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Responsible pet ownership for prevention and control of zoonotic diseases: A mini review

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Abstract

The relationship between humans and pets brings joy and companionship, but also carries risks of zoonotic diseases. This review discusses the importance of responsible pet ownership in mitigating these risks through hygiene practices, vaccination protocols, and public health education. By promoting responsible pet ownership, communities can effectively reduce the incidence and impact of zoonotic diseases.

Keywords: Responsible pet ownership, zoonotic diseases, public health

1. Introduction

Pets are cherished members of households worldwide and play significant roles in providing emotional support, social benefits and even numerous health and therapeutic benefits to their owners (Bakerjian, 2014; Brooks *et al.*, 2018; McConnell *et al.*, 2019) [8, 13, 65]. Studies have shown that pet ownership can lead to reduced stress levels, lower blood pressure, and increased physical activity among owners (Kertes *et al.*, 2017; Ein *et al.*, 2018; Maugeri *et al.*, 2019; Carr *et al.*, 2021) [48, 33, 64, 15]. Having pets, especially dogs, might be linked to a lower risk of cardiovascular disease (Arhant-Sudhir *et al.*, 2011) [3]. However, alongside the advantages of pet ownership, close interaction between humans and pet animals also brings potential risks of zoonotic disease transmission, posing public health challenges (Stull, 2015; Varela *et al.*, 2022, CDC, 2025) [91, 98, 18]. Zoonotic diseases are the illnesses that can be transmitted between animals and humans (FAO/WHO, 1959) [36].

Zoonoses can be caused by wide range of pathogens, including bacteria (e.g., *Salmonella*, *Campylobacter*), viruses (e.g., rabies, influenza), parasites (e.g., *Toxoplasma gondii*, roundworms) and fungi (e.g., ringworm) (Stull *et al.*, 2015) [91]. These pathogens can spread through direct contact with animals or indirectly through surfaces or environments that have been contaminated by an animal's waste, secretions, or other bodily fluids; through the contamination of food preparation areas and utensils in the kitchen; or, less frequently, through infectious droplets or aerosols (Daly *et al.*, 2017) [25] as well as through bite of insect vectors like fleas and ticks that infest pets (Overgaauw and van Knapen, 2013; Ghasemzadeh and Namazi, 2015; Stull *et al.*, 2015; Varela *et al.*, 2022, CDC, 2025) [73, 40, 91, 98, 18]. In addition, zoonotic pathogens can be transmitted to individuals while touching or kissing their pets, accidentally ingest

contaminated feces from the animals' fur, feathers, scales, or come into contact with contaminated saliva while hand-feeding or being licked by an animal and through bites and scratches inflicted by household pets (Daly *et al.*, 2017; Varela *et al.*, 2022) [25, 98].

Besides conventional companions, though rare, bite and scratch injuries caused by nontraditional pet (NTP), can be associated with transmission of zoonotic infection depending on the pet species involved (Daly *et al.*, 2017) [25]. Pet reptiles and amphibians may carry bacteria like *Salmonella*, which can cause severe illness in humans, particularly in young children and immunocompromised individuals (Pedersen *et al.*, 2009; Lapo *et al.*, 2016; Pees *et al.*, 2023) [77, 54, 78]. Birds can transmit psittacosis (Hogerwerf *et al.*, 2017) [44], and small mammals like rodents can carry hantavirus or lymphocytic choriomeningitis virus (LCMV) (Childs *et al.*, 1992 & 1994; Herrero-Cófreces *et al.*, 2022) [19-20, 42]. Certain non-traditional pets, including arthropods (e.g. scorpions and centipedes), arachnids (e.g. spiders), reptiles, amphibians, and fish kept as pets, have been known to inflict envenomation through stings, bites, or other forms of contact. Additionally, these pets may harbor parasites like ticks and fleas, which can transmit vector-borne illnesses to humans (Daly *et al.*, 2017; Mendoza-Roldan *et al.*, 2020) [25, 66] and underscores the critical importance of responsible pet practices in mitigating the risks associated with zoonotic diseases.

