Cryptosporidium Risk from Swimming Pool Exposures

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ASSOCIATED CONTENT

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Background: Infection risk estimates from swimming in treated recreational water venues are lacking and needed to prioritize public health interventions to mitigate risks. Quantitative infection risk estimates among different age groups are needed to identify high-risk populations. High-risk populations can be targeted during public health interventions, like education campaigns and pool operator improvements. Objective: This study estimated per-exposure and annual Cryptosporidium infection risk to adults (>20 years), children (3-17 years), and children (0-2 years) using experimental data collected in the US on swimming behavior. Methods: Risks were estimated using per-exposure data from the literature, and data collected in this study and were categorized into high, medium, and low risk groups. Results: The most influential model variables were effective probability and pool size. The estimated risk to adults in this study differed from estimates based on the literature (e.g., <1). Infection risk estimates differed by age and were higher for children compared to adults. Conclusion: The results suggest the need for standardized post-swimmer policy monitoring for Cryptosporidium., infection risk estimates, and data collection. Additional infection risk estimates are needed to identify high-risk groups and prioritize public health interventions. Infection risk estimates are also needed to evaluate the effectiveness of interventions and to improve public health education campaigns.

1. Introduction

Cryptosporidium is a protozoan parasite that causes cryptosporidiosis, a gastrointestinal infection characterized by watery diarrhea, abdominal cramps, nausea, and vomiting. Human transmission occurs via the fecal-oral route through contaminated water or food. Cryptosporidium is present in natural and treated recreational water environments, including swimming pools, beaches, and lakes. Infection risk estimates from swimming in treated recreational water venues are lacking and needed to prioritize public health interventions to mitigate risks. Quantitative infection risk estimates among different age groups are needed to identify high-risk populations. High-risk populations can be targeted during public health interventions, like education campaigns and pool operator improvements. Objective: This study estimated per-exposure and annual Cryptosporidium infection risk to adults (>20 years), children (3-17 years), and children (0-2 years) using experimental data collected in the US on swimming behavior. Methods: Risks were estimated using per-exposure data from the literature, and data collected in this study and were categorized into high, medium, and low risk groups. Results: The most influential model variables were effective probability and pool size. The estimated risk to adults in this study differed from estimates based on the literature (e.g., <1). Infection risk estimates differed by age and were higher for children compared to adults. Conclusion: The results suggest the need for standardized post-swimmer policy monitoring for Cryptosporidium., infection risk estimates, and data collection. Additional infection risk estimates are needed to identify high-risk groups and prioritize public health interventions. Infection risk estimates are also needed to evaluate the effectiveness of interventions and to improve public health education campaigns.

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Infection risk estimates from swimming in treated recreational water venues are lacking and needed to prioritize public health interventions in swimming pools. This research estimates the number of swimmers who become ill with cryptosporidiosis every year from swimming in US pools. We found for every 100 swimmers, between 2 and 3 become sick with cryptosporidiosis every year from swimming in pools. Children have a higher risk than adults because they swallow more water when swimming. To put this in context, researchers have estimated less than 1 (0.8) out of every 100 swimmers become ill with vomiting, diarrhea, and nausea from swimming in lakes or rivers. Our research suggests a need for more awareness and better controls at swimming pools that prevent Cryptosporidium contamination.