

VIRGINIA EPIDEMIOLOGY BULLETIN

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Psittacosis

Case Report

On May 20, 1991, the Virginia Department of Health received a report of a parrot that had died of suspected psittacosis. Postmortem examination of the parrot at the Bureau of Laboratory Services, Virginia Department of Agriculture & Consumer Services in Richmond, subsequently confirmed the presence of *Chlamydia psittaci*, the etiologic agent of psittacosis, in tissue.

The bird was a yellow-naped Amazon parrot, purchased by a pet store in southwestern Virginia from an exotic bird distributor in Alabama. The parrot, named Sam, had not been kept for sale, but as a sales promotion. Sam was allowed outside his cage only in the morning prior to the daily opening of the store. At that time, he sat on the shoulder of the person feeding and cleaning his cage. He appeared healthy during the 18 months he was a resident of the store until the manager of the pet shop noted Sam experiencing lethargy, ruffled feathers and greenish diarrhea on the 12th of May. No other birds in the store had developed illness.

Four employees worked in the pet shop. All took turns feeding the birds and cleaning the cages, including

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Sam's. Three had been symptomatic, with onsets of illness between May 7 and May 20. Frequency of symptoms was as follows: cough 3/3, photophobia 3/3, anorexia 3/3, fever 2/3 (102° F and 104° F), lethargy 2/3, headache 2/3, myalgia 2/3, sore throat 1/3, diarrhea 1/3. Chest x-rays, performed on two suspected cases, were normal. All three responded to tetracycline therapy, but one suffered more severe and prolonged symptoms (with a 30 pound weight loss), possibly due to her underlying lupus erythematosus. No significant rise in antibody titer was detected by the State lab (Division of Consolidated Laboratory Services) using the complement fixation test on acute and convalescent phase blood specimens obtained from two suspected cases.

Other birds (mainly finches and parakeets) in the pet shop looked healthy at the time of investigation. Glass-enclosed cages were available for all the birds, except Sam, who had been housed in a normal wire cage that was geographically separated from the other cages. Excessive accumulation of fecal material was not observed in the glass cages, which were cleaned every other day. Crowd-

ing was not a problem as each cage held only three birds.

Guidelines for the control of psittacosis were shared with the pet store (see accompanying article). The store manager chose to return all remaining birds to the Alabama distributor for disposition and/or treatment with tetracycline for 45 days.

Reported by: Robert L. Hackler, Southwest Regional Epidemiologist, VDH; Timothy H. Baker, Sanitarian Manager, Barbara H. Adams, RN, and Janice B. Smith, RN, both Public Health Nurses, and Elizabeth W. Roycroft, MD, Director, West Piedmont Health District, Virginia Department of Health.

Comment: The epidemiologic circumstances and clinical illnesses experienced by the three employees are highly suggestive of human psittacosis even though the paired blood specimens of the two em-

ployees tested were negative. Prompt antibiotic therapy may have precluded the development of a significant antibody titer rise. The most likely mode of transmission was inhalation of Sam's contaminated fecal material by these employees.

Sam's source of exposure to *Chlamydia psittaci* is unknown. He may have been infected prior to his arrival at the pet store, remaining asympto-



Psittacosis Control Guidelines*

matic the 18 months prior to his illness. Sam was given a bath on May 11 by one of his handlers. This event may have caused him unusual stress leading to the clinical expression of his infection.

A less likely possibility is that new birds purchased by the pet shop during his residence at the store may have been the source of infection even though these new birds were housed in glassed-in cages.

Interested in Epi-Info Training?

Some have expressed an interest in training in the use of the Epi-Info software. The package was developed by the Centers for Disease Control and is useful for designing questionnaires and entering and analyzing data. Basic statistical tests are also performed. Its primary use in the Office of Epidemiology thus far has been for managing data collected during investigations of foodborne outbreaks.

If anyone is interested in training in Epi-Info, please call the Office of Epidemiology at (804) 786-6261 so that we can get an idea of the number of people who are interested, where you are located, and if you could travel to Richmond for the training. The Division of Organization Development and Training has offered to develop a one-half day course, if we demonstrate an interest. Non-State employees would be accepted on a space available basis; for State employees, first priority would be given to health department staff.

Epi-Info software and documentation is available for a small fee from USD, Inc., 2075A West Park Place, Stone Mountain, GA 30087, phone:(404) 469-4098. It runs on IBM-compatible microcomputers with at least 512 kilobytes (640 K preferred) of RAM and either two floppy disk drives or a floppy and a hard disk (a hard disk is recommended for speed and convenience). The program is compatible with most video boards but color and resolution are best with EGA/VGA boards.

