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## Domestic animals and zoonosis: A review

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### Abstract

Zoonotic diseases are infectious diseases which is spread from animals to public and vice versa. The causative organisms ranged from bacteria, viruses, fungi, parasites to prions. Even though on one side the development of vaccines to control the spread of diseases of zoonotic importance is happening, the emerging novel pathogens are creating headache to the scientists. There are considerable risks associated with domesticating animals in a zoonotic point of view. Cattle, dogs and cats are the main sources of zoonosis in the household. The causative organism can be transmitted directly from the companion animals or through vectors. Major vectors encountered are ticks, mosquitos and fleas. Close appropriation with animals is a factor that should not be encouraged, especially in children. Lacking of proper awareness, or sometimes ignorance to the zoonotic risk associated with livestock and companion animals leads to dreadful conditions. Not always, but sometimes. This review investigates and discuss on the major zoonotic affections that are spread by the domesticated animals or companion animals and the possible ways to prevent such infections.

**Keywords:** Zoonosis, cattle, dog, cat, domestic animals, virus

### 1. Introduction

Human animal relation begins in 15,000 years ago and still going on. Humans depends on different animals for food, work and companionship. Animal origin infective agents are the main source for human infection and it contributes over half of the contagion in humans. The risk of zoonotic emerges when a biological agent from an animal started causing disease conditions in humans. Such a situation or act is called as zoonosis. It is defined as any infection that is naturally spreading from a vertebrate animal host to humans. Animals remains as a vital part in the maintenance of zoonotic infections in nature. Zoonotic pathogens may be bacterial, viral, parasitic or fungal. There are approximately 1500 pathogens, which are known to infect humans and 61 per cent of these cause zoonotic diseases<sup>[1]</sup>. As well as being a public health problem, many of the major zoonotic diseases spoil the efficient production of food of animal origin and produce difficulties to international trade in food animal products<sup>[2]</sup>.

Emerging zoonotic diseases may have significant effects on human health and the Countries economy. Certainly, human impact on animal populations worldwide is a straight contributor to zoonotic disease spread of infections like rabies, toxoplasmosis, avian influenza, ebola, Q fever, dengue fever and anthrax. Additionally, respiratory, flu- like diseases acquired from animals inflicted destruction in the past century. The Spanish flu that caused 50 million deaths in 1918 and the Hong Kong flu with 700,000 deaths in 1968 were two examples. So, what is the reason for the transmission of dangerous diseases from animals to humans? Our immune system and natural selection play an important role in the spread and of course our close proximity to such environment that makes it fast<sup>[3]</sup>. Scientists evaluation suggests, 6 out of every 10 known infectious diseases in people can be transmits from animals and 3 out of every 4 new or emerging infectious diseases in people spread from animals. Due to this, Centers for Disease Control and Prevention (CDC) works efficiently whole week to guard people from zoonotic diseases in the United States and around the world.<sup>4</sup> The key factors in controlling emerging zoonoses are surveillance and response. These depend on rapid clinical diagnosis, early detection and containment of infections in populations and in the environment. Globally, such efforts are coordinated by the World Health Organization, which led a multi-faceted effort to effectively contain the global SARS outbreak of 2002 - 2003 and in the United States, the US Centers for Disease Control and Prevention (CDC) is answerable such threats<sup>4</sup>. This analysis will highlight the main zoonotic diseases transmitted by various domestic animal groups in the expectation that this will lead to an early notice system to detect pathogenic diseases that affect individuals who are exposed to domestic animals.

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## 2. Major Causes of Zoonotic Infections

Movement of human hosts or vectors or reservoirs of infection was found to have a great effect on both new and re-emerging infectious diseases in human. Each disease followed a distributional geographical area. Travel plays a significant role in taking people into contact with the infectious agents. There are many factors affecting the emergence and re-emergence of diseases especially zoonotic disease which include microbial adaptation and change, human susceptibility to infection, climate and weather, changing ecosystems, human demographics and conduct, economic progress and land use, international travel and trade, technology and industry, breakdown of public health measures, poverty and social inequality, war and famine, lack of political will and mind of harm [5]. Vector-borne diseases can cause unpredictable epidemics, public health challenges and difficulties, especially for those affected with some other ailments and relatively healthy animals can be attributed to zoonoses.

## 3. Transmission of Zoonotic Infections

There is a spectrum of infectious diseases of domestic animals that are shared by humans. Many of these are true zoonoses spread by direct contact between the species, and others are vector-transmitted (e.g., fleas, ticks, flies, and mosquitoes) diseases for which domestic animals might act as reservoirs for the pathogen. Reverse zoonoses also occur in which disease is transmitted from the human reservoir to the domestic animals. Methicillin-resistant *Staphylococcus aureus* (MRSA) is the most contemporary example [8].

