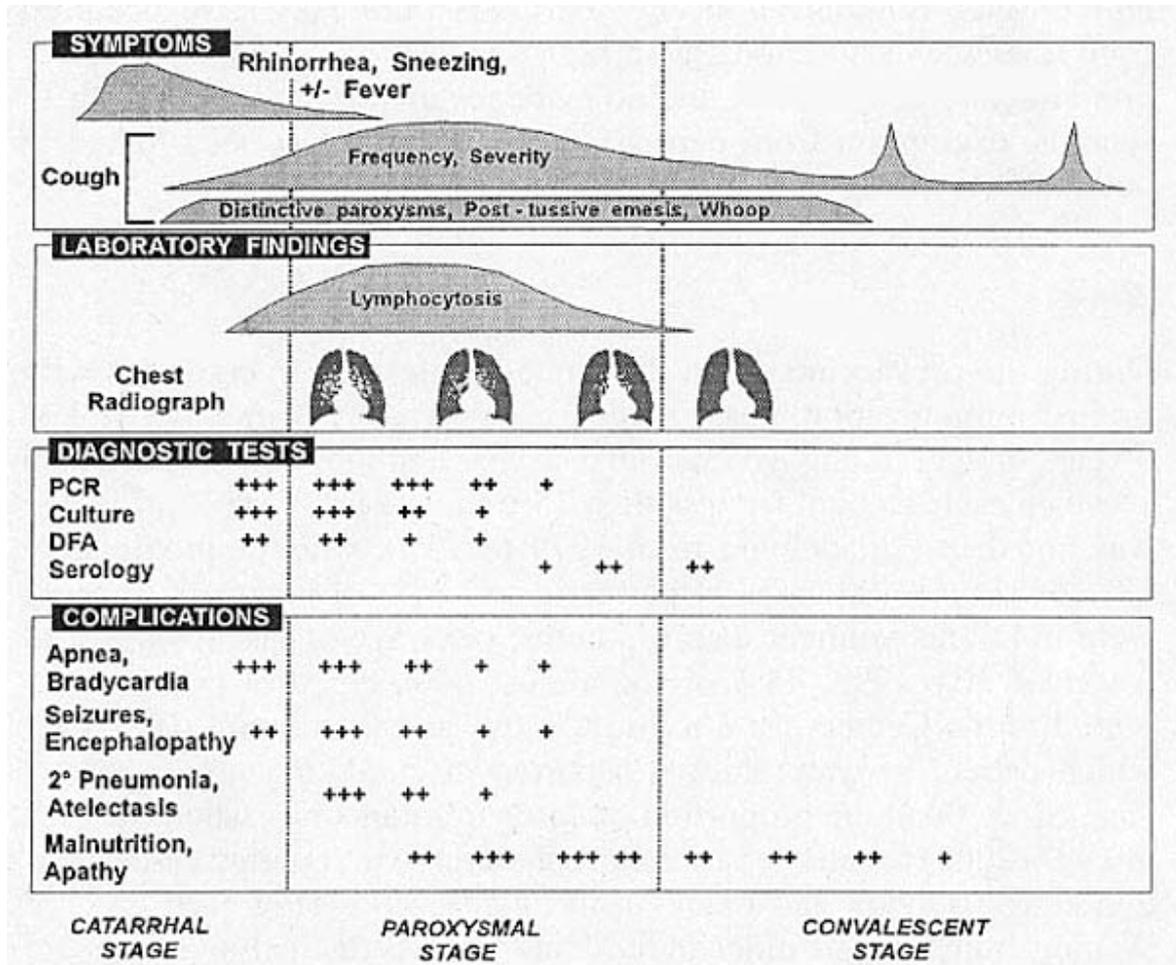


Figure 2: Manifestations and complications of pertussis

Persons with pertussis are infectious from the beginning of the catarrhal stage through the third week after the onset of paroxysms or until 5 days after the start of effective antibiotic treatment (figure 3).