Psittacosis is primarily a disease of birds that incidentally affects people. Previous illness does not confer immunity on either birds or humans. Psittacosis, or parrot fever, refers to the disease in psittacine birds like parrots or parakeets. Ornithosis refers to the disease in poultry and other nonpsittacine birds, but the two terms are often used interchangeably. The etiologic agent is *Chlamydia psittaci*.

Source of Human Disease

Humans become infected by inhaling the agent from aerosolized fresh feces, dusts from dried bird droppings, or other discharges of infected birds. Transmission from person to person is rare; personnel attending patients with paroxysmal coughing may rarely become infected. Because birds do not always show signs of illness when they are shedding organisms, it is possible to become infected from an apparently healthy bird. Shedding may be intermittent and is exacerbated by stress from such things as shipping, crowding, chilling, or breeding. Infected sick birds excrete high concentrations of *C. psittaci* organisms in their feces,



and if not properly treated, constitute the greatest hazard to other birds and to their human contacts. Household birds, usually imported psittacine birds, are the most frequent sources of human infection. Ducks, geese, and pigeons are occasionally responsible for human disease. Large

outbreaks of human disease have been associated with turkey processing plants. In 1984 an outbreak in a Virginia turkey processing plant resulted in 71 cases; usually less than 2 cases per year are reported.

Human Clinical Presentation and Treatment

In humans the disease has a variable clinical presentation; fever, headache, photophobia, anorexia, myalgia, chills, and upper or lower respiratory tract disease are common. The fever may be low-grade (101° to 102° F) at first and gradually increase; in severe cases it may remain high (105° F). A severe headache is often the predominant symptom. Respiratory symptoms may be mild despite extensive pneumonia demonstrated by x-ray. Cough is initially absent or nonproductive, but may develop with scant mucopurulent sputum. The pulse is usually slow in relation to temperature. Although psittacosis often presents as a mild disease, it can be severe, especially in untreated, older persons. The incubation period ranges from 4 to 15 days, but is usually 10 days. An antibiotic of the tetracycline group, continued for 10-14 days after the temperature returns to normal, is the treatment of choice. Erythromycin is an alternative when tetracycline is contraindicated.

Human Diagnosis

The diagnosis can be confirmed by a significant increase in specific antibodies during convalescence or, under suitably safe laboratory conditions only, by isolation of the agent from sputum, blood or postmortem tissues. Recovery of the agent may be difficult, especially if the patient has received broad spectrum antibiotics.

The Central Laboratory of the Division of Consolidated Laboratory Services uses a psittacosis-lymphogranuloma venereum group antigen for their complement fixation procedure; resulting titers do not differentiate between psittacosis, trachoma, lymphogranuloma venereum, inclusion conjunctivitis, or nongonococcal urethritis. In outbreak situations, it may be possible to make special arrangements with the Centers for Disease Control for



Avian Diagnosis

Commercial and academic laboratories offer a variety of tests. Sera from birds can be tested by direct complement fixation, latex agglutination, or ELISA. Results should be interpreted with care. A single, low titer does not differentiate between active disease and previous exposure. In addition, a small percentage of birds can be culture positive without detectable antibodies. A significant rise or fall of antibodies between acute and convalescent serum samples is more reliable, but treatment of a suspected bird should not be delayed until convalescent results are available.

Isolation of the organism can be attempted from feces, a cloacal swab, or suspensions of spleen, liver, air sacs, pericardium, heart, or intestines. This requires specialized laboratory facilities and training. Because of the intermittent shedding of the organism, it is possible to have a negative culture from an infected bird.

The Animal Health Laboratory of the Virginia Department of Agriculture and Consumer Services performs an ELISA test on cloacal swabs. They will also perform post-mortem examinations and evaluate tissue specimens by ELISA, fluorescent antibody and histopathology using special stains.

Case Investigation

A case may be a report of an infected bird or an infected person. Most investigations in Virginia have resulted from a private veterinarian or the Department of Agriculture and Consumer Services reporting a bird with confirmed disease. Occasionally, we hear about a suspected human case first. It is generally not practical to test a pet bird the patient may have been in contact with in order to help establish the diagnosis in the patient. If the bird appears ill, it should be examined by a veterinarian experienced in treating birds. A newly purchased psittacine bird is more likely to be responsible for human disease than a nonpsittacine or one that has been a pet for a prolonged time.

