

Case study

EXPERIENCES IN INVESTIGATING MASS OCCURRENCE OF OCCUPATIONAL ORNITHOSIS

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ABSTRACT

In one of Hungary's biggest poultry processing enterprise ornithosis cases among workers that had occurred only sporadically before, were recognized in increasing number from the end of 2014. In the exposure background of the mass occurrences in 2016 authority investigation could reveal some relevant causes concerning workers' safety and health like inadequate technical prevention measures at the workplaces, inappropriate or lack of personal protective equipment, inappropriate work arrangements.

KEY WORDS: ornithosis, mass occurrence, inadequate technical preventive measures, inappropriate or lack of PPE, inappropriate work arrangements

INTRODUCTION

The aim of this article is to review the experiences of authorities of occupational safety and health and epidemiology, and to reveal the deficiencies in occupational safety and health that on several occasions led to mass occurrence of *Chlamydia psittaci* infection among workers of a significant poultry processing enterprise. The findings and conclusions may be partly generalizable, relevant and useful for other enterprises as well. *Chlamydia psittaci* infections at the enterprise in question occurred repetitively for a couple of years. In 2016 there were several mass occurrences of the infection, affecting 5 or more employees at the same time, in the same workplace. Altogether 30 cases (15 men, 15 women) were reported that year as occupational disease to the labour inspectorate. This number of cases – unlike in the case of

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other, compulsorily reportable diseases induced by biological agents – matches the number of reports received by the epidemiology authority, which indicates a significant and remarkable discipline in reporting ornithosis.

There are many causes of such a discipline. One of them is the exceptionally lawful conduct of the physicians, perceiving the proper and efficient information provided by the authorities. Another factor is the penalty that may be assessed by the authority in case the reporting and the supervening investigation – aiming to prevent further appearances of infection – are omitted.

Figure 1 shows the proportion of reported occupational infectious diseases and zoonoses between 2007 and 2016. The number of ornithosis cases and their proportion to zoonoses in the same period is indicated in *Figure 2*.

