ASSESSMENT OF THE EVIDENCE BASE AND DEVELOPMENT OF A REPORTING SCHEME FOR WATER-RELATED DISEASES

Report on a meeting of a working group

Bonn, Germany
25-26 October 2001
1. BACKGROUND AND INTRODUCTION

At the First Meeting of the Working Group on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Budapest, Hungary, 14-15 May 2001), it was decided to create a small group of experts for the further exploration of the agenda item, “Arrangements for preparing an evidence base under the Protocol”. The Meeting welcomed the offer of the WHO CC for Health Promoting Water Management and Risk Communication at the Hygiene Institute of the Rheinische Friedrich Wilhelms Universität (Bonn, Germany) to take the lead in organizing an expert consultation on the development of a reporting scheme for water-related diseases during the last week of October 2001 in Bonn. This report summarizes the main findings and conclusions of the small working group meeting on Assessment of the Evidence Base and Development of a Reporting System for Water Related Diseases (Bonn, Germany, 25-26 October 2001). The consultation was attended by 12 experts from 8 different countries and institutions.

The aim of the meeting was

- To identify the requirements for effective surveillance and management of water-related diseases, applicable to all WHO European member countries and
- To generate recommendations which would contribute to the identification of water-related diseases in both a reactive and a proactive manner.

2. ORGANIZATIONAL PROCEDURES

Prof. Dr. Exner welcomed the participants, and was unanimously elected as Chairperson of the Meeting. WHO representatives served as Rapporteur.

3. REVIEW REPORTING AT NATIONAL LEVEL

The participants were asked to present their national reporting systems as introduction to the further deliberations.

In the federal structure characteristic for Belgium, both the Flemish region and the Francophone community are independently competent for the notification of waterborne diseases. Water companies are responsible for the surveillance of drinking water quality. Compliance with guideline values is monitored by both the environmental and the public health authorities at the regional level. In Flanders, mandatory notification includes among others hepatitis A, shigellosis, protozoan infections of the central nervous system, leptospirosis and legionellosis. Gastroenteritic cases have to be notified if there are at least 3 cases in one week with the same origin. All other infectious diseases have to be notified when they develop an epidemic character.

In France there is a surveillance of the exposure to pathogens, but no specific surveillance of waterborne diseases. Mandatory notification exists for Poliomyelitis, Typhoid and Paratyphoid fever, Cholera, collective food-borne disease outbreaks and Legionellosis. There is a network of first-line physicians that surveys acute diarrhea and haemolytic uremic syndrome, and reference laboratories are responsible for the notification of Campylobacter, enteroviruses, Salmonella and Shigella. The administrative departments are responsible for water quality
monitoring, and there is a co-operation between the fields of risk management, environmental management and public health surveillance.

**Germany** has adopted, since January 2001, a new federal law for the protection against infectious diseases, which requires notification of selected waterborne infectious diseases like *Entero Hemorrhagic Escherichia Coli (EHEC)*, *Typhus* and *Paratyphus*. The laboratories have to notify the pathogens *Campylobacter* spp., *Cryptosporidium parvum*, *Giardia lamblia*, *Legionella*, Hepatitis A, Norwalk-like viruses, polioviruses, rotaviruses, *Salmonella*, *Shigella*, *Vibrio cholera* and *Yersinia*. The notification pathway is from the local health department to the Federal Ministry of Health, more specifically the Robert Koch-Institute in Berlin.

In **Hungary**, water suppliers are legally obliged to monitor the produced and distributed water, but there is no legal obligation to report either on the general quality of the water supplied or extraordinary events. Outbreaks of waterborne diseases are rather rarely detected in relation to drinking water. Acute diarrheal diseases are reportable since 2000. There is a laboratory-based enteritis surveillance system that follows the occurrence of serotype patterns of the four enteric pathogens *Salmonella*, *Campylobacter*, *Shigella* and *E. coli* 0124.

In **the Netherlands**, water supply companies are responsible for the monitoring of sources, treatment and products. If there is non-compliance, the inspectorates for bacteriology and toxic chemicals at the Ministry of Environment will be informed immediately. The monitored data are reported yearly to the to the Health Ministry and to the EU.

The **Swedish** system is similar to the German one. The water company, which has to report before taking actions upon extraordinary situations, and the National Environmental Protection Agency participate in the reporting system. The water control is county-based. Each county has a public health-inspector, who is responsible for the notification, the information system (including laboratory data and clinical cases), and for the pathogen-based reporting system. There is however no national database gathering information for the different counties in one common format.

In the **Switzerland**, each canton has its own laboratory. Rules are set on the federal level, the cantons inspect and enforce, and the water services practice auto-control. As an indicator value, *E. coli*, but not all pathogenic coliforms, are measured. Statistics on infectious diseases are compiled and evaluated on a weekly, monthly and yearly basis.

### 4. DEVELOPING SURVEILLANCE GUIDANCE

Three important questions were addressed by the participants:

i. What are the most important water-related diseases, which should be brought into a systematic reporting?

ii. Which water supply data are needed to assess the risk for waterborne diseases, and

iii. How could such data be integrated into a systematic reporting?
4.1. Most-important water-related diseases

4.1.1. Diseases of defined etiology

The working group identified the most important water-related diseases of defined etiology as follows:

- Cholera;
- Typhoid fever;
- Shigella;
- EHEC (O157, E coli); and
- Hepatitis-A.

4.1.2. Diseases of undefined etiology

Participants also recognized that waterborne outbreaks are often of undefined etiology. In such cases, Symptoms that can serve as indicators of waterborne infections were identified as follows:

- Severe and acute diarrhea, both bloody (red) and watery (rice-water)
- Vomiting, continuous fever, headache, malaise and bradycardia
- Signs of dehydration
- Jaundice.

