Zoonoses

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CDC defines zoonotic diseases (also known as zoonoses) as diseases that are caused by germs that spread between animals and people. Zoonotic Diseases | One Health | CDC

Millions of people around the world have one or more pets. We may come into contact with animals in urban or rural settings, while traveling, visiting animal exhibits or while enjoying outdoor activities.

Animals can sometimes carry harmful germs that can spread to people and cause disease from harmful germs such as viruses, bacteria, parasites and fungi. the consequence can be the development of many different types of diseases in people and animals, ranging from mild to severe diseases and even death. Animals that carry germs capable of making people sick do not always present themselves ill, indeed they can appear healthy, depending on the zoonotic disease, and do not suggest that they are instead carriers of pathogenic dangers for humans.

Zoonotic diseases are very common and it has been estimated that more than 6 out of 10 known infectious diseases in people can be transmitted by animals and 3 out of 4 new or emerging infectious diseases in people come from animals ((just think of 2019 SARC-COV pandemic-2).

Germs manage to spread between animals and people due to the close connection between people and animals. There are various modes of transmission of pathogens:

Direct contact with saliva, blood, urine, mucus, feces, or other body fluids of an infected animal, by stroking and touching the animals or by biting and scratching.

Indirect contact with areas where animals live and roam, or objects or surfaces that have been contaminated with germs, such as contact with aquarium tank water, pet habitats, chicken coops, barns, plants and soil, or the same pet food and water.

A vector is a living organism that transmits an infectious agent from an infected animal to humans or another animal. They are often arthropods such as mosquitoes, ticks, flies, fleas and lice. The mode of transmission of zoonoses can occur in two ways: an active way and a passive way, biological vectors (such as mosquitoes and ticks) can carry pathogens that can multiply within their bodies and be subsequently transmitted to new hosts, generally by bite or sting;

mechanical vectors (flies), can carry the infectious agent on the surface of their body and transmit it by simple physical contact only

Transportation by carriers such as a tick or a mosquito or a flea. The passage in this case occurs through the sting or bite of the vector animal.

Passing through contaminated food or water such as eating or drinking unpasteurized (raw) milk, undercooked meat or eggs, or raw fruits and vegetables contaminated with the feaces of an infected animal. Contaminated food can cause disease in people and animals, drink or come into contact with water contaminated with the feaces of an infected animal.

Zoonotic diseases can make anyone sick, even healthy people. People such as children under the age of 5, the adults over the age of 65, people with weakened immune systems and pregnant women are obviously at greater risk of getting sick from an animal-borne disease.

Prevention measures to reduce the risk of contagion reflect normal hygiene rules such as washing hands with clean water and soap or hydroalcoholic gel with at least 70% alcohol, immediately after being with animals, preventing mosquito bites, ticks and fleas, bites and scratches from other types of animals.

Panzootic Risk

A panzootic is a term used to indicate in animals, the equivalent of the pandemic for humans. It represents an epizootic that spreads over a large region, such as a continent or around the world. It can start when various conditions have been met such as the emergence of a disease new to the population, the agent capable of infecting a species is capable of causing severe disease, the agent spreads easily between animals and healing the disease is difficult to implement.

According to the OIE (World Organization for Animal Health) there are two main panzootics for avian influenza (AI); one started in 2005 which peaked in 2006, resolving only in 2012, the other active since 2013 and with peaks in 2015 and 2017. Current control measures such as AIV surveillance in wild and domestic birds, culling of infected birds and diagnosis and treatment of infected birds may not be sufficient. Prevention of future panzootic, are effective vaccines. The report shows us the subtypes divided by continents: H5N1, H5N2, H5N8 in Africa, H5N1, H5N2, H5N8, H7N3, H7N8, H7N9 in Americas, H5N1, H5N2, H5N3, H5N6, H5N8, H7N9 in Asia, H5N1, H5N2, H5N5, H5N6, H5N8, H5N9, H7N7 in Europe, H7N2 in Oceania. OIE_SituationReport_AI_August2018.pdf

The risk of panzootic is represented also by the novel 2019 SARS-COV-2 as reported by Gollakner and Capua (2020) Source (Gollakner R, Capua I. Is COVID-19 the first pandemic that evolves into a panzootic? Vet Ital. 2020 Apr 24;56(1):7-8. doi: 10.12834/VetIt.2246.12523.1. PMID: 32315124).

One of the latest epidemics to be mentioned in Europe is definitely Newcastle disease with important repercussions both in health terms and in terms of economic costs. Source Dimitrov KM, Ramey AM, Qiu X, Bahl J, Afonso CL. Temporal, geographic, and host distribution of avian paramyxovirus 1 (Newcastle disease virus). Infect Genet Evol. 2016 Apr;39:22-34. doi: 10.1016/j.meegid.2016.01.008. Epub 2016 Jan 12. PMID: 26792710.