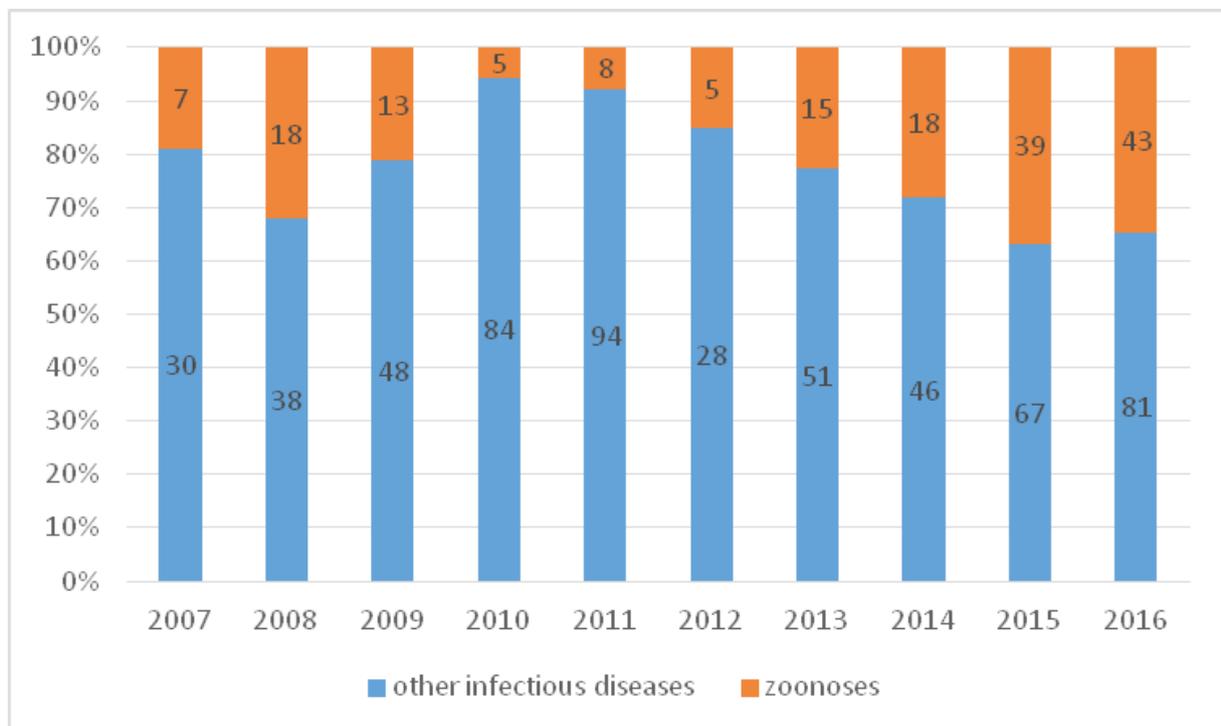


Figure 1. Proportion of occupational infectious diseases and zoonoses, 2007-2016
Source: Nagy I. (2016)

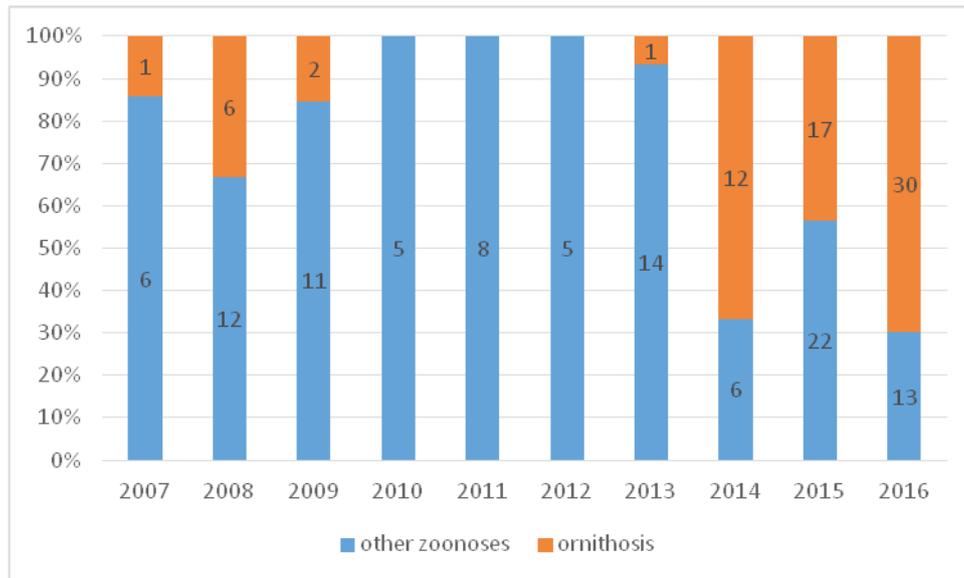


Figure 2. Proportion of occupational zoonoses and ornithosis, 2007-2016
Source: Nagy I. (2016)

Figure 3. shows the monthly fluctuation of the number of ornithosis cases reported and investigated in 2016 at the above-mentioned poultry processing enterprise.