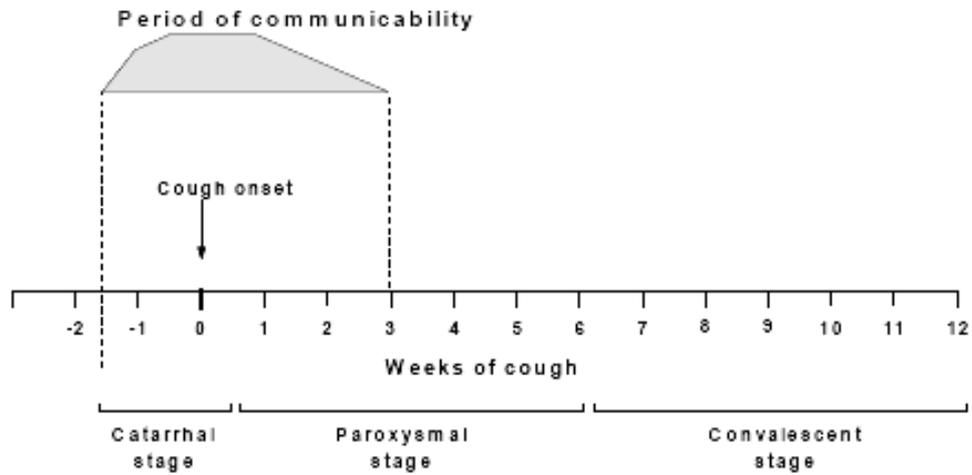


Figure 3: Stages of pertussis infection and period of communicability

Section 3: Disease surveillance

3.1 Objectives:

- i. To detect impending pertussis outbreak.
- ii. To monitor burden of pertussis in the country.

3.2 Case Definition:

Clinical case definition:

A person with a cough lasting at least 2 weeks

WITH *at least one of the following* :

- Paroxysmal coughing
- Inspiratory “whoop”
- Post-tussive vomiting

AND

without other apparent cause.

Laboratory criteria for diagnosis

isolation of *Bordetella pertussis* from the clinical specimen,

OR

positive polymerase chain reaction (PCR) assay for *B. pertussis*.

OR

positive paired sera for *B. pertussis*.

3.3 Case Classification

Suspected: A case that only meets the clinical case definition.

Confirmed:

- i. A clinical compatible case with *B. pertussis* isolation, OR
- ii. A case that meet the clinical case definition and is confirmed by PCR, OR
- iii. A case that meet the clinical case definition and is confirmed serology test with 4 fold rise of antibody in paired sera, OR
- iv. A case that meet the clinical case definition and is epidemiologically linked directly to a confirmed case (first generation contact) by either culture or PCR.

In an outbreak settings with two or more cases epidemiologically linked, a case may be defined as a case with cough illness lasting more than 14 days with or without additional symptoms.

Section 4: Laboratory diagnosis

The laboratory diagnosis of pertussis is carried out by detection of *B. pertussis* by either culture or polymerase chain reaction (PCR). Indirect diagnosis is made by serology, detecting specific antibodies in the serum of an infected person. In Malaysia, as per 2010, the indirect diagnosis is not established yet.

Culture is considered by WHO as the “gold standard” of laboratory case confirmation. This method of diagnosis is not very sensitive since the percentage of success is generally not higher than 60%. The highest rates are obtained with infants and non-vaccinated children. It is important to continue to culture in order to analyse the evolution of the pathogen and perform surveillance of eventual variants that might be antigenically different from vaccine strains.

The polymerase chain reaction (PCR) method is more sensitive and more rapid than bacterial culture. However it requires specialized equipment, special reagents and

trained personnel. PCR may be used as an alternative for a rapid diagnosis of pertussis. Below is the sensitivity and specificity of each test for confirmation of *B.pertussis* infection (table 2).

Table 2: Accuracy of Diagnostic Tests for Pertussis Infection

Test	Sensitivity (%)	Specificity (%)	PPV	NPV	Comments
<i>Bordetella pertussis</i> culture	15	100	100	88	Requires special culture media; takes seven to 12 days to receive results; up to 80 percent sensitive only in early disease; sensitivity is affected by antibiotics. The organism is fastidious and prompt processing of specimen is required. US CDC recommends detection of <i>B. pertussis</i> by PCR assay to confirm a pertussis diagnosis.
Polymerase Chain Reaction assay (PCR)	94	97	84	99	Can confirm diagnosis quickly (one to two days); not affected by antibiotics.
Serology	Variable	Variable	-	-	Not recommended.
Direct fluorescent antibody test	52	98	83	92	Requires specially trained personnel; can confirm diagnosis quickly; high false-positive rates; not recommended by the US CDC.

4.1 Isolation of *B. pertussis*

The gold standard laboratory test for diagnosis of pertussis is isolation of *B. pertussis* by culture (media used is either Regan Lowe charcoal agar media or Bordet -Gengou agar).

Isolation of the organism using direct plating is most successful during the catarrhal stage (first 1-2 weeks of cough).