An acute increase in the number of clinical symptoms, positive test results or drug consumption above an expected number (outbreak) should lead to:

- Reporting to health departments
- Outbreak investigation

If changes are seen in clinical, microbiological or drug consumption trends, not only physicians and hospitals have to report to the health department but also research institutions, pharmacists, nursing homes, laboratories etc.

4.2. Required data related to water supply

A case study on the impact of heavy rainfall in the catchment area on the microbial quality of well-water served as introduction to the session. The pilot showed that regular and continuous sampling has to be made in areas with a risk factor (such as periodical heavy rain), and that a surveillance system has to be developed to react appropriately when known risk factors are present.

A more detailed list of risk indicators were developed as follows:

- Security of the catchment area (protection from, or impacted by heavy rainfall, uncontrolled agricultural activities (particularly cattle breeding), stagnation of water...)
- Water loss in the water supply/distribution system
- Pressure fluctuations
- Cross contamination through insufficient isolation of sewage streams
- Education and training of the staff of waterworks in charge of water treatment and distribution

It was recognized that it was not possible to develop a comprehensive list of risk factors during the meeting. Participants nevertheless felt that it would be advisable to:
Compile the list of risk factors in a comprehensive manner
- Categorize the risk indicators
- Integrate the risk indicators into a monitoring and assessment scheme for water services.

The WHO CC would develop this idea further and come up with a proposal for a risk assessment methodology.

4.3. Data gathering and integration

The session was introduced by a case study concerning a *Giardiasis* outbreak in Germany.

Cooperation must be expected between health departments, water companies, water works environmental institutions, institutions for water microbiology and hygiene.

Requirements for effective data gathering, documentation and exchange in case of an outbreak of water-related diseases were identified as follows:

- Standardized and compatible reporting systems for both health and water quality data
- Few, but reliable and available standard parameters
- Electronic data management and documentation
- Linkage of health and water authorities' databases
- Information flow between:
  - Labs and medical doctors
  - Health authorities (local, state, national, international)
  - Water authorities (local, state, national, international)
  - Water companies
  - Population
  - National and international data managing institutions
- Information for action

The same type of information will be important to allow pro-active measures in case local conditions are found to favor outbreaks of waterborne diseases, i.e. heavy rainfall over the catchment area, high risk of pollution of the source or treated water etc.

5. OUTBREAK INVESTIGATION

An ‘outbreak’ is defined as ‘the occurrence of a number of cases of a disease in excess of the number expected at any given time and place’.

The reasons for undertaking an outbreak investigation are multiple:

- To identify the origin and transmission route of a disease
- To prevent recurrence from the same source
- To prevent spread of the disease
- To avoid secondary cases
- To obtain and preserve accurate records of the event.

Important parameters to include in an outbreak investigation are:
Personal information such as age, gender, and residence of affected persons (In gathering these data, a balance needs to be realized between the right to privacy of the patients and the protection of the public).
- Changes in incidence of the disease
- Clusters in time and space, for which GIS might be a useful tool

In order to validate cases, good co-operation between the first-line physicians, information providers and patients is needed.

6. CONCLUSIONS

Participants concluded that a key for the successful strengthening of capabilities in WHO EURO countries to deal with waterborne diseases will be to give equal importance to proactive and reactive measures, and formulated recommendations accordingly.

6.1. Pro-active measures

6.1.1. Risk indicators

While recognizing that the risk indicators mentioned earlier are not comprehensive, participants did recommend that future work be done on:

- The compilation of a comprehensive list of risk indicators
- The categorization of these risk indicators in terms of permanent, average or exceptional risks
- The integration of the risk indicators into an overall monitoring scheme of water services, including an initial assessment of risk posed by deficient water services

Risk indicators will be particularly important in the prevention of outbreaks or the interruption of transmission routes once an outbreak has occurred.

6.1.2. Outbreak and incident management plan.

Key to a successful pro-active approach is the development of an outbreak and incident management plan. Such a plan identifies responsible institutions and individuals. It defines clear lines of reporting for both water quality and epidemiological data, and identifies the sources of these data including unconventional sources that can act as triggers.

Local health departments should be designated as coordinator for outbreak management. In fulfilling this function, they should be supported by expert groups composed of collaborators from health departments, environmental institutions, institutions for microbiological research and hygiene, water suppliers and general water services. Every effort needs to be made to strengthen the co-operation between these services.

6.2. Re-active measures

Priority diseases of known etiology were defined, as were trigger events of unknown etiology. Recommended are:
Diseases of known etiology | Diseases of unknown etiology
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- Cholera | - Severe and acute diarrhea, both bloody (red) and colorless (rice water)
- Typhoid fever | - Vomiting, continuous fever and bradycardia
- Shigellosis | - Dehydration
- EHEC O157 | - Jaundice
- Hepatitis A

Upon detection of an outbreak, the outbreak and disease management plan is to be applied to arrest the current outbreak. However, further steps may include appropriate epidemiological studies to verify the situation. The results of epidemiological investigations and the experiences gained during these studies should be integrated in the plans.

### 6.3. Support measures

A number of support measures were felt to be important enough to warrant specific mention:

- Continuous education of responsible staff, particularly in the field of hygiene, microbiology, epidemiology and environmental sciences has to be ensured by the relevant home agencies
- Geographic Information Systems (GIS) are a significant technology for both the proactive and the reactive phase, particularly with regard to risk characterization, incident identification, and communication
- Risk awareness needs to be increased to the public at large through the preparation of information materials.

### 6.4. Geographic coverage

Participants recognized and deplored the limited participation of experts from the Eastern part of the WHO European region, and recommended that the conclusions of this meeting be distributed as widely as possible in the entire region.