

PSITTACOSIS (ORNITHOSIS)

CDNA National Guidelines for Public Health Units

Revision history			
Version	Date	Revised by	Changes
1.0	October 2015	Developed by the Psittacosis SoNG Working Group	

The Series of National Guidelines ('the Guidelines') have been developed by the Communicable Diseases Network Australia (CDNA) and noted by the Australian Health Protection Principal Committee (AHPPC). Their purpose is to provide nationally consistent guidance to public health units (PHUs) in responding to a notifiable disease event.

These guidelines capture the knowledge of experienced professionals and provide guidance on best practice based upon the best available evidence at the time of completion.

Readers should not rely solely on the information contained within these guidelines. Guideline information is not intended to be a substitute for advice from other relevant sources including, but not limited to, the advice from a health professional. Clinical judgement and discretion may be required in the interpretation and application of these guidelines.

The membership of CDNA and AHPPC, and the Commonwealth of Australia as represented by the Department of Health ('Health'), do not warrant or represent that the information contained in the Guidelines is accurate, current or complete. CDNA, AHPPC and Health do not accept any legal liability or responsibility for any loss, damages, costs or expenses incurred by the use of, or reliance on, or interpretation of, the information contained in the guidelines.

Endorsed by CDNA: 22 October 2015
Endorsed by AHPPC: 12 February 2016
Released by Health: 23 February 2016

PSITTACOSIS (ORNITHOSIS)

CDNA National Guidelines for Public Health Units

1. Summary

Public health priority

Sporadic cases: Routine. Action should be carried out as part of routine duties. Data entry should be completed within 5 working days.

Cluster / Outbreak: High. Act as soon as possible, generally within one working day. Data entry should be completed within 3 working days.

Case management

Appropriate antibiotics under direction of the treating doctor. Determine likely source of infection.

Contact management

Ask about unwell co-exposed coworkers, family, and friends to help identify cases that may be associated with an outbreak.

2. The disease

Infectious agent

*Chlamydia psittaci*¹⁻² (previously known as *Chlamydophila psittaci**) a gram negative obligate intracellular bacterium. *C. psittaci* is divided into eight serovars according to variation in the major outer membrane protein; serovar A to F, WC and M56.

Subsequently, eight corresponding genotypes based on the sequencing of variable domains of the outer membrane protein A (ompA) gene were defined, with the later addition of genotype E/B. Each serovar/genotype is associated to a varying degree with a particular animal host; A to F with avian hosts, WC and M56 with mammalian hosts. Human infection has been associated with all avian host serovars.³

Reservoir

Birds are the major zoonotic reservoir of *C. psittaci* which has been documented in 467 species in 30 bird orders worldwide.⁴ In practice, most human infections are associated with pet or wild psittacine birds (such as lorikeets, budgerigars, cockatiels and cockatoos) and farmed birds such as poultry.

Mode of transmission

Bird-to-bird

The disease in birds is referred to as avian chlamydiosis (AC). *C. psittaci* is excreted in the faeces and nasal discharges of infected birds. The organism can remain infectious for months if protected by organic debris such as cage litter or faeces. Infected birds, including asymptomatic birds may shed the bacteria intermittently for several months. Bacterial shedding can be exacerbated by stressors such as transportation, overcrowding and reproductive activities. Birds do not develop protective immunity and so may become reinfected.⁵

Bird-to-person

Humans usually become infected after inhaling *C. psittaci* which has been aerosolised from dried faeces, feather dust, or respiratory secretions (e.g. sneezed droplets) of infected birds, including birds which are asymptomatic carriers. Other

* The taxonomy of the organism has been subject to change; *Chlamydia psittaci* is the correct designation in 2015.

means of exposure include mouth-to-beak contact and possibly the handling of plumage and tissues of infected birds. Even brief exposures can lead to symptomatic infection.⁵⁻⁶

Person-to-person

Person-to-person transmission is rare, but has been reported, and includes instances of potential nosocomial transmission.⁷⁻¹⁰

Incubation period

Onset of illness follows an incubation period of 5-21 days,³ typically 10 days, but may be up to 4 weeks.¹¹ Immunity following infection is incomplete and transitory, so patients can be reinfected.

Infectious period

Person-to-person transmission has been reported only rarely, hence the infectious period is unknown.

Clinical presentation and outcome

Psittacosis can result in a range of clinical manifestations from asymptomatic infection through mild flu-like illness to systemic illness with severe atypical pneumonia. Persons with symptomatic infection typically have abrupt onset of headache, fever, chills, malaise, and myalgia. They also usually develop a non-productive cough that can be accompanied by breathing difficulty and chest tightness.^{3,11} A pulse-temperature dissociation (fever without elevated pulse), enlarged spleen, and rash are sometimes observed and are suggestive of psittacosis in-patients with community-acquired pneumonia.