The most common situation involves a pet shop that has infected birds on the premises or has sold an infected bird. At the present time

there are no regulations (other than local ordinances) that address pet shops. The only authority that the Department of Health has is the broad mandate to protect the public's health. Our role is to identify any possible human cases and to educate the owners and employees about the disease and ways to minimize the risk to themselves and to customers. Recommendations on treatment of the birds should come from a private veterinarian experienced in treating birds. Quarantine of the facility or an order not to sell any birds might be necessary if human illness has resulted from exposure to the birds (indicating a virulent strain of *C. psittaci*), the facility is poorly designed and lacks adequate hygiene, and/or there are many sick birds.

Pet Shop Site Visit

- Interview employees about compatible illness, usual duties, how birds are maintained and how cleaning is done.
- Refer employees with symptoms compatible with psittacosis to their own physicians; remind them to tell their physicians about exposure to birds.
- Provide handout with basic information, symptoms to look for, protective methods, name and phone number of contact at local health department.
- Establish whether records exist to trace birds (source and sales).
- Observe for crowding of birds, color and consistency of stools, nasal discharge, level of activity, ruffled feathers.
- Evaluate design and placement of cages for risk of aerosolization of feces and discharges to customers and staff.
- Obtain name, address, and phone number of attending veterinarian.

Recommendations (tailored to situation)

- Redesign cages so customers are not exposed to aerosol and cleaning can be done with a minimum of exposure. Cages with grates in bottom that allow feces to drop through for efficient cleaning are preferred.
- Limit number of people who clean cages.
- People doing cleaning should use respirators or masks,

isolation procedures to be performed on specimens.

Avian Clinical Presentation and Treatment

Transmission between birds occurs most frequently by inhalation or ingestion of nasal secretions or feces. The signs of psittacosis/ornithosis in birds vary with the species of bird, the virulence of the strain of *Chlamydia*, stresses on the bird and the route of exposure. There are no pathognomonic signs or lesions. It is a systemic disease with signs that include lethargy, ruffled feathers, anorexia, and a serous or purulent ocular and/or nasal discharge. If diarrhea occurs, the urates are often stained green to yellow-green. If death does not occur, the signs may subside after a prolonged period of weakness and debilitation. Rarely, the first sign of illness is sudden death.

Tetracycline for 45 days will eliminate the organism from most birds. Some birds do not consume the commonly used tetracycline impregnated pellets and may require parenteral or direct oral therapy with it or a related drug. Tetracycline mixed in the water does not deliver an adequate dose and should not be recommended.

gloves, and protective clothing. These items should not be removed from the room unless properly bagged for disposal.

- Cages should be cleaned frequently so feces don't have time to dry and become airborne. Feather and dust circulation should be kept to a minimum.
- If feces are dry, dampen with disinfectant or water prior to cleaning. Waste should be adequately contained and disposed of to avoid spillage and contamination.
- Use quaternary ammonium compounds for disinfection (read labels; Roccal[®], Zephiran[®], and some Lysol[®] products contain quaternary ammonium compounds).[†] Although 1:50 solution of bleach can be used, it is caustic to certain metals and the chlorine is toxic for animals.
- All birds that were exposed to sick birds should be cohorted and maintained on 45 days of tetracycline or a related drug as advised by a veterinarian. If birds are sold before 45 days, the new owner must be informed and the bird maintained on medication.
- Sick birds should be isolated, cohorted and not sold until healthy.
- New birds should be free of psittacosis, as shown by testing or documentation of 45 days tetracycline treatment.

Reporting

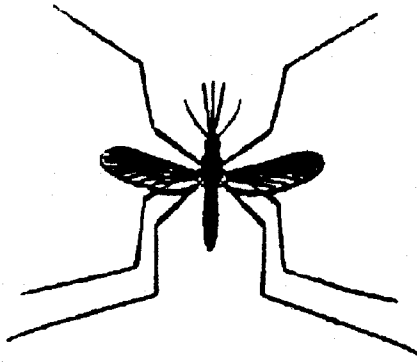
Please notify the Office of Epidemiology (804-786-6261) if you become aware of any human or avian cases of psittacosis. We can advise you on management of the investigation and report avian cases to the Virginia Department of Agriculture and Consumer Services (VDACS). In addition, some testing and investigation may be available through VDACS or the United States Department of Agriculture, especially if birds were imported illegally or brought into the state while known to be sick.