For effective management of these risks, the initiatives like responsible pet ownership is of utmost importance. Getting pet owners to take responsibility helps prevent and control zoonotic diseases and keeps everyone healthy. The responsible practices under this includes regular veterinary visits for vaccinations and health check-ups of pets, maintaining good hygiene by washing hands or cleaning up after handling them, and appropriate disposal of pet waste

(Stull *et al.*, 2015; Evason *et al.*, 2021; Chowdhury, 2023) [91,35,22]. It's also important to provide pets with proper nutrition, including functional foods and living conditions to support health and reduce their susceptibility to diseases (Fascetti, 2010; Swanson *et al.*, 2013; EFSA, 2023; AVMA a) [37, 94, 32, 4]. This article stresses how important it is to own pets responsibly in order to protect public health and stop the spread of zoonotic diseases, as shown by current research and public health campaigns.

1. Understanding zoonotic risks associated with pets

Pets can be reservoirs or carriers for wide range of zoonotic pathogens. Bacterial infections commonly associated with pet ownership such as salmonella and campylobacter can be transmitted to human through direct contact with pets or their contaminated feces, resulting in gastrointestinal illnesses ranging from mild discomfort to severe complications in humans (Stull *et al.*, 2015; Damborg *et al.*, 2016; Bhat, 2021) [91, 26, 10].

Viral diseases such as rabies pose a significant public health threat worldwide, with transmission primarily occurring through bites or scratches from infected animals (Hampson *et al.*, 2015; CDC, 2024) [41, 24]. Because of their close proximity to humans, infected pet animals (such as dogs and cats) can transmit rabies to humans in 99.8% of cases (Baer, 1991; Kumar *et al.*, 2023) [7, 52]. Rabies is almost invariably fatal once clinical symptoms appear, making prevention through vaccination of pets and responsible animal management a crucial practice (Amoako *et al.*, 2021; Kumar *et al.*, 2023; WHO, 2024) [2, 52, 102]. Parasitic infections such as *Toxoplasma gondii*, transmitted via cat feces, highlight another aspect of zoonotic disease transmission associated with pet ownership (Tenter *et al.*, 2000; Baneth *et al.*, 2016) [97, 9]. Cats are definitive host and the parasite can be excreted in their feces. According to Jones and Dubey (2012) [46] and Shapiro *et al.* (2019) [84], humans can contract toxoplasmosis through tainted drinking water, eating contaminated fruit or vegetables, or by coming into contact with soil contaminated with *T. gondii* oocysts. Some groups, like kids, the elderly, pregnant women, and people with weak immune systems, are more likely to have serious problems like neurological problems or birth defects (Jones and Dubey, 2012; Overgaauw and van Knapen, 2013; Bobic *et al.*, 2019; Deganich *et al.*, 2022; Kota & Shabbir, 2023) [46, 73, 12, 28, 51]. Although this list is not complete, it gives a clear summary of zoonotic dangers and the pathways by which pets spread diseases to humans.

2. Importance of hygiene practices and preventive measures

Ensuring basic hygiene helps stop zoonotic diseases that linked with pet ownership. Zoonotic risk like *T. gondii* and Salmonella transmission can be limited by pet owners, after handling their pets, by washing their hands thoroughly with soap and water, especially before eating or preparing food (Stull *et al.*, 2015; Mamun *et al.*, 2024) [91, 62]. Regularly cleaning and disinfecting pet habitats, such as cages, litter boxes, pet waste and feeding areas, is crucial to reducing microbial contamination, preventing the spread of disease-causing organisms, and maintaining a clean living environment for both humans and pets (Miller, 2009; Subbiah, 2023, CDC, 2025) [67,93,18]. According to recent

assessments, higher health outcomes are linked to better WASH conditions (Stocks *et al.*, 2014; Strunz *et al.*, 2014) [89-90]. These procedures especially, avoiding direct touch or consuming contaminated materials, help reduce the risk of potential bacterial and parasite diseases (Overgaauw *et al.*, 2020) [74]. In addition to this, the proper disposal of pet waste is crucial against environmental contamination and possible disease transmission (Cinquelpalmi *et al.*, 2012; Siddiqua *et al.*, 2022) [23, 87]. Also, regular grooming of pets and use of approved veterinary parasite control products contribute to maintaining pets' well-being and reducing the risk of zoonotic infections. Keeping pets free of external parasites like fleas and ticks is essential for preventing vector-borne diseases that can affect both humans and animals, in addition to safeguarding their health (Stull *et al.*, 2015) [91]. Basic health and hygiene care, when adopting a pet from a shelter or pet store, should be ensured of before bringing it home. Moreover, continuous stray and feral dog and cat population control measures are also required to reduce the continuation and spread of infectious diseases in nature (Matos *et al.*, 2015; Pereira *et al.*, 2016; Otranto *et al.*, 2017) [63, 79, 72].

