

Scientists seek to assess the microbial risks in the water we drink

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It is a familiar scenario experienced around the world: an outbreak of gastrointestinal illness suddenly emerges in a community, and no one knows where it came from or how to stop it. At the start of the outbreak, only a few people are affected, most often the very old and the very young. As the outbreak worsens, more and more people fall ill, and people who were weak or unwell may develop life-threatening complications.

Such outbreaks sometimes originate from a source that most people in the United States and other developed countries trust unquestioningly: drinking water. However, there is much we do not know about the causes and likelihood of waterborne illness, and we can and should do more to assess the risks, according to a new report, "Clean Water: What is Acceptable Microbial Risk", released by the American Academy of Microbiology.

“In the developing world, where diarrheal illnesses claim roughly 2 million lives each year, access to clean water is a serious public health challenge,” says Mark LeChevallier of American Water Works Service Company in Vorhees, New Jersey, one of the authors of the report. “Fortunately, the United States and other developed countries have managed to rein in the biggest waterborne disease problems, but water quality is still a very real concern. Sporadic illnesses and outbreaks still occur, and they can have a serious impact on public health and commerce.”

The report focuses on microbial risk assessment, a relatively new tool for addressing the problems of waterborne infectious diseases that provides a formal process for quantifying the health risks from pathogenic microorganisms.

“Microbial risk assessment is an evolving field, and it requires an interdisciplinary, collaborative approach,” LeChevallier explains. “Much more research is needed to fill gaps in our understanding of waterborne pathogens and to determine the current rate of waterborne illness.”

The report is the result of a colloquium convened by the American Academy of Microbiology in October, 2006. Experts in diverse fields with expertise in water quality and analysis – including microbiology, public health, engineering, epidemiology, medicine, and water science – discussed some of the controversial topics in microbial risk assessment, research that could move the field forward, and the need for increased training and better communication with the public. The report is a record of their discussions and recommendations.

During an outbreak situation, scientists and public health officials have many questions to address. Which water treatment option is best" Who are the most sensitive members of the population, and how can they be protected" Where should efforts and resources be directed" What are the most dangerous pathogens found in the water, and how did they get there"

Microbial risk assessment addresses all these questions by offering a formalized approach for identifying the risks that arise from contact with pathogenic microorganisms, including certain bacteria, viruses, and microscopic eukaryotes. Microbial risk assessment also can help guide management decisions, identify sensitive groups, spot critical pathogen control points, and aid in the assessment of the adequacy of drinking water treatment barriers.

The report describes the scientific methods involved in microbial risk assessment, addresses the current challenges facing this evolving field, and offers a number of recommendations, including:

- An international database of pathogen occurrence in drinking water and ambient waters should be established. This would inform microbial risk assessment, risk management, and enable the implementation of effective public health initiatives.

- An independent microbial risk assessment advisory board with members from both industry and academia, and with international representation, should be assembled. This advisory board could foster the most consistent use of the best techniques for evaluating the problems of public health and ambient water.

- The general public needs to know basic information about their source and treatment of drinking water, the need for future treatment upgrades and infrastructure enhancements, and the fundamentals of microbial risk.

- Additional research is needed to validate numerical guidelines, such as the EPA's microbial water guidance of one illness per 10,000 individuals in a given year. Numerical guidelines are useful, but may not be suitable for all water exposures.

- Microbial risk assessment needs to broaden the use of available epidemiologic data. Studies are needed to integrate outbreak data to better estimate microbial infectivity under real-world conditions.

Source: American Society for Microbiology

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