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Environment and healthcare-associated infections

Carbapenem-resistant *Klebsiella pneumoniae* survive for longer on mattress fabric and are more resistant to hypochlorite than other carbapenem-resistant Enterobacteriaceae

C. Ogbonda¹, F. Nolan¹, H. Humphreys¹, D. Fitzgerald-Hughes¹

¹Royal College of Surgeons in Ireland, Dublin, Ireland

Infections caused by carbapenem-resistant enterobacteriaceae (CRE), particularly *Klebsiella pneumoniae* and *Escherichia coli* are rapidly emerging in healthcare settings and treatment of these infections is increasingly challenging. Persistence of *K. pneumoniae* in healthcare environments may be greater than for other enterobacteriaceae **Aim** Two factors that may contribute to increased persistence of carbapenem-resistant *K. pneumoniae* compared to other CRE were assessed; their survival on mattress sections and their susceptibility to hypochlorite. **Methods** Three clinical isolates of carbapenem-resistant *K.pneumoniae* and 3 other CRE (Two *E.coli* and one *Citrobacter freundii*) were used to artificially contaminate mattress fabric sections (5cm²) using inocula of 1 x 10⁵ colony forming units (CFU), to which 3% human serum albumin was added. Survival was monitored over 48 h following contamination using Eswabs (Copan, Italy). The susceptibility of the isolates to hypochlorite at concentrations of 500, 1000 and 2000 ppm was investigated using a modified agar dilution method. Biofilm formation was measured using a static biofilm assay. **Results** There was little difference in the survival of carbapenem-resistant *K. pneumoniae* on mattress fabric compared to other CRE up to 6 h. After 24 and 48 h the numbers of *K. pneumoniae* recovered were significantly greater than for other CRE (2.2 x 10⁴ CFU Vs 1.4 X10⁴ CFU, $p \leq 0.05$ at 24 h, 8.9 x 10³ CFU Vs 2.2 x10³ CFU at 48 h, $p \leq 0.05$). With hypochlorite concentrations used for surface cleaning (1000ppm), carbapenem-resistant *K. pneumoniae* CFU fell by log₁₀3 whereas CFU of other CRE fell by log₁₀5. At twice the recommended concentration for surface cleaning, other CRE CFU decreased by log₁₀10 whereas for *K. pneumoniae* no further improvement on log₁₀3 reduction was found. *In-vitro* biofilm formation by *K. pneumoniae* was greater than for other CRE isolates. **Conclusions** Carbapenem-resistant *K.pneumoniae* survive longer on mattress fabric and are more resistant to hypochlorite than other CRE. Enhanced cleaning adjacent to patients with carbapenem-resistant *K. pneumoniae* is required to effectively reduce onward transmission.