

Water Quality

Guidelines, Standards and Health: Assessment of risk and risk management for water-related infectious disease

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Foreword

The quality of water, whether it is used for drinking, irrigation or recreational purposes, is significant for health in both developing and developed countries worldwide. Water quality can have a major impact on health, both through outbreaks of waterborne disease and by contributing to the background rates of disease. Accordingly, countries develop water quality standards to protect public health. Recognising this, the World Health Organization (WHO) has developed a series of normative “guidelines” that present an authoritative assessment of the health risks associated with exposure to health hazards through water and of the effectiveness of approaches to their control. The three principal guidelines are intended to assist countries in establishing effective national or regional strategies and standards and are:

- *Guidelines for drinking-water quality*.¹
- *Guidelines for the safe use of wastewater and excreta in agriculture and aquaculture*.²
- *Guidelines for safe recreational water environments*.³

These guidelines are updated as scientific and managerial developments occur, to ensure that they continue to be based on the best available evidence.

The assessment and management of the health risks associated with exposure to microbial hazards through water present special challenges, for example:

- not all of the microbial hazards (pathogens) are recognised and many cannot be readily enumerated or studied;
- adverse health effects may arise after a single exposure, yet water quality varies widely and rapidly;
- management actions are rarely of consistent effectiveness, and their outcome may be difficult to predict; and
- when water is unsafe, conventional testing indicates this only after exposure has occurred, i.e. too late to contribute to disease prevention.

¹ *Guidelines for drinking-water quality*, 2nd ed. (Addendum, in press). *Volume 1: recommendations*, 1993 (Addendum, 1998); *Volume 2: health criteria and other supporting information*, 1996 (Addendum, 1998); *Volume 3: surveillance and control of community supplies*, 1997. Geneva, World Health Organization.

² Mara D, Cairncross S. *Guidelines for the safe use of wastewater and excreta in agriculture and aquaculture*. Geneva, World Health Organization, 1989 (update in preparation).

³ *Guidelines for safe recreational water environments*. Geneva, World Health Organization, in preparation.

To date, the various WHO guidelines relating to water have been developed in isolation from one another. Their primary water quality concern is for health hazards derived from excreta. Addressing their specific areas of concern together will tend to support better health protection and highlight the value of interventions directed at sources of pollution, which may otherwise be undervalued.

The potential to increase consistency in approaches to assessment and management of water-related microbial hazards was discussed by an international group of experts between 1999 and 2001. The group included professionals in the fields of drinking-water, irrigation, wastewater use and recreational water with expertise in public health, epidemiology, risk assessment/management, economics, communication, and the development of standards and regulations. These discussions led to the development of a harmonised framework, which was intended to inform the process of development of guidelines and standards. Subsequently, a series of reviews was progressively developed and refined, which addressed the principal issues of concern linking water and health to the establishment and implementation of effective, affordable and efficient guidelines and standards. This book is based on these reviews, together with the discussions of the harmonised framework and the issues surrounding it.

In its simplest form, the framework consists of an iterative cycle, comprising: an assessment of risk; health targets linked to the wider public health context; and risk management, with these components being informed by aspects of environmental exposure and tolerable (“acceptable”) risk. A key component of the harmonised framework is the use of an inclusive range of tools for the assessment of risk, including epidemiology and information collected during the investigation of outbreaks of waterborne disease, as well as the formal risk assessment process (Chapters 6–8). Simultaneously, WHO is developing detailed guidelines on the characterization of hazards associated with exposure to both food and water, which will further aid the process of harmonisation. Another important development is the move towards integrated risk management strategies (Chapter 12). Information needs to be made available to managers in a timely manner, so that they can take appropriate action to prevent exposure to microbial hazards. Present approaches to end-product quality testing for microbial indicators are inadequate for this. Improved management of water safety therefore requires development, validation and use of more process-oriented indicators and testing methods (Chapter 13). This issue is being examined by WHO in collaboration with the Organization for Economic Co-operation and Development (OECD).

It is hoped that this book will be useful to all those concerned with issues relating to microbial water quality and health, including environmental and public health scientists, water scientists, policy-makers and those responsible for developing standards and regulations.