One Health approach

As already discussed in this guide, the One Health approach is important, with the aim of having healthy animals for healthy people. The "One Health" approach is quite young, although since the 1800s, scientists have noticed similarities in the pathological processes between animals and humans. Unfortunately, human and animal medicine were practiced separately until the 20th century. Fortunately, the One Health concept has gained greater recognition in the public health and animal health communities in recent years. The One Health approach supports global health security by improving coordination, collaboration and communication at the human-animal-environment interface to address shared health threats such as zoonotic diseases, antimicrobial resistance and food security. Over the past decade, more and more Weights have implemented the One Health approach and the benefits of this approach are widely recognized, and government decision makers must continue to provide government decision makers with nationwide data on the impact of One Health to help justify decisions. policies and the allocation of resources by promoting synergy between multiple disciplines and sectors, but this does not always appear to be easy to implement. To review comments on the recognized benefits of implementing a One Health approach in the context of global health security, the discussion of the challenges in measuring the impact of One Health and proposed possible solutions to assess the impact of One Health on global health security you can learn more by reading this recent acticle: Sinclair, J. R. (2019). Importance of a One Health approach in advancing global health security and the Sustainable Development Goals. Revue scientifique et technique (International Office of Epizootics), 38(1), 145..

To learn more about the ONE health concept and see the history of the ONE health approach, please consult the following website: History | One Health | CDC

The European Union One Health 2018 Zoonoses Report

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In this report the European Food Safety Authority and the European Centre for Disease Prevention and Control presents the results of zoonoses monitoring activities carried out in 2018 in 36 European countries (28 Member States (MS) and 8 non-MS).

zoonoses Directive 2003/99 / EC obliges the Member States (MS) of the European Union (EU) to collect relevant comparable data on zoonoses, zoonotic agents, resistance to food-borne outbreaks (FBOs) by submitting an annual report each year by the end of May to the European Commission. The European Commission subsequently forwards these reports to the European Food Safety Authority (EFSA), which reviews this data and publishes the EU annual summary reports. Since 2004, with EFSA mandate n. 2004-01782, EFSA has created an electronic reporting system and database for monitoring zoonoses, which are collected in accordance with Decision 1082/2013 / EU. Decision 2018/945 / EU indicates the case definitions to be followed to report data on infectious diseases to the European Center for Disease Prevention and Control (ECDC). since 2005 ECDC has been providing data and analyzes on zoonotic infections in humans and since 2008, ECDC manages the European surveillance system (TESSy).

The European Zoonosis Situation

The report presents 13 zoonoses that have led to human diseases:

Campylobacteriosis, Salmonellosis, STEC infections, Yersiniosis, Listeriosis, West Nile fever, Echinococcosis, Q fever, Brucellosis, Tularaemia, TB caused by M. bovis, Trichinellosis, Rabies.

The first and second most commonly reported the zoonoses in humans are campylobacteriosis and salmonellosis, with a confirmed trend of human cases confirmed in the years between 2014 to 2018. In 27 reporting Member States, 16 achieved all Salmonella reduction targets for poultry. The third most common reported cases in Europe are Shig toxin-producing Escherichia coli (STEC) infections, with an increasing trend in the years from 2014 to 2018. Yersiniosis was the fourth zoonosis most frequently reported in humans in 2018. Regarding listeriosis, human cases reported further increased in 2018, although Listeria rarely exceeded the EU food safety limit. A large increase in human West Nile virus infections has been reported in 2018.

Campylobacteriosis

Campylobacter infection, or campylobacteriosis, is caused by Campylobacter bacteria Campylobacteriosis is the most commonly reported gastrointestinal disease in humans in the European Union since 2005. It is the most common bacterial cause of diarrheal illness in the United States In 2018, the number of confirmed cases of human campylobacteriosis was 246,571. The rate in the EU of 64.1 per 100,000 inhabitants while in the Foodborne Diseases Active Surveillance Network (FoodNet) indicates that about 20 cases are diagnosed each year for every 100,000 people in the United States. Cases of campylobacteriosis are stable in the period 2014-2018. Most of the campylobacteriosis outbreaks reported in total N = 524, are of food origin (N = 522) and of aqueous origin (N = 2) In Europe, 2,335 cases were reported in 2018. The most common sources of The OSAs were milk and chicken meat. Of the 3,746 neck skin samples from chilled broiler carcasses, 34.6% were positive. Eight of the 10 Member States provided quantified results and overall 18.4% of 2,403 samples tested exceeded the 1,000 CFU / g limit. Twenty-five Member States reported 2018 general monitoring data on Campylobacter in food with higher percentage of positive test units observed in fresh broiler meat (37.5%), such as during the previous 4 years. Nineteen Member States reported that the overall higher presence was observed in turkeys (71.6%), compared to chickens and cattle.

Symptoms

Diarrhea (often bloody), fever and stomach cramps with nausea and vomiting are reported in infection with this bacterium. Symptoms onset typically take between two and five days after infection and last for about a week. Complications such as irritable bowel syndrome (temporary 5-20% of total cases), temporary paralysis and arthritis (1-5% of total cases) can arise. In people with weakened immune systems, such as AIDS or who are receiving chemotherapy, Campylobacter occasionally spreads into the bloodstream with a life-threatening effect. In this particularly people, Campylobacter could trigger the Guillain-Barré syndrome with acute severe syndrome that might need intensive care with a chronic damage nerve .

