



Zoonotic Diseases (Avian): Work Smart, Stay Safe

Including information on:
Disease and Biosafety

Avian Influenza
Chlamydiosis
Histoplasmosis
Newcastle Disease
Salmonellosis
West Nile Virus

Work Smart, Stay Safe

Disease Concepts and Biosafety

Disease is anything that interrupts or interferes with normal body function.

Zoonotic diseases are diseases of animals that can infect people.

For disease to occur you need a susceptible host- disease agent- environment suitable for both (**Disease triad**). Must break a triad link to stop or prevent disease process.

Host susceptibility can vary depending on age, nutritional status and response to cumulative stressors such as temperature extremes, overcrowding and parasite loads.

Disease agents include bacteria, viruses, fungi, parasites, trauma, toxins.

The **environment** must be hospitable to both the host and the agent.

Routes of infection include: inhalation, ingestion (particularly contaminated food and water), direct contact, absorption (through mucus membranes), injection (bites and scratches).

Need to protect human health and wildlife health. Want preserve human health and avoid mechanically transporting disease agents from site to site on clothing and equipment.

Personal Protective Equipment (PPE). Masks, gloves, boots, coveralls, respirators, goggles. Puts a barrier between you and the disease agent. Level of protection required depends on situation.

Prevent mechanical transmission of disease agents though disinfecting supplies and equipment between sites and/or animals. Bag and clean items before leaving site, clean more thoroughly as soon as possible.

Disinfect: Wash hands in warm soapy water and supplies in detergent and water. Disinfect using germicidal compounds, 10% bleach and water solution (1 part bleach to 9 parts water) or other suitable disinfectant. Follow label directions. Must remove mud and muck first or will overwhelm disinfectant and will not disinfect completely. Sunlight/UV light and drying can kill some organisms. Disinfect boats and vehicles as necessary. Wash bag clothing as soon as possible in warm or hot water and separately from other clothing.

Medical Care: Follow up with physician. Be familiar with zoonotic diseases you may encounter. Make sure health professionals know you work with wildlife. Be persistent if necessary.

Sources of further information: <http://www.cdc.gov/nczved/>
<http://www.cdc.gov/niosh/> and <http://www.cdc.gov/ncidod/osr/>
<http://www.aphis.usda.gov/library/forms/pdf/APHIS260.pdf>

Avian Influenza

Organism — Highly Pathogenic H5N1 avian influenza virus

Hosts — Birds, humans and other mammals such as pigs, tigers, leopards, ferrets, stone-marten and domestic cats.

Seasonality — year round

Transmission — direct contact with infected birds, contact with surfaces contaminated with feces, oral or nasal discharge from infected birds. Eating raw or undercooked poultry and poultry products.

Disease in Birds —

Field signs — Sometimes sudden death without clinical signs.

Gross lesions — varies, congestion and hemorrhage in multiple tissues.

Control in birds — prevent access to infected poultry and contaminated materials.

Disease in Humans —

Clinical signs — include fever, sore throat, cough, muscle aches, eye infections and pneumonia and severe respiratory infections.

Diagnosis — Laboratory confirmation of the virus in patient samples

Treatment — antiviral drugs and supportive care

Minimizing risk of Human Infection — wear gloves, mask and protective clothing, disinfect well. In the event of a confirmed H5N1 outbreak in the vicinity check the latest Center for Disease Control guidelines for field activities at <http://www.cdc.gov/flu/avian/>

Sources of further information

<http://www.doi.gov/pandemicflu/appendix/appH.html>

<http://www.cdc.gov/flu/avian/>

<http://www.nwhc.usgs.gov/>

<http://www.osha.gov/dsg/guidance/avian-flu.html>

http://www.who.int/csr/disease/avian_influenza/en/

<http://www.cdc.gov/niosh/npptl/topics/respirators/factsheets/respfact.html>

Chlamydiosis

Organism — *Chlamydia psittaci*, intracellular bacteria excreted in the feces and nasal discharges of infected birds.

Hosts — mammals (cats, sheep, goats, cattle, pigs, humans) and birds

Seasonality — any time of year; active shedding increased by stress (shipping, crowding, chilling, breeding); important in colonial nesting birds

Transmission — inhalation of aerosols, inhalation or ingestion of dry fecal contaminated materials (dust)

Disease in Birds — all birds are susceptible. Occurs worldwide in feral pigeons. Waterfowl, herons, and pigeons are the most commonly infected wild birds in North America. Carrier birds appear healthy but can shed the organism intermittently in feces and nasal discharges. Exposure to nestlings is major mode of transmission.

Field Signs — ranges from inapparent infection to a severe disease with high mortality; lethargy, anorexia, ruffled feathers; serous or mucopurulent ocular or nasal discharge, diarrhea, and excretion of green to yellow-green urates. Birds can die soon after onset or become emaciated and dehydrated before death.