C. psittaci can affect other organ systems and result in endocarditis, myocarditis, hepatitis, arthritis, keratoconjunctivitis, and encephalitis. Severe illness is rare in pregnant women, but can result in respiratory failure, thrombocytopenia, hepatitis, and foetal death.³

Persons at increased risk of disease

Persons at risk include bird owners, pet shop employees, and persons whose occupation places them at risk for exposure (e.g. employees in poultry slaughtering and processing plants, veterinarians, veterinary technicians, laboratory workers, taxidermists, workers in avian quarantine stations, farmers, wildlife rehabilitators, and zoo workers).⁵ Lawn mowing without a grass catcher and gardening have also been associated with disease transmission.¹²

Any age group can be affected, although children rarely present with clinically significant illness³. Immunocompromised people do not appear to be at increased risk of contracting the disease.⁵

Disease occurrence and public health significance

Between 2001 and 2014 there were 1687 notifications of psittacosis reported in Australia, with an average rate of 0.5 cases per 100,000 population. Rates peaked in 2003 and 2004 at 1.1 cases per 100,000 population for both years and were lowest in 2013 and 2014 at 0.1 cases per 100,000 population¹³ Rates in NSW and Victoria are generally higher than other states. Males are more commonly affected than females, which may represent higher occupational exposure or testing bias. Notifications are highest in people aged 40 years or older. This may reflect more severe disease in older age groups rather than a difference in incidence.

Psittacosis is endemic in some areas of Australia¹⁴, and outbreaks have been reported.^{112, 15-16} Cases may report only indirect contact with birds (i.e. seeing birds and their excreta in the local environment).^{12,16, 3}

3. Routine prevention activities

There is no vaccine available to protect against psittacosis. Prevention activities are focused largely on education of high risk groups such as staff of pet shops and poultry processing plants, as well as bird owners and/or breeders, trappers, veterinarians, zoo workers and taxidermists.

Pet shops and bird suppliers should contact their jurisdictional animal health agency for advice on quarantining new birds, management of infected birds, general hygiene and housing requirements for pet birds (see also Appendix 2: Avian chlamydiosis factsheet for bird carers and suppliers).

The psittacosis factsheet provides advice to the public about reducing the risk of household exposure to infected pet birds (see Appendix 1: Psittacosis (Ornithosis) Factsheet).

This advice includes:

- Wearing gloves, dust masks or P2 respirators and using a disinfectant (see section 12. Special situations) when cleaning areas where birds have had frequent contact, such as cages and bird feeders.
- Using a grass catcher on lawnmowers whilst mowing lawns and wearing dust masks or P2 respirators and eye protection.
- Avoiding feeding and handling wild birds.
- Seeking advice and treatment from a veterinarian as soon as pet birds develop signs of respiratory illness.

4. Surveillance objectives

To rapidly identify and control the source of infection.

To monitor the epidemiology of psittacosis in Australia to better inform prevention strategies.

5. Data management

Within 5 working days of notification enter confirmed and probable cases onto the notifiable diseases database. In the event of a re-infection, enter as a new case, as above.

6. Communications

- Jurisdictional Communicable Disease Branches (CDBs) should liaise with the jurisdictional animal health agencies about human cases to facilitate investigation of possible pet shop, wild bird, poultry or other bird sources.
- Suspected clusters or outbreaks (2 or more cases epidemiologically linked) in humans, linked to pet shops or bird breeders, should be reported to the jurisdictional CDB with the patient's age, sex, date of onset, laboratory status, possible sources of infection, other people thought to be at risk, and follow up action taken.

- Jurisdictional animal health agencies should report suspected clusters or outbreaks of avian chlamydiosis if there is associated human illness.
- De-identified cases and suspected outbreaks associated with commercial poultry farms and processing plants should be reported to the jurisdictional animal health agency.
- During a recognised outbreak in an endemic area, jurisdictional CDBs should provide advice to the public regarding protective practices.

7. Case definition

Reporting

Both confirmed cases and probable cases should be notified.

Confirmed case

A confirmed case requires laboratory definitive evidence AND clinical evidence AND epidemiological evidence.

Laboratory definitive evidence

A fourfold rise or greater in antibody titre against *Chlamydia psittaci* as demonstrated by microimmunofluorescence (MIF) on acute and convalescent sera (collected at least two weeks later) tested in parallel

OR

Detection of *C. psittaci* by nucleic acid testing or culture.

Clinical evidence

Pneumonia

OR

AT LEAST TWO of the following:

- fever,
- headache,
- myalgia,
- rigors,
- dry cough or
- dyspnoea.

Epidemiological evidence

Exposure to birds or bird products, or proximity to an outbreak of psittacosis.

Probable case

A probable case requires laboratory suggestive evidence AND clinical evidence AND epidemiological evidence.

Laboratory suggestive evidence

A single high total antibody level or detection of IgM antibody to *C. psittaci* by MIF

OR

A single high total antibody titre to Chlamydia species demonstrated by complement fixation (CF) in at least one sample obtained at least two weeks after onset of symptoms

OR

A fourfold or greater rise in antibody titre against Chlamydia species as demonstrated by CF.

Clinical evidence

As with confirmed case.

Epidemiological evidence

As with confirmed case.

The most recent Australian national notifiable diseases case definition for psittacosis can be found at the Department of Health website: (www.health.gov.au/casedefinitions).

8. Laboratory testing

Testing guidelines

The clinical presentation of psittacosis can be similar to other respiratory pathogens and laboratory suggestive or confirmatory testing is required as part of the case definition.

NAT testing of respiratory specimens is the preferred diagnostic method.¹⁷ Appropriate respiratory specimens include nasopharyngeal swabs, sputum specimens, and bronchoalveolar lavage specimens. *C. psittaci* is a biosafety risk group 3 organism and culture is not usually performed due to the inherent technical difficulties and biosafety concerns.

If culture is attempted, this should be performed in an appropriate physical containment level 3 (PC3) facility.¹⁸

Appropriate antibiotic treatment can delay or diminish the antibody response so a third serum specimen up to 8 weeks after the initial may be required to confirm diagnosis.

