

MANUSCRIPT

INTRODUCTION

Contact between pets and their owners can result in transmission of zoonotic pathogens, either through skin or mucous membrane contact, ingestion of faecal material, or inhalation of aerosols.¹⁻⁴ Immunocompromised individuals are at increased risk of both acquiring zoonotic pathogens and experiencing increased illness severity, compared with immunocompetent individuals.⁵⁻⁷ There is potential to reduce the risk of acquiring zoonotic pathogens from companion animals through reducing the number and types of exposures, as well as adhering to guidelines for immunocompromised patients on selecting and caring for companion animals.⁸⁻⁹

The aim of this study was to determine whether members of three groups of immunocompromised patients engaged in high-risk behaviours with their companion animals.

MATERIALS AND METHODS

A cross-sectional survey was conducted at a large public, metropolitan tertiary hospital in 2014.

Three groups of adult immunocompromised patients were selected; patients with haematological malignancies (chronic lymphocytic leukaemia and lymphoma), patients with haemoglobinopathies requiring transfusion and patients living with HIV. Consecutive adult patients attending the haematology or HIV outpatient clinics were approached by one of the investigators and asked to complete an anonymous, self-administered written questionnaire

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which was completed on site. Participation was voluntary.

The survey consisted of questions about demographic details, animal ownership and types of animal contact. Questions about potentially infectious activities with animals included questions about mucosal contact (letting animal lick or kiss the face), sharing food, sleeping in the same room or bed, picking up animal faeces and cleaning pet areas. The survey was piloted on a small number of patients prior to use.

Patients were asked if they had ever been bitten or scratched by an animal and whether they could recall receiving education from a health care worker regarding safe animal contact.

The study was approved by the Monash Health Human Research and Ethics Committee.

RESULTS

Two hundred and sixty-five patients completed the survey. 170 (64%) were male; median age was 48 years (range 17-92). For 194 (73%) patients, their primary language was English and 109 (41%) had received tertiary level education. 35 (13%) lived alone. There were 79 (30%) patients with haematological malignancy, 86 (32%) with haemoglobinopathies and 100 (38%) with HIV.

137 (52%) of surveyed patients had an animal of any kind; 41 (52%) with haematological malignancy, 40 (47%) with haemoglobinopathies and 56 (56%) with HIV.

The most common animals were dogs 101 (74%), followed by cats 50 (36%), birds 19 (14%), reptiles 4 (3%), rabbits 3 (2%), rodents 1 (1%) and other animals not specified 13 (9%).

80 (30%) patients who owned animals reported having received a bite or scratch from an animal at some time.

109 (80%) patients who owned animals engaged in at least one activity that may have exposed them to zoonotic infections. The most frequent behaviours were picking up animal faeces 72 (66%), cleaning animal areas 69 (63%) and allowing animals to sleep in the same bed 51 (47%).

Only 45 (17%) patients who owned animals could recall advice from a healthcare worker regarding safe practices around animals. Of these patients, 18 (40%) received the information from their primary care physician, 14 (31%) from their specialist and 13 (29%) from both.

DISCUSSION

Over half of the patients in this study owned a companion animal and 80% of them engaged in behaviour which placed them at risk of zoonotic infection. Although there are guidelines for immunocompromised patients regarding selection and care of companion animals to minimise risk of infection,⁷⁻⁹ these guidelines are based on limited evidence and no randomised controlled studies.

The nasopharynx of dogs and cats are colonised by potentially pathogenic bacteria such as *Pasteurella sp.*, *Capnocytophaga sp.* and *Staphylococcus aureus*. There are numerous case reports of invasive *Pasteurella* infection in animal owners, acquired through being licked by their animal.^{1-2, 10-14} Supportive evidence of colonisation of *Pasteurella* in the pet owner's mouth comes from a Japanese study which found no *Pasteurella* species in the oral

cavity of 19 pet owners who had not kissed their pets, but isolated *Pasteurella* from three of five owners who had kissed their pets.¹⁵ Similarly, there are several cases reports of *Capnocytophaga canimorsus* infection in humans that have been associated with being licked by or sleeping in a bed with a dog or cat,¹⁶⁻¹⁷ including the case of a splenectomised patient who died of overwhelming infection following a dog lick.⁵ Our findings are similar to other studies, though information on the immunocompromised is sparse.^{18 19} It is estimated that 14% of all human illness caused by common enteric pathogens are attributable to animal contact.⁴

Bites are probably more significant than mucosal exposures in terms of infectious risk. Considering approximately 18% of dog bites and 71% of cat bites become infected in immunocompetent patients, it is likely immunocompromised patients have similar or higher rates than this.²⁰ Immunocompromised patients are more likely to develop severe disease following infection with pathogens commonly associated with bites (*Pasteurella*, *Capnocytophaga*) and there are reports of mortality following dog and cat bites.⁶

The most important limitation of the study was that we did not collect data on clinical zoonotic infections which may have resulted from the potentially infectious exposures, so the magnitude of the risk of these behaviours is not quantifiable. While previous infections in immunocompromised hosts have been reported,²¹ quantifying the rates of infection versus exposure in immunocompetent versus immunocompromised is beyond the scope of the study. In addition the findings are not necessarily generalizable to children though it would seem probable that exposure rates would be comparable. Quantification of risk is also likely to vary by underlying disease: in the past avoidance of cat faeces was recommended for those with HIV in order to prevent cerebral toxoplasmosis.

With respect to the asplenic patients, such as those with haemaglobinopathies, Monash Health has contributed to Spleen Australia since its foundation and those registered are advised to report bites and receive antibiotic prophylaxis as well as a wallet card that could identify them as being asplenic in an emergency.²²

Pets are a much-loved companion for many patients, especially during chronic illnesses. However, many patients in this study exhibited risky behaviour in relation to their animals. This study highlighted a potential for both doctors and veterinarians to educate their patients about safe practice around their animals. How to do so beyond fixed programs such as the spleen registry or increasing awareness among practitioners by presentations and publications is unclear. One possibility is more printed information for patients though the utility is unproven. Future research could focus on the correlation between education programs to minimise exposure to zoonotic organisms from companion animals and the rates of clinical infection with zoonotic organisms in the same patients.

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Abstract

A cross-sectional survey of 265 adult patients with haematological malignancy, haemoglobinopathy or HIV was performed to determine the potential risk of infection from animal exposures. One hundred and thirty seven (52%) owned an animal; the majority were dogs (74%) and cats (39%) but 14% owned birds and 3% reptiles. 80% engaged in behaviour with their animals that potentially put them at risk of zoonotic infections. The most frequent behaviours were picking up animal faeces 72 (52%), cleaning animal areas 69 (50%) and allowing animals to sleep in the same bed 51 (37%). Twenty-eight percent allowed the animal to lick their face. Of all patients, 80(30%) had been bitten or scratched by an animal. Only 16% of those who owned pets could recall receiving education regarding safe behaviours around animals. These immunocompromised patients are at risk of infection through exposure to pets. Our study highlights the need for increased education of patients regarding how to remain safe around their pets.

TITLE PAGE

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High Rates of potentially infectious exposures between immunocompromised patients and their companion animals: An unmet need for education

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