HYGIENE

Yasumoto Magara
Professor of Engineering, Hokkaido University, Sapporo, Japan

Mitsugu Saito
Technical Manager, Overseas Environmental Cooperation Center, Tokyo, Japan

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Contents

1. Introduction
2. Global statistics on Hygiene
3. Water Related Infectious Diseases
4. Pathogenic Organisms
4.1. Helminthiasis
4.2. Protozoiasis
4.3. Bacterial Diseases
4.4. Viral Infections
5. Hygiene Promotion
5.1. Principles
5.2. Target group
5.3. Procedures
5.4. Social Marketing Approach
5.4.1. Key Component
5.4.2. Programming
5.5. Relation to other Components
6. School Sanitation and Hygiene
7. Hygiene Evaluation
7.1. Study Plan
7.2. Training Study Team
7.3. Methodologies and Tools
7.4. Analysis and Interpretation
Glossary
Bibliography and Suggestions for further study
Biographical Sketches

Summary

Most of the waterborne infectious diseases are caused by bacteria, viruses, or helminthes which are originated to human or animal excreta. Hygiene is a protective measure to interfere pathogens from reaching to new host. Both facility provision and behavior change of hygiene work complementary each other.

Hygiene promotion is the activity to encourage people to adopt safer practice in the household to prevent fecal-oral infectious diseases. Important assumption is that

hygiene promotion does not attempt to "educate" people about "good" and "bad" hygiene practice. Instead, it seeks the motivation for people to act and tries to implement positive values attributed to better practices. Hygiene promotion is basically founded on knowledge of what people know, do and want. It respects indigenous understandings of sickness and cleanliness, and adds some values on their behavior change.

Social marketing uses marketing approaches to match available resources with social needs. Social marketing is demand-creating approach, which is different from previous hygiene programs. Supply-based approaches have often failed because they have rarely considered people's behaviors which determines the effectiveness of new facilities.

School sanitation and hygiene program focuses on school age children to recognize and acquire good hygiene practices in school and in their home.

1. Introduction

Most of the waterborne infectious diseases are caused by bacteria, viruses, or helminthes which are originated to human or animal excreta. These pathogenic microorganisms are ingested with foods or water, or through hands or fingers, and then they are again excreted into the environment after the multiplication in human intestines. Therefore, many neighbors will be exposed to the health risks unless appropriate sanitations are provided. Needless to say, appropriate hygiene behaviors as well as provision of water supply and toilet are the most important features toward healthier life.

Both facility provision and behavior change of hygiene work complementary each other, and the benefits derived from the promotion program cover many aspects. Besides health implication, it enhances the dignity and aesthetic comfort for people.

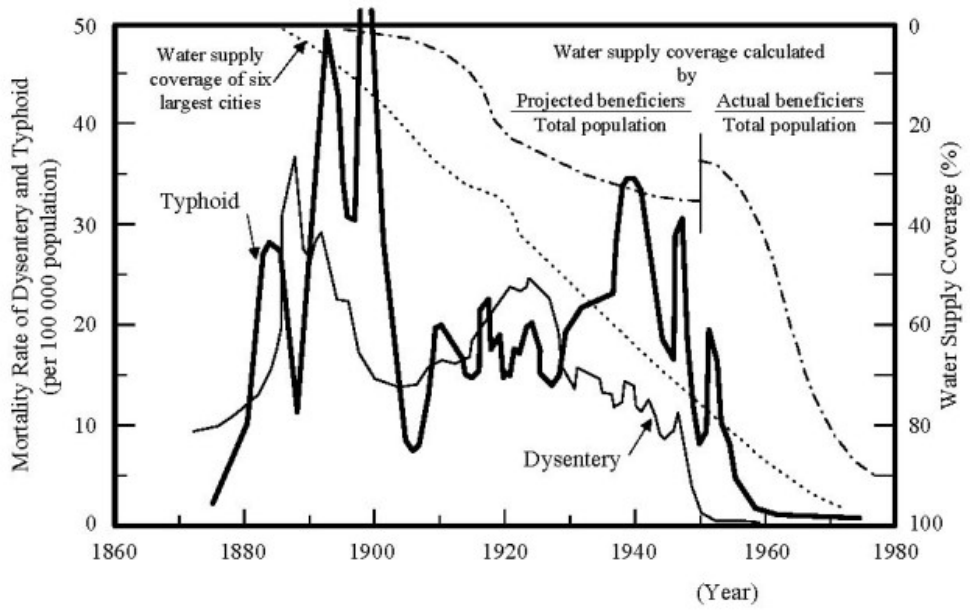

Figure 1. Infection chain of fecal-oral diseases

Hygiene is a protective measure to interfere pathogens from reaching to new host. Figure 1 shows the transmission routes and possible barriers in each stage. Hygiene mainly works as the secondary barrier while sanitation plays role as the primary barrier against fecal contamination. Therefore, the combined measures of double confinement reduce possible risk to great extent.

2. Global Statistics on Hygiene

World Health Organization (WHO) estimated that one-sixth (1.1 billion people) of the world's population was without access to improved water supply at the beginning of 2000. Similarly, two-fifth (2.4 billion people) lacked access to improved sanitation. Poor water supply and sanitation are health hazards for people.