Zoonotic diseases involve viruses, bacteria, fungus and parasites which are transmitted through bloodborne, water-borne, foodborne or airborne infection. The major routes observed are animal bites that tear the skin, insect bites by mosquitos, ticks and fleas, drinking tainted water or dairy products, eating meat infected with pathogen, inhaling pathogenic droplets or particles, direct skin-to-skin contact or close contact to mucous membrane and direct or indirect contact with animal feces or urine. Even if the animal is not affected with diseases, they can transmit the disease. This is often evident in case of bats. On the other hand, there are diseases, like rabies, that both humans and animals equally [9].

## 4. Domestic Animals' as Sources of Infection

Among various zoonotic diseases, several species function as reservoir. Such reservoirs contain numerous species of fish, domestic and wild animals, birds and even insects. All domestic animals including dogs, cats, birds, horses, cows, sheep, goats, and rabbits can potentially spread diseases to people, but hardly does this really occur. If pet owners exercise basic hygiene principles, especially hand washing, most of these potential diseases can be avoided. Since the middle of the 20<sup>th</sup> century, dogs and cats are more and more considered as "family members" within households as "pets" bringing major psychological well-being to our modern, urbanised society. However, cats and dogs still can be a source of human infection by various pathogens, including viruses, bacteria, parasites and fungi [6].

Methods of farm production are greatly varied and fetch with them their own particular risks in terms of the introduction and transmission of infectious diseases. At one extreme is the very low-intensity maintenance livestock farming, particularly of poultry, sheep and goats, that operates in the poorest of the world's rural households and that is critical to sustaining local

food supplies, alleviating poverty through income generation and for nutritional status. These animals are often kept under foraging conditions with little attention to disease control, housing or feed supplementation, suffer a high burden of endemic disease and are likely to be in close contact with other livestock species and humans, and potentially in contact with a variety of non-domestic animals. The impact of epidemic diseases on the livelihoods of these poor farmers is severe, mostly if there is high mortality or the burden of animal movement restrictions or culling [7].

Most people live around animals, even if they don't have farms or pets. From ticks to squirrels to rats, many members of the animal kingdom can transmit disease. Here's a short list of common domestic animals and some of the diseases that are transmitted from them:

### 4.1 Zoonotic Diseases from Cats

Toxoplasmosis, Pasteurellosis, Cat scratch disease Salmonellosis, Scabies, Flea Itch, Ringworm, Hookworm, Roundworm, Cryptosporidiosis, Giardiasis [10].

### 4.2 Zoonotic Diseases from Dogs

Pasteurellosis, Salmonellosis, Leptospirosis, Lyme disease, Campylobacter infection, Methicillin resistance *Staphylococcus aureus*, *Staphylococcus intermedius* infection, Q fever, *Bordetella bronchiseptica*, Capnocytophaga infection, *Yersinia enterocolitica* infection, Giardia infection, Cryptosporidium infection, Roundworms, Hookworm, Tapeworms, Ringworm, Scabies [12].

### 4.3 Zoonotic Diseases from Sheep and Goats

Rabies, Contagious Ecthyma (Soremouth), Ringworm, Chlamydiosis, Campylobacteriosis, Cryptosporidiosis, Listeriosis, Salmonella, Q Fever [11].

### 4.4 Zoonotic Diseases from Pigs

Ringworm, Erysipelas, Leptospirosis, Streptococcosis, Campylobacteriosis, Salmonellosis, Cryptosporidiosis, Giardiasis, Balantidiasis, Influenza and infection with Pathogenic *E. Coli* [1].

### 4.5 Zoonotic Diseases from Cattle

*Escherichia coli*, Ringworm, Salmonellosis, Tuberculosis and Brucellosis, Q fever, Leptospirosis, *Mycobacterium paratuberculosis*, *Chlamydomphila psittaci* and *Chlamydomphila abortus* [1].

### 4.6 Zoonotic Diseases from Birds:

Avian influenza (H1N1, H5N1), Psittacosis, Avian Tuberculosis, Erysipelas, Ornithosis, Cryptococcosis, Salmonellosis, Cryptosporidiosis and Campylobacteriosis [1].

## 5. Major control measures

Anybody in adjacent proximity or handling animals should take precautions to diminish the risk of infection. Because different zoonotic diseases behave differently, avoiding specific infections requires an individual approach. A few general practices can provide a high level of personal protection which have to be practiced in our day today life [1]. Good personal hygiene which is a must as far as an animal caretaker is concerned. Washing hands after handling animals and before preparing or eating food or smoking cigarettes should be practiced. Unwashed hands should not be used for eating or feeding children. Care should be taken while

preparing food and hygienic food preparation avoids food-borne diseases through correct processing of food items<sup>5</sup>. Vaccination is the preventive measure for people who are in close proximity to such infections. Vaccines are available for some zoonoses and they should be made use of. Abattoir workers, farmers and vets should seek advice on Q fever vaccination. To protect against Australian bat lyssa virus, people with close proximity to bat are advised to have a rabies vaccination. Use of personal protection apparels like gloves, boots and aprons or overalls should be worn when handling animals. Cover cuts and scratches with waterproof plasters. For some diseases that may be fatal to people such as Hendra virus, Nipah virus, full protective clothing is essential including respiratory protection.

