Extended-spectrum cephalosporin, carbapenem, and fluoroquinolone-resistant bacteria present on equine environmental surfaces

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Antimicrobial resistant bacteria are a rapidly growing concern in human and veterinary medicine. The increasing prevalence of extended spectrum beta-lactamase (ESBL), carbapenemase (CRE), and flouroquinolone-resistant Enterobacteriaceae continually decreases the efficiency of essential antibiotics. Moreover, antibiotic resistant enteric bacteria are zoonotic and can be transmitted between horses and people. Our objective was to evaluate the prevalence of antibiotic resistant bacteria on human contact surfaces in equine environments. Environmental surfaces in 20 Ohio equine barns were sampled using two electro-static-cloths (Swiffer®), yielding a total of 242 samples. Samples were phenotypically screened for AmpC, ESBL, CRE, and fluoroquinolone resistance using selective media. To select for cephalosporinase phenotypes, samples were incubated at 37°C in nutrient broth with 2 ug/mL cefotaxime. This broth was aseptically inoculated to MacConkey Agar with 8 ug/mL cefoxitin, 4 ug/mL cefepime, and 1 ug/mL meropenem to detect AmpC, ESBL, and CRE phenotypes, respectively. Additionally, samples were incubated in nutrient broth containing 16 ug/mL naladixic acid and then inoculated to MacConkey agar with 16 ug/mL naladixic acid and 2 ug/mL ciprofloxacin to detect fluoroquinolone resistance phenotypes. Genotypes were confirmed using standard PCR techniques. Of the Gram-negative coliform bacteria sampled from 242 surfaces, 51 (21.07%) were cefoxitin resistant, 24 (9.92%) were naladixic acid resistant, 13 (5.37%) were cefepime resistant, and 8 (3.31%) were ciprofloxacin resistant. Drains and wash stalls harbored the highest prevalence at 9.92% (n=24), followed by handles of mucking equipment at 5.37% (n=13). These results suggest that equine environmental surfaces are commonly contaminated with resistant bacteria that can potentially be transmitted between human and horse populations. Furthermore, identifying these bacteria on common human contact surfaces suggests that the equine environment can serve as a reservoir for antibiotic resistance genes. Identifying interventions to lower the prevalence of antibiotic resistant bacteria in equine environments will protect both animal and public health.