9. Case management

Response times

Investigation

Within 3 working days of laboratory notification determine whether case is probable or confirmed and begin follow-up investigation. Notify jurisdictional CDB when an outbreak is identified.

Response procedure

Case investigation

The response to a notification will normally be carried out in collaboration with the case's health carers. Regardless of who does the follow-up, for confirmed cases, PHU staff should ensure that action has been taken to:

- Confirm the onset date and symptoms of the illness.
- Confirm results of relevant pathology tests, or recommend that tests be done.
- Find out if the case or relevant care-giver has been told what the diagnosis is and seek the doctor's permission to contact the case or relevant care-giver (where possible) before beginning the interview.

- Interview case or relevant care-giver and obtain history, including possible exposures (i.e. occupational, recreational and travel).

Exposure Investigation

A history of exposure to birds, bird products or excreta from 4 days up to 4 weeks before onset of symptoms should be sought.

Pay particular attention to pet bird contact/ownership, occupations that would bring the case into contact with birds, or recreational activities including gardening that would result in these exposures. Ask about unwell co-exposed coworkers, family, and friends to help identify cases that may be associated with a common exposure or an outbreak.

Case treatment

This is the responsibility of the treating doctor. For the current recommended treatment, refer to the *Therapeutic Guidelines*.¹⁹

Education

The case or relevant care-giver should be informed about nature of infection and mode of transmission. The psittacosis and avian chlamydiosis factsheet should be provided, where relevant.

Isolation and restriction

Standard infection control procedures are sufficient.

Active case finding

Refer to section 12. Special situations.

10. Environmental evaluation

Birds that are suspected sources of human infection should be referred to a veterinarian for evaluation, testing and treatment by the owner. All birds with confirmed or probable avian chlamydiosis should be evaluated and managed by a veterinarian. To prevent reinfection, contaminated aviaries should be thoroughly cleaned and sanitised using routine protective measures (see section 12. Special situations). If the source of infection is a pet bird, obtain the history of ownership, date and place of acquisition, and bird's health history.

Sampling environmental surfaces in any setting is rarely warranted for single cases. Further advice can be obtained through the jurisdictional animal health agency, which can assist in identifying local avian veterinary expertise.

11. Contact management

Ask about unwell co-exposed coworkers, family, and friends to help identify cases that may be associated with an outbreak.

12. Special situations

Where a bird with probable or confirmed avian chlamydiosis (AC) linked to a human case has been acquired from a pet store, dealer or breeder within 60 days of the onset of signs of illness, an investigation should be undertaken to ensure that there is no ongoing risk associated with the source of the bird.

Special control measures may be necessary at pet stores that have been linked to case or cases of human psittacosis, or where there has been a recognised avian outbreak. Contact the jurisdictional CDB and liaise with the appropriate jurisdictional animal health or other designated agency for advice prior to proceeding with inspection. Store inspection may involve officers from the jurisdictional animal health agency, PHU and Local Government Environmental Health Officers. (see Appendix 3: Psittacosis Environmental Health Investigation Questionnaire).

Control measures typically include the isolation and management of sick birds. There is no public health or animal health requirement to destroy infected birds; however in many cases the owner may elect to euthanize the birds. Cleaning/disinfection of cages and other surfaces are required (see below). These measures should be undertaken on advice from and under supervision of a veterinarian. Where a pet store (include pet store bird suppliers) has been linked to human disease, the suppliers should be notified by telephone and by letter (see Appendix 6: Psittacosis: model letter to bird suppliers and pet shops). Also provide the Psittacosis (Ornithosis) Factsheet and Avian chlamydiosis factsheet for bird carers and suppliers.

Environmental decontamination

Where infected birds are identified or suspected, the following guidelines should be followed by bird keepers:

Personal protective equipment (PPE)

- Wash hands with soap and running water for 10 seconds before and after handling pet birds. Wearing gloves and a properly fitted P2 respirator (obtainable from pharmacies and hardware stores) are recommended when cleaning areas where sick birds have been contained, or where wild birds have been roosting. Cover cuts and abrasions before gloving. Always handle healthy birds before handling isolated or sick birds.
- Instructions on how to properly fit a P2 respirator are available from: http://www.health.qld.gov.au/chrisp/resources/Fit_Check.ppt

Disinfection

- *C. psittaci* is susceptible to most disinfectants and detergents as well as heat; however, it is resistant to acid and alkali. Appropriate disinfectants include quaternary ammonium disinfectants such as benzalkonium chloride, 3% hydrogen peroxide, alcoholic iodine solutions and 70% ethanol. Hospital grade disinfectants based on sodium hypochlorite are also suitable. A 1:100 (500ppm of chlorine) dilution should be prepared immediately before use, and discarded at the end of each disinfection session. Many disinfectants are respiratory irritants and should be used in a well-ventilated area. Avoid mixing disinfectants with any other product.
- Rooms and cages where infected birds were housed should be cleaned immediately and disinfected thoroughly. When the cage is being cleaned, transfer the bird to a clean cage. Thoroughly wash and scour the soiled cage with a detergent to remove all faecal debris, rinse the cage, disinfect it (allowing at least 5 minutes of contact with the disinfectant), and re-rinse the cage to remove the disinfectant. Discard all items that cannot be adequately disinfected (e.g., wooden perches, ropes, nest material, and litter).
- Minimise the circulation of feathers and dust by wet-mopping the floor frequently with disinfectant and preventing air currents and drafts within the area. Reduce contamination from dust by spraying the floor with a disinfectant or water before sweeping it. Do not use a vacuum cleaner, as it can aerosolise infectious particles. Frequently remove waste material from the cage (after moistening the material), and burn or double-bag the waste for disposal.

