

Prologue

Estimating the infectious disease risks associated with drinking water in the United States

In the United States and other developed countries, we enjoy a quality of life in which waterborne disease is no longer a constant threat. However, we have not eradicated waterborne disease, and we need to better understand its burden. This Supplement Issue of the *Journal of Water and Health* provides information about the disease risks associated with microorganisms in drinking water and describes methodologies that can be used to estimate these risks on a national basis.

This issue is largely the result of efforts by the U.S. Environmental Protection Agency (EPA) and the U.S. Centers for Disease Control and Prevention (CDC). In January of 2004, the EPA and CDC convened a group of scientists to review the current state of the science, and organization of the articles in this issue began to take shape as key areas of research were identified. Section 1458 (d) (1) of the 1996 amendments to the Safe Drinking Water Act (SDWA) had required the Administrator of the EPA and the Director of the CDC to jointly conduct pilot waterborne disease occurrence studies for at least five major communities or public water systems, prepare a report on the findings, and develop a national estimate of waterborne disease occurrence. The amendments did not specify which waterborne diseases were to be included in the studies, and the options and a research agenda were considered during workshops in 1997 and 1998. Participants in these workshops determined that microbial contaminants were the drinking water pollutants of highest concern and hence, recommended that gastrointestinal illness should be studied, at least initially. Although some waterborne microbes can cause severe health effects including typhoid fever, hepatitis, and hemolytic-uremic syndrome, workshop participants agreed that acute gastroenteritis is the predominate effect associated with the consumption of microbially

contaminated water. It was recommended that the research provide quantitative information about the waterborne attributable risk.

In response to Section 1458 (d) (1), several research studies were conducted. These included: two pilot intervention trials of home water treatment in households and one full-scale intervention trial, three community intervention studies, and several other epidemiologic studies (e.g. water consumption patterns and usage behavior, serological surveys of *Cryptosporidium* infection, gastroenteritis incidence from CDC's annual cross-sectional survey called FoodNet).

A workshop was held on July 7 and 8 2005 to review the available information for estimating the occurrence of waterborne illness in the United States. The last article of this issue presents the workshop conclusions, which include an assessment of the adequacy of the current information, identification of key data gaps, and recommendations for the next generation of studies. Although the SDWA amendments pertain to waterborne disease risks in the United States, review articles in this issue include information reported in epidemiologic studies conducted outside the United States, primarily in other developed countries. Authors evaluated only drinking water exposures and did not review information about outbreaks and illnesses associated with swimming and other water-related activities. Also included in this issue are articles that discuss the importance of microbial risk assessment and disease burden measures.

When evaluating the current waterborne risks, we are reminded of the efforts of those epidemiologists, microbiologists, and public health engineers who in the mid 19th and early 20th centuries recognized the importance of contaminated water in the transmission of infectious diseases. Although the risks today may not be as grave as they once were, the multiple barrier concept of source water protection and water treatment and sanitation introduced early in

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the 20th century continues to be important in the prevention of waterborne disease. Waterborne outbreaks may occur when one or more barriers are neglected, and there is a continuing need for improving these barriers and monitoring their effectiveness, especially in terms of operation, water treatment, and water distribution. As emphasized by information in these articles, we cannot become complacent about current water treatment processes nor neglect the possible degradation of water quality as the water travels through the distribution system. We should also keep in mind that current technologies may not be adequate for emerging waterborne pathogens and that sporadic cases of waterborne illness may occur even in some systems that meet current standards and regulations.

We dedicate this series of articles to all public health professionals – the epidemiologists, microbiologists, engineers,

water suppliers, risk assessors, technicians, and others who endeavor to protect our health through the prevention and reduction of waterborne disease. The information in this issue is possible only because of their surveillance activities, investigations, research, and dedication to the provision of safe drinking water. More work is needed, and we hope these articles will encourage others to become engaged in moving the research agenda ahead into the future.

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