Animal health should be maintained and farm biosecurity and animal health programs, including the use of vaccines, play an important role in reducing the risk of such zoonotic diseases. Pet owners should make sure their animals are healthy and regularly dewormed can be ensured by consultation with family veterinarians. Pregnant ladies should be cautioned to reduce the risk of toxoplasmosis and pregnant women should not empty cat litter boxes and handle pregnant ewes. Care when immuno-suppressed: People with depressed immunity whether due to illness or medical treatments, should avoid all exposure to zoonotic diseases. Stray animals and suspected animals that appear ill or carry skin infections should not be handled without taking precautions. It is also wise to avoid handling stray animals. Animals such as rats or feral pigs can transmit zoonotic diseases and control programs will decrease the probability of transmission to people.

## 6. Conclusion

Zoonoses have a major impact on global public health. Both emerging and re-emerging zoonoses have gained increasing national and international attention in recent years. The closer contact with companion animals and rapid socio-economic changes in food production system has increased the number of animal-borne zoonoses. Many zoonoses can be considered opportunistic infections. Contact with animals during farming, hunting, or by animal bites can increase transmission of diseases. Arthropod vectors can transmit diseases on an immense scale to other hosts. Pathogens are subjected to changes by many intrinsic and extrinsic factors. Mutation, recombination, selection and deliberate manipulation can result in new traits acquired by pathogens and result in potential epidemic consequences. Re-emergence of diseases through opportunistic host switching is likely to continue as a major source of human infectious disease. Strategies to improve public health should focus on improved surveillance in regions of perceived high likelihood of re-emergence. These strategies include improved detection of pathogens in reservoirs, early outbreak detection, broad-based research to identify factors that favor reemergence, and effective control. As far as pet zoonoses is concerned, risk of zoonoses is limited when good animal care and appropriate preventive measures are applied in the human environment. However, the risks are not null and some behaviors (kissing, sleeping, being licked, or sharing food or kitchen utensils) or exposure of high-risk group persons may lead to disease carried by companion animals. Better diagnostic tools have also increased our knowledge of the zoonotic or potentially zoonotic pathogens present in our direct environment. A "One Health" approaches that focus on collaborative efforts between human and animal health professionals will

contribute significantly to zoonotic infectious disease management and can generate innovative solutions to these complex problems.

## 7. References

1. Taylor LH, Latham SM, Woolhouse ME. Risk factors for human disease emergence. *Philosophical Transactions of the Royal Society B*. 2001; 356: 983-989.
2. WHO. Zoonoses [Internet]. WHO? World Health Organization; [cited 2020 Apr 30]. Available from: <http://www.who.int/topics/zoonoses/en/>.
3. Why are infections from animals so dangerous to humans? [Internet]; [cited 2020 Apr 30]. Available from: <https://www.medicalnewstoday.com/articles/zoonotic-diseases-why-are-infections-from-animals-so-dangerous-to-humans>.
4. Zoonotic Diseases | One Health | CDC [Internet]. 2020 [cited 2020 Apr 30]. Available from: <https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html>.
5. Aguirre AA. Changing patterns of emerging zoonotic diseases in wildlife, domestic animals and humans linked to biodiversity loss and globalization. *Institute for Laboratory Animal Research Journal*. 2017; 58(3):315-318.
6. Song SJ, Lauber C, Costello EK, Lozupon CA, Humphrey G, Berg-Lyons D *et al*. Cohabiting family members share microbiota with one another and with their dogs. *eLife Sciences Publications Ltd*. 2013; 2:e00458.
7. Tomley FM, Shirley MW. Livestock infectious diseases and zoonoses. *Philosophical Transactions of the Royal Society B*. 2009; 364:2637-2642.
8. Lin Y, Emily B, Jennifer K, Pravin K, Mary ES, Madhulatha P *et al*. Evidence of multiple virulence subtypes in nosocomial and community-associated MRSA genotypes in companion animals from the upper midwestern and northeastern United States. *Clinical Medicine & Research*. 2011; 91:7-16.
9. Zoonotic Diseases Passed from Animals to Humans [Internet]. Very well Health. [cited 2020 Apr 30]. Available from: <https://www.verywellhealth.com/all-about-zoonotic-disease-1958844>
10. Gerhold RW, Jessup DA. Zoonotic diseases associated with free-roaming cats. *Zoonoses and public health*. 2013; 60(3):189-195.
11. Amisshah-Reynolds PK. Zoonotic Risks from Domestic Animals in Ghana. *International Journal of Pathogen Research*, 2020, 17-31.
12. Beeler E, Ehnert K. Rabies in Dogs and Cats. *Clinical Small Animal Internal Medicine*, 2020, 891-897.