4.1.1 Specimen collection and transport

- a. Pernasal swab or posterior nasopharynx specimen must be obtained. Throat swab should not be taken.
- b. A Dacron or calcium alginate (not cotton) swab on a soft flexible wire is passed through the nostril and along floor of the nasal cavity into the posterior nasopharynx, rotate the swab and withdraw it (Figure 2) OR let it be there for 15 to 30 seconds or until a cough is produced.
- c. Promptly inoculate the sample into special media (preferred are Regan-Lowe or Bordet-Gengou agar) and incubate for 7 days.

Note: *Negative culture findings are common in patients who were previously immunized or have received antibiotics therapy effective against B. pertussis and in patients in the late phase of the illness, beyond the first 2 weeks of illness.*

4.2 PCR assay for *B. pertussis*.

Polymerase chain reaction (PCR) is recommended to detect *B. pertussis*. It is better than specimen for culture as it detects antigen and is not affected by antibiotic treatment.

Specimens for PCR must be sent for all suspected pertussis cases. Specimens from hospitals should be sent to the Bacteriology Unit, Institute for Medical Research (IMR) and specimens from fields investigation and clinics should be sent to National Public Health Laboratory (NPHL), Sungai Buloh. Please refer to Ministry of Health's letter with serial number (16)dlm.KKM-171/BKP/09/43/0640 dated 22 March 2010.

4.2.1 Specimen collection and transportation

- a. Nasopharyngeal aspirate is the best specimen for PCR.
- b. Pernasal swab or posterior nasopharynx specimen can also be obtained. Do not send throat swab.
- c. To obtain a pernasal or posterior nasopharynx sample, a Dacron (not cotton) swab on a soft flexible wire is passed through the nostril and along floor of the nasal cavity into the posterior nasopharynx. The swab is rotated gently and withdrawn (figure 4) OR let it be there for 15 to 30 seconds or until a cough is produced.

- d. Never use calcium alginate swab or cotton-tipped swab to collect specimen for PCR. PCR assays may be inhibited by residues present in these materials
- e. Place the swab into the transport medium (Stuart's media) immediately as drying decreases recovery of the organism and send as soon as possible to the laboratory.
- f. Specimens should be stored and transported at 4°C and to reach the laboratory within 3 days.

Note: *Even when PCR method for diagnosing pertussis is established, culturing for B. pertussis should continue. This is especially important when an outbreak is suspected, because isolation of the bacterium confirms pertussis. Hospitals laboratories should retain the capability to culture pertussis.*

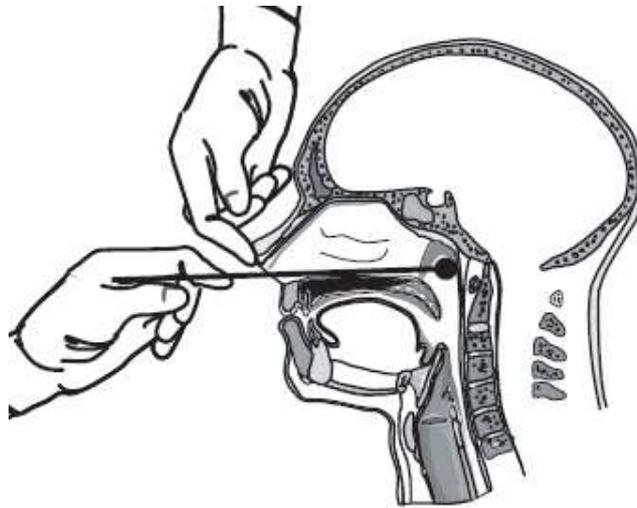


Figure 4 – Pernasal Swab
with appropriate positioning of a nasopharyngeal swab

Tip: Have patient sit with head against a wall as patients have a tendency to pull away during these procedures

4.3 Serology for *B. pertussis*.

Positive paired serology test can be used to determine the pertussis cases. However, this method is not recommended.

Section 5: Disease Reporting and Case Investigation

5.1 Purpose of reporting and investigation

- i. To investigate case, identify and evaluate contacts and recommend appropriate preventive measures, including exclusion, antibiotic prophylaxis and/or immunization.
- ii. To assist in the diagnosis of cases.
- iii. To educate exposed persons regarding signs and symptoms of the disease, thereby facilitating early diagnosis.
- iv. To identify situations of under vaccination or vaccine failure.

