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Multi-drug resistant Clostridium difficile ribotype 027 in southwestern Virginia 2007 - 2013: common, fit and virulent

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Background: Ribotype 027 is a strain of *C. difficile* that initially emerged about 15 years ago. Today's isolates are almost always fluoroquinolone resistant. Some consider 027 highly virulent, causing worse symptoms and outcomes. Others disagree.

Material/methods: We assayed 3118 sequential, anonymous and unlinked stool samples, including formed samples, for qualitative and quantitative evidence of *C. difficile* infection.

Results: Between 2007 and 2013, 027 was the most common of 128 *C. difficil*e ribotypes in southwestern Virginia. 027 isolates were 32% of 3118 isolates. >98% of 027 isolates were resistant to fluoroquinolones e.g. moxifloxacin and levofloxacin. The majority (>75%) was also resistant to erythromycin, clindamycin and rifampicin. 027 was in 45% of cytotoxin positive but only 17% of cytotoxin negative fecal samples ($p \leq 0.05$) and 34% of unformed but only 21% of formed stool samples ($p \leq 0.05$). The association of 027 with unformed stool and toxins and the reverse for 014/020 and non-toxigenic isolates suggested 027 is virulent and 014/020 and the non-toxigenic isolates are not. Samples from a subset of patients infected with 027 had higher counts, higher concentrations of toxins and more lactoferrin (n=15, $10^{5.2}$ cfu/g feces, 157 ng TcdA/g, 180 ng TcdB /g, 163 ng CdtB/g, 410 µg/g lactoferrin) than those infected with 014/020 (n=9, $10^{3.5}$ cfu/g, 11 ng/g*, 1 ng/g*, 0 ng/g* and 39 µg/g* respectively*$p>0.05$ vs 027) and non-toxigenic isolate (n=17, 103.7 cfu/g, 0 ng/g*, 0 ng/g*, 0 ng/g*, 42 µg/g* respectively).

Conclusions: Ribotype contributed to virulence, affecting both bioburden, toxin levels, and host response.