*Prepared by Suzanne R. Jenkins VMD, MPH, Bureau of Zoonotic Diseases, Office of Epidemiology, VDH

[†]Use of trade names is for information only and does not imply endorsement by the Commonwealth of Virginia

Treatment of Severe *Plasmodium falciparum* Infection: Quinine Dihydrochloride vs. Quinidine Gluconate*

CDC has recently reviewed data on the reported incidence in the United States of *Plasmodium falciparum* malaria and has evaluated available information on the effective management of severe life-threatening infections. As a result of this review, CDC has concluded that the therapeutic drug of choice in the United States for persons with com-



plicated *P. falciparum* infection is parenteral quinidine gluconate, and that stocking of parenteral quinine dihydrochloride for emergency distribution is no longer required to provide optimal management of *P. falciparum* infections.

P. falciparum Infection in the United States

P. falciparum malaria continues to be an important cause of morbidity but an uncommon, and usually preventable, cause of mortality among U.S. residents who travel abroad, visitors, and immigrants to the United States. From 1966 to 1987, CDC was notified of 1,760 persons who acquired *P. falciparum* infection abroad but who were diagnosed and treated in the United States; 66 of these persons died, for a case-fatality rate of 3.8% (1).

Complicated *P. falciparum* infection represents a medical emergency and requires aggressive and skilled medical care. An essential component of the management of severe *P. falciparum* infection is the prompt administration of a rapidly acting drug that kills the asexual erythro-

cytic stages of the parasite (a schizonticidal drug).

Therapeutic Agents

Parenteral quinine dihydrochloride has long been regarded as the most effective drug for *P. falciparum* infection. Because parenteral quinine is not commercially available in the United States, the CDC Drug Service has procured and provided this drug as a service to licensed U.S. physicians. Although quinine dihydrochloride has been stocked in strategic locations around the country, transportation of emergency supplies of quinine from these locations to the patient's bedside has frequently required 24-36 hours.

Quinidine, the dextrorotatory diastereoisomer of quinine, is widely available in the United States as parenteral quinidine gluconate. It is primarily used as a treatment of persons with cardiac arrhythmias; however it has also long been recognized as a potent antimalarial (2-4). On an equimolar basis, quinidine is a more active antimalarial than quinine for *P. falciparum* (5,6). Therefore, the dosage of quinidine required for the effective treatment of persons with *P. falciparum* malaria is lower than the dosage of quinine needed (7).

Management of Patients

Data on the clinical efficacy and toxicity of parenteral quinidine gluconate in the United States over a 2-year period (8), as well as the experience of an expert panel convened by the World Health Organization (9), have recently been published. **In general, an individual with malaria should be treated parenterally if a) vomiting is prominent and oral fluids and medication are not retained, b) there are signs or symptoms of neurologic dysfunction, or c) the peripheral asexual parasitemia is at a level of >5% of erythrocytes infected.** Quinine administered by slow intravenous infusion is generally well-tolerated, even by critically ill patients, individuals with underlying cardiac disease, and children (6,10,11). Nevertheless, patients requiring parenteral quinidine ideally

should be treated in intensive-care facilities where central hemodynamic and electrocardiographic monitoring is available. Close attention to the patient's hydration and blood glucose are required. Electrocardiographic changes, such as prolongation of the QT-interval and widening of the QRS complex, may be an accurate indicator of both plasma concentration and incipient cardiotoxicity (12-14). Most critical-care facilities in the United States are capable of monitoring quinidine blood concentrations.

Treatment Regimen With Quinidine Gluconate

Results of a study of patients infected with *P. falciparum* and treated in the United States (8), show that continuous-infusion quinidine gluconate produces effective drug concen-

Need Help?

Information regarding treatment of *Plasmodium falciparum* malaria is available from the Malaria Branch, Division of Parasitic Diseases, Center for Infectious Diseases, CDC; telephone (404) 488-4046.

trations. A loading dose of 10 mg of quinidine gluconate (equivalent to 6.2 mg of quinidine base)/kg of body weight is given over 1-2 hours, followed by a constant infusion of 0.02 mg of quinidine gluconate/kg/minute. Plasma quinidine levels >6 mg/mL, QT interval >0.6 sec, or QRS widening beyond 25% of baseline are indications for slowing infusion rates (12,13). Persons with hypoglycemia, which may be a manifestation of *P. falciparum* malaria and which is exacerbated by quinine/quinidine-induced hyperinsulinemia, should be treated with intravenous dextrose (9). Parenteral therapy should continue until parasitemia is <1% (generally, within 48 hours) and/or until oral medication can be tolerated. When patients with cerebral malaria are treated, clinical improvement is usually observed within 72 hours. If improvement does not occur, drug resistance or inadequate drug delivery, complications of malaria, or other eti-

ologies for the illness should be investigated. Treatment is continued (usually with oral quinine) for a total of 3-7 days, depending on the geographic origin of the infecting parasite. Therapy with an additional antimalarial is advised, e.g. tetracycline 250 mg every 6 hours for 7 days (12,13,15).

