Click to prove you're human

inherited metabolic disease means a disease caused by an inherited abnormality of body chemistry for which testing is mandated by law;Inherited Metabolic Disorder means a disease caused by an inherited abnormality of body chemistry that meets all of the following requirements:Therapeutic diet means meals served that are soft, low-fat, low-sodium or controlled calorie.Economic Dispatch means the sending of dispatch instructions to generation units to minimize the cost of reliably meeting load demands.Opioid antagonist means a drug that binds to opioidPublic display means the showing of the original or a copy of a work—Disease means an alteration in the state of the body or of some of its organs, interrupting or disturbing the performance of the functions, and causing or threatening pain and weakness or physical or mental disorder and certified by a Medical Practitioner.muscular dystrophy means a group of hereditary genetic muscle disease that weakens the muscles that move the human body and persons with multiple dystrophy have incorrect and missing information in their genes, which prevents them from making the proteins they need for healthy muscles. It is characterised by progressive skeletal muscle weakness, defects in muscle proteins, and the death of muscle cells and tissue;Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.Genetic test means an analysis of human DNA, RNA, chromosomes, proteins, or metabolites, that detect genotypes, mutations, or chromosomal changes. The term “genetic test” does not mean an analysis of proteins or metabolites that does not detect genotypes, mutations, or chromosomal changes; or an analysis of proteins or metabolites that is directly related to a manifested disease, disorder, or pathological condition that could reasonably be detected by a health care professional with appropriate training and expertise in the field of medicine involved.Biologically-based mental illness means schizophrenia, schizoaffective disorder, major depressive disorder, bipolar disorder, paranoia and other psychotic disorders, obsessive-compulsive disorder, and panic disorder, as these terms are defined in the most recent edition of the diagnostic and statistical manual of mental disorders published by the American Psychiatric Association.Anaerobic digestion ’ means a controlled process involving microbial decomposition of organic matter in the absence of oxygen ;Genetic testing means an analysis of genetic markers to exclude or identify a man as the father or a woman as the mother of a child. The term includes an analysis of one or a combination of the following:Massive Multiauthor Collaboration Site (or “MMC Site”) means any World Wide Web server that publishes copyrightable works and also provides prominent facilities for anybody to edit those works. A public wiki that anybody can edit is an example of such a server. A “Massive Multiauthor Collaboration” (or “MMC”) contained in the site means any set of copyrightable works thus published on the MMC site.Vaccine means a specially prepared antigen which, upon administration to a person, will result in immunity and, specifically for the purposes of this rule, shall mean influenza and pneumococcal vaccines.Anabolic steroid means any drug or hormonal substance, chemically and pharmacologically relatedExpected week of childbirth (EWC) means the week, starting on a Sunday, during which the employee's doctor or midwife expects her to give birth; andChronic toxicity means toxicity involving a stimulus that lingers or continues for a relatively long period relative to the life span of an organism. Chronic effects include, but are not limited to, lethality, growth impairment, behavioral modifications, disease and reduced reproduction.Communicable disease means an illness caused by an infectious agent or its toxins that occurs through the direct or indirect transmission of the infectious agent or its products from an infected individual or via an animal, vector or the inanimate environment to a susceptible animal or human host.Diagnostic Product means an assemblage of reagents, including but not limited to reagents packaged in the form of a kit, useful in performing a Licensed Service.Acute toxicity means concurrent and delayed adverse effects that result from an acute exposure and occur within any short observation period, which begins when the exposure begins, may extend beyond the exposure period, and usually does not constitute a substantial portion of the life span of the organism.sickle cell disease means a hemolytic disorder characterized by chronic anemia, painful events, and various complications due to associated tissue and organ damage; "hemolytic" refers to the destruction of the cell membrane of red blood cells resulting in the release of hemoglobin.Cannabinoid means any of the chemical compounds that are the active constituents of marijuana.Iatrogenic infertility means an impairment of fertility by surgery, radiation, chemotherapy, or other medical treatment affecting reproductive organs or processes.Phase III Trial means a Clinical Trial of an investigational product in subjects that incorporates accepted endpoints for confirmation of statistical significance of efficacy and safety with the aim to generate data and results that can be submitted to obtain Regulatory Approval as described in 21 C.F.R. 312.21(c), or a comparable Clinical Trial prescribed by the relevant Regulatory Authority in a country other than the United States.Phase III Study means a human clinical trial that is prospectively designed to demonstrate statistically whether a product is safe and effective for use in humans