5.2 Reporting and Follow-up

5.2.1 What to report to District Health Office

Any case of suspected pertussis must be notified to the nearest District Health Office within 7 days from the date of diagnosis. Flow of diagnosis is as below (figure 5):

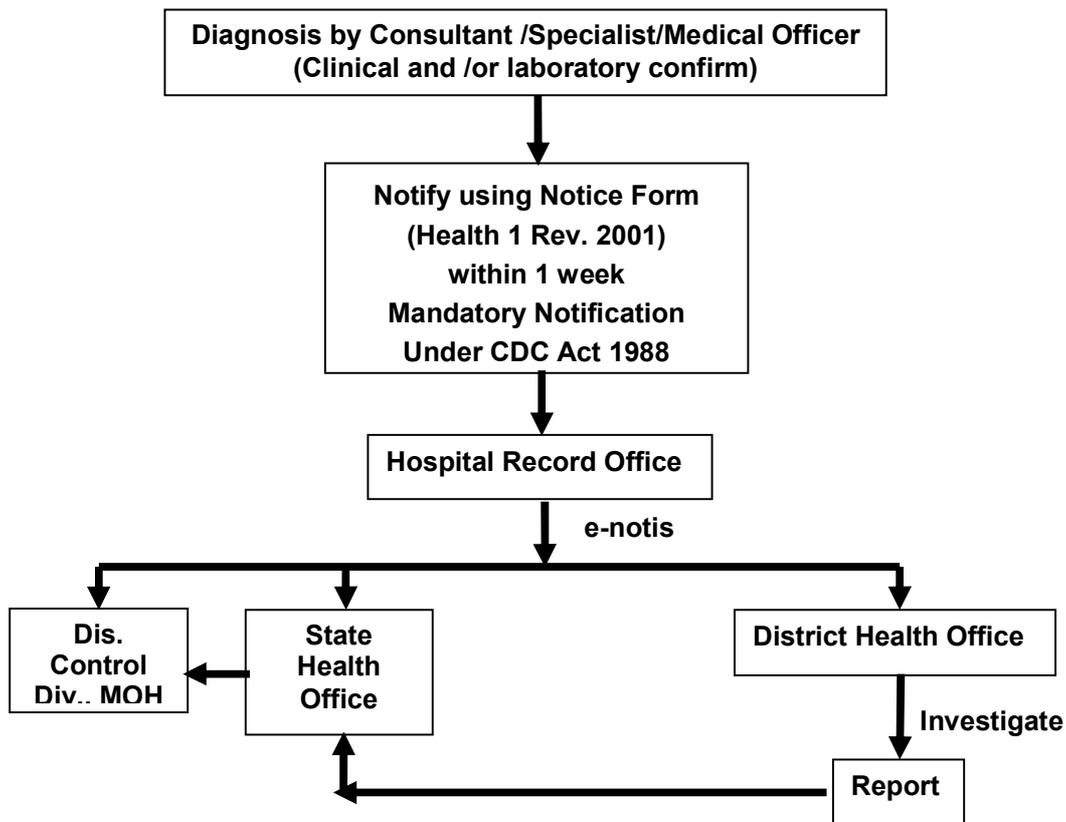


Figure 5: Flow of information for pertussis notification

B. parapertussis causes a pertussis-like illness that is generally milder than pertussis because the bacteria do not produce pertussis toxin. Co-infection of *B. pertussis* and *B. parapertussis* is not unusual. Disease attributable to *Bordetella parapertussis* is not notifiable.

5.3 Case Investigation

- a. In order to assess the likelihood a suspected case is a true case prior to laboratory testing, public health staff should collect necessary information using Pertussis Case Investigation Form (see attachment A) including the contact worksheet.
- b. Investigate all contacts and possible source of infection. A search for early and missed atypical cases is indicated where a non-immune infant or young child is or might be at risk.
- c. It is important that information on the duration of cough be obtained, especially if the first interview is conducted within 14 days of cough onset and cough is still present. In these circumstances, a follow-up interview after 14 days of onset must be conducted to identify persons with 14 days cough duration.

5.4 Outbreak investigation

- **Definition of an outbreak**

Two or more cases clustered in time (occurring within 42 days of each other) and space (in one child care center / class). The outbreak case definition may be used to count cases if one case has been confirmed.

Investigate cases and their contacts as stated above.

Develop a line listing of the cases and their contacts for easy reference.

5.5 Identify Contacts

5.5.1 Identify close contacts that had significant exposure to the case during the infectious period. "Close Contact " is defined as:

- Direct face-to-face contact for a period (not defined) with a case-patient who is symptomatic

- Shared confined space in close proximity for a prolonged period of time such as more than 1 hour with a symptomatic case-patient; e.g. household contacts, family members, classmates, bus seat-mates etc.
- Direct contact with respiratory, oral or nasal secretions from a symptomatic case-patient (e.g., an explosive cough or sneeze in the face, sharing food, sharing eating utensils during a meal, kissing, mouth-to-mouth resuscitation, or performing a full medical exam including examination of the nose and throat).

