

Pathogens, Public Health and Coastal Ocean Water

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In Florida, a large percent of the population lives close to the coast and spends time swimming, fishing, boating and enjoying the beach. In addition, the economy of the state relies on a cruise ship industry and ocean-based tourism industries. Thus, it is important to accurately assess the hygienic quality of the coastal ocean water so that public health is not compromised by recreational exposure to human pathogens. Current microbial water monitoring practices test only for indicator bacteria. As part of a five year study on Oceans and Human Health, we have applied molecular biology-based assays to the analysis of coastal water to detect specific viruses and protozoa of public health interest. Quantitative PCR (qPCR) assays were initially optimized using ocean water seeded with known concentrations of *Giardia*, *Cryptosporidium*, and/or poliovirus to assess recovery efficiencies. Unseeded ocean water samples were analyzed by qPCR for the presence of *Giardia*, *Cryptosporidium*, norovirus (genotypes I and II), enteroviruses and Hepatitis A virus. Genetic sequencing was used to confirm positive samples. Results from analyses of South Florida coastal water demonstrate our assays can detect pathogenic microorganisms in near-shore coastal water. While we did not discover a point-source of the microbial pathogens, the fact that they were detected raises important questions concerning human health risks. Currently, there are no regulatory standards for specific pathogens in coastal water and thus, if pathogenic microorganisms are detected, what should be the appropriate response from a regulatory standpoint and what type of corrective measures should be taken. Which pathogens should be targeted for monitoring purposes and how many organisms would constitute a health hazard? Improved public health protection will depend on the approach taken to address these questions and upon the resources devoted to monitor coastal water for the presence of pathogenic microorganisms.

Keywords: microbial pathogens, *Giardia*, *Cryptosporidium*, *norovirus*, public health

Challenges: Public health, wildlife health, ecosystem health and water resource sustainability

Issues: Sources and impacts of emerging contaminants