Using rapid indicators for Enterococcus to assess the risk of illness after exposure to urban runoff contaminated marine water

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\textbf{ABSTRACT}

Traditional fecal indicator bacteria (FIB) measurement is too slow (>18 h) for timely swimmer warnings. Assess relationship of rapid indicator methods (qPCR) to illness at a marine beach impacted by urban runoff. We measured baseline and two-week health in 9525 individuals visiting Doheny Beach 2007-2008. Illness rates were compared (swimmers vs. non-swimmers). FIB measured by traditional (Enterococcus spp. by EPA Method 1600 or Enterolert\textsuperscript{TM}, fecal coliforms, total coliforms) and three rapid qPCR assays for Enterococcus spp. (Taqman\textsuperscript{®}, Scorpion-1, Scorpion-2) were compared to health. Primary bacterial source was a creek flowing untreated into ocean; the creek did not reach the ocean when a sand berm formed. This provided a natural experiment for examining FIB-health relationships under varying conditions. We observed significant increases in diarrhea (OR 1.90, 95% CI 1.29 - 2.80 for swallowing water) and other outcomes in swimmers compared to non-swimmers. Exposure (body immersion, head immersion, swallowed water) was associated with increasing risk of gastrointestinal illness (GI). Daily GI incidence patterns were different: swimmers (2-day peak) and non-swimmers (no peak). With berm-open, we observed associations between GI and traditional and rapid methods for Enterococcus; fewer associations occurred when berm status was not considered.

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