

Extended-spectrum cephalosporin, carbapenem, and fluoroquinolone resistant coliform bacteria from two large equine referral hospitals

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Objective: The heightened use of broad-spectrum antibiotics in veterinary and human medicine provides selection pressure for dangerous antibiotic resistance genes in bacteria. Surveillance of bacterial resistance to clinically important antimicrobials is necessary to maintain the effectiveness of antimicrobials for critical medical cases. Our objective was to estimate the prevalence of clinically significant resistance genes in equine veterinary hospital environments and from feces of their hospitalized patients.

Methods: Environmental and fecal samples were collected from The Ohio State University Galbreath Equine Center (OSUGEC) and a referral equine hospital in Kentucky from May 2015 through the present. Fecal swabs were obtained from equine patients upon admission, at 48 hours, and post 48 hours. Environmental and fecal samples were enriched and inoculated onto selective media to identify extended-spectrum cephalosporin, carbapenem, and fluoroquinolone resistance.

Results: Of the 80 hospitalized horses enrolled, patients were significantly more likely to harbor antimicrobial resistance after 48 hours of hospitalization, with odds ratios of 4.14 ($p < 0.0001$), 2.02 ($p = 0.034$), and 3.13 ($p < 0.0001$) for cefoxitin, cefepime, and ciprofloxacin, respectively. Patients were significantly less likely to harbor antimicrobial resistance if they were hospitalized at OSUGEC, with odds ratios of 0.29 ($p = 0.012$), 0.26 ($p = 0.006$), and 0.14 ($p < 0.0001$) for cefoxitin, cefepime, and ciprofloxacin. From the Kentucky hospital, 52%, 38%, and 34% of the 166 surfaces sampled over 3 visits housed isolates resistant to cefoxitin, cefepime, and ciprofloxacin respectively. Over 3 similar visits, 80%, 47%, and 38% of the 96 surfaces from OSUGEC harbored bacteria resistant to cefoxitin, cefepime, and ciprofloxacin.

Discussion: These results show that hospital environmental surfaces are contaminated with resistant bacteria and can serve as reservoirs for antibiotic resistant bacteria.

Additionally, longer hospitalization lead to increased carriage of clinically important antimicrobial resistance genes. Antibiotic stewardship and preventing environmental contamination is essential to protect both animal and public health.