Diagnosis and treatment

The diagnosis takes place in the laboratory. A test that finds Campylobacter bacteria in feces (poop), body tissues or fluids after a culture that detects the genetic material of the bacteria is positive.

Most people recover from Campylobacter infection without antibiotic treatment. Patients should drink extra fluids as long as diarrhea that causes loss of fluids and electrolytes lasts. (Questions and Answers | Campylobacter | CDC)

Salmonella

Salmonella is a gram negative rods genus belonging to the Enterobacteriaceae family. Within 2 species, Salmonella bongori and Salmonella enterica, over 2500 different serotypes or serovars have been identified to date. Salmonella is a ubiquitous and hardy bacteria that can survive several weeks in a dry environment and several months in water. Salmonella is 1 of the 4 key global causes of diarrhoeal diseases.

Salmonella (non-typhoidal) (who.int)

The confirmed cases of salmonellosis in humans reported in the EU, in 2018, were 91,857, (20.1 cases per 100,000 inhabitants), unchanged compared to 2017. It caused 30.7% of all FBOs in 2018 with the majority of Salmonella outbreaks caused by S. Enteritidis (increased by 36.3% from 2017 - this figure is mainly due to outbreaks in Slovakia). The main food that transmits the bacterium are represented by eggs and egg products, but it is possible to find the bacterium also in mixed food baked goods. It is also present in poultry and other meat, intended to be cooked before consumption. Among the animal categories where Salmonella is on the rise are turkeys. Salmonella Infantis was the most reported serotype in poultry (Gallus gallus), accounting for 36.7% of serotyped isolates.

Salmonellosis

the disease presents with acute fever, abdominal pain, diarrhea, nausea, and sometimes vomiting, with symptoms occurring 6-72 hours (average 12-36 hours) after Salmonella ingestion and the illness lasts 2-7 days. Symptoms of salmonellosis are relatively mild and in most cases patients will recover without specific treatment. However, in some cases, particularly in children and elderly patients, the associated dehydration can become severe and life-threatening.

Diagnosis and treatment

the diagnosis takes place in the laboratory and is confirmed by the bacterium positivity in the coproculture. Treatment in severe cases is the replacement of lost electrolytes by diarrhea and vomiting (sodium, potassium and chloride) and fluid by rehydration.

Routine antimicrobial therapy is not recommended for mild or moderate cases in healthy individuals, while for health risk groups such as infants, the elderly and immunocompromised patients they may need to receive antimicrobial therapy, taking into account the resistance pattern of bacteria based on of the local surveillance system, in order to avoid the strengthening of resistance to antibiotics.

Listeria/Listerioris

Listeriosis is a serious infection usually caused by eating food contaminated with the Gram-positive bacterium Listeria monocytogenes.

Listeriosis is one of the most serious of food origin diseases under EU surveillance. 28 Member States reported 2,549 confirmed invasive human cases of listeriosis in 2018 (the rate is 0.47 cases per 100,000 population). The data are comparable to 2017. The age group most affected is that of people over 64 years old (especially> 84 years old). Mortality was high, reaching up to 15.6%, 14 outbreaks of food-borne listeriosis have been reported in European Union in the year 2018. The food where the bacterium is found most is frozen vegetables, especially as regards Listeria monocytogenes ST6. In the years between 2010 and 2017, the food that most carried the bacterium was mixed foods, then fish, vegetables and juices and other derivatives, crustaceans, molluscs and derived products. The presence of Listeria monocytogenes varies from 0.09% for hard pasteurized milk cheeses up to 3.1% for RTE beef. An estimated 1,600 people get listeriosis each year, and about 260 die in the United States.

Symptomps

(Questions and Answers | Listeria | CDC)

Listeriosis is capable of causing a variety of symptoms, depending on the person and body part affected. Fever and diarrhea similar to other food-borne germs may appear. If the bacteria have spread beyond the intestines, it is called invasive listeriosis. When faced with a human case of invasive listeriosis, the symptoms depend on whether the person is pregnant.

Pregnant women typically only experience fever and other flu-like symptoms, represented by fatigue and muscle aches. But infections during pregnancy can lead to miscarriage (20% of cases), stillbirth (3% of cases), premature birth, or infections that are dangerous for the newborn.

Other types of people can have headaches, stiff necks, confusion, loss of balance and seizures, body aches and fever. Most people with invasive listeriosis require hospital care, and about one in five people with the infection die.

People with invasive listeriosis usually report symptoms starting 1 to 4 weeks after eating food contaminated with Listeria; with cases reporting symptoms as early as the same day of exposure or even up to 70 days after contracting the bacterium.

Diagnosis and treatment

Source: Pagliano, P., Arslan, F., & Ascione, T. (2017). Epidemiology and treatment of the commonest form of listeriosis: meningitis and bacteraemia. Infez Med, 25(3), 210-6.

Bacterial culture of tissue, blood, spinal fluid or placenta is required. Treatment involves the use of antibiotics.