By lowering their exposure to infectious agents and creating a healthy living environment, these hygiene practices not only safeguard human health but also benefit pet animals (Stull *et al.*, 2015) [91].

3. Vaccination protocols

One crucial intervention to stop the spread of zoonotic diseases between species is immunizing humans and animals (Vourch *et al.*, 2022; Carpenter *et al.*, 2022) [99,14]. In such circumstances vaccination may be the most effective and economical method of prevention and control when there is a high risk of infection or a serious disease that results (Monath, 2013) [69]. The purpose of vaccines is to boost immunity and protect against a range of infectious diseases (Pollard & Bijker, 2021) [82]. It is important for good preventive care of animals and also for preventing diseases that pets can transmit to humans.

Animals can transmit a very serious disease to humans, for example, rabies. Vaccination against this virus borne fatal disease is recommended for all pet animals. This rabies vaccination safeguards individual animals and inhibits the transmission to humans through bites or scratches from infected animals (Lodha *et al.*, 2023; WHO, 2024) [59, 102]. Depending on the risk in the area and a pet's health, a veterinarian might suggest other vaccines in addition. For instance, pets in areas where leptospirosis is common often get vaccines against the disease (Klaasen & Adler, 2015; Lopez Robles, *et al.*, 2021; Jayathangaraj *et al.*, 2024) [49, 60, 45]. To achieve and maintain immunity in animal populations and protect human and animals from zoonotic threats, adherence to vaccination schedules recommended by veterinarians is essential (AVMAc) [6]. It is important for a pet owner to get their pet vaccinated and schedule regular visits to the veterinarian.

4. Public health education, community engagement and interventions

To create awareness, let people know more about zoonotic diseases, help them handle their pets properly, and improve the environment for all, it all depend on effectual

communication and health education. Pet owners can learn the value of routine veterinary care, vaccinations, and other preventive health measures for their animals through public health campaigns (AVMAb; WOA, 2018) ^[5, 103].

Public health initiatives to control zoonotic diseases must include community-based initiatives like mass vaccinations, pet registration and licensing, and mandatory health screenings. They help with early zoonotic outbreak detection and disease surveillance in pet populations (Duamor *et al.*, 2023) ^[31]. By urging pet owners to register their animals and obtain permits, authorities can support disease surveillance and management initiatives (Carvelli *et al.*, 2020; More, *et al.*, 2022; Hiregange, 2024) ^[16, 68, 43]. To put in to practice the strategies that reduce zoonotic risks and boost the efficacy of intervention measures requires, active cooperation between veterinary professionals, public health authorities, and pet owners is required (Kogan *et al.*, 2021; Sharan *et al.*, 2023) ^[50, 85]. When it comes to providing advice on how to prevent, treat, and care for dogs, veterinarians are crucial (Garcia-Sanchez *et al.*, 2023; Noah, 2024) ^[38, 71]. By creating and enforcing laws that advance both public health and animal welfare, public health experts ensure a coordinated approach to zoonotic disease control (Shiferaw *et al.*, 2017; Erkyihun & Alemayehu, 2022) ^[86, 34]. Attending educational workshops, holding neighbourhood gatherings, and using internet resources can help pet owners better understand zoonotic threats and take preventative actions to safeguard both themselves and their animals (Stull *et al.*, 2015; Corrales, 2023) ^[91, 24]. Media campaigns for public education can help close knowledge gaps, promote collaboration, and raise awareness of the vital role that the veterinary profession and appropriate pet care play in protecting the public's health (Lai, 2020) ^[53]. Working as a team, they can apply a solid plan to lower the risks of zoonotic diseases for humans and animals.