in a manner sufficient to obtain regulatory approval to market such product in patients having the disease or condition being studied as described in 21 C.F.R. § 312.21(c) (FDCA), as amended from time to time, and the foreign equivalent thereof.Exotic disease Disease introduction may be more likely to occur in some components of the target population than others.","Exotic disease introduction may be more likely to occur in some components of the target population than others.","Incidents of Notifiable, Reportable or Exotic disease must continue to be reported to Scottish Government in the appropriate manner as directed by the Operations Manual.","Exotic disease surveillance is carried out by National Institute of High Security Animal Disease (NIHSAD), Bhopal which have BSL-4 facility.","Exotic disease R&D (FMD vulnerabilities project)The project is a package of research activities that need to be completed to better prepare Australian livestock industries for an outbreak of FMD.","Some of the critical factors that farmers have to respond to are: • Droughts• Floods• Transport costs• Exotic disease outbreaks• Global demand• Animal welfare expectations• Imposition of tariffs and quotas Meat processors and exporters More than 150 New Zealand meat companies are licensed to operate and thus to export.","Exotic disease R&DThe 2011/12 program was made up of five projects that addressed the key priority areas of biosecurity and disease risk.\"],"id":"exotic-disease","title":"Exotic disease"},"groups":[{"snippet":"means any foreign animal disease listed by the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) or the World Organization for Animal Health (WOAH).","snippetLinks":[{"key":"united-states-department-of-agriculture","type":"definition","offset":[47,86]},{"key":"animal-and-plant-health-inspection-service","type":"clause","offset":[94,136]},{"key":"the-world","type":"definition","offset":[148,157]},{"key":"animal-health","type":"definition","offset":[175,188]}],"size":2,"samples":[{"hash":"8mAdvc65QCW","uri":" ","label":"170.94.37.152","score":17.3949521577,"published":false},{"hash":"g58rnZ5WZQE","uri":" ","label":"www.agriculture.arkansas.gov","score":12.7980835044,"published":false}],"hash":"2fb42efd83effbb122d74dad3fbdd963","id":1},{"snippet":"means a disease not native to the United States.","snippetLinks":[{"key":"the-united-states","type":"definition","offset":[30,47]}],"size":2,"samples":[{"hash":"bKOf01OQ0iT","uri":" ","label":"agr.georgia.gov","score":11.1704312115,"published":false},{"hash":"aV8wm3vdc2G","uri":" ","label":"agr.georgia.gov","score":11.1704312115,"published":false}],"hash":"bea3c6eabac512b81de8d281566bdc0c","id":2},{"snippet":"means a disease defined by the secretary of agriculture.","snippetLinks":[{"key":"secretary-of-agriculture","type":"definition","offset":[31,55]}],"size":1,"samples":[{"hash":"3DOQUEUHkvS","uri":" id=pagination-first-page> As a library, NLM provides access to scientific literature. Inclusion in an NLM database does not imply endorsement of, or agreement with, the contents by NLM or the National Institutes of Health. Learn more: PMC Disclaimer | PMC Copyright Notice Recent outbreaks in humans associated with nondomestic animal species include Sudden Acute Respiratory Syndrome (SARS), Ebola virus, salmonellosis, and monkeypox. Animals may act as sentinels for human health. Expanding human populations and encroachment on habitats may increase exposure to zoonotic agents. Education and preventive medicine practices can be applied to reduce the risk of contracting a zoonotic disease. The health of humans, animals, and the environment must be treated as a whole to prevent the transmission of zoonoses. Zoonoses are estimated to make up 75% of today's emerging infectious diseases.1 Many of these zoonoses are carried by exotic pets or wildlife species,2 and recent outbreaks in humans associated with nondomestic species include Sudden Acute Respiratory Syndrome (SARS),3 Ebola virus,4 salmonellosis,5 and monkeypox.6, 7 Some of these infectious agents can cause disease in animals, and these animals may act as sentinels for human health. Expanding human populations and subsequent encroachment on habitats of reservoir species of zoonoses, increased trade in and ownership of “exotic” pets, and changes in climate will likely lead to increased exposure to zoonotic agents. Veterinarians could be held legally responsible for the transmission of zoonoses to staff or clients. Education and preventive medicine practices can be applied to reduce the risk of contracting a zoonotic disease by veterinarians, their staff, or owners of exotic pets. The health of humans, animals, and the environment are linked and must be treated as a whole to prevent the transmission of zoonoses and increase our understanding of the concept of “One Health.” Numerous recent epidemics have been associated with exotic pets or wildlife species including SARS, Ebola, salmonellosis, and monkeypox. Morbidity and mortality in humans varies with each etiologic agent; animals can sometimes also be affected with disease. More dangerous, though, reservoir species may be asymptomatic and provide no outward sign that they are potential sources of zoonotic agents. Transmission and case identification often results in large scale costly investigations to determine the source of an outbreak and apply steps to reduce further spread of disease. In February 2003, an outbreak of respiratory disease was recognized in approximately a dozen people in a Hong Kong hotel. The infection, later determined to be caused by a novel coronavirus, eventually led to 8,096 human cases with 774 deaths in 26 countries