The intracellular nature of Listeria makes its effective treatment difficult. Many antibiotics that are shown to be effective in vitro are not directly related to in in vivo efficacy. Numerous antibiotics have been proven be active against L. monocytogenes, penicillin, amoxicillin and ampicillin are the ones used with the highest frequency and suggested on the base guidelines or expert opinions. These antibiotics, have the ability to bind to PBP-3 with high affinity and being stored in the cytosol when absorbed by cells, but they proved to be only slowly bactericidal in an intracellular infection model in vitro. Ampicillin is currently the drug of choice for the treatment of listeriosis. Current opinions suggest that the adult dose of ampicillin has to be greater than 9 g (2g/IV/every 4hrs) per day and that treatment has to be administered for at least 21 days when meningitis is to be treated. Primary endocarditis and Listeria bacteraemia are treated with ampicillin 2 g IV every 4 hours plus gentamicin, for their synergistic effect, given for at least another 6 weeks for endocarditis or 2 weeks for bacteremia, after the patient is not show more fever. Linezolid is an oxazolidinone and is active in vitroactivity

against L. monocytogenes. Its elevated CSF and intracellular concentrations appear adequate for the treatment of neurolysteriosis, but data and clinical use are currently limited. Cephalosporins are not effective. Steroid administration cannot currently be offered to patients with listeriosis.

Shiga toxin-producing Escherichia coli

Escherichia coli (E. coli) is a Gram-negative bacterium that is readily found in the lower intestine of warm-blooded organisms. Some strains can cause severe food poisoning, while most E. coli strains are harmless.

Shiga toxin producing E. coli (STEC) is a bacterium that can cause serious diseases such as haemolytic uremic syndrome (HUS), especially in young children and the elderly.

In 2018, 8,161 confirmed cases of Shiga toxin-producing Escherichia coli (STEC) infections in humans were reported in the EU (rate of 2.28 cases per 100,000 population, a worrying increase of 39.0% over the previous year). 2017 especially in Ireland, Sweden, Malta and Denmark).

The food source in 2018 of infections due to E. The toxin-producing SHIGA coli were caused mostly by cheese and raw milk, other undercooked red or mixed meat and derived products and vegetables and juices and other derived products, with a reported percentage of food samples with the presence of STEC of 2.4% in 2018.

58.8% of the strains with the information reported on the serogroup belonged to serogroups O. the test for the detection of Escherichia coli O157 alone is widely used, hindering the correct circulation analysis of Shiga toxin producing Escherichia Coli in animals circulating in the EU.

Symptoms

E. coli (who.int)

The disease presents with abdominal cramps and diarrhea which in some cases can progress to bloody diarrhea (hemorrhagic colitis) often also accompanied by fever and vomiting. The incubation period can range from 3 to 8 days, with most patients recovering within 10 days, but in a small percentage of patients (particularly young children and the elderly), the infection can progress to hemolytic uremic syndrome. (HUS), a particular form of disease that leads to acute renal failure, haemolytic anemia, and thrombocytopenia. The percentage of people who, once infected with STEC develop HUS, is 10%, with a mortality rate of 3 to 5%. HUS is the most common cause of acute kidney failure in young children. It can have neurological compromises such as seizures, strokes and coma in 25% of patients and renal sequelae, even chronic, in 50% of survivors. Other complication of HUS are hypertension and proteinuria.

Diagnosis and Treatment

Source: Cody, E. M., & Dixon, B. P. (2019). Hemolytic uremic syndrome. *Pediatric Clinics*, *66*(1), 235-246.

Clinical and laboratory test are required.

Shiga toxin–associated hemolytic uremic syndrome (HUS) is responsible for approximately 90% of cases of HUS in children, and supportive care remains the backbone of therapy. Other HUS could be caused also by Streptococcus pneumoniae or Atypical HUS is due to genetic dysregulation of the alternative complement pathway or coagulation cascade.

HUS associated with STEC (STEC-HUS) is a typical disease of children, with incidence from 3 to 5 years of age. The predominant pathogen in the US and EU is E coli O157: H7, Shigella dysenteriae type 1 remains a predominant cause of disease in other countries. The overall incidence of HUS is 1 to 2 cases per 100,000 per year, in children presenting with E coli enterocolitis, approximately 15% will progress to the development of HUS, with the risk increasing at a younger age, previous leukocytosis, and female sex. The Shiga toxin is able

to enter the bloodstream and therefore bind to globotriaosylceramide (Gb3) on endothelial cells, which is also present on renal tubular cells, managing to inactivate ribosomes, resulting in cell death. The toxin has proinflammatory and prothrombotic capacities, leading to increased endothelial secretion of von Willebrand's coagulation factor, also activating complement.

The disease presents with watery diarrhea after an incubation period of 3-5 days after contact with the bacterium, with progression to bloody and severe diarrhea crampy abdominal pain, nausea and vomiting. Thrombocytopenia and the generation of acute kidney injury usually occur within 2-14 days of the onset of diarrhea and with an extrarenal, life-threatening, neurological manifestation with convulsions and coma.

Other dangerous manifestations of the disease can be myocardial infarction, congestive heart failure and dilated cardiomyopathy, pulmonary haemorrhage, intestinal necrosis with perforation, pancreatitis and cholecystitis.