Approximately four billion cases of diarrhea are estimated annually, which claim 2.2 million lives. Water, sanitation and hygiene can reduce the diarrheal diseases by between one-quarter and one-third.

Intestinal parasitic infections, which account for 10 % of the population in developing countries, lead to malnutrition, anemia and retarded growth. These infections can surely be controlled by sanitation, hygiene and water supply.

Six million people are blind from trachoma and population at risk is approximately 500 million. 200 million people are infected with shistosomiasis, of whom 20 million suffer severe consequences.

3. Water Related Infectious Diseases

Most of water related diseases are communicable. They are caused by pathogenic organisms, which are originated human or animal feces. Pathogens (e.g. viruses, bacteria, protozoa, or helminthes) infect human orally by contaminated foods or water, or through hands or fingers. Most of pathogens multiply in intestine; then, they are excreted with feces; therefore, the excreta of infected person contaminate surrounding water body unless appropriate sanitation measure is taken. As a result, neighbors are exposed to the risk of the infection.

Water related infectious diseases are classified into following categories.

(1) Waterborne diseases
Cholera or typhoid is a typical example. They are caused by water pollution by excreta from infected person or animal. They propagate through water ingestion in case sanitary water supply facilities and/or sanitation facilities have yet been appropriately furnished.

(2) Water-washed diseases
They are caused by scarcity of water to clean face and body (e.g. some diarrheal diseases, infectious skin diseases, eye diseases, etc.). Water-washed transmission is not significant as waterborne transmission, but the infection is continuous at lower rate. Improving quality of water can reduce waterborne diseases but the quantity of water is much more important for water-washed diseases.

(3) Water-based diseases
They are the diseases that aquatic organisms play as intermediate host (e.g. shistosomiasis, clonorchiasis, Guinea worm, etc.).

(4) Water-related insect vector diseases
They are transmitted by vector insects which breed in or near water (malaria, filariasis, dengue fever, yellow fever, and Japanese encephalitis which are caused by mosquitoes, river blindness and African sleeping sickness caused by flies, etc.). This type of diseases is unlikely to be reduced by hygiene and sanitation promotion.

(5) Water-dispersed diseases
Often appearing in developed countries, pathogens breed themselves in water tanks of air-conditioning or plumbing system, and dispersed with the water emission (Legionnaire's diseases etc.).

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Bibliography and Suggestions for further study

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Biographical Sketches

Yasumoto Magara is Professor of Engineering at Hokkaido University, where he has been on faculty since 1997. He was admitted to Hokkaido University in 1960 and received the degree of Bachelor of Engineering in Sanitary Engineering in 1964 and Master of Engineering in 1966. After working for the same university for 4 years, he moved to National Institute of Public Health in 1970. He served as the Director of the Institute since 1984 for Department of Sanitary Engineering, then Department of Water Supply Engineering. In the meantime, he was also obtained the Ph.D. in Engineering from Hokkaido University in 1979 and was conferred Honorary Doctoral Degree in Engineering from Chiangmai University in 1994. Since 1964, his research subjects have been in environmental engineering and have included advanced water purification for drinking water, control of hazardous chemicals in drinking water, planning and treatment of domestic waste including human excreta, management of ambient water quality, and mechanisms of biological wastewater treatment system performance. He has also been the member of governmental deliberation councils of several ministries and agencies including Ministry of Health and Welfare, Ministry of Education, Environmental Agency, and National Land Agency. He meanwhile performs the international activities with JICA (Japan International Cooperation Agency) and World Health Organization. As for academic fields, he plays pivotal role in many associations and societies, and has been Chairman of Japan Society on Water Environment.

Professor Magara has written and edited books on analysis and assessment of drinking water. He has been the author or co-author of more than 100 research articles.

Mitsugu Saito is Technical Manager at Overseas Environmental Cooperation Center, Japan. He was born in 1959 in Sapporo, Japan; grew and was educated there. He was admitted by Architectural Engineering Department, Hokkaido University in 1978 and graduated from it with his graduate thesis on thermal environment. He continued his study at Graduate School of Environmental Science. By his research on thermal waste recovery system from industrial cooling water, he was conferred master degree of environmental science from Hokkaido University in 1984. Then, he worked for a construction company; Obayashi Corporation, from 1984 to 1997 as a mechanical engineer on building service works. In the meantime, he was dispatched to Thailand from 1990 to 1995. Serving as Manager of Mechanical and Electrical Department, he was dedicated to many construction and renovation projects (mainly hi-tech factories). His responsibilities covered air-conditioning, plumbing, water and wastewater treatment, utility supply, and pollution control. From 1997, he enrolled to Japan Overseas Cooperation Volunteers (JOCV), one of frameworks of Japan International Cooperation Agency (JICA). He spent two years in Morocco as an urbanist of the municipality of Fès. He was assigned to "Service Nettoiement et Parc Municipal" with his duty on research and planning of solid waste management system. In 1999, he returned to Japan and resumed his study in Hokkaido University as a PhD student at Environmental Risk Engineering Laboratory, School of Engineering. He obtained PhD in 2003 by his dissertation titled "Appropriate technology of domestic wastewater management for low-income urban communities." Currently he works for a public cooperation under Ministry of the Environment of Japan. The projects in charge covers from trans-boundary air pollution, wastewater treatment, solid waste management, environmental impact assessment, etc.