worldwide.8 Many of the early cases occurred in the Guangdong province of China and were associated with animal or food handling; later cases were associated with direct contact with an infected human. Himalayan palm civets (Paguma larvata) found in live animal markets and wild fruit bats have both been implicated as possible reservoirs of SARS-like coronaviruses.3, 9 There have been no reports of illness in civets or bats associated with these coronaviruses; however, nonhuman primates develop illness when experimentally infected.8 Numerous outbreaks of Ebola have occurred in humans in Central Africa since the 1970s; mortality is typically high, but variable.10 Many outbreaks have been associated with exposure to nonhuman primates, but Ebola virus also causes significant mortality in gorillas (Gorilla gorilla) and chimpanzees (Pan troglodytes).10, 11 A few outbreaks were also associated with exposure to duikers and monkeys.10 Fruit bats have recently been implicated as reservoirs for Ebola virus but do not develop disease.4 Although Ebola virus infection is rare outside of Africa, quarantine procedures must still be followed to avoid the importation of infected animals such as occurred with imported primates for laboratories in Virginia and Texas.12, 13 The Centers for Disease Control and Prevention (CDC) regulate importation and quarantine of all nonhuman primates, as well as any other animal that may carry zoonotic pathogens.14 Historically, salmonellosis from exotic animals has most commonly been associated with exposure to reptiles, but a recent outbreak in 2009 was associated with exposure to aquatic frogs.5 The outbreak was caused by Salmonella Typhimurium and the organism was isolated from 85 people in 31 states of the USA. No deaths were reported, but numerous people required hospitalization. An investigation determined that exposure to African dwarf frogs (Hymenochyrus spp) was associated with infection, and the organism was isolated from animals, samples from tanks where pet frogs were housed, and breeder facilities. Similar to reptiles, amphibians can be asymptomatic carriers of Salmonella. The CDC concluded that educational material addressing Salmonella exposure from reptiles should also include amphibians as possible sources of the organism.15 In 2003, an outbreak of monkeypox (orthopoxvirus) was linked to exposure to pet prairie dogs (Cynomus sp) in the US. Eighty-one human cases were reported in 6 states.6, 7 Numerous species of African rodents that had been imported for the pet trade were found to be positive for the monkeypox virus associated with the outbreak. Imported rodents had been commingled with prairie dogs that were eventually sold as pets. One study showed that prairie dogs do develop disease and suffer mortality when infected with monkeypox.16 CDC issued guidance on the quarantine and euthanasia of animals in the infected shipment as well as other exposed animals, particularly prairie dogs.17 Numerous factors may contribute to the continued increasing exposure to zoonoses from wildlife and exotic pets.18 Some of these factors include: a continually growing and globalized human population, increased exotic pet ownership, and changes in climate that affect wildlife and vector distribution. As human populations continue to increase, more people will move into areas that have not previously been inhabited and alter the environment to suit their purposes, whether for housing or agriculture; interactions with native wildlife and invertebrate vectors of disease will increase as a result.19, 20 One study found that increased interactions with wildlife occurred in suburban and exurban communities, while fewer interactions occurred in more densely populated communities.21 Interactions may lead to increased exposure to zoonotic pathogens through direct contact with animals, contact with infected urine, feces, pelts or a carcass, or exposure to vectors such as ticks or fleas. Zooanthroponotic pathogen (those passed from humans to animals) exposure to animals may also increase with these interactions.22 Additionally, as humans move into previously uninhabited areas, consumption of native wildlife may increase leading to increased exposure to zoonotic agents. Historically, tularemia was associated with rabbit hunting, and now Ebola virus outbreaks are associated with the bush meat trade in Africa.23 Larger human populations will require increasingly larger amounts of protein for sustenance, and some of this protein will undoubtedly come from wildlife. Finally, because of increased ease of international travel and globalization of cultures, humans, animals, and pathogens can travel the globe quickly allowing diseases to spread rapidly worldwide.24 Although dogs and cats are still the largest population of pets in the US, the American Veterinary Medical Association reports that ownership has increased from 2001 to 2007 for the following other types of pets: fish, ferrets, rabbits, hamsters, guinea pigs, other rodents (not specifically identified), turtles, snakes, and lizards.25 A category titled “all others” also increased from 2001 to 2007, but the specific animals included in this category were not listed. The total number of birds kept as pets has increased, but the number of households owning birds decreased in the same time period. In general, the number of households with pets other than dogs and cats is increasing. Depending on the country of origin of these exotic pets, and what importation and quarantine procedures are performed, exotic pets may carry zoonoses that have not previously been identified in that particular geographic area19; numerous outbreaks of