13. References and additional sources of information

1. Sachse K et al. (2015) Emendation of the family Chlamydiaceae: Proposal of a single genus, Chlamydia, to include all currently recognized species. *Syst Appl Microbiol* 38(2) 99-103.
2. Sachse K et al. (2015) Avian Chlamydiosis. *Current Clinical Microbiology Reports* 2(1):10–21 .
3. Stewardson AJ and Grayson ML. (2010) Psittacosis. *Infectious Disease Clinics of North America* 24(1):7-25.
4. Kaleta EF and Taday EM. (2003) Avian host range of *Chlamydophila* spp. based on isolation, antigen detection and serology, *Avian Pathology* 32(5):435-462.
5. National Association of State Public Health Veterinarians, USA, (2010) Compendium of Measures To Control *Chlamydophila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), (accessed November 2013). <http://www.nasphv.org/Documents/Psittacosis.pdf>
6. Rehn M, Ringberg H, Runehagen A, Herrmann B, Olsen B, Petersson AC, Hjertqvist M, Kühlmann-Berenzon S, Wallensten A. Unusual increase of psittacosis in southern Sweden linked to wild bird exposure, January to April 2013. *Euro Surveill.* 2013;18(19):pii=20478
7. Hughes C et al. (1997) Possible Nosocomial Transmission of Psittacosis. *Infection Control and Hospital Epidemiology* 18(3):165-168.
8. Ito I et al. (2002) Familial cases of psittacosis: possible person-to-person transmission. *Internal Medicine* 41(7):580-583.
9. McGuigan CC et al. (2012) Psittacosis outbreak in Tayside, Scotland, December 2011 to February 2012. *Eurosurveillance* 17(22):pii=20186.
10. Wallensten A, Fredlund H, Runehagen A. Multiple human-to-human transmission from a severe case of psittacosis, Sweden, January–February 2013. *Euro Surveill.* 2014;19(42)
11. Heymann DL (ed) *Control of Communicable Diseases Manual*. 20th Edition (2015) American Public Health Association
12. Telfer BL et al. (2005) Probable psittacosis outbreak linked to wild birds. *Emerging Infectious Diseases* 11(3):391-397.
13. National Notifiable Diseases Surveillance System http://www9.health.gov.au/cda/source/rpt_3.cfm (Accessed July 2015)
14. Branley JM et al. (2014) Clinical features of endemic community-acquired psittacosis. *New Microbes and New Infections* 2(1):7-12.
15. Yung AP and Grayson ML. (1988) Psittacosis – a review of 135 cases. *The Medical Journal of Australia* 148:228-233.
16. Williams J et al. (1998) Community outbreak of psittacosis in a rural Australian town. *The Lancet* 351(9117):1697-1699.
17. Branley JM et al. (2008) Real-time PCR detection and quantitation of *Chlamydophila psittaci* in human and avian specimens from a veterinary cluster. *European Journal of Clinical Microbiology and Infectious Diseases* 27(4):269-273.
17. Standards Australia Limited/Standards New Zealand (2010). Australian/New Zealand Standard. Safety in laboratories Part 3: Microbiological safety and containment AS/NZS 2243.3:2010.
18. Therapeutic Guidelines Ltd. (2012) Directed antibiotic therapy for pneumonia due to other pathogens. Melbourne: eTG complete [Internet]. Melbourne: Therapeutic Guidelines Limited. (accessed December 2013).

14. Appendices

Appendix 1: Psittacosis (Ornithosis) Factsheet

Appendix 2: Avian chlamydiosis factsheet for bird carers and suppliers

Appendix 3: Psittacosis Environmental Health Investigation Questionnaire

Appendix 4: PHU Psittacosis Checklist

Appendix 5: Psittacosis Disease Investigation Form

Appendix 6: Psittacosis: model letter to bird suppliers and pet shops

15. Jurisdiction specific issues

Links to State and Territory Public Health Legislation, the Quarantine Act and the National Health Security Act 2007.

<http://www.health.gov.au/internet/main/publishing.nsf/Content/cda-state-legislation-links.htm>

Note: Avian chlamydiosis is not notifiable in some states/territories; consult your jurisdictional animal health agency for further advice.

Appendix 1: Psittacosis (Ornithosis) Factsheet

Psittacosis (also known as ornithosis) is a disease caused by the bacterium *Chlamydia psittaci*, carried by birds. Humans most commonly catch the disease by inhaling dust containing feathers, secretions and droppings from infected birds. Older people generally experience more severe illness. This disease can be treated with antibiotics.

What is Psittacosis?

Psittacosis is an uncommon disease that is usually transmitted to humans from birds. It is caused by a bacterium called *Chlamydia psittaci*.

What are the symptoms?

The time from between human exposure to the bacteria and the development of symptoms varies from about five days to 4 weeks, but commonly 10 days. People with psittacosis often develop:

- headache
- fever
- chills
- weakness
- muscle aches
- a dry cough
- chest pain
- breathlessness

In severe cases, pneumonia develops. Rare complications may include encephalitis (inflammation of the brain), or myocarditis (inflammation of the heart muscle).

