


## Letter to the Editor

# Investigation of multidrug-resistant bacteria in dogs enrolled at animal-assisted therapy in a trauma and surgical emergency hospital

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*To the Editor*—Animal-assisted activities, such as informal visitations and interactions through dog-assisted therapy (DAT), can promote well-being and improve the health of patients in hospitals.<sup>1</sup> However, despite the significant benefits that DAT can provide, animals can harbor and transmit potential hazardous microorganisms, such as fungi, parasites, and multidrug-resistant (MDR) bacteria.<sup>2</sup>

Few studies have investigated the risk of MDR bacteria in dogs involved in hospital DAT. Recently, some studies have shown the presence of opportunistic pathogens associated with nosocomial infections, which can be carried by dogs and transmitted to humans, including *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacter* spp, extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli*, and methicillin-resistant staphylococci.<sup>3,4</sup> Moreover, Walther et al<sup>5</sup> point out that clinical outbreaks associated with these microorganisms are reported in the veterinary context, which can be related to the MDR transmission between animal to humans.

Due to the possibility of the MDR bacteria colonization in dogs enrolled at DAT that keep in contact with hospitalized individuals, we sought to detect the presence of MDR bacterial strains in nasal and rectal swab from dogs enrolled at DAT before and after patient visitation.

This transversal study approved by the institutional review board (animal ethics committee). It was conducted at Hospital Universitário Cajuru (HUC), an acute-care university hospital with 207 beds located in Curitiba, state of Paraná, in Southern Brazil. HUC is a referral center for trauma and surgical emergency, and in the first semester of 2020, 46% of the healthcare-associated infections were caused by MDR bacteria, with a density between 1.5 and 9.6 cases per 1,000 patient days.

Since 2014, the HUC has promoted DAT, in which dogs have visited hospitalized patients in the ward once each week. All dogs are housed in a veterinary clinic, receiving daily care, and assisted by a veterinarian. Before the visits, the dogs were cleaned with ethanol (70%). During the visit period, patients

and professionals were instructed to sanitize their hands with 70% ethanol before and after contact with the animals, and all the visits were supervised by a veterinarian. After the visit, dogs were again cleaned with 70% ethanol. During 2018, 10 dogs were enrolled in DAT, and before entering the hospital and after the period of visitation, nasal and rectal swabs were collected by direct sterile swabbing (Stuart Agar Gel Medium, Copan-Transystem, Copan, Brescia, Italy) and were stored for microbiological analysis.

The samples were immediately subjected to microbiological analysis, in which the swabs were streaked in specific media and incubated at 37°C for 24 hours for MDR screening. The swabs were inoculated as follows: nasal swabs were screened for methicillin-resistant *Staphylococcus aureus* (MRSA), in which the swabs were streaked onto mannitol agar (Laborclin, Pinhais, Brazil). The characteristic yellow colonies identified in the agar plate were tested for coagulase and cefoxitin.

Rectal swabs were sampled to detect the presence of ESBL, *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo- $\beta$ -lactamase (NDM), and vancomycin-resistant enterococci (VRE). To screen for resistant enterococci, suspected colonies were inoculated onto bile esculin agar supplemented with vancomycin. To screen for gram-negative bacilli, the swabs were streaked onto specific chromogenic agar for ESBL (which also selects KPC and NDM; Laborclin, Pinhais, Brazil). Suspicious colonies were subjected to phenotypic testing with antibiotic-impregnated discs with amoxicillin/clavulanate, cefepime, ceftriaxone, aztreonam, and ceftazidime (Laborclin, Pinhais, Brazil). A meropenem-impregnated disc (Laborclin, Pinhais, Brazil) for carbapenem resistance was also evaluated.

All samples from 10 dogs showed bacterial growth on mannitol, bile esculin, and chromogenic agar. However, none of the isolated colonies showed resistance profile for the tested antibiotics according to the 2018 CLSI standards.<sup>6</sup> This is the first study of this conducted in a Brazilian hospital. Despite the absence of MDR bacteria in our samples, this type of surveillance should be expanded, and all dogs enrolled in a DAT should be tested to avoid bacterial and resistance-gene dissemination, and to ensure the safety of the animals and patients.

**Supplementary material.** To view supplementary material for this article, please visit <https://doi.org/10.1017/ice.2021.358>

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# Nosocomial influenza in patients with cancer before the coronavirus disease 2019 (COVID-19) era and one year after the pandemic: Can we do any better in hospitals?

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*To the Editor*—The nosocomial influenza rate among cancer and severely immunosuppressed patients (ie, transplant recipients) has been reported to be between 9% and 28%.<sup>1,2</sup> Healthcare workers (HCWs) with influenza can transmit the virus to patients, and this transmission can be particularly problematic when HCW vaccination rates are low.<sup>3</sup> High rates of influenza vaccination in HCWs have been associated with lower morbidity and mortality among patients in long-term care facilities.<sup>4</sup>

During the coronavirus disease 2019 (COVID-19) pandemic, most hospitals established measures to limit the spread of severe acute respiratory coronavirus virus 2 (SARS-CoV-2); therefore, the transmission of other respiratory viruses was also limited. In this study, we examined the demographics, clinical presentation, and outcomes of patients with nosocomial influenza in a Mexican cancer-referral center over 13 years, including the first year of the COVID-19 pandemic.

## Methods

This cross-sectional study was conducted from 2008 to 2021 at the Instituto Nacional de Cancerología, an oncological referral center in Mexico City. We included adult patients with solid and hematological malignancies and confirmed nosocomial influenza. Informed consent was waived, and patient confidentiality was protected. Nosocomial influenza was suspected in patients who developed influenza-like symptoms >48 hours after admission. Influenza

was confirmed by polymerase chain reaction from nasal swabs, endotracheal tube aspirates, or bronchoalveolar lavage samples.

Demographic and clinical data were obtained from influenza surveillance databases and electronic medical records. Categorical variables are described using proportions, and continuous variables are described using mean and standard deviation (SD) or median and interquartile range (IQR). The Pearson  $\chi^2$  test was used to compare categorical variables, the Student *t* test was used for means, and the Mann-Whitney *U* test was used for medians. In addition, we compared HCW influenza vaccination rates from 2015 to 2021.

Before COVID-19, any patient with an influenza-like illness was isolated in an individual room, with droplet and contact precautions. Relatives of patients with influenza-like illnesses had to wear surgical masks, and hand hygiene was also reinforced. In March 2020, tighter infection control practices were introduced, with mandatory face mask use, increased hand hygiene, restrictions for accompanying persons, and cohort isolation in a specific in-hospital ward for patients under evaluation for respiratory symptoms.

## Results

In total, 1,808 influenza-like illness cases were evaluated between 2008 and March 2021. Among them, 289 (15.3%) had confirmed influenza. Of these, 30 (10.38%) were diagnosed with nosocomial influenza. The median number of nosocomial influenza cases per year was 2 (IQR, 0–3).

Overall, the median age of these patients was 43 years (IQR, 22–55), and most (70%) had hematologic malignancies. Oseltamivir was prescribed for 29 patients (96.6%). In addition, 10 patients (33.3%) with nosocomial influenza died. Clinical and sociodemographic characteristics are summarized in Table 1.

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