Supportive treatment remains the primary management strategy for STEC-HUS with fluid therapy and electrolyte management after the development of oligoanuric renal failure, concentrated red blood cell transfusion (pRBC) and dialysis (peritoneal dialysis is preferred for children).

Recent data emerging from the 2011 STEC-HUS epidemic in Germany identified that no worsening of disease activity occurred with the administration of macrolide antibiotics; reduction of long-term transport of E coli; and ultimately a decrease in the incidence of crises.

Another controversial intervention is platelet transfusions, particularly given the prominent role of platelets in the pathogenesis of the disease. The use of therapeutic plasmapheresis has long been debated in STEC-HUS although there have not been large randomized control studies to fully evaluate this therapy, and it has not been found uniformly to improve outcomes. There is still no evidence on the efficacy of monoclonal antibodies such as eculizumab. Other therapeutic proposals have been applied, such as more specific therapies for Shiga toxin in an attempt to prevent progression of the systemic disease, but the evidence shows that to be more effective, such therapies would require administration to sequester the toxin before the start of the TMA. Newer pharmacological agents that target Shiga toxin, including intravenous peptides and anti-Shiga toxin monoclonal antibodies have been shown to be protective in animal models of the disease but without efficacy published in the human beings.

Tuberculosis due to Mycobacterium bovis

Tuberculosis due to Mycobacterium bovis and is in humans in the EU. In fact, only 170 cases were reported in 2018 (rate between 0.04 and 0.05 per 100,000 inhabitants, 2014-2018). Seventeen Member States are officially free of bovine tuberculosis in cattle. In EU non-OTF regions of 11 Member States, a total of 18,801 (1.93%) cattle herds were reported positive for bovine tuberculosis. The UK has reported an increase in prevalence of over 10% for Wales and England, and Northern Ireland in recent years.

Brucella

Brucellosis is one of the most frequently encountered zoonotic diseases, with approximately 500,000 cases identified annually worldwide. Brucella are small, gram-negative, nonmotile, non–spore-forming, aerobic coccobacilli that can reproduce intracellularly only. Historically, human disease was thought to be caused by several different species, including Brucella melitensis, Brucella abortus, Brucella suis, and Brucella canis. However, these are now thought to be closely related organisms in a single species. The bacteria can survive for many days to weeks in dairy products but are killed by boiling, pasteurization, and souring or lactic acid fermentation of milk. (Harrison ER, Posada R. Brucellosis. Pediatr Rev. 2018 Apr;39(4):222-224. doi: 10.1542/pir.2017-0126. PMID: 29610436).

Brucellosis is an infection caused by the Gram-negative bacterium Brucella that is spread to humans from infected animals.

358 confirmed cases of brucellosis were reported in the EU in 2018 (0.08 cases per 100,000 population, down). Countries such as Portugal and Spain, Greece and Italy accounted for 70% of brucellosis cases in the EU. Most patients with Brucellosis have been hospitalized, with one death reported in 2018.

No food-borne outbreaks of brucellosis were reported for 2018 in the EU. Compared to 2017, the total number of herds of positive cattle or raw sheep and herds of Brucella infected goats decreased by 13% and 12% respectively, The disease is endemic in the southern regions of Italy (especially Sicily), Portugal and Greece. In the latter country there are cases of confirmed infections in humans, 10 times higher than the EU average. To this day, brucellosis is still an animal health problem with public health relevance in southern Europe and in Countries that are not officially free from brucellosis yet.

Symptoms

Source: Brucellosis fact sheet - Fact sheets (nsw.gov.au)

Brucellosis begins with a flu-like illness, with fever, headache, weakness, soaked sweating, chills, weight loss, generalized pain, joint and muscle pain. Respiratory and gastrointestinal symptoms or inflammation of the liver and spleen may also appear. Inflammation of the testicles is possible. Although rare, Brucellosis can lead to inflammation of the heart valves with fatal consequences. Symptoms usually appear in a range of 5-60 days after the organism enters the human body, and the infection typically lasts for days to months, but can occasionally last a year or more and may recur. The disease can be mild and some people are asymptomatic. Gradive women and their children are at risk of developing serious illness. If left untreated, infection can cause birth defects, miscarriage, or fetal death.

Diagnosis and treatment

Two blood samples, two or more weeks apart to check for antibodies to the bacteria or fluid or tissue samples from the affected body parts to grow the bacteria.

The principles of brucellosis treatment are based on combined regimens composed of two or more antibiotics with at least one antibiotic that has intracellular activity and acts in an acidic environment, as well as a sufficient duration of treatment

Effective treatment usually involves a combination of antibiotics (Doxycycline with the addition of either rifampicin, or an aminoglycoside (streptomycin or gentamicin), or ciprofloxacin).

Oral doxycycline 100 mg orally twice/day for 6 weeks combined with streptomycin 1 g IM every 12 to 24 hours (or gentamicin 3 mg/kg IV once/day) for 14 days reduces the relapse rate. For uncomplicated cases, rifampicin 600 to 900 mg orally 2 times / day for 6 weeks can be used instead of an aminoglycoside. Regimens with ciprofloxacin 500 mg orally twice / day for 14-42 days plus rifampicin or doxycycline instead of an aminoglycoside have been shown to be equally effective. Despite treatment, brucellosis can recur.