5. Role of veterinarians

Pet owners often do not recognize these zoonotic diseases, and many healthcare professionals lack the training to identify them (Tan, 1997) ^[96]. Educational campaigns for pet owners about zoonotic diseases and preventive measures play essential roles in endorsing responsible pet ownership practices (Overgaauw and van Knapen, 2013; Waheed *et al.*, 2023) ^[73, 100]. Veterinarians ought to be at the forefront of educating pet owners about zoonoses and implanting the appropriate strategies for treatment and prevention (Day, 2011) ^[27]. Veterinary professionals can also play a key role in providing guidance on maintaining a clean living environment for pets, parasite control, the importance of vaccinations, and the safe handling of pets, especially for households with children, elderly individuals, or individuals with weakened immunity who may be more vulnerable to zoonotic infections (Garcia-Sanchez *et al.*, 2023) ^[38]. Public health organizations and veterinary associations often collaborate to enhance awareness of zoonoses and advocate for responsible pet ownership practices (Karesh *et al.*, 2012; Sharan *et al.*, 2023) ^[47, 85].

5. Challenges and future directions

Despite the recognized advantages of responsible pet ownership effective disease prevention and control efforts

are still hindered by a number of issues. Some problems people encounter include unequal access to veterinary care, cultural beliefs that influence pet care behaviors-sticking to old ways of pet care, and a lack of knowledge regarding the risk of zoonoses. More studies are required and should focus on creating novel approaches to encourage responsible pet ownership, expand access to veterinary care, and to ensure implementation of guidelines across a range of demographics. Deeper understanding of the key concerns, the necessity of research-driven solutions and improved access to veterinary care for all in need, is thus emphasized.

- 1. Disparities in Access to Veterinary Care:** Access to veterinary care in communities varies widely by region and socioeconomic status (Pasteur *et al.*, 2024) ^[76]. Lack of veterinary facilities and services, particularly in rural areas, makes it difficult for pet owners to get necessary preventative care, such as vaccinations and routine examinations as desired (LaVallee *et al.*, 2017; Wiltzius *et al.*, 2018; Lem, 2019) ^[55, 101, 58]. Some of the creative approaches needed to reduce these disparities include telemedicine, ambulatory or mobile veterinary clinics, and collaborations between veterinary professionals and community organizations to reach underprivileged populations (Kogan *et al.*, 2021; DiGangi *et al.*, 2023; Abu-Seida *et al.*, 2024; Niemiec *et al.*, 2024) ^[50, 29, 1, 70].
- 2. Cultural Beliefs Impacting Pet Care Practices:** Cultural beliefs and customs have a significant impact on how communities feel and react when it comes to pets (Lawrence, 1985; Szucs *et al.*, 2012; Park *et al.*, 2021) ^[56, 95, 75]. For instance, cultural norms that may prohibit spaying or neutering pets results in pet overpopulation and the risk of zoonotic disease transmission (Blackshaw & Day, 1994; Downes *et al.*, 2015; Schoenfeld-Tacher *et al.*, 2016; Smith *et al.*, 2019) ^[11, 30, 83, 88]. Effective educational programs and outreach plan that encourage accountable pet ownership while taking into account various cultural background require an understanding of and respect for cultural perspectives (Gehrt *et al.*, 2017) ^[39].
- 3. Inadequate Awareness Among Pet Owners:** The timely and accurate dissemination of information regarding zoonotic illnesses is one of the proficient ways to manage and prevent them (Chomel, 2008) ^[21]. Many pet owners are likely unaware about zoonotic diseases and the precautions to take to keep themselves and their animals safe (Maaten *et al.*, 2016; Lee & Devlin, 2022) ^[61, 57]. This ignorance could raise the risk of zoonotic disease transmission and result in less-than-ideal pet care practices (Stull *et al.*, 2012 & 2015) ^[92, 91]. To empower pet owners to make knowledgeable decisions regarding the health and wellbeing of their animals, it is crucial to increase public awareness through targeted educational campaigns, readily available information resources, and community involvement programs (Philpotts *et al.*, 2019 & 2024) ^[81, 80].

Looking for answers to these problems ought to be the main purpose of future studies. It is also necessary to use methods that suit different groups while accounting for socioeconomic, linguistic, and cultural aspects. The actions

should aid in controlling zoonotic diseases, boost the public's trust in veterinarians, and increase the number of those who follow guidelines.

Conclusion

In conclusion, there are several benefits to having a pet, but pet owners should be aware of the risks that come with it. By following proper pet care practices and staying up to date on health guidelines, owners can protect the health of their pets and the community as a whole. Nevertheless, it requires regular work with the community, learning, and research to completely avoid zoonotic diseases. Through constant scientific research, knowledge dissemination including educational initiatives, and cross-sector cooperation, can improve methods to safeguard and preserve pets' health and strengthen public health resilience.

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