Gross Lesions — most common change is enlargement of the spleen or liver; pericarditis; lung and air sac congestion

Control in Birds — sick birds should be collected and euthanized and carcasses should be picked up; treatment with antibiotics; isolation/quarantine

Disease in Humans (reportable disease) — occurs when a person inhales the organism, which has been aerosolized from respiratory secretions or dried feces of infected birds; other means of exposure include bird bites, mouth-to-beak contact, and the handling of infected birds' plumage and tissues.

Clinical Signs — incubation period of 5 to 14 days; severity varies from inapparent illness to systemic illness with severe pneumonia; flu-like symptoms; nonproductive cough; pneumonia

Diagnosis — can be difficult (antibiotic treatment may prevent an antibody response); laboratory confirmation (culture, antibody titer)

Treatment — tetracyclines

Minimizing Risk of Human Infection — Use respirator to avoid inhaling airborne avian fecal material when cleaning cages or handling infected birds; mask may not be effective. Wet down dry, dusty areas with bird droppings with disinfectant. Avoid working with large numbers of birds in dusty, closely confined areas. Wear protective clothing, gloves, cap. Wet down carcasses and use hood for necropsies.

Sources of Further Information

CDC--http://www.cdc.gov/ncidod/dbmd/diseaseinfo/psittacosis_t.htm

Compendium of Measures to Control Chlamydia psittaci Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), 2000--

<http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4908a1.htm>

NWHC—http://www.nwhc.usgs.gov/publications/field_manual/

Histoplasmosis

Organism — fungus *Histoplasma capsulatum*

Hosts — grows in soil and material contaminated with bird or bat droppings; found in poultry house litter, caves, areas harboring bats, bird roosts (particularly starlings, grackles, red-winged blackbirds, and cowbirds)

Geographic Regions and Habitats — found worldwide; endemic in certain areas of the US (particularly states bordering the Ohio River valley and the lower Mississippi River-- KY, IL, IN, MO, OH, TN)

Disease in Birds — birds do not appear to be infected by *H. capsulatum*; bird droppings are primarily a nutrient source for the growth of the organism already in the soil; organism can be carried on the wings, feet, and beaks of birds and contaminate soil under roosting sites or manure accumulations inside or outside buildings

Disease in Humans — Primarily affects the lungs. Transmission by inhalation of spores when contaminated soil/material is disturbed. High risk jobs—chimney cleaner, bridge worker, construction/demolition workers, farmer/gardener, lab worker, spelunker

Clinical Signs — symptoms appear 3-17 days after exposure. Most infected people are asymptomatic or have only mild flu-like symptoms. Infants, young children, and older persons, in particular those with chronic lung disease are at increased risk for severe disease.

Acute pulmonary disease—respiratory symptoms, malaise, fever, chest pains, dry or nonproductive cough;

Chronic pulmonary disease—resembles TB;

Disseminated form (more frequently seen in people with cancer, AIDS, or other forms of immunosuppression)—most severe and rare form; affects multiple organ systems and is fatal unless treated

Diagnosis — distinct patterns may be seen on chest x-ray; identification of organism in samples of sputum, blood, or infected organs; detection of antigens in blood or urine samples by ELISA or PCR; antibody test in blood

Treatment — mild cases usually resolve without treatment; antifungal medications used to treat severe cases of acute disease and all cases of chronic and disseminated disease.

Minimizing Risk of Human Infections — Best to assume soil in endemic regions and any accumulations of bat droppings or bird manure are contaminated—testing of soil samples is expensive, time consuming, not foolproof; PCR method being developed. Avoid areas that may harbor the fungus (accumulations of bird or bat droppings). Use proper PPE, NIOSH-approved respirator. Suppress dust by wetting.

Sources of Further Information

CDC--http://www.cdc.gov/nczved/dfbmd/disease_listing/histoplasmosis_gi.html

NIOSH/NCID Document Histoplasmosis: Protecting Workers at Risk--

<http://www.cdc.gov/niosh/docs/2005-109/#g>

Newcastle Disease

Organism — *Avian paramyxovirus-1*

Hosts — Birds

Seasonality — generally March through September- breeding season

Transmission — direct contact with affected birds, inhalation or ingestion of contaminated material. Can survive in the environment, especially in feces.

Disease in wild birds — More than 230 species of birds have been found to be susceptible, in addition to poultry

Field signs — Uncoordinated movement, head twisted over back, weakness, muscle tremors, paralysis of one or both wings and legs.

Gross lesions — nonspecific, maybe mildly enlarged livers and spleens

Control in birds — coordinate with State veterinarian (<http://www.aphis.usda.gov/vs/sregs/official.html>) and Federal animal health officials to minimize potential poultry health risks. Strict biosecurity to contain to as small an area as possible. Possibly carcass collection and disposal.

Disease in humans. Contracted thorough contact with affected birds

Clinical signs — Conjunctivitis and possibly mild flu like symptoms.

