Progress towards Companion Animal Zoonotic Disease Surveillance in the U.S. Army

Sheldon G. Waugh, Sara B. Mullaney

Army Public Health Center, United States

Objective

We assesed the feasibility of a zoonotic disease surveillance system through the current EHR (ROVR) for all POAs and GOAs. Additionally, we conducted a retrospective observational study querying and collecting reported zoonoses of interest, for 2017.

Introduction

Dogs, cats and other companion animals have played an integral role in many aspects of human life. Human and companion animal (CAs) interactions have a wide range of benefits to human health [1-3]. The threat of zoonotic transmission between CAs and humans is exacerbated by proximity (56% of dog owners and 62% of cat owners sleep with their animal next to them [4]) and the number of diseases CAs share with humans. Many of these highlighted zoonoses are spread by direct contact, and others are vector-transmitted (e.g., fleas, ticks, flies, and mosquitos). Within the realm of the One-Health concept, CAs can serve multiple roles in zoonotic transmission chains between humans and animals. They can serve as intermediate hosts between wildlife reservoirs and humans, or as possible sentinel or proxy species for emerging diseases [5]. Given the large number of CAs within the United States (estimated 72 million pet dogs, 81 million pet cats), understanding and preventing the diseases prevalent in CA populations is of utmost importance.

Biosurveillance is a critical component of One Health initiatives including zoonotic disease mitigation and control. As Lead Service for Veterinary Animal and Public Health Services, the Army has a responsibility to champion biosurveillance efforts to support One Health initiatives, improving Servicemember, family, and retiree health across the Joint Force. Additionally, with military personnel experiencing apparent increased rates of job-reducing ailments such as diarrheal, bacterial and viral disease [6-8], it is essential that the Army focus on maximizing their operational potential by minimizing the amount of time personnel are sick from these transmissible diseases and observing potential sources of infection. By observing the zoonotic disease burden in privately owned (POAs) and government-owned (GOAs) animals, public health investigators can increase focus on what transmittable diseases are at greatest risk of being spread from companion animals to military personnel.

To address this potential source of infection, the Department of Defense (DoD) sought and continues to seek to establish a centralized and integrated veterinary zoonotic surveillance system to provide Commanders with a clear picture of disease burden [9]. With this assigned responsibility, the Army Veterinary Service (VS) seeks to centralize and enhance surveillance efforts through the Remote Online Veterinary Record (ROVR) Electronic Health Record (EHR), an enterprise web-based application to support the Army VS, accurately establishing a zoonotic epidemiological baseline and sustaining consistent future reporting.

Methods

Through a requested effort and proof of concept, the Army Public Health Center's (APHC) One Health Division tested the feasibility of a zoonotic disease surveillance system through the current EHR (ROVR) for all POAs and GOAs. We obtained one year (2017) worth of zoonotic encounters of interest through ROVR, querying a population of roughly 202,000 animals (n=202,217). We conducted a retrospective observational study comparing reported zoonoses of interest between CA populations. Maximum Likelihood Estimations of frequency detailed comparisons of frequency and prevalence between GOAs and POAs, within the ROVR EHR. Additionally, we evaluated the accuracy of surveillance data queried, proposed potential metrics and dashboards for commanders and stakeholders to easily observe zoonotic burden of companion animals and developed potential courses of action for future tools, collaborations, and educational interventions.

Results

Of the 512 collected zoonotic encounters, Giardia and Hookworm were the two most prevalent zoonoses overall, with 4.23 and 5.43 cases per 10,000 outpatient visits (OPVs), respectively. We observed a significant differential frequency of Giardia and

Hookworm between GOAs and POAs (63% (CI: 54.6-71.4) vs 12.7% (CI: 9.7-16.1) and 2.5% (CI: 0.1-5.9) vs 41.9% (CI: 37.1-46.8) of all queried zoonotic diseases of interest, respectively). In addition to back-end database and querying improvements, we suggested the development of an educational intervention based at Army First-Year Graduate Veterinary Education program (FYGVE) locations to emphasize the important benefits of capturing zoonotic diseases of interest correctly, early stages in the clinical experience. The intervention would focus on increasing accurate data capture with the ultimate goal of a phased regional rollout through education and collaboartive buy-in.

Conclusions

From these results and recent CDC guidance of data-driven surveillance, we've proposed a phased surveillance development plan focused on systematic data collection, collaboration, and evaluation. Our idenfitied overexpressed zoonoses will focus our efforts on tracking Giardia and Hookworm through multi-year trends. This assessment and proof of concept allows for illumination of gaps and limitations within the Army VS to effectively track the zoonotic burden of GOA and POA populations. Our current and future work will look to close surveillance gaps and help identify potential routes of transmission from companion animals to humans.

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