zoonoses have been associated with the legal and illegal importation of animals in the pet trade.20 The identification of monkeypox in a population of pet prairie dogs in the midwestern US is an excellent example of how non-native exotic rodents that were carrying a zoonotic agent uncommon to the US transmitted the virus to native rodents in the pet trade; no human cases were directly caused by the non-native exotic rodents.6 Global climate change is occurring and is unlikely to slow without significant measures by humans.26 These climate changes are not only expected to directly affect humans through more severe and prolonged weather events, but also by changing the home range of wildlife species and vectors of disease, such as ticks, and altering the time when a disease can typically be transmitted to humans. One recent study predicts that the range of Ixodes scapularis, the primary tick that transmits the etiologic agent of Lyme disease in the US, will noticeably expand in the next two decades with the predicted rate of climate change; this change in range of the vector species will also affect the geographic distribution of the disease in humans and animals, such as dogs.27 Another paper suggests that the current ranges of plague and tularemia are likely to shift north due to changes in range of host rodent species, although the changes will likely be subtle.28 Prevalence, intensity, and geographic distribution of disease due to some helminths are also expected to change with changes in climate.29 Finally, milder winters and earlier springs may lead to alterations in the typical transmission period of some vector borne diseases. For example, West Nile virus, which typically peaks in late summer, could be transmitted earlier in the year leading to a higher incidence of disease in humans earlier in the year.26 The total effects of climate change on zoonotic disease transmission and distribution is still unknown, and there are many factors that complicate predictions.26 Regardless of the specifics, alterations in disease distribution and transmission are expected as a result of changes in climate. Veterinarians, as well as physicians and other health care professionals, have a responsibility to protect human health. A recent paper reports several scenarios where a veterinarian could potentially breach their professional duty and be subject to litigation.30 These scenarios include: (1) failure to recommend preventive measures to owners of animals with zoonotic diseases, (2) failure to advise clients on the dangers of exotic pets, and (3) failure to advise clients to seek care from a physician when appropriate. Veterinarians, as members of any community's health care team, must not only treat animals, but also play a role in the prevention of zoonoses in humans. Educational materials and counseling should be provided to pet owners regarding zoonoses and how to prevent their transmission. Veterinarians, physicians, and other health care professionals must also increase communication between each other regarding zoonoses. A recent study found that 97% of veterinarians rarely or never contacted physicians regarding animal aspects of zoonoses or transmission of zoonoses to an individual person with HIV/AIDS.31 In the same study, 100% of physicians rarely or never contacted a veterinarian regarding the animal aspects of zoonoses transmission or transmission of zoonoses to an individual HIV/AIDS patient. All health professionals must communicate and play a role in human and animal health in order to facilitate the concept of “One Health.” Finally, veterinarians must take steps to prevent zoonoses in the personnel under their supervision. These steps may include having standard operating procedures in place to prevent zoonoses, disinfecting contaminated areas, and providing education for staff regarding disease prevention. Specific guidelines regarding disease prevention are available in the Compendium of Veterinary Standard Precautions for Zoonotic Disease Prevention in Veterinary Personnel.32 Many of these recommendations can also be given to pet owners that are caring for a sick animal at home. Human, animal, and environmental health are intertwined and must all be considered when dealing with zoonotic diseases. With expanding human populations, increased exotic pet ownership, and changes in climate, human exposure to zoonotic agents will continue and likely increase. Veterinarians must not only treat animals with zoonoses, but also play a role in the prevention of zoonoses in humans. Veterinarians should work with physicians to provide education and preventive measures to humans in order to reduce the likelihood of zoonoses transmission. Special thanks to Dr John New for reviewing this manuscript and providing guidance to me in veterinary public health. 1.Taylor L.H., Latham S.M., Woolhouse M.E. Risk factors for human disease emergence. Philos Trans R Soc Lond B Biol Sci. 2001;356(1411):983–989. doi: 10.1098/rstb.2001.0888. [DOI] [PMC free article] [PubMed] [Google Scholar] 2.Jones K.E., Patel N.G., Levy M.A. Global trends in emerging infectious diseases. Nature. 2008;451:990–993. doi: 10.1038/nature06536. [DOI] [PMC free article] [PubMed] [Google Scholar] 3.Guan Y., Zheng B.J., He Y.Q. Isolation and characterization of viruses related to the SARS coronavirus from animals in southern China. Science. 2003;302:276–278. doi: 10.1126/science.1087139. [DOI] [PubMed] [Google Scholar] 4.Leroy E.M., Kumulungui B., Pourrut X. Fruit bats as reservoirs of Ebola virus. Nature. 