Diagnosis — confirmed by detecting virus in samples

Treatment — supportive care, infections are usually self-limiting.

Minimizing Risk of Human Infections — wear gloves, mask and coveralls, disinfect equipment and supplies.

Sources of additional information

<http://www.nwhc.usgs.gov/>

<http://www.avma.org/reference/zoonosis/znainewcastle.asp>

Federal USDA APHIS Area Veterinarian in Charge contact info
http://www.aphis.usda.gov/animal_health/area_offices/

Salmonellosis

Organism — bacteria of genus *Salmonella* — *S. typhimurium* is the most common in wild birds in the US

Hosts — birds, mammals, reptiles; bacteria live in the intestinal tracts

Seasonality — any time of year

Transmission — direct contact, contaminated food or water

Disease in Birds — all species are susceptible. Occurs worldwide. Large-scale mortalities in passerines/songbirds using feeding stations. Young birds especially vulnerable.

Field Signs — no distinctive signs; ruffled feathers, droopiness, diarrhea, severe lethargy, incoordination, convulsions. Rapid death of songbirds mimics poisoning.

Gross Lesions — swollen and crumbly livers with small reddened or pale spots in prolonged infections; reddening of the internal lining of the posterior small intestine. Yellow, cheesy nodules on the surface of the esophagus of songbirds.

Control in Birds — eliminate points of infection: garbage, sewage wastewater, wastewater discharges from livestock and poultry operations. Eliminate contamination of migratory bird habitat from intentionally using wastewater to create wetland habitat. Public education to maintain clean feeding stations. Strict sanitation and testing in captive flocks during and before release into the wild.

Disease in Humans — (reportable disease) most common source is eating foods contaminated with animal feces (beef, poultry, milk, eggs, vegetables); inadequate hand washing after handling infected animal or contact with feces

Clinical Signs — most people infected with salmonellosis develop diarrhea, fever, and abdominal cramps 12 to 72 hours after infection. Illness usually lasts 4 to 7 days.

Diagnosis — laboratory tests to identify *Salmonella* in the stools of an infected person

Treatment — most people recover without treatment. The elderly, infants, and immunocompromised people are more likely to have a severe illness and require treatment with antibiotics.

Minimizing Risk of Human Infection — extra care with personal hygiene is warranted by people who handle birds or materials soiled by bird feces.

Sources of Further Information

CDC--<http://www.cdc.gov/salmonella/>

NWHC—http://nwhc.usgs.gov/publications/field_manual/

West Nile Virus

Organism — single-stranded RNA virus of genus *Flavivirus*; member of the Japanese encephalitis virus antigenic complex; arbovirus (arthropod-borne)

Hosts — birds act as reservoir; humans, horses, most other mammals susceptible to infection but are dead-end hosts

Seasonality — coincides with mosquito season (varies with geographic region/climate); peak incidence of human disease in North America occurs in late August and early September

Transmission — transmitted by mosquito vector (*Culex* species)--Infectious mosquitoes carry virus particles in their salivary glands and infect susceptible animals/humans during blood-meal feeding.

Disease in Birds — virus has been detected in dead birds of at least 317 species; crows and jays especially susceptible to illness or death; most species survive infection

Field Signs — most birds found dead. Emaciation, trembling, difficulty in balance, inability to fly, stand or perch, unafraid of humans, may be blind.

Gross Lesions — inflammation of the heart and brain

Disease in Humans — (reportable disease since 1999) — primarily transmitted by mosquito bites

Clinical Signs — incubation period 3-14 days; most infections (80%) cause no symptoms; West Nile fever (20%): flu-like symptoms including fever, fatigue, headache, muscle or joint pain; West Nile Meningitis, West Nile Encephalitis, West Nile Poliomyelitis (<1%)—severe neuroinvasive disease; high fever, stiff neck, disorientation, tremors, muscle weakness, paralysis, encephalitis or meningitis; severe cases may be fatal;

Diagnosis — detection of IgM antibody to WNV in serum or CSF (ELISA, indirect IFA, hemagglutination inhibition tests); plaque reduction neutralization test more specific

Treatment — non-specific; supportive care including hospitalization, intravenous fluids, respiratory support, prevention of secondary infections

Minimizing Risk of Human Infection — occupations at risk: outdoor (farmers, foresters, landscapers, gardeners, laborers, etc.), laboratory (diagnosticians, technicians, pathologists), field workers (wildlife biologists, veterinarians, researchers, etc.)

Minimize exposure to mosquito bites (mosquito repellents, protective clothing), eliminate mosquito breeding areas, protective clothing when handling animals to avoid exposure to blood and tissues, vector control programs (insecticide spraying, draining of wetlands, etc.)

Sources of Further Information

CDC--www.cdc.gov/westnile

www.cdc.gov/ncidod/dvbid/westnile (basic information, clinical and laboratory guidance, resources)

www.cdc.gov/niosh/topics/westnile (overview, recommendations for outdoor and lab workers)