Other source: Mile, B., Valerija, K., Krsto, G., Ivan, V., Ilir, D., & Nikola, L. (2012). Doxycycline-rifampin versus doxycycline-rifampin-gentamicin in treatment of human brucellosis. Tropical doctor, 42(1), 13-17.

Deng, Y., Liu, X., Duan, K., & Peng, Q. (2019). Research progress on brucellosis. Current medicinal chemistry, 26(30), 5598-5608.

Toxoplasma gondii

Toxoplasmosis is an infection caused by a single-celled parasite called Toxoplasma gondii. Although the parasite is found worldwide, more than 40 million people in the United States could be infected with the

Toxoplasma parasite. The Toxoplasma parasite can persist for long periods of time in the body of humans (and other animals), possibly even for life. Of those who are infected, however, very few have symptoms because a healthy person's immune system usually prevents the parasite from causing disease. However, pregnant women and people with compromised immune systems should be wary; for them, a Toxoplasma infection could cause serious health problems. (CDC - Toxoplasmosis - General Information - Frequently Asked Questions (FAQs))

Toxoplasma gondii is widespread in humans and animals throughout the world. Virtually all warm-blooded animals can act as Intermediate hosts, but the life cycle is only completed in the Definitive Hosts: mainly cats and other felines, including the lynx which is present in Europe. In 2017, 194 congenital cases were confirmed in the EU, and in 2018, 208 congenital toxoplasmosis case were confirmed, with the majority of cases represented by France (73% of all cases) also due to massive active screening of pregnant women. The number of notifications per 100 000 living newborns was 5.8 in the EU/EEA, with the highest rate in France (19.9), followed by Slovenia, Estonia and Poland. In 2018, gender was reported for 77% of congenital toxoplasmosis cases, with a male-to-female ratio of 1.1:1. Of 148 cases with known outcome, nine were reported to have died, giving a case fatality of 6.1%.

No cases of foodborne toxoplasmosis outbreaks were reported in the EU in 2018, with the highest overall prevalence of animal toxoplasmosis infections occurring in small ruminants (sheep and goats; 18.3%; based on data reported by 12 MS) and cattle (27.8%; based on six MS).

Symptoms

Most people who become infected with Toxoplasma gondii are asymptomatic. Symptoms, when present, can present with swollen lymph glands or muscle aches and pains that can last for a month or more. Severe toxoplasmosis, which causes damage to the brain, eyes, or other organs, can develop from an acute Toxoplasma infection or one that occurred earlier in life and is now reactivated. Obviously the risk increases in individuals who have weak immune systems, although occasionally, even people with healthy immune systems can suffer eye damage from toxoplasmosis.

Signs and symptoms of ocular toxoplasmosis can include reduced vision, blurred vision, pain (often in bright light), redness of the eyes, and sometimes tearing. Ophthalmologists sometimes prescribe drugs to treat active disease. Whether the drug is recommended or not depends on the size of the eye lesion, the location and characteristics of the lesion (acute active versus chronic non-progressive).

Most babies who become infected while still in the womb have no symptoms at birth, but they can develop them later in life. A small percentage of infected infants have severe eye or brain damage at birth.

Even without symptoms, pregnant women can transmit toxoplasma infection to their fetus, with serious consequences such as miscarriage, stillbirth, perinatal death or congenital infection with severe eye and brain malformation. Infection in individuals immune system problems seriously affects the central nervous system, but other organs can also be affected. Prolonged therapy may be required for these patients. There are cases like in France, where it is reported that maternal infections did not cause clinical symptoms in newborns and birth defects occurred in less than 1% but this was thanks to the early diagnosis and treatment of maternal infections. Nanotechnology is currently being explored as a tool to manage and develop T. gondii infections vaccines that use mRNA sequences that code for disease-specific antigens. Congenital toxoplasmosis can cause severe outcomes in infected fetuses. regardless of national strategies for surveillance, strengthening prevention for congenital toxoplasmosis is essential.

In an otherwise healthy person who is not pregnant, treatment usually is not needed. If symptoms occur, they typically go away within a few weeks to months. For pregnant women or persons who have weakened immune systems, medications are mandatory.

People at risk can keep their own cat with them, with appropriate safety precautions such as the cat litter being changed daily, as the Toxoplasma parasite does not become infectious until 1-5 days after it is shed in the stool of a cat. Pregnant or immunocompromised people should avoid changing the cat litter box and if no one else can do the task, they should wear disposable gloves and wash their hands with soap and water afterwards. Cats should be kept indoors to avoid Toxoplasma infections by hunting and eating rodents, birds or other small animals infected with the parasite. Adoptions or caresses of stray cats, especially very small cats, are to be avoided, and care for a new cat while pregnant or immunocompromised must be avoided. Your cats should be assured only commercial canned or dried food or well-cooked table food, not raw or undercooked meat. Your outdoor sandboxes should be kept covered. Cats only spread Toxoplasma in their feces for 1-3 weeks following infection with the parasite.