5.5.2 Examine all high risk contacts for pertussis symptoms.

5.5.3 Treat /give prophylaxis to close contacts of case with the following as a guide:

- If symptomatic people are already beyond their infectious period, which ends 21 day after cough onset, treatment is not of use. However they should be referred for medical evaluation.
- For asymptomatic individual, if their last exposure occurred beyond 21 days, prophylaxis is not needed.
- Precaution when treating or giving prophylaxis to newborns: an association between orally administered erythromycin and infantile hypertrophic stenosis (IHPS) has been reported in infants less than 6 weeks of age. Physician who prescribes erythromycin to newborn infants should inform parents about potential risk of developing IHPS and signs of IHPS e.g. projectile vomiting or excessive irritability.

Section 6: Control of Patient and Contacts

6.1 Isolation and Quarantine requirements

i. Isolation

- **Minimum Period of Isolation of Patient**
 - Respiratory isolation for known cases. Suspected cases should be removed from the presence of young children and infants, especially non-immunized infants, until the patients have received at least 5 days of a minimum 14-day course of antibiotics. Suspected cases who do not receive antibiotics should be isolated for 3 weeks.
- **Minimum Period of isolation of Contacts**
 - If contact is symptomatic, then use the same restriction as for cases.

- If contact is an asymptomatic healthcare worker not receiving prophylaxis, then exclude from workplace for 21 day after last exposure or if unknown, for 21 days after the onset of the last case setting
- If the contact is asymptomatic, not a health care worker, and exposed within the 21 days, patient should receive antibiotic prophylaxis but no isolation is generally required.

ii. Quarantine:

- Inadequately immunised household contacts less than 7 years of age should be excluded from schools, day care centers and public gatherings for 21 days after last exposure or until the cases and contacts have received 5 days of a minimum 14 - day course of appropriate antibiotics.

6.2 Treatment / Prophylaxis regime

Treatment reduces transmission and is essential for disease control. The spread of pertussis can be limited by decreasing the infectivity of the patient and by protecting close contacts. Persons with pertussis are infectious from the beginning of the catarrhal stage through the third week after the onset of paroxysms or until 5 days after the start of effective antibiotic treatment.

Antimicrobial treatment does not generally lessen the severity of disease unless it is begun in the catarrhal phase, prior to paroxysmal coughing. If treatment begins later in the course of illness, it may not decrease symptoms but it will decrease the period of infectiousness. The recommended antimicrobial agents and doses are the same for treatment and chemoprophylaxis (table 3).

It is generally recommended to provide prophylaxis to individuals/groups with significant exposure to a confirmed case-patient. It is important to determine if there are any patterns of interaction that would increase exposure time among a group. Providing prophylaxis to an entire school or child care center vary according to the extent of exposure, the presence/absence of other coughing persons in the class, any other reported pertussis cases in the area and presence of high-risk individuals or unvaccinated young children.

The need for prophylaxis in the following high risk groups is particularly important:

- i. infants
- ii. non-immunized children
- iii. immunocompromised individuals
- iv. pregnant women
- v. individuals with chronic respiratory illness, including asthmatics

Table 3: Antimicrobial Agents for Treatment and Prophylaxis of Pertussis

DRUG	INFANT < 6 MONTHS	INFANT ≥6 MONTHS AND CHILDREN	ADULT
<p>Erythromycin</p>	<p>≤ 30 days of age: not preferred as it is associated with infantile hypertrophic pyloric stenosis, Use if azithromycin is unavailable. Dosage is 40 – 50 mg/kg per day in 4 divided doses for 14 days.</p> <p>1 – 5 months of age: 40-50 mg/kg/day divided into 4 doses, for 14 days.</p>	<p>40-50 mg/kg/day in 4 divided doses, for 14 days (maximum 2 g/day)</p>	<p>2 g/day in 4 divided doses, for 14 days.</p>
<p>Clarithromycin For those unable to tolerate erythromycin.</p> <p>Not recommended during pregnancy.</p>	<p>Not recommended for use in infants <1 month of age; for infants ≥1 month of age use child dose.</p>	<p>15 mg/kg/day divided into 2 doses, for 7 days (maximum 1 g/day).</p>	<p>1 g per day in 2 divided doses for a minimum of 7 days.</p>
<p>Azithromycin</p> <p>5-day course. For those unable to tolerate erythromycin.</p>	<p>Preferred anti-microbial for use in children <1 month of age; 10 mg/kg per day in a single dose for 5 days.</p> <p>for infants ≥1 months of ag; 10 mg/kg/day in a single dose for 5 days.</p>	<p>10 mg/kg/day on the first day, then 5 mg/kg once daily for next 5 days (maximum 500 mg).</p>	<p>500 mg on the first day, then 250 mg once daily for next 5 days.</p>
<p>Trimethoprim-Sulfamethoxazole (Bactrim®, Septra®)</p>	<p>Should not be used for children <2 month of age (risk of kernicterus); for infants ≥2</p>	<p>TMP 8 mg/ kg per day, SMZ 40 mg/ kg/day in 2 divided doses, for 14 days.</p>	<p>TMP 320 mg per day, SMZ 1600 mg per day in 2 divided doses, for 14 days.</p>