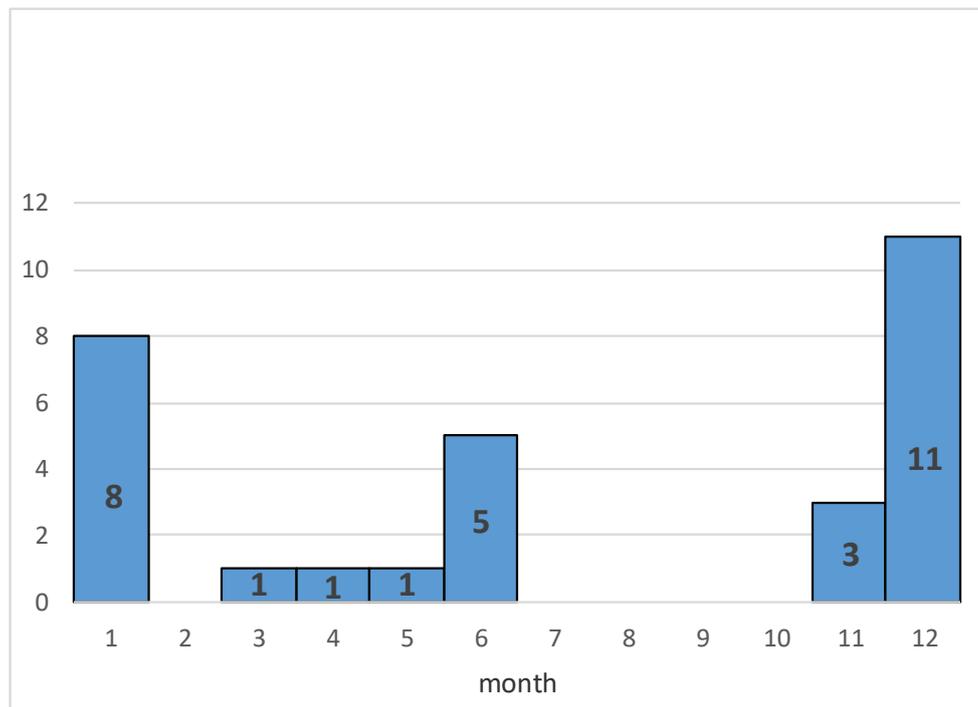


Figure 3. Reported and investigated ornithosis cases in a poultry processing enterprise (Csongrád county, Hungary), 2016 (n=30) Source: Nagy I. (2016)

Before summarizing the experiences of the investigation we take a closer look at the characteristics of the pathogenic agent and the epidemiology of the infection.

THE DISEASE

Ornithosis, which is also known as chlamydiosis or psittacosis, is caused by the gram negative obligate intracellular bacterium, *Chlamydia psittaci*. All members of the genus *Chlamydia* lack peptidoglycan in their cell wall. Three of the nine species of the genus cause disease in humans, among which *Chlamydia psittaci* is a respiratory pathogen causing psittacosis, a zoonotic pneumonia contracted by inhalation of respiratory secretions or aerosols from cloacal droppings of infected birds of diverse, more than 450 species (in 30 bird orders) worldwide.

According to their level of risk of infection biological agents are classified into four risk groups. The grouping is laid down in Directive 2000/54/EC on the protection of workers from risks related to exposure to biological agents at work. *Chlamydia psittaci* belongs to group 3 biological agents, which means the one that can cause severe human disease and present a serious hazard to workers. It may present a risk of spreading to the community as well, but usually there is effective prophylaxis or treatment available.

Chlamydiosis is a rather common disease of birds, especially psittacines (parrots) in captivity. There have been very few studies on infection rates in free-living wild birds but there is evidence that the organism is quite frequently carried by pigeons and some raptors. The carriage rates in garden passerine birds are not known. There are very few reports of the disease and mortality in wild birds in Britain due to chlamydiosis but this is probably because few investigations have been undertaken. Birds can carry the infection for long periods (probably years) without showing signs of the disease and, in captivity, it is recognised that development of the disease, and/or onset of shedding of the organism, is often precipitated by stress. In some cases in wild collared doves the disease appeared to be secondary to stress due to *Trichomonas* infections (see below). Transmission between birds takes place via faeces and, under conditions of close contact, also via aerosols produced on sneezing and by respiratory system or ocular discharges (aerosols). These organisms can also be transmitted from the hen to the egg (vertical transmission,) resulting in chicks being born with the disease. Within bird colonies the most significant route of infection is via inhalation of dried faeces. The agent can survive outside the body for at least several days and may also be spread in feather dust and dried faeces. Wild birds as carriers may be significant sources of infection among domestic bird colonies but this is very probably because the association is hard to prove.