How is it spread?

Infection usually occurs when a person inhales bacteria, usually from dried droppings and mucous and feather dust from infected birds. People can also become infected by mouth-to-beak contact (kissing) with birds or by handling the feathers or tissues of infected birds. Psittacosis can be spread from person to person or from other animals to humans but this happens very rarely.

All birds are susceptible to infection, but pet birds, especially parrots (for example: budgies, lorikeets and cockatiels) are most frequently involved in passing the infection to humans. Human cases associated with commercial poultry flocks are very rare in Australia and usually occur in poultry workers. Contact with wild birds and their droppings can also cause infection. Outbreaks have been linked to breathing in dust stirred up by lawn mowers after being contaminated by wild bird droppings.

Who is at risk?

People most at risk of infection with psittacosis include bird owners and/or breeders, pet shop employees, and persons whose occupation places them at risk for exposure (e.g. employees in poultry slaughtering and processing plants, veterinarians, veterinary technicians, laboratory workers, workers in avian quarantine stations, taxidermists, farmers, wildlife rehabilitators and zoo workers). Lawn mowing and gardening have also been associated with psittacosis during outbreaks.

How is it prevented?

Birds may carry the infection without signs of illness, however the infection can also be fatal to birds. Sick birds may have signs such as:

- Diarrhoea
- Weakness
- Ruffled feathers
- Poor feeding
- Runny eyes or nose.

If in doubt, a vet should examine your bird. Infected birds respond to treatment in many instances but need to be isolated and placed on long course of antibiotic treatment and have their cages disinfected. Appropriate disinfectants include those with any of the following active ingredients:

- quaternary ammonium compounds (QACs) such as benzalkonium chloride;
- 3% hydrogen peroxide;
- alcoholic iodine solutions;
- 70% ethanol; or

- A hospital grade disinfectant based on sodium hypochlorite. A 1:100 dilution (10mL/L) should be prepared immediately before use, and discarded at the end of each disinfection session.

Many disinfectants are respiratory irritants and should be used in a well ventilated area. Avoid mixing disinfectants with any other product. Because birds can carry the organism without showing clinical signs it can be difficult to tell if a bird is infected, so to be safe:

- Only purchase birds from a licensed pet store or breeder.
- Wash your hands with soap and running water for 10 seconds before and after handling pet birds.
- Avoid kissing pet birds (mouth-to-beak contact).
- House birds in clean cages of ample size that are lined with newspaper that is changed frequently.
- Do not allow droppings in cages to build up, dry up or become airborne.
- Wear a P2 respirator (available from pharmacies and hardware or other stores), and gloves and dampen any bird droppings or cages, before cleaning the cage.
- Wash your hands after cleaning the cage.
- Take sick birds to a veterinarian as soon as possible.
- Wear a P2 respirator, gloves, disposable cap and protective clothing when dealing with infected birds. Instructions on how to properly fit a P2 respirator can be found here: http://www.health.qld.gov.au/chrisp/resources/Fit_Check.ppt

How is it diagnosed?

Your doctor can diagnose psittacosis by the symptoms, an examination and by doing some tests. Tests may include a chest x-ray, and taking some blood or respiratory samples to test for the bacteria.

How is it treated?

Psittacosis is treated with antibiotics for a period of up to two weeks.

What is the public health response?

Laboratories must confidentially notify cases of psittacosis to the local public health unit. Public health unit staff will talk to the treating doctor and patient or carer to identify where the infection may have come from. Other people who may have been exposed to an infected bird should be made aware of the symptoms of infection. The bird should be isolated and managed by a vet and its environment cleaned with disinfectant to prevent further infections being spread to other people or other birds.

Appendix 2: Avian chlamydiosis factsheet for bird carers and suppliers

Avian chlamydiosis is a bacterial disease caused by Chlamydia psittaci, which is carried commonly by birds. Humans can catch the disease by breathing in dust containing dried saliva, feathers, mucous and droppings from infected birds. Infection in humans is called psittacosis.

What is avian chlamydiosis?

Avian chlamydiosis (AC) is a disease of birds caused by the bacteria *Chlamydia psittaci*. AC is common in wild, caged and aviary birds. All birds can be infected by AC, but pet birds, especially parrots (e.g. budgies, lorikeets and cockatiels) most commonly pass infection to humans. Infection in humans causes psittacosis, which is frequently a mild flu-like illness that can sometimes result in a severe pneumonia.

How is it spread?

Spread between birds (and to people) occurs mainly through breathing in dust containing dried saliva, feathers, mucous and droppings from infected birds. Direct contact with feathers, bird droppings and litter, saliva and mucous, and contaminated food or water can also result in disease. The organism is resistant to drying and can remain infectious for several months if protected by organic debris (e.g. litter or faeces).

What are the signs of AC in birds?

The signs of AC vary depending on the species of bird and the strain of *C. psittaci* involved. Birds with an AC infection may not look sick and so can carry the disease for long periods. If they are sick (usually young birds), the signs can include:

- mucous or pus coming from the nostrils and eyes
- cough
- diarrhoea or dark green droppings
- poor feeding
- difficulty moving or flying
- death, which can sometimes be sudden with no warning signs.

Stress (e.g., from transport, or a new environment) may cause the appearance of clinical signs in birds that otherwise carry the organism without symptoms.

How is AC diagnosed and treated?

