Isolation of Multidrug-Resistant Bacterium in Urban Wildlife: What Is in Your Backyard?

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ABSTRACT

Animal and human interaction encourage zoonotic transmission of microbes, resulting in colonization and risk for infectious disease. Studies of individuals working in agriculture show increased cases of *Salmonella* infection along with a higher colonization of antimicrobial-resistant microbes. However, risk from wildlife exposure is not fully understood. Alaska's largest city, Anchorage, is home to approximately 1000 moose migrating into city parks and suburban backyards. Environmental impact of moose fecal contamination could prove to be a public health risk.

From November 2018 through February 2019, we collected 40 moose fecal samples surveying the Anchorage/Matanuska-Susitna Valley region. Using standard microbial techniques, isolated bacterium were identified, along with antimicrobial susceptibility testing using MicroScan™ conventional panels. Colistin resistance on *Escherichia coli* and phenotypic evaluation for extended spectrum beta-lactamase enzyme (ESBL) in Enterobacteriacea were performed using disc diffusion.

Multidrug-resistant (MDR) organisms were isolated in 39% of moose fecal samples, with 100% containing colistin resistant *Escherichia coli*. MDR Gram-negative bacilli identified included *Acinetobacter baumanii/haemolyticus, Ewingella americana*, *Klebsiella ascorbate, Klebsiella ozaenae, Leminorella grimotti,* and *Pantoea agglomerans*. Additionally, *Klebsiella* isolates expressed phenotypic ESBL. Antibiotic resistant Gram-positive organisms included methicillin resistant *Staphylococcus aureus* (MRSA) and linezolid resistant, vancomycin resistant *Enterococcus fecalis* (VRE).

Close proximity of moose in the urban Alaska environment draws attention to their commensal microbiome and potential for infectious transfer to humans. We discovered nearly 40% of moose fecal samples contained one or more MDR bacteria with several organisms currently identified as a health care risk, including MRSA, VRE, and ESBL-producing *Klebsiella* species. Wildlife exposure to the urban landscape, including antibiotic-contaminated water, could provide an additional avenue for development of antimicrobial-resistant organisms. Further study is indicated to determine the potential public health risk of wildlife zoonotic transfer of existing and novel MDR bacteria.

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