Diagnosis and treatment

CDC - Toxoplasmosis - Resources for Health Professionals

Diagnosis of toxoplasmosis is made by serological tests of immunoglobulins G. It can also be made by culturing sections of tissue, cerebrospinal fluid (CSF) or blood, or biopsy. These techniques are used less frequently due to the difficulty of obtaining these samples. Molecular techniques capable of detecting parasite DNA in amniotic fluid may be useful in cases of possible mother-to-child (congenital) transmission.

Pyrimethamine is considered the most effective drug against toxoplasmosis. It must be combined with folic acid as pyrimethamine is a folic acid antagonist and can cause dose-dependent suppression of the bone marrow. A second drug, such as sulfadiazine or clindamycin, should also be included.

See also: Montoya JG, Boothroyd JC, Kovacs JA. Toxoplasma gondii in Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases, 8th, Edition, 2017 Mandell GL, Bennett JE, Dolin R, Eds. Churchill Livingstone Elsevier, Philadelphia, PA.

Treatment of immunocompetent adults with lymphadenopathic toxoplasmosis is rarely indicated; this form of the disease is usually self-limited. If visceral disease is clinically evident or symptoms are severe or persistent, treatment may be indicated for 2-4 weeks.

CDC recommend treatment of eye diseases after a full ophthalmologic evaluation has been performed and for adults, pyrimethamine 100 mg for 1 day as a loading dose, then 25 to 50 mg per day, plus 2 to 4 grams sulfadiazine per day for adults. 2 days, followed by a dose of 500 mg to 1 gram four times a day, plus folinic acid (5-25 mg with each dose of pyrimethamine); whereas the pediatric dose includes pyrimethamine 2 mg/kg on the first day then 1 mg/kg every day, plus sulfadiazine 50 mg/kg/twice a day, plus folinic acid 7.5 mg per day.

Therapy should be administered for 4-6 weeks, followed by a re-evaluation of the patient's condition. Corticosteroids are sometimes prescribed in addition to anti-parasitic agents.

Particular attention deserves the management of maternal and fetal infection. In general, spiramycin is recommended for women whose infections were acquired and diagnosed before the 18th week of gestation and the fetal infection is not documented or suspected. Spiramycin works by reducing transmission to the fetus and is most effective if started within 8 weeks of seroconversion. Pyrimethamine, sulfadiazine and leucovorin are recommended for infections acquired during or after the 18th week of gestation or for documented or suspected infections in the fetus. PCR is often performed on amniotic fluid at 18 weeks of gestation to determine if the baby is infected.

See also: Montoya JG, Remington JS. Management of Toxoplasma gondii infection in pregnancy. Clin Infect Dis 2008; 47: 554-566 and Maldonado YA, read JS, AAP Committee on Infectious Diseases. Diagnosis,

treatment, and prevention of congenital toxoplasmosis in the United States. Pediatrics. 2017; 139 (2): e20163860.

For newborns with congenital infection, treatment with pyrimethamine, a sulphonamide and leucovorin for 12 months at reduced doses compared to that of adults is expected.

See also: Maldonado YA, Read JS, AAP Committee on Infectious Diseases. Diagnosis, treatment, and prevention of congenital toxoplasmosis in the United States. Pediatrics. 2017; 139 (2): e20163860.

Toxoplasmosis in immunodeficient patients is often fatal if left untreated. CDC Treatment recommended is for at least 4-6 weeks (Pyrimethamine, folinic acid (leucovorin), and sulfadiazine) beyond resolution of all clinical signs and symptoms. Relapses occur in AIDS patients and maintenance therapy is recommended until significant immunological improvement is achieved in response to antiretroviral therapy.

Trichinella

Nematode worms belonging to the genus Trichinella are the etiological agent of a zoonosis named trichinellosis. These parasites are widespread in wildlife on all continents but Antarctica, and in domestic pigs of many countries (Pozio and Murrell, 2006). Infections occur in humans where cultural food practices include dishes based on raw or undercooked meat and meat products of different animal origins (e.g. pork, horse, game). At present, eight species and three genotypes are recognized in the genus Trichinella, namely Trichinella spiralis, T. nativa and its related genotype Trichinella T6, T.britovi and its related genotype Trichinella T8, T. pseudospiralis, T. murrelli and its related genotype Trichinella T9, T. nelsoni, T. papuae, and T. zimbabwensis. The average yearly incidence of the disease in humans worldwide is over ten thousand cases with a mortality rate of about 0.2%. **Source:** Dupouy-Camet, J., & Murrell, K. D. (Eds.). (2007). FAO/WHO/OIE guidelines for the surveillance, management, prevention and control of trichinellosis. Food & Agriculture Org..

In 2018, 66 confirmed cases of trichinellosis in humans were reported in the EU (rate 0.01 cases per 100,000 population). Bulgaria and Romania have the highest rates within the European Union.

