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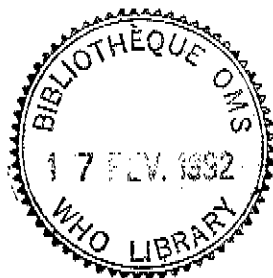
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SUMMARY REPORT

CONSULTATION ON HEALTH RISKS FROM BATHING IN MARINE WATERS (WHO/UNEP JOINT PROJECT, MED POL PHASE II)

Athens
15-18 May 1991



1991

EUR/HFA target 20

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ABSTRACT

Most countries apply criteria and standards for the quality of coastal sea water, which is vital for the growing numbers of people who use the sea for recreational purposes; but the effectiveness of their implementation depends on the way water quality and health effects are measured. WHO and UNEP called a joint meeting to revise guidelines originally drawn up in 1985 for use in studies of the correlation between the quality of recreational water and effects on the health of the people exposed to it. The participants reviewed the results of the latest microbiological/epidemiological studies and revised the guidelines accordingly, allowing for modifications to suit local conditions while ensuring the reliability and the comparability of the results.

TARGET 20

WATER QUALITY

By the year 2000, all people should have access to adequate supplies of safe drinking-water and the pollution of groundwater sources, rivers, lakes and seas should no longer pose a threat to health.

Index:

WATER QUALITY
SEAWATER
RISK FACTORS
ENVIRONMENTAL EXPOSURE
WATER POLLUTION
(1) UNEP
EUR

The Consultation was attended by 14 temporary advisers from three Mediterranean countries, one non-Mediterranean country in Europe and one in the Americas, two observers from the host country, Greece, and one representative each of the United Nations Environment Programme (UNEP) and the WHO Regional Office for Europe. The participants were mainly microbiologists, epidemiologists or environmental engineers engaged in studies on the correlation between recreational water quality and effects on the health of exposed population groups.

Practically all current criteria and standards used for the microbiological quality of bathing waters, are based entirely on the concentrations of bacterial indicator organisms in such waters as an index of acceptability or otherwise. They differ widely, however, between countries in many aspects of their implementation. An important basis for such criteria and standards is the results of microbiological/epidemiological studies correlating water quality and effects on the health of exposed population groups. Such studies have been performed on a varying scale in several countries during the last two decades and have produced divergent results. Recent reviews of the situation have indicated that, so far, no good epidemiological data exist on which to base the implementation of scientifically-justified quality standards for recreational waters, which would control for a defined level of risk.

The objectives of the present Consultation, convened jointly by WHO and UNEP in collaboration with the Athens School of Hygiene within the framework of the Long-term Programme of Pollution Monitoring and Research in the Mediterranean Sea (MED POL Phase II), included the following:

- to review and evaluate the results of microbiological/epidemiological studies carried out to date correlating recreational water quality and effects on health;
- to develop, on the basis of such an evaluation, a core protocol or protocols for future studies, taking into account the general and specific adaptations that would have to be made to conform with conditions prevailing in different regions;
- to make appropriate recommendations.

Discussion of study results

The participants discussed several microbiological/epidemiological studies performed to date, on the basis of three review papers covering Mediterranean, United Kingdom and United States studies respectively. They were prepared specifically for the Consultation and presented by their authors. In addition, other information was made available through updates on current projects and other supplementary material prepared by participants, and by other experts not present at the Consultation.

In discussing the microbiological component of the studies, the participants reviewed problems with the reliability of water quality data, including those arising from pooling data differing spatially and/or temporally. They debated the relative merits of indicator organisms, noting that while faecal coliforms are the most commonly used indicator in several international and national criteria and standards, enterococci and Escherichia coli have been found to show the highest correlation with enteric diseases among bathers. They also discussed the methodological problems caused by the

two main methods in current use (the membrane filtration (MF) and the most probable number (MPN)) not being directly comparable. Finally, they discussed the potential contribution of bathers themselves to water quality, particularly in areas with high bather densities and relatively hydrostatic conditions.

The participants felt that reasonable progress had been made in epidemiological design, including cohort design and the control of confounding factors, the calculation of relative risk through logistic regression analysis, and the identification of differences in bathing behaviour. They stressed the importance of identifying variation both within and between bather and non-bather groups. They also discussed the relative merits of self-reported and clinically-obtained data and agreed that, when clinical data were unobtainable, self-reported data with a validated questionnaire method were acceptable. When relying on perceived symptoms, however, investigators should also build in a procedure to validate them, such as through prescriptions for medication or visits to general practitioners.

Several other details of the study design were discussed, including the quantification of the degree of exposure, the exact type of follow-up work, and the possibility of using control groups other than non-bathers. In general, the basic design of cohort studies has not varied much, and more rigorous designs could be usefully examined, such as that of the randomized controlled clinical trial or others not yet tried out. Alternatives to the most common type of cohort design on publicly accessible beaches were discussed, including identifying subgroups such as tourists or campers. Some participants considered that studies of these groups would allow better control of a number of confounding factors, including more control over participants during the study period.

The participants stressed that, in any epidemiological study, it was necessary to show that the observed health effects were attributable to exposure to pathogens in water or sand or, alternatively, to other specified agents.

On the basis of these discussions, the participants reviewed and modified the guidelines for prospective microbiological/epidemiological studies on the correlation between natural recreational water quality and effects on health. They had originally been developed for Mediterranean studies by a WHO/UNEP consultation in Follonica in 1985, and successively modified in later meetings. The participants all accepted the importance of following the guidelines and developing protocols to provide a common foundation for epidemiological studies and enable comparison between them. They also agreed that such protocols might need to be modified with respect to the country of implementation, taking local constraints into account.

After considerable discussion, the participants could not agree whether to incorporate the randomized controlled clinical trial as an alternative design into the framework of the guidelines. They therefore decided that immediate modifications to the existing guidelines should be limited to designs already covered, and that this design, as well as others aimed at more specific recreational water activities (such as for groups of scuba divers or windsurfers) should be incorporated in future revisions of the guidelines.

Recommendations

1. Microbiological/epidemiological studies, correlating recreational water quality with effects on the health of exposed population groups, should be carried out by multidisciplinary study teams, and should contain sufficient numbers of participants.
2. The division of water quality data for use in an epidemiological study into low, medium or high bands of contamination should be based on health-related criteria, and not on arbitrary criteria convenient to the data in question.
3. Epidemiological studies should use common indicators to determine the quality of recreational water, preferably enterococci, Escherichia coli and one virus.
4. Whichever method (MF or MPN) is used to determine the microbiological quality of water, particular attention should be paid to standard techniques and analytical quality control to enhance the reliability and comparability of the results.
5. Water quality data collected from different sites, or from the same site on different days, should be pooled only when the results of microbiological analysis indicate that the water quality of such data sets was not significantly different.
6. WHO should issue the revised guidelines as early as possible, and recommend their use in microbiological/epidemiological studies correlating recreational water quality with health effects.
7. WHO should consider alternative study designs, including those covering specific recreational water activities, such as scuba diving and windsurfing, with a view to their eventual incorporation into the guidelines.
8. Given the comparatively high cost of microbiological/epidemiological studies and their increasing importance due to the mass use of the sea for recreational purposes, WHO should continue to seek funds from appropriate agencies to support the organization and implementation of such studies on an appropriate scale.
9. WHO should promote further work on the determination of (a) the survival and death rate of pathogens under different environmental conditions, and (b) the effects of bathers on the quality of marine water.