2005;438:575–576. doi: 10.1038/438575a. [DOI] [PubMed] [Google Scholar] 5.Centers for Disease Control and Prevention Multistate outbreak of human Salmonella typhimurium infections associated with aquatic frogs - United States, 2009. MMWR Morb Mortal Wkly Rep. 2010;58:1433–1436. [PubMed] [Google Scholar] 6.Centers for Disease Control and Prevention Multistate outbreak of monkeypox–Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin, 2003. MMWR Morb Mortal Wkly Rep. 2003;52:537–540. [PubMed] [Google Scholar] 7.Centers for Disease Control and Prevention Update: Multistate outbreak of monkeypox–Illinois, Indiana, Kansas, Missouri, Ohio, and Wisconsin, 2003. MMWR Morb Mortal Wkly Rep. 2003;52:614–618. [PubMed] [Google Scholar] 8.Skowronski D.M., Astell C., Brunham R.C. Severe acute respiratory syndrome (SARS): a year in review. Annu Rev Med. 2005;56:357–381. doi: 10.1146/annurev.med.56.091103.134135. [DOI] [PubMed] [Google Scholar] 9.Li W., Shi Z., Yu M. Bats are natural reservoirs of SARS-like coronaviruses. Science. 2005;310:676–679. doi: 10.1126/science.1118391. [DOI] [PubMed] [Google Scholar] 10.Leroy E.M., Epelboin A., Mondonge V. Human Ebola outbreak resulting from direct exposure to fruit bats in Luebo, Democratic Republic of Congo, 2007. Vector Borne Zoonotic Dis. 2009;9:723–728. doi: 10.1089/vbz.2008.0167. [DOI] [PubMed] [Google Scholar] 11.Huijbregts B., De Wachter P., Sosthene L. Ebola and the decline of gorilla Gorilla gorilla and chimpanzee Pan troglodytes populations in Minkebe Forest, north-eastern Gabon. Oryx. 2003;37:437–443. [Google Scholar] 12.Centers for Disease Control and Prevention (CDC) Ebola virus infections in imported primates--Virginia, 1989. MMWR Morb Mortal Wkly Rep. 1989;38:831–838. [PubMed] [Google Scholar] 13.Centers for Disease Control and Prevention (CDC) Ebola-Reston virus infection among quarantined nonhuman primates--Texas, 1996. MMWR Morb Mortal Wkly Rep. 1996;45:314–316. [PubMed] [Google Scholar] 14.Centers for Disease Contol and Prevention (CDC) Importing Animals (including pets) and Animal Products. Accessed January 17, 2011. 15.Centers for Disease Contol and Prevention (CDC) Investigation update: outbreak of human Salmonella Typhimurium infections associated with contact with water frogs. Accessed January 17, 2011. 16.Guarner J., Johnson B.J., Paddock C.D. Monkeypox transmission and pathogenesis in prairie dogs. Emerg Infect Dis. 2004;10:426–431. doi: 10.3201/eid1003.030878. [DOI] [PMC free article] [PubMed] [Google Scholar] 17.Centers for Disease Control and Prevention (CDC) Questions and Answers About Monkeypox. Accessed January 17, 2011. 18.Cutler S.J., Fooks A.R., van der Poel W.H. Public health threat of new, reemerging, and neglected zoonoses in the industrialized world. Emerg Infect Dis. 2010;16:1–7. doi: 10.3201/eid1601.081467. [DOI] [PMC free article] [PubMed] [Google Scholar] 19.Chomel B.B., Belotto A., Meslin F.X. Wildlife, exotic pets, and emerging zoonoses. Emerg Infect Dis. 2007;13:6–11. doi: 10.3201/eid1301.060480. [DOI] [PMC free article] [PubMed] [Google Scholar] 20.Greger M. The human/animal interface: emergence and resurgence of zoonotic infectious diseases. Crit Rev Microbiol. 2007;33:243–299. doi: 10.1080/10408410701647594. [DOI] [PubMed] [Google Scholar] 21.Kretser H.E., Sullivan P.J., Knuth B.A. Housing density as an indicator of spatial patterns of reported human-wildlife interactions in Northern New York. Landscape Urban Plann. 2008;84:282–292. [Google Scholar] 22.Epstein J.H., Price J.T. The significant but understudied impact of pathogen transmission from humans to animals. Mt Sinai J Med. 2009;76:448–455. doi: 10.1002/msj.20140. [DOI] [PMC free article] [PubMed] [Google Scholar] 23.Karesh W.B., Noble E. The bushmeat trade: increased opportunities for transmission of zoonotic disease. Mt Sinai J Med. 2009;76:429–434. doi: 10.1002/msj.20139. [DOI] [PubMed] [Google Scholar] 24.Brown C. Emerging zoonoses and pathogens of public health significance–an overview. Rev Sci Tech. 2004;23:435–442. doi: 10.20506/rst.23.2.1495. [DOI] [PubMed] [Google Scholar] 25.American Veterinary Medical Association US pet ownership—2007. Accessed December 29, 2010. 26.Greer A., Ng V., Fisman D. Climate change and infectious diseases in North America: the road ahead. CMAJ. 2008;178:715–722. doi: 10.1503/cmaj.081325. [DOI] [PMC free article] [PubMed] [Google Scholar] 27.Ogden N.H., Maarouf A., Barker I.K. Climate change and the potential for range expansion of the Lyme disease vector Ixodes scapularis in Canada. Int J Parasitol. 2006;36:63–70. doi: 10.1016/j.ijpara.2005.08.016. [DOI] [PubMed] [Google Scholar] 28.Nakazawa Y., Williams R., Peterson A.T. Climate change effects of plague and tularemia in the United States. Vector Borne Zoonotic Dis. 2007;7:529–540. doi: 10.1089/vbz.2007.0125. [DOI] [PubMed] [Google Scholar] 29.Mas-Coma S., Valero M.A., Bargues M.D. Effects of climate change on animal and zoonotic helminthiases. Rev Sci Tech. 2008;27:443–457. [PubMed] [Google Scholar] 30.Babcock S., Marsh A.E., Lin J. Legal implications of zoonoses for clinical veterinarians. J Amer Vet Med Assoc. 