There were a total of 114 human cases of foodborne trichinellosis reported to EFSA for 2018, mainly caused by pork and pork products, with only Trichinella spiralis reported in 3 states, while Trichinella britovi was reported to EFSA as an etiological agent of an outbreak in Romania due to wild boar meat. In 2018, no Trichinella infections were reported in the fattening pigs tested (76.6 million) and breeding pigs (0.5 million) kept under controlled housing conditions, confirming that the rearing conditions are the key factor in preventing these pigs from becoming infected with this zoonosis. In pigs not kept under controlled housing conditions, 0.0002% (248 out of 128.5 million) fattening pigs and 0.0003% (74 of 25.1 million) of breeding pigs tested positive for Trichinella. Cases of Trichinella are also found in red foxes, with a percentage of 1.6%.

Symptoms

The disease presents with general malaise and headache, fever, chills which may be associated with diarrhea and abdominal pain. Pyrexia, eyelid or facial edema and myalgia are the main syndrome of the acute phase, which can be complicated by myocarditis, thromboembolic disease and encephalitis. All Trichinella species are potentially pathogenic to humans, with different signs, symptoms and clinical course observed between different species or genotypes. Clinical signs and symptoms are directly related to the parasite cycle in the human host.

Diagnosis and Treatment

The diagnosis of Trichinella infections is based primarily on clinical signs and symptoms and serology (enzyme-linked indirect immunosorbent test (i-ELISA) and western blot) Histopathology on muscle biopsies are rarely done. The clinical diagnosis of trichinellosis is difficult not presenting with typical signs and

symptoms. Clinically it presents with eyelid or facial edema and myalgia during the acute phase and can lead to myocarditis, thromboembolic disease and encephalitis. As a laboratory diagnostic it may present with high eosinophilia and serum creatine phosphokinase (CPK). The parasitological examination of a muscle biopsy and the identification of specific circulating antibodies are useful for making a correct diagnosis. Medical treatment includes anthelmintics (mebendazole or albendazole) and glucocorticosteroids. Mebendazole of 5 mg / kg / day, but higher doses (20 mg / kg / day to 25 mg / kg / day) are recommended in some countries. Albendazole is used at 800 mg / day (with a dosage of 15 mg / kg / day) given in two divided doses. therapy is administered for at least 10-15 days. The drugs mebendazole and albendazole are contraindicated in pregnancy and in children under 2 years of age. Prednisolone is associated with anthelmintics at a dose of 30 mg / day to 60 mg / day, also administered for at least 10-15 days.

Source: Microsoft Word - A0227E (trichinellosis.org)

Rabies

Access online: OIE - World Organisation for Animal Health

Anger causes around 59,000 deaths each year worldwide. Despite evidence that canine rabies control through animal vaccination programs and the elimination of stray dogs can reduce the incidence of human rabies, canine rabies remains common in many countries and exposure to rabid dogs is still the cause of over 90% of human exposure to rabies and 99% of human rabies deaths worldwide. CDC - Rabies around the World - Rabies

Rabies is a disease caused by neurotropic viruses of the Lyssavirus genus of the Rhabdoviridae family of the order Mononegavirales and is transmissible to all mammals. The populations of the Carnivora and Chiroptera orders are considered the main hosts of the reservoir.

Rabies virus, the taxonomic prototype species of the genus Lyssavirus formerly referred to as "classical rabies virus, genotype-1", is found in most parts of the world and is responsible for the vast majority of reported cases of rabies in animals and humans. The most common source of human exposure to the rabies virus is dogs.

For 2018, a human case of travel-related anger was reported from the UK after traveling to Morocco. In 2018, five Member States reported positive results for lyssavirus in European bats (EBLV), type 1 (EBLV-1) and type 2 (EBLV-2) and two other Member States reported positive results for lyssavirus without specifically indicating which strain. A total of 45 cases reported in bats have been reported.

Eight cases of rabies involving two pets and six foxes, were reported by three Member States: Poland (four foxes), Lithuania (one fox) and Romania, the only country where positivity is found in domestic animals, (one fox, a bovine and a dog). The number of cases of rabies in foxes in the EU is still very low, only 6 cases, in 2017 there were 2 cases reported.

Symptoms

The rabies virus generally enters the human body after a bite from an infected animal. The rabies virus must travel through the body to the brain before it can cause symptoms. Incubation can last from weeks to months. The initial symptoms of anger can be very similar to those of the flu, general weakness or malaise, fever or headache. These symptoms can last for days.

It can be uncomfortable, tingling, or itchy at the site of the bite, progressing to acute symptoms of brain dysfunction, anxiety, confusion, and agitation within a few days. As the disease progresses and brain involvement, symptoms of cognitive blurring, delirium, hydrophobia, hallucinations, and insomnia appear. The acute period of the disease lasts an average of 2-10 days. Once the clinical signs of rabies appear, the disease is almost always fatal and treatment is usually supportive. Fewer than 20 human survival cases from

clinical rabies have been documented to date. The importance of vaccination is essential as only a few survivors did not have a history of pre / post exposure prophylaxis.

Diagnosis and treatment

Skin biopsy (posterior neck), PCR (polymerase chain reaction) on liquid (CFS, saliva) or tissue samples.

A rapid and accurate laboratory diagnosis of rabies in humans and other animals is essential for the timely administration of post-exposure prophylaxis (generally rabies vaccine and human rabies immune globuline (HRIG).