The infection of birds in most cases is inapparent, without the occurrence of any signs and symptoms. The clinical signs can vary considerably and the disease cannot be diagnosed on the basis of these. The infection may be very acute and cause sudden death or the disease may progress more slowly over days or even weeks. Signs may include: fluffed-up plumage, lethargy, poor race performance, unwillingness to fly around loft, lack of appetite, conjunctivitis, nasal and ocular discharges, tremors, and watery droppings.

It is likely that a wide range of species are potentially susceptible. Among poultry birds the most susceptible species are turkeys but considering human infections the most significant ones are ducks.

Chlamydia psittaci can cause severe disease (psittacosis or ornithosis) in humans: an atypical pneumonia characterized by 'flu'-like symptoms: high fever, headache, debility and shortness of breath. The disease can be fatal if not treated. Most human infections – particularly at slaughtering and processing activities – are acquired from exposure to poultry birds that developed no signs

of infection. Human infection with *Chlamydia psittaci* usually occurs when a person (usually an employed person at work) inhales organisms that have been aerosolized from dried faeces, feather dust, loft surfaces or respiratory tract secretions of inapparently infected birds. Infective parts of the organism similar to animal infections settle on the mucous membranes of upper respiratory system, digestive system and eyes, where they can cause mild to severe illness, then multiply and spread. The onset of illness typically follows an incubation period of 5–14 days, but carrier status with no clinical signs is also common. Those with symptomatic infections typically have an abrupt onset of fever, chills, headache, photophobia, malaise, myalgia, non-productive cough and chest tightness.

The likelihood of occupational exposure of the biological agent is significantly higher among those exposed poultry slaughtering plant workers who release the living birds from cages, fix them to the slaughtering line then let them bleed out. The flutter of wings at these activities builds up considerable amount of dust in the working environment.

Chlamydia psittaci is susceptible to most disinfectants and detergents as well as heat.

THE WORK ENVIRONMENT

In 2016 five occupational safety and health inspections were held at the processing plant of the enterprise with the aim of investigating the reported occupational diseases. The findings of the inspection and the provisions of the authority are summarized below.

Broken down machines or machine parts (e.g. electric engines, machine casings, twisted parts) were very often taken to the maintenance workhouse from the so-called „dirty area” of the processing plant without cleaning. The use of respiratory protective equipment type FFP3, prescribed at the dirty areas, is not obligatory for the workers of the workhouse. Nevertheless the machine parts, polluted with poultry faeces and feather remains, getting at the workhouse posed a risk of spreading biological agents and might represent a source of infection. The authority immediately suspended the maintenance work performed without the use of respiratory protective equipment, providing protection from biological risk factors.

The disinfectant cleaning of the cooling system was carried out on annual basis. Nevertheless the firm, providing the cleaning services, did not certify the completion of the work for the whole area of the plant, but only for the so-called poultry portioning area. The effectiveness of the cleaning was controlled with microbiological analysis.

The mass occurrence of occupational diseases appeared just before the time of the yearly cleaning. For that, one of the authority’s obligations was related to the frequency of cleaning, prescribing disinfectant cleaning of the cooling system every six months. Furthermore, a complex control of the heating, ventilation and air conditioning system was ordered. This was necessary because the measurement record for the dirty areas of the poultry processing plant presented by the employer certified only that the atmospheric pressure in the dirty area is lower than the outer (depression), so the air polluted with biological agents cannot get out from the dirty area. However, there were no data on overpressure in the clean areas, which would mean the polluted air cannot get in there. For this reason performing measurements of mechanical heating, ventilating, and air conditioning systems, and presenting certification of

the measurements were ordered by the authority. The main focus of the measurements had to be on the boundaries between clean and dirty areas, wall pass-through on the trace of the conveyor rail between defeathering and evisceration divisions and the surroundings of doors between the clean and dirty areas.