2008;233:1556–1562. doi: 10.2460/javma.233.10.1556. [DOI] [PubMed] [Google Scholar] 31.Hill WA, Petty G, Erwin P, et al. Prevention of zoonoses among companion animal owners infected with HIV/AIDS: a survey of Tennessee veterinarian and physician attitudes, knowledge, and practices. J Amer Vet Med Assoc, in press [DOI] [PubMed] 32.National Association of State Public Health Veterinarians (NASPHV) Compendium of veterinary standard precautions for zoonotic disease prevention in veterinary personnel. Accessed January 2, 2011. [DOI] [PubMed] Articles from The Veterinary Clinics of North America. Exotic Animal Practice are provided here courtesy of Elsevier Keeping exotic pets has become increasingly popular, but it comes with significant health risks that are often underestimated. Zoonotic diseases—illnesses transmitted from animals to humans—pose a serious threat, particularly when the animals in question come from diverse and sometimes unfamiliar ecosystems. These health risks aren’t just theoretical; they have real-world implications for public health. Understanding the potential bacterial, viral, fungal, and parasitic infections associated with exotic pets can better prepare both pet owners and healthcare providers. Bacterial Infections Exotic pets, ranging from reptiles to small mammals, can harbor a variety of bacteria that pose health risks to humans. One of the most well-known bacterial infections transmitted by exotic pets is Salmonella. Reptiles such as turtles, snakes, and lizards are common carriers of this bacterium. Even healthy-looking reptiles can shed Salmonella in their feces, which can then contaminate their skin, water, and the environment they inhabit. Human infection typically occurs through direct contact with the animal or its habitat, leading to symptoms like diarrhea, fever, and abdominal cramps. Another bacterial concern is Mycobacterium marinum, often associated with fish tanks and aquatic environments. This bacterium can cause skin infections in humans, particularly when they have open wounds or cuts that come into contact with contaminated water. The infection, known as “fish tank granuloma,” manifests as skin lesions that can be challenging to treat and may require prolonged antibiotic therapy. Capnocytophaga canimorsus, a bacterium found in the mouths of dogs and cats, can also be transmitted to humans through bites or scratches. While it is more commonly associated with domestic pets, exotic mammals like ferrets can also be carriers. In humans, this bacterium can cause severe infections, particularly in individuals with weakened immune systems, leading to symptoms such as fever, vomiting, and in severe cases, sepsis. Viral Infections Exotic pets are not only fascinating but also potential carriers of viral infections that can be transmitted to humans. One notable example is the Herpes B virus, commonly found in macaque monkeys. While these primates may appear healthy, they can harbor this virus in their saliva, urine, and feces. Human infection usually occurs through bites, scratches, or direct contact with these bodily fluids. The consequences can be severe, leading to encephalitis, neurological impairment, or even death if not promptly treated. Rodents, another popular category of exotic pets, can also be vectors for viral diseases. Lymphocytic choriomeningitis virus (LCMV) is often associated with hamsters and guinea pigs. This virus can be transmitted to humans through exposure to the animal’s urine, droppings, or nesting materials. Infection in humans can be asymptomatic or present with flu-like symptoms, but in severe cases, it can progress to meningitis or encephalitis. Bird enthusiasts must also be cautious, as exotic avian species can carry the Avian Influenza virus. Although the risk of transmission to humans is relatively low, it is not negligible. The virus can be spread through direct contact with infected birds, their droppings, or contaminated surfaces. Symptoms in humans can range from mild respiratory issues to severe pneumonia, making it essential to maintain stringent hygiene practices when handling these pets. Fungal Infections Fungal infections represent another significant health concern for those who keep exotic pets. These infections can be particularly insidious, as they often present subtly and can easily be overlooked until they become more severe. One common fungal infection linked to exotic pets is dermatophytosis, more widely known as ringworm. This infection is not caused by a worm but by a group of fungi, and it is highly contagious. Animals such as hedgehogs, rabbits, and certain reptiles can be carriers. Ringworm manifests as circular, red patches on the skin and can be transmitted through direct contact with the infected animal or contaminated surfaces. Another fungal infection to be aware of is histoplasmosis, which is associated with bird and bat droppings. While not all exotic birds carry this risk, those that do can pose a significant health threat to their owners. Histoplasmosis spores become airborne when droppings are disturbed, making inhalation the primary route of infection. Symptoms in humans can range from mild respiratory issues to severe lung infections, particularly in individuals with compromised immune systems. Amphibian enthusiasts should also be cautious of chytridiomycosis, a fungal disease affecting amphibians like frogs and salamanders. While this fungus primarily threatens the amphibians themselves, handling infected animals or their habitats without proper precautions can lead to fungal spores being transferred to humans. Though human infections are rare, the potential for cross-species transmission underscores the need for rigorous hygiene practices. Parasitic Infections Parasitic infections are another hidden danger lurking in the world of exotic pet ownership. These infections can be particularly troubling due to their often stealthy nature, making them difficult to detect until serious health issues arise. One of the most concerning parasites is Toxoplasma gondii, commonly found in exotic cats such as caracals and servals. Humans can contract toxoplasmosis through contact with the feces of an infected animal. While many infected individuals may experience mild flu-like symptoms, the parasite can cause severe complications for pregnant women and individuals with