Several tests are available to confirm AC infection. These need to be discussed with your veterinarian. Testing can be done either when the bird is alive or when it is recently deceased. Infected birds need to be isolated, receive a long course of antibiotics and have their cages disinfected. Treatment is not always 100% effective at clearing the infection so AC can return after treatment is finished and the same bird can be re-infected with a different strain of *C. psittaci*. Treatment and control measures should be supervised by a veterinarian.

How can I prevent transmission and infection?

Educate persons at risk:

- All people in contact with birds or bird-contaminated materials should be aware of the potential health risks.
- Bird caretakers with respiratory or influenza-like symptoms should seek prompt medical attention and inform their health care provider about bird contact.

Be alert for symptoms

- Avoid purchasing or selling birds that have any clinical signs or appear unwell.
- Maintain accurate records of all bird-related transactions for at least one year to aid in identifying sources of infected birds and potentially exposed persons.
- Where possible, quarantine newly acquired birds for 30 days or test/treat them before adding to a group. Birds that have been to shows, exhibitions, fairs and other events should also be quarantined.

Practice preventive husbandry:

- Position cages so droppings, feathers, food, and other materials can't spread from one cage to another.
- Do not stack cages and use solid-sided cages or barriers if cages are adjoining.
- Ensure adequate ventilation and light in the room.
- Use litter that will not produce dust (e.g. newspaper).
- Clean all cages, food bowls, and water bowls daily.
- Use a disinfectant solution when cleaning. All surfaces should be thoroughly cleaned of organic debris (e.g. litter or faeces) before disinfection. Appropriate disinfectants are quaternary ammonium compounds such as benzalkonium chloride, 3% hydrogen peroxide, alcoholic iodine solutions or 70% ethanol. Hospital grade disinfectants based on sodium hypochlorite are also suitable. A 1:100 dilution (10mL/L) should be prepared immediately before use, and discarded at the end of each disinfection session.
- Empty soiled bowls, clean with soap and water, rinse, disinfect, and rinse again before reuse.
- Scrub cages with soap and water, disinfect and rinse in clean running water between use by different birds.
- Isolate sick birds and disinfect their cages under veterinary supervision. Recommend not to sell sick birds due to human health risk.

Protect yourself:

- Wash your hands with soap and running water for 10 seconds before and after handling birds.
- When cleaning cages or handling potentially infected birds, caretakers should wear appropriate protection to reduce exposure to dust without appropriate protection.

- Avoid very close contact with potentially infected birds or take appropriate measures to reduce the risk, such as gloves, protective eyewear, and a properly fitted P2 respirator (available from most pharmacies and hardware stores). Surgical masks are not effective in preventing transmission.
- Instructions for fitting a P2 respirator are available here: http://www.health.qld.gov.au/chrisp/resources/Fit_Check.ppt
- Wetting the litter before cleaning reduces the risk of disease.
- Always use disinfectants in a well ventilated area as they can irritate the nasal passages and lungs of both humans and birds

Appendix 3: Psittacosis Environmental Health Investigation Questionnaire*

Name of owner: _____

Business Name: _____

Address of the property: _____

Contact Details: (B) _____ (H) _____ (M) _____

Fax: _____ email: _____

Date of Investigation: _____ Previous Visits: _____

Officer/s: _____

1. Purchasing birds from breeders

What system is implemented to identify and track bird breeders? (e.g. records of date of purchase, species of birds, source of birds and any identified illnesses or deaths among birds).

What system is in place to ensure sick birds are not purchased? (e.g. who purchases birds, can they describe what to look for – eye and nasal discharge, diarrhoea or low body weight etc.)

What system is in place when birds are sold to pet shops/individuals? (e.g. seller should record the name, address, telephone number, date of purchase, species of birds purchased and band identifiers)

2. Pet shop/bird supplier stock

How many birds are kept on the premises on average? _____

Have any of your birds died on your premises in the past 6 months? Yes No

If yes, how many? _____

Were any of the deaths investigated? (e.g. Sent to a vet or laboratory for investigation?) Yes No

If yes, were any of these deaths attributed to avian chlamydiosis infections? Yes No

Have you had any vet consultations for sick birds in the past 6 months? Yes No

* Questions based on Psittacosis SoNG and the National Association of State Public Health Veterinarians (NASPHV) Compendium of Measures to Control *Chlamydoiphila psittaci* Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2010 (refer to Psittacosis SoNG for further details)

If yes, what was the diagnosis?

Owner to provide copies of any results

Vet Name/s: _____

Contact Number/s: _____

Address: _____

When did they visit? _____

Was any treatment prescribed? _____

Have all infected birds completed the treatment? Yes No

Are birds under treatment sold to the public? Yes No

Do you inform the purchaser of treatment required to prevent disease once the bird is taken home? Please describe. (Is there evidence of this provision of information?)