Alternative choice. Not recommended during pregnancy.	months of age, TMP 8 mg/kg per day, SMZ 40 mg/kg per day in 2 divided doses, for 14 days.		
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6.3 Control in Healthcare Settings

Due to the potential higher risk of transmission and complications from pertussis among individuals within a health care setting, exposure criteria and control measures are more rigorous than other setting.

Control measures should be implemented when one or more cases of pertussis are recognized in a hospital, institution, outpatient clinic, or other health-care setting. Confirmed and suspected cases should be reported to local and/or state health departments.

1. Apply the control measures below to all patients, families and staffs in close contact with confirm case. In health care setting “ close contact’ includes:
 - having face to face contact, within 3 feet of the case, without wearing a surgical mask, Close contact includes activities such as performing a physical examination, suctioning, intubation, bronchoscopy, feeding, bathing, and other procedures requiring prolonged or close interaction
 - coming into mucosal contact with respiratory, oral or nasal secretion of the case directly .
 - sharing a room with case : degree of contact and risk infection in such situation should be evaluated on case-by- case basis.
2. Treat the case according to the schedule in 5.5.3 above. Treatment is unnecessary if more than 21 days have elapsed since cough onset.
3. Give antibiotic prophylaxis to contacts of any confirmed case, as indicated.
4. In addition to notifying, inform department heads, infection control and other relevant personnel / department of confirmed cases.
5. Exclude close contacts as follows :
 - a. **Staff, Symptomatic:**
 - If it is ≤ 21 days since cough onset: exclude through the first 5 days of full course of antibiotic or , if not treated, for 3 weeks after cough onset.

- If it is > 21 days since cough onset: they are no longer infectious and no antibiotic treatment / exclusion is required.
- b. **Staff , Asymptomatic:**
 - If they are not on antibiotic prophylaxis, they should be monitored for early symptoms and signs of pertussis for 21 days after the onset of the last case setting. If they show symptoms suggesting pertussis infection, they should be placed on administrative leave and be treated with antimicrobials. ***If their last exposure occurred ≥ 21 days ago, prophylaxis/ exclusion in generally not required.***
 - c. **Outpatients, Symptomatic:**
Restrict from public activities for the first 5 days of full course of antibiotic therapy.
 - d. **Outpatients, Asymptomatic:**
No need to restrict their public activities.

HCW who practices standard and droplet precaution including wearing surgical mask during treating cases do not require prophylaxis.

6. Isolate all confirmed and suspected inpatient cases. They should be placed on droplet precautions i.e. wearing standard surgical mask and space out patients more than 3 feet until 5 days of full course of antibiotic therapy have been completed.
7. Surveillance for cough illness should continue through two incubation periods (42 days) after the date of cough onset in last case.

6.4 Assess the immunization status of close contact under age 7.

Contacts who are less than 7 years of age and are non-immunised or have received fewer than 4 dose of DPT or DTaP should, in addition to receiving antibiotic prophylaxis, have pertussis immunisation initiated or continued according following guidelines, as soon as possible after exposure :

- a. Give 1 st dose at ≥ 6 weeks of age ; doses 1,2 and 3 must be separated by at least 4 weeks
- b. Children who receive their 3rd dose of DPT or DTaP ≥ 6 month before exposure should receive the 4th dose at this time.
- c. Children who have received four doses of DTP /DTaP should get a booster of DTP /DTaP, unless a dose has been given within the last three years.

6.5 Exclude cases, suspect cases and contacts from school and works:

6.5.1 Cases :

- If it is ≤ 21 days since cough onset: exclude through the first 5 days of full course of appropriate antibiotics or if not treated, for 3 weeks after cough onset.
- If it is ≥ 21 days since cough onset: they are no longer infectious, no antibiotic treatment and exclusion is required.