weakened immune systems, leading to neurological and ocular issues. Another parasitic threat comes from exotic reptiles, particularly those imported from tropical regions. The Pentastomid parasite, also known as tongue worms, can infect reptiles like snakes and lizards. Humans can become accidental hosts through ingestion of eggs present in contaminated water or food. Once inside the human body, these parasites can cause respiratory issues, abdominal pain, and, in severe cases, systemic infections that require medical attention. Fish enthusiasts are not exempt from parasitic concerns either. The Capillaria worm, which can infest freshwater fish, poses a risk to humans who handle infected fish or consume undercooked fish meat. Human infections can result in gastrointestinal distress, malnutrition, and anemia, underscoring the importance of proper handling and cooking practices. Prevention and Safety Measures Understanding the potential health risks associated with exotic pets is just the first step; implementing effective prevention and safety measures is equally important. By adopting a proactive approach, pet owners can significantly mitigate the risks of zoonotic diseases. Proper Hygiene Practices Maintaining rigorous hygiene practices is paramount in reducing the risk of infection. Always wash your hands thoroughly with soap and water after handling exotic pets or cleaning their habitats. Using hand sanitizers with at least 60% alcohol can provide an additional layer of protection. Regularly disinfecting cages, tanks, and other living spaces with appropriate cleaning agents like bleach solutions will minimize the presence of harmful microorganisms. Wearing gloves when handling pets or cleaning their environments can further reduce direct contact with potential pathogens. Veterinary Care and Quarantine Ensuring that exotic pets receive regular veterinary care is crucial for early detection and management of zoonotic diseases. Specialized veterinarians can provide tailored advice on vaccinations, parasite control, and overall health management. New pets should be quarantined for a period, typically 30 days, to monitor for signs of illness before introducing them to other animals or humans in the household. This practice helps to prevent the spread of diseases that might not be immediately apparent. Education and Awareness Educating oneself and others about the specific risks associated with different exotic pets can make a significant difference. Resources such as the Centers for Disease Control and Prevention (CDC) and the World Health Organization (WHO) offer valuable information on zoonotic diseases and prevention strategies. Participating in community forums or joining pet owner groups can provide additional support and insights. Being informed enables pet owners to make better decisions regarding the care and handling of their exotic companions. It is important that veterinary staff working with exotic pets are aware of potential zoonotic diseases and take precautions to avoid transmission Veterinarians have long been aware that common companion animals carry zoonotic diseases, and exotic pets are no exception.Zoonotic diseases are diseases that can pass from animals to people, resulting in symptomatic or asymptomatic infections. They are not uncommon, and it has been postulated that up to 75 percent of emerging human diseases are of zoonotic origin (Taylor et al., 2001). The list of zoonotic diseases carried by exotic pets is extensive, and veterinarians should ensure that they are aware of species-specific zoonoses when treating exotic patients.This article discusses some of the most common zoonoses a clinician may encounter in practice but it is by no means exhaustive.Psittacosis is a human disease syndrome resulting from an infection with the bacteria Chlamydia psittaci. The disease can also be known as ornithosis, parrot fever or chlamydiosis (Balsamo et al., 2017), but is commonly known as psittacosis due to how well associated it is with psittacine birds (Crosta et al., 2016).The causative agent is an obligate intracellular bacterium usually transmitted following inhalation of infectious organisms from respiratory secretions, feather dander or dried faeces, or direct beak-to-mouth contact between a bird and human (Zwart, 2016). This is particularly important for owners who engage in over-amorous behaviour with their pet parrots, including mouth-to-beak contact when kissing their birds on the head, beak or over the nares.Common carriers of C. psittaci include psittacines (parrots), poultry, doves, pigeons and birds of prey (Balsamo et al., 2017). Transmission of C. psittaci between humans is rare but has been reported (Hughes et al., 1997; McGuigan et al., 2012).FIGURE (1) A yellow crowned Amazon parrot suspected of having Chlamydia psittaci. It presented with dyspnoea, lethargy, anorexia and nasal dischargeClinical signs in humans can be absent, but usually, there is an incubation period of 5 to 14 days following exposure, although incubation times as long as one month have been observed (Crosta et al., 2016).Symptoms are individual but range from a mild, non-specific malaise to pneumonia and systemic disease, with mortalities being reported (Balsamo et al., 2017). Commonly reported symptoms include fever, chills, muscle aches, dry cough, headache and upper respiratory tract signs (Crosta et al., 2016).Psittacosis should be strongly suspected in people who have contact with birds and are showing clinical signs, regardless of whether the bird or birds are showing clinical signs. Clinical signs in birds can be non-specific, such as lethargy, hyporexia or anorexia, regurgitation, green