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Swimmer illness associated with marine water exposure and water quality indicators: Impact of widely used assumptions

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ABSTRACT

Studies of health risks associated with recreational water exposure require investigators to make choices about water quality indicator averaging techniques, exposure definitions, follow-up periods, and model specifications; however, investigators seldom describe the impact of these choices on reported results. Our objectives were to report illness risk from swimming at a marine beach affected by nonpoint sources of urban runoff, measure associations between fecal indicator bacteria levels and subsequent illness among swimmers, and investigate the sensitivity of results to a range of exposure and outcome definitions. In 2009, we enrolled 5,674 people in a prospective cohort at Malibu Beach, a coastal marine beach in California, USA, with health symptoms measured daily for 10 to 19 days after enrollment. We analyzed concurrent water quality samples for indicator bacteria using culture and molecular methods. We compared illness risk between nonswimmers and swimmers, and among swimmers exposed to various levels of fecal indicator bacteria. We found diarrhea to be more common among swimmers than nonswimmers within three days of the beach visit, and sensitivity analyses demonstrated that overall inference was not substantially affected by the choice of exposure and outcome definitions. Our study suggests that the three days following a beach visit may be the most relevant period for health outcome measurement in recreational water studies. Although water quality conditions observed in this study were generally good, fecal indicator bacteria levels were not associated with swimmer illness.

Full Text

http://ftp.sccwrp.org/pub/download/DOCUMENTS/AnnualReports/2013AnnualReport/ar13_611_624.pdf