Discontinuation of Parenteral Quinine

The U.S. Food and Drug Administration and the drug manufacturer have recently amended the indications for the use of quinidine gluconate to include therapy for persons with complicated *P. falciparum* infection. Recent publications describing the clinical use of parenteral quinine have apparently already influenced the therapy for persons with severe malaria in the United States; since 1985, there have been only two requests for parenteral quinine dihydrochloride, despite the fact that the incidence of *P. falciparum* infections has increased by 53% (16). **The demonstrated efficacy and safety of parenteral quinidine gluconate and the general unavailability of parenteral quinine that has caused delays in administering an antimalarial drug to critically ill individuals underscore the need to initiate the routine use of parenteral quinidine gluconate in the United States. Therefore, parenteral quinine dihydrochloride will no longer be available from the CDC Drug Service.**

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*Reprinted from: *Centers for Disease Control. Treatment with quinidine gluconate of persons with severe Plasmodium falciparum infection: discontinuation of parenteral quinine from CDC drug service. MMWR* 1991;40(RR-4)21-23.

Rabies Serology Testing

For those persons who need to have their rabies antibody titers monitored (see Rabies Prevention guidelines in the September, 1991 issue of the *Bulletin*), there are two labs that will perform such for a fee of approximately \$25. Both use the rapid fluorescent focus inhibition test (RFFIT). Shipping requirements and forms to be completed should be requested from whichever lab is chosen.

Contact:

- Serologicals, Inc., ATTN: Rabies Dept., 780 Park North Blvd., # 120, Clarkston, GA 30021, phone: (404) 296-5595.
- K.S.U., Department of Veterinary Diagnosis, College of Veterinary Medicine, Veterinary Clinical Science Building, Manhattan, Kansas 66506

Cases of Selected Notifiable Diseases, Virginia, September 1 through September 30, 1991.

Disease	Total Cases Reported This Month						Total Cases Reported to Date in Virginia		
	State	Regions					This Yr	Last Yr	5 Yr Avg
		NW	N	SW	C	E			
AIDS	35	1	17	4	7	6	531	460	270
Campylobacter	104	21	16	19	26	22	492	441	471
Gonorrhea*	1699	-	-	-	-	-	13602	13668	12736
Hepatitis A	10	0	5	1	3	1	130	231	204
Hepatitis B	22	0	3	3	5	11	167	187	273
Hepatitis NANB	1	1	0	0	0	0	24	33	48
Influenza	0	0	0	0	0	0	689	775	2067
Kawasaki Syndrome	0	0	0	0	0	0	22	18	18
Legionellosis	1	1	0	0	0	0	11	11	10
Lyme Disease	28	1	11	3	5	8	113	100	37
Measles	1	0	1	0	0	0	30	86	67
Meningitis, Aseptic	64	2	21	7	13	21	299	233	193
Meningitis, Bacterial ⁻	6	2	0	2	0	2	96	109	125
Meningococcal Infections	3	1	1	0	1	0	31	42	51
Mumps	4	1	1	0	1	1	53	97	84
Pertussis	0	0	0	0	0	0	18	17	30
Rabies in Animals	18	9	3	1	0	5	195	153	214
Reye Syndrome	0	0	0	0	0	0	2	1	1
Rocky Mountain Spotted Fever	4	1	0	0	1	2	14	19	22
Rubella	0	0	0	0	0	0	0	1	3
Salmonellosis	173	16	39	26	41	51	1029	1020	1146
Shigellosis	44	6	15	18	1	4	322	125	206
Syphilis (1° & 2°)*	67	5	13	4	11	34	709	684	403
Tuberculosis	31	1	14	2	0	14	260	283	290

Localities Reporting Animal Rabies: Appomatox 1 skunk; Arlington 1 raccoon; Augusta 1 skunk; Caroline 1 skunk; Fairfax 2 raccoons; Fauquier 2 raccoons; Frederick 1 skunk; Isle of Wight 1 raccoon; Orange 1 groundhog; Southampton 1 raccoon; Spotsylvania 1 raccoon, 1 skunk; Suffolk 2 raccoons; Warren 1 raccoon; York 1 raccoon.

Occupational Illnesses: Asbestosis 4; Carpal Tunnel Syndrome 65; Coal Workers' Pneumoconiosis 35; Lead Poisoning 6; Loss of Hearing 8; Mesothelioma 1; Occupational Asthma 1; Repetitive Motion Disorder 4.

*Total now includes military cases to make the data consistent with reports of the other diseases.
⁻Other than meningococcal

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