6.5.2 Asymptomatic contacts:

- Asymptomatic contacts that chose not to take antibiotics may be considered for exclusion from child care or school for 21 days after their last exposure.
- If placed on antibiotics, they do not need to be excluded.

6.5.3 Symptomatic contacts:

- Should be referred to the physician for testing and/or prophylaxis.
- Should be placed on antibiotics and may return to school/work after 5 days of the 14 day course of antibiotic treatment has been completed.
- If the physician defers antibiotics until the diagnostic test results are available, the suspect individual should be excluded from school. When the results are negative, they may return immediately. However if results are positive, antibiotics are taken as defined above, with the individual being excluded for the first 5 days of the 14 - day course of treatment.

6.6 Preventive Measures

1. Educate the public, particularly parents of infants, about the dangers of whooping cough and on the advantages of initiating immunization at 2 months of age and adhering to the immunization schedule. This continues to be important because of the wide publicity given the relatively rare adverse reactions.
2. Evaluate the immunization coverage of the locality. Do mop-up if the coverage is less than 90%.

Active primary immunization against *B. pertussis* infection is recommended with 3 doses of pertussis vaccine consisting of a suspension of killed bacteria.

Routine childhood vaccination and post – exposure antimicrobial prophylaxis is the best preventive measures against Pertussis.

Section 7: Roles and Responsibilities

7.1 At hospital or clinic

Medical Officer:

- Any case diagnose as pertussis must be notified within 7 days.
- Notification should be done using the notification form and forwarded to Record Office (for hospital) or to District Health Office (for clinic).
- Ensure specimens are taken and sent to IMR / NPHL for PCR as well as for C & S at the hospital laboratory.

Record Officer:

- Notification received must be entered to the e-notis System within a day.

Link nurse:

- Ensure that the pertussis case and contacts
 - are given treatment / prophylaxis
 - abide to the infection control measures impose to them.

Assistant Environmental Health Officer (AEHO):

- Ensure that patients diagnosed as pertussis are notified.
- Assist the doctors/link nurse
 - In identifying close contacts
 - Ensuring contacts abide to the infection control measures impose to them and take prophylaxis.

7.2 At District Health Office

Assistant Environmental Health Officer (AEHO) – CDC:

- Notifications for all disease should be checked every morning.
- Pertussis cases must be investigated within 48 hours upon received notification, using the investigation form attached.
- Case must be registered within 7 days.
- Communicate with Sister/Matron of Health at district health office / health centre if case is confirmed pertussis.
- Identify contacts of confirmed case and refer to doctor for medical evaluation.

Sister of Health / Public Health Nurse

- Check the immunization coverage.
- Check the cold chain of the vaccine especially batch used for vaccinating the case.
- Mop-up vaccination if necessary.
- Assist AEHO in investigate the case.

Medical Officer of Health / District Epidemiologist:

- Summary report of the case investigation and submit to State Epidemiologist (CDC) for verification (format 1).

7.3 At State Health Office**State Epidemiologist (CDC):**

- Verify report.
- Send report to Vaccine Preventable Disease (VPD) Sector, MOH with comment.

7.4 At Ministry Level**VPD Unit**

- Verify report of confirmed pertussis cases.
- Update PCR report from IMR and NPHL to State Epidemiologists as and when get report from the institutions.
- Analyse pertussis cases regularly and share information with others.

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**BAHAGIAN KAWALAN PENYAKIT
KEMENTERIAN KESIHATAN MALAYSIA**

BORANG SIASATAN PERTUSSIS

A. MAKLUMAT PESAKIT		
Nama Penuh (HURUF BESAR):		
Nama Ibu/Bapa/Penjaga (jika berumur di bawah 12 tahun):		
No. Pengenalan Diri:		
Warganegara Malaysia:	<input type="checkbox"/> Ya <input type="checkbox"/> Tidak	Keturunan: Negara asal: <input type="checkbox"/> Izin <input type="checkbox"/> Tanpa izin <input type="checkbox"/> Pemaustautin tetap
Jantina:	<input type="checkbox"/> Lelaki <input type="checkbox"/> Perempuan	
Tarikh lahir:	Umur:	<input type="checkbox"/> Hari / <input type="checkbox"/> Bulan / <input type="checkbox"/> Tahun
Alamat Kediaman:		
	Postkod:	Negeri:
Nombor telefon: Rumah:		Pejabat:
	Tel. Bimbit:	e-mail:
B. PEMBERITAHUAN		
Tarikh notifikasi:	Sumber notifikasi:	
	<input type="checkbox"/> Klinik kerajaan	<input type="checkbox"/> Klinik swasta
	<input type="checkbox"/> Hospital kerajaan	<input type="checkbox"/> Hospital swasta
	<input type="checkbox"/> Makmal kerajaan	<input type="checkbox"/> Makmal swasta
	<input type="checkbox"/> Komuniti	<input type="checkbox"/> Pencarian secara aktif
	<input type="checkbox"/> Kontak kes	<input type="checkbox"/> Lain-lain
Tarikh mendapatkan rawatan / masuk wad*:		
<i>*potong yang tidak berkenaan</i>		