Describe the action taken to manage any birds suffering avian chlamydiosis infections over the last 6 months. (Treatment may include euthanasia of severely affected birds and / or disposal of dead birds. Action should include isolation, thorough daily cleaning with detergent and disinfection with 5 minutes contact time)

Have customers returned birds that died shortly after purchase to the store, in the last 6 months? Yes No

If yes, do you have a refund or replacement policy? Yes No (if yes, obtain a copy)

Do you check if the bird was in contact with any other sick or dead birds? Yes No

Do you check how many birds were purchased and how many have died? Yes No

3. Quarantine and isolation practices

Please describe your process for quarantining newly acquired birds? (How long are birds quarantined and where? An "all-in, all out" system should be implemented)

Please describe your process for isolating sick birds? (How long are birds isolated and where? An "all-in, all out" system should be implemented)

Are new birds tested for avian chlamydiosis infection before being caged with existing stock? Yes No

Are new birds that test positive, treated for avian chlamydiosis infection before being caged with existing stock? Yes No

Do any of your birds go to shows, exhibitions, fairs or other events? Yes No
If yes, are they quarantined upon return? Yes No

Please describe your process for quarantining returning birds? (How long are birds quarantined and where? An "all-in, all out" system should be implemented)

4. Husbandry Practices

Are all bird cages positioned to prevent the transfer of faecal matter, feathers, food and other materials from one cage to another? Yes No

If no, which are not? _____

Are cages ever stacked? Describe.

Is the bottom of all cages constructed from wire mesh? _____

Do all cages have solid sides or barriers for adjoining cages? _____

if no, which are not: _____

Is litter that will not produce dust used? (e.g. newspapers placed underneath the mesh)

Do you care for healthy birds before sick birds? Yes No

If No, do you remove personal protective equipment (PPE) and wash hands before caring for healthy birds? Yes No

5. Cleaning

How often are cages cleaned? (e.g. daily) _____

How often are food and water containers cleaned? (e.g. daily) _____

Please describe how faecal contaminated containers are cleaned (e.g. empty, clean with soap and water, rinsed, placed in disinfectant solution allowing at least 5 minutes contact, rinsed again before reuse)

Where do contaminated containers get cleaned in the premises?

Please describe the cleaning regime between bird cage occupancies? (e.g. cages scrubbed with soap and water, disinfected allowing at least 5 minutes contact, rinsed clean with running water)

Please describe cleaning products and equipment used?

(appropriate disinfectants include: quaternary ammonium disinfectants such as benzalkonium chloride, 3% hydrogen peroxide, alcoholic iodine solutions and 70% ethanol. Hospital grade disinfectants based on sodium hypochlorite are also suitable, a 1:100 dilution should be prepared immediately before use, and discarded immediately afterwards)

Who does the cleaning? _____

(confirm cleaning practices with this person) _____

Describe floor cleaning. (Do they wet mop or vacuum?)

When birds are treated for avian chlamydiosis, are items that cannot be cleaned, disposed of safely? (e.g. wooden perches, nest material, litter – burned or double bagged in rubbish bin)

What type of exhaust ventilation is available? _____

Additional Inspection Notes:

Are there any unwell birds in cages with avian chlamydiosis signs Yes No
(e.g. eye/nasal discharge, diarrhoea)

Schematic Diagram of premises:

6. Staff and PPE

How many staff? (include casuals) _____

Any severe respiratory illness in staff in last 6 months? Yes No

If yes, please describe? _____

Have staff been advised of the risks associated with working in a pet store? Yes No

Are staff trained in appropriate use of PPE and hand washing? Yes No

What type of PPE is available to staff? (e.g. protective clothing, dust masks or P2 respirators, gloves, glasses or goggles and paper surgical caps)

When do staff use PPE? (e.g. when cleaning/handling known sick/dead birds)

Do staff remove PPE and wash hands before moving to healthy birds? Yes No

Where is PPE stored?

Is there an adequate supply of PPE?

What procedures are in place to ensure staff wear PPE?

Were staff observed using or not using PPE? Yes No

Is there evidence of used and discarded PPE? (e.g. check bins inside and out)

Are there hand washing facilities available? Yes No

Are they accessible and unobstructed? (e.g. soap/hand towels/warm running water)

Were staff observed washing hands? Yes No

Does hand washing occur after working with sick/dead birds before moving onto healthy birds? Yes No

Environmental samples[†]: _____

Location: _____

[†]Environmental samples should only be taken if there is a prior arrangement with the public health laboratory and testing is agreed appropriate by the jurisdictional animal health agency

Appendix 4: PHU Psittacosis Checklist

Patient ID number: _____

Contact the patient's doctor to:

- Obtain patient's history
- Obtain patient's contact details and permission to contact the patient
- Confirm results of relevant pathology tests

Contact the patient (or care giver) to:

- Identify likely source of infection
- Confirm onset date and symptoms of the illness
- Provide with psittacosis factsheet and avian chlamydiosis factsheet (if relevant)

Contact laboratory to:

- Check samples received and obtain any outstanding results

Confirm case

- Assess information against case definition

Other issues:

- Report details of case and action plan to jurisdictional CDB
- Contact jurisdictional animal health agency or local government and PHU environmental health if pet shop exposure is a likely source
- Contact jurisdictional animal health agency if commercial poultry premises are a likely exposure source
- Enter case data onto notifiable diseases database
- During outbreaks, consider a media release, Chief Health Officer advisory or health alert

Appendix 5: Psittacosis Disease Investigation Form

PSITTACOSIS DISEASE INVESTIGATION FORM

(TO BE COMPLETED FOR SUSPECTED AND CONFIRMED CASES)