faeces or conjunctivitis, or they can manifest as respiratory disease with obvious dyspnoea and oculonasal discharge (Figure 1) (Zwart, 2016).There are set criteria that define suspected cases, probable cases and confirmed cases in avian patients, and probable or confirmed cases in humans (Table 1).In humans, the treatment of choice is tetracyclines, with most clinical cases treated with oral doxycycline (Balsamo et al., 2017). This is similar to treatment of avian patients, where oral tetracyclines are also recommended. It is essential that the treating clinician discusses the potential for zoonoses with the owner if psittacosis is suspected or diagnosed in any avian patient. This is especially crucial if immunosuppressed people are living in the home with the bird or have come in contact with the bird.C. psittaci is very treatable in avian and human patients, and reinfection can be avoided by following quarantine protocols after treatment. Confusion between psittacosis and other diseases may cause human medical professionals to recommend removing or rehoming the bird, but this is rarely, if ever, necessary.Avian patientsHuman patientsSuspected cases: one of these criteriaCompatible illness not confirmed by a laboratory but is epidemiologically linked to a confirmed case in an avian or human patientA patient with no clinical signs but a high serological titre or detection of chlamydial antigenCompatible clinical signs with a positive result from a non-standardised testCompatible clinical signs that respond to therapyn/aProbable cases: compatible clinical signs and one of these criteriaA single high serological titre following onset of clinical signsChlamydial antigen detected in respiratory secretions, faeces or cloacal swabProbable case: compatible clinical signs and one of these two laboratory resultsAn IgM titre below 32 in at least one serum sample obtained after onset of clinical signsDetection of C. psittaci in a respiratory specimen (sputum, pleural fluid or tissue) via PCRConfirmed cases: one of these criteriaIsolation of C. psittaci from a clinical specimenIdentification of antigens in the patient’s tissues with immunofluorescenceA fourfold or greater increase in serological titres taken a minimum of two weeks apart and assayed simultaneously at the same laboratoryIdentification of C. psittaci within macrophages in smears or tissue using Macchiavello or Gimenez stainConfirmed cases: compatible clinical signs and one of the following laboratory resultsIsolation of C. psittaci from respiratory secretions or bloodFourfold or greater increase in serum IgG by use of complement fixation or microimmunofluoresence between samples obtained two to four weeks apartTABLE (1) Case definitions of suspected, probable and confirmed cases of chlamydial infection in avian and human patients (Crosta et al., 2016)Historically, salmonellosis has been associated with reptiles and reptile ownership, but this association has also evolved to include amphibians (Souza, 2011). While reptiles are known to carry Salmonella, with up to 93.7 percent of reptiles harbouring Salmonella spp. as part of their normal gastrointestinal flora (Sodagari et al., 2020), the majority of reptiles are asymptomatic carriers. In fact, Salmonella infection from reptiles is rare. A 2004 study in the United States attributed only 6 percent of salmonellosis cases to contact with reptiles or amphibians (Mermin et al., 2004). Most salmonellosis cases are attributed to contaminated food, most commonly of poultry origin such as eggs and meat (Marin et al., 2021).The biggest concern for infection with Salmonella spp. is the increasing number of antibiotic-resistant strains, which is a public health concern. Multidrug-resistant Salmonella strains have been identified in reptiles (Wei et al., 2019) and there is concern that, as Europe is a large-scale exporter of many reptile species, the use of antibiotics by commercial breeders and exporters is promoting strains of antimicrobial-resistant Salmonella (Marin et al., 2021).Reptile-to-human transmission of Salmonella spp. is via indirect or direct contact with the patient or their faeces (Sodagari et al., 2020). Those most at risk include children, whose immune systems are still developing and potentially have poorer hygiene than adults, and immunosuppressed people, such as the elderly.Clinical signs in humans are often only self-limiting gastroenteritis with fever, diarrhoea, nausea, vomiting and abdominal pain, but death can occur with severe illness in immunocompromised individuals (Marin et al., 2021).FIGURE (2) Clinical staff members wearing gloves to avoid zoonotic disease while handling a Horsefield tortoise for clinical examination and blood samplingThe best way to prevent Salmonella infection is good hygiene. Always wash hands before and after handling any reptile patients and their faeces. Clinicians and veterinary staff should always wear gloves when handling faeces from any species but should also consider wearing gloves when handling reptiles in any context (Figure 2). Clients should be discouraged from kissing reptiles or having them close to their face. Reptiles should not be allowed in areas where their owners are eating or preparing food. In addition, a separate sink, such as a utility sink, is recommended to wash reptile bowls and enclosure furniture (Sodagari et al., 2020).The use of antibiotics to treat reptile patients whose faeces has positively cultured Salmonella spp. is controversial. Treatment of healthy reptiles carrying Salmonella spp. is unlikely to clear the bacteria and can result in the development of antibiotic-resistant strains (Marin et al.,