C. MAKLUMAT KLINIKAL				
Batuk				
– Tarikh mula: ___/___/___				
Tempoh gejala batuk (tarikh dari mula gejala sehingga tarikh mendapatkan rawatan) : ___ hari				
	Ya	Tidak	Tidak diketahui	
Paroxysmal cough	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Inspiratory whoop	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Muntah selepas batuk	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cyanosis selepas batuk paroxysm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Apnea (exclude cyanotic episode)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Diagnosis : _____		Tarikh diagnosis: ___/___/___		
D. KOMPLIKASI				
	Ya	Tiada	Tidak diketahui	
Pneumonia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Seizure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Encephalopathy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Lain- lain: _____				
Status pesakit: <input type="checkbox"/> Hidup <input type="checkbox"/> Mati <input type="checkbox"/> Tidak diketahui				
Jika mati, tarikh mati: _____				
Sebab kematian: _____				
E. IMUNISASI (Untuk diisi bagi pesakit yang berumur < 15 tahun sahaja)				
Imunisasi DTP atau DTap <input type="checkbox"/> Ya <input type="checkbox"/> Tidak <input type="checkbox"/> Tidak diketahui				
Tarikh Imunisasi	Jenis	Tempat	Kod jenis vaksin	Kod Tempat menerima vaksinasi
1. ___/___/___	___	___	A. DTP	A. fasiliti kerajaan
2. ___/___/___	___	___	B. DTap	B. fasiliti swasta
3. ___/___/___	___	___	C. DTP/Hib	C. fasiliti kerajaan & swasta
4. ___/___/___	___	___		
Sumber maklumat imunisasi: <input type="checkbox"/> Kad <input type="checkbox"/> lisan <input type="checkbox"/> Buku rekod <input type="checkbox"/> Tidak diketahui				
Jika tiada vaksinasi, nyatakan sebabnya: _____				

F. DATA MAKMAL

Adakah ujian dilakukan bagi *Bordetella pertussis* Ya Tidak Tidak diketahui

Culture: Tarikh sampel diambil: ___/___/___

Keputusan:

PCR: Tarikh sampel diambil: ___/___/___

Keputusan:

IgM IgG Tarikh sampel diambil: ___/___/___ Keputusan:

Total Ig (M + G) Tarikh convalescent sample di ambil: ___/___/___ Keputusan:

Nota: Kenaikan 4 - kali ganda titer dari sampel convalescent boleh dipertimbangkan sebagai serologi positif bagi Whooping cough. Keputusan dari satu sampel tidak boleh diterima sebagai pengesahan makmal bagi suspected kes Whooping cough.

G. Rawatan

Adakah rawatan antibiotik diberi? Ya Tidak

Apakah antibiotik pertama yang diberi? _____

Tarikh mula: ___/___/___

Tempoh rawatan: ____ (hari)

H: Punca jangkitan disyaki:

Tadika	<input type="checkbox"/>	Jiran	<input type="checkbox"/>
Sekolah	<input type="checkbox"/>	Perjalanan ke luar Negara	<input type="checkbox"/>
Klinik	<input type="checkbox"/>	Lain- lain	<input type="checkbox"/>
Hospital	<input type="checkbox"/>	Tidak diketahui	<input type="checkbox"/>
Rumah	<input type="checkbox"/>		

I: Pergerakan dalam tempoh 3 minggu kebelakangan

Pegawai Penyiasat:

Disemak oleh:

Tarikh siasatan:

Tarikh:

Possible SPREAD from this Case (for JKN use)							
Household Members (list <u>all</u> siblings, adults, roommates etc.)							
Name	Age	Relationship to case	Name of school, day care centre, clubs, employer, baby sitter, etc.	Total doses of DTP - DTaP	Treatment	Date Started	Total Days Taken
Close Contacts (list <u>all</u> face to face non-household)							
Name	Age	Relationship to case	Name of school, day care centre, clubs, employer, baby sitter, etc.	Total doses of DTP - DTaP	Treatment	Date Started	Total Days Taken