Case details		NDD no. _____	
Surname _____	Given name _____	Sex	M F
DOB ___/___/___	Age ___ yrs/___ mths		
Address _____			
Suburb _____	Postcode _____	Telephone _____	
Other contact _____		Telephone _____	
Occupation/school _____		Telephone _____	
Indigenous <input type="checkbox"/> Aboriginal <input type="checkbox"/> Torres St Islander <input type="checkbox"/> both Aboriginal and TSI <input type="checkbox"/> not Indigenous <input type="checkbox"/> not stated	Country of Birth <input type="checkbox"/> Australia <input type="checkbox"/> Other: <i>specify</i> _____	Language <input type="checkbox"/> English <input type="checkbox"/> Other: <i>specify</i> _____	
Disease			
Onset of First Symptoms ___/___/___		Time _____	
Fever >38°C	Y / N / Unknown		
Dry Cough	Y / N / Unknown If Yes: Productive / Non-productive		
Dyspnoea	Y / N / Unknown		
Headache	Y / N / Unknown		
Myalgia	Y / N / Unknown		
Rigors	Y / N / Unknown		
Other Symptoms	Y / N / Unknown Details _____		
CXR Performed?	Y / N / Unknown If Yes, date performed ___/___/___		
Description of CXR Findings _____			
Other Abnormal Findings _____			

Laboratory			
Lab confirmed	Y N	Specimen _____	Specimen date/(s) ___/___/___
Organism _____		ID method _____	
Notification			
First notifier _____		Telephone _____	Fax _____
Notifier type ___ Lab ___ Doctor ___ Hospital (not lab) ___ Other _____		Notified date ___/___/___	Received date ___/___/___
No. in order of receipt _____			
Treating doctor _____		Telephone _____	Postcode _____
Address _____		Fax _____	_____
Exposure History			

Direct contact with pet birds in 5-28 days before onset (e.g. hand feeding) Y / N / Unknown

If yes, obtain ownership history, date and place of purchase and bird health history

Indirect contact with wild birds in 5-28 days before onset Y / N / Unknown
(e.g. mowing lawns contaminated with bird faeces, cleaning bird feeders/bird baths, picking up dead birds)

If yes, obtain location, date, bird species and whether any dead birds were seen

Hospital Admission History (in Australia)

Hospitalised Y / N / Unknown

Hospital Name _____

Date Admitted ___/___/___

Date Discharged ___/___/___

Treating Doctor Name _____ Position _____

Contact No. _____

Isolation Y / N / Unknown

If Yes, dates of period of isolation ___/___/___ to ___/___/___

ICU Admission Y / N / Unknown

If Yes, dates of ICU stay ___/___/___ to ___/___/___

Mechanical Ventilation Y / N / Unknown

Co-morbidities Y / N / Unknown **If Yes, specify** _____

Treatment Details

Antibiotics (please list) _____

Other (please list) _____

Outcome (circle all that apply)

Confirmed as Psittacosis? Y / N

Alternative Diagnosis Made? Y / N **If Yes, specify** _____

If yes, was there supporting microbiological evidence? Y / N / Unknown

Details: _____

Case Recovered? Y / N / Unknown

Case Died? Y / N / Unknown

If yes, was an autopsy conducted?

Y / N / Unknown **If yes, results:** _____

Notes

Administration

Completed by

Date finalised ___/___/___

PHU

Appendix 6: Psittacosis: model letter to bird suppliers and pet shops

Name:
Address:
Date:

Dear <owner> <supplier>,

The <name> public health unit has been notified of a person with psittacosis. The recent case of psittacosis notified was exposed to a bird that was purchased at <name of place of purchase>. It is important to notify you so you can take appropriate action to protect your health and the health of your staff and your birds.

Psittacosis in humans is caused by exposure to birds infected with the bacteria *Chlamydia psittaci* (the disease is known as avian chlamydiosis in birds). Psittacosis causes a respiratory illness and can result in pneumonia and other serious complications.

Psittacosis in humans is notifiable to <state> health authorities, and cases are investigated by public health units. Public health follow up includes investigations to determine the source of the person's illness.

It is important to ensure that any staff in contact with birds are protected from possible illness and that good hygiene practices are followed to minimise the risk of infection.

It is recommended that any birds that are showing signs of illness be evaluated by a veterinarian and not be sold due to the human health risk.

For cages/aviaries which have held birds with confirmed avian chlamydiosis it is important to:

- Wear protective clothing including: gloves, overalls, P2 respirator (obtainable from pharmacies, hardware or other stores), and protective eyewear.
- Instructions for fitting a P2 respirator are available here: http://www.health.qld.gov.au/chrsp/resources/Fit_Check.ppt
- Wet down all surfaces and items in the cage/aviary to reduce dust.
- Carefully discard everything that cannot be disinfected such as perches, ropes, and nest-material.
- Thoroughly scrub the soiled cage/aviary with a detergent to remove all faecal debris, rinse the cage, apply a disinfectant (allowing five minutes contact), and re-rinse the cage. Appropriate disinfectants are quaternary ammonium compounds such as benzalkonium chloride, 3% hydrogen peroxide, alcoholic iodine solution or 70% ethanol. Hospital grade disinfectants based on sodium hypochlorite are also suitable. A 1:100 (500ppm of chlorine) dilution (10mL/L) should be prepared immediately before use, and discarded at the end of each disinfection session.
- Many disinfectants are respiratory irritants for humans and birds, so use in a well-ventilated area.
- Do not use a vacuum cleaner or high pressure cleaner as this increases the risk of raising dust.

Please refer to the fact sheets enclosed regarding psittacosis and avian chlamydiosis for general information regarding these illnesses and their prevention.

If you have any questions please contact the <public health unit> on <telephone>.

Yours sincerely,

<Name> <Director, xxx PHU>
<date>