The occupational safety and health inspections found further deficiencies and irregularities by the statements of the employees, e.g.:

- At times workers from the clean area could not dine in the lunchroom separated for them, due to the lack of seats. On these occasions they dined in the so-called combined lunchroom, where workers wearing polluted clothing were also present.
- Protective drink was not provided in the poultry portioning plant, hence workers had to take it from the dressing rooms of the dirty area.

The authority forbade the workers of clean and dirty areas to stay at the same place in the same time, due to the risk of spreading biological risk factors and obligated the employer to dissolve irregularities.

Due to the increasing number of occupational diseases resulting in epidemiological reports, on the initiative of the public health authority, occupational safety and health inspections were held repeatedly at the enterprise in question. As a result of the inspections the following obligations (regarding general aspects of hygiene, to eliminate shortcomings) were ordered:

- the technological instructions for regular cleaning, sanitizing and disinfection of lunchrooms must be worked out;
- regular disinfectant cleaning of every lunchroom must be prescribed;
- places classified as clean areas must be designed properly and cleaned continuously;
- places of different cleanliness must be properly separated.

Further, the authority obligated the employer to

- acquire certification of the performed work from the firm in charge of disinfectant cleaning and maintenance of the heating, ventilation and air conditioning system;
- certify that the fresh air inlet and the used air outlet locations satisfy requirements of legislation, namely:
 - their design, settling and construction makes them suitable to prevent or minimize the possibility of biological agents spreading in the workplace,
 - they prevent or reduce the possibility of biological agents spreading in or outside the workplace.

The inspection among other things found that the hall of the slaughter-house might have been polluted by feather remains (the possible sources of the causal agent) and wastewater. Both the wastewater and the feather remains came from the scalding tanks, belonging to the dirty area, whereas the hall is classified as clean area.

Furthermore, the inspection by the authorities of occupational safety and health, aiming to investigate the occupational disease found that some workers of the dirty area – workers responsible for checking poultry transport containers, manually removing birds stuck in the

containers, collecting runaway birds and restarting machines in case of shutdown – were performing work using inappropriate respiratory protective equipments, namely hygiene face masks instead of mask type FFP3. Though the appropriate personal protective equipment (PPE) was displayed to the workers during the safety training, the employees were not educated and given the opportunity to practice how to use them. Thus they did not object when were provided with inappropriate personal protective equipment or other than PPE in the course of work.

In summary we emphasize the following:

The enterprise in question processes 25 million birds annually. Ornithosis had been appearing sporadically, but from the end of 2014 the illnesses occur en masse. Thence the infection effects employees working plant-wide, even those, who work not directly in poultry processing.

Work areas are classified as „clean”, „not clean” and „dirty” areas, depending on the type of work performed in the area. Meat processing takes place in the clean area, where workers are obliged to wear hygiene face masks, primarily for the sake of protecting the product. Technological operations that are characterized by increased probability of presence of biological risk factors (e.g. defeathering) are performed on the dirty side.

Due to the mass occurrence of infections the employer made significant technological developments. *Chlamydia psittaci* infection is taken into account in the biological risk assessment and emphasized on safety trainings.

The employer provided every worker performing work in the dirty zone with respiratory protective equipment type FFP3, which is considered effective against biological aerosols. At first there were no consequences of failing to use protective equipment. Later deprivation of extra payment was introduced as a sanction.

In 2013 the employer’s occupational health service in cooperation with the regional hospital initiated training courses for general practitioners who are supposed to first meet patients with the clinical signs and symptoms of the disease. The following early and appropriate recognition of psittacosis cases and the reporting of all occurring cases to the health and safety authorities are likely due to these courses. After the quick and precise diagnoses all the infested employees developing clinical disease could be properly treated with antibiotics, which resulted in recovery without relapses and complications.

In the exposure background of the mass occurrences in line with the above causes it can be assumed that a new serovar of *Chlamydia psittaci* with higher levels of virulence and higher transmissibility was spreading among birds that are more susceptible to the new variant of the biological agent. Therefore newer cases are presumed to emerge even under better conditions of health and safety at the workplace.

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