

National Drinking Water Advisory Council

November 2-4, 1999 Strategic Assessment and Recommendations

The Health Care Provider Outreach and Education Working Group

The National Drinking Water Advisory Council serves an advisory role to the Administrator of the U.S. Environmental Protection Agency (EPA) on the implementation of the Safe Drinking Water Act (SDWA). At its Spring 1998 meeting, NDWAC discussed the need to forge better links with the community of doctors, nurses, and other health care providers on drinking water concerns. NDWAC called for the establishment of a Working Group on this topic, not to make specific regulatory recommendations, but to examine from a strategic perspective whether the health care provider community needs to become better educated on drinking water issues, and how such an effort might be structured.

EPA posted a notice in the *Federal Register* on May 18, 1998, requesting nominations to four NDWAC working groups, including one on "Waterborne Disease Education". In discussions with the nominees and several sponsoring organizations, there was some concern with overlap on audience and mission with another new NDWAC working group, that on Public Right-to-Know. This led to a clarification of the first group to cover strategic recommendations regarding "Health Care Provider Education and Outreach". Membership on this Working Group was sought from a wide range in specialties and organizations over the August through October, 1998 period. Representation was sought from the local and State public health and drinking water fields, water utilities and trade/professional associations, primary care physicians and nurses, medical research, and health care communications. Invitations to the final nominees to serve on the Working Group were sent from Cynthia Dougherty, Director of the EPA Office of Ground Water and Drinking Water in late October, 1998. The composition of the Working Group and its draft Mission Statement were reviewed and ratified by the full NDWAC on November 17, 1998, at its meeting in Arlington, Virginia.

The Working Group held face-to-face meetings in Washington, DC on December 2-3, 1998 and June 1-2, 1999. Full group conference calls were held on January 26, 1999, April 16, 1999, and September 27, 1999. Public notices of all these full meetings were published in the *Federal Register*, and meeting summaries are available from OGWDW. A number of sub-groups worked on draft assessments, recommendations and interim products; these groups communicated by E-mail and conference calls.

2.3 Working Group Roster and Mission

The current roster of Working Group members is included as Attachment 1. The final Mission Statement was approved by the Working Group at its January 26, 1999 conference call to read:

Prepare an integrated strategy, for consideration by the NDWAC, as to how the U.S. EPA and CDC should inform and educate health care providers in their efforts to: 1) counsel persons about the quality of their drinking water; and 2) recognize, report, treat, and prevent adverse health effects that can be caused by infectious and non-infectious agents that could be acquired from drinking water.

2.4 The Health Care Provider Community

One of the first issues faced by the Working Group was the definition of the audience for the strategy. The U.S. Bureau of Labor estimated that in June 1999, 9.98 million people were employed in the U.S. in the broadest Health Services category⁽²⁾. This includes, for example, 1.87 million employees in offices and clinics of medical doctors, and 1.75 million employees in nursing and personal health care facilities. Apart from the size of the audience, the Working Group was intimately familiar with the very wide range in expertise and specialization. No one strategy, outreach product, or communications approach can be ideal for all these groups. After several discussions, the Working Group suggested several tiers:

Primary audience: general health care providers (e.g., internists, nurses, general practitioners, nurse practitioners and physicians' assistants), health advisors to sensitive subpopulations, and laboratory scientists.

Secondary audience: hospital and HMO administrators, dietitians, emergency room staff, advocacy groups, dentists, pharmacists, and other health care staff working in schools.

3.0 Key Issues for Strategic Attention

The Working Group discussed the underlying need for HCP outreach and education, and the best approach from a strategic perspective for meeting this need. These are outlined in Sections 3.1 through 3.4. Specific projects which mirror this philosophy and direction are outlined in Sections 4.1 through 4.3.

3.1 Health Care Providers Could Use Information to Better Counsel Their Patients on Drinking Water and Health

The NDWAC Health Care Provider Working Group believes that many HCPs have only limited information to answer patient questions and concerns about drinking water and health. Such questions may arise from any number of sources, including media reports on drinking water system problems, the issuance of boil-water notices by health officials, or patient interest in specific findings shown in Consumer Confidence Reports being issued by water utilities this year. While the Working Group noted that EPA provides much information which is available to the general public, such information may need to be revised and structured to be of most benefit to HCPs as guidance on patient counseling.

3.1.1 Basic Principles

The Working Group suggests that EPA⁽³⁾ consider the following basic principals in developing such anticipatory guidance.

- *Health care providers would benefit from information on the basics on drinking water and health.* A knowledge of the linkages between drinking water quality and both acute and chronic health effects caused by infectious and non-infectious agents would be of benefit to many HCPs. Such understanding would assist in effective diagnosis, treatment and prevention in certain routinely occurring situations (e.g. patient with gastrointestinal illness⁽⁴⁾).
- *A wide range in information sources would be useful for HCPs.* Health care providers need information on how and where to find answers to patient questions about drinking water and health. The information sources could include those from EPA, CDC, HCP professional associations, advocacy groups, and others. These sources can cover the full spectrum of information; from applied solutions to ongoing research.
- *Health care providers can serve many roles.* Information and outreach materials can assist HCPs who are interested in serving in a proactive role with their patients/clients. With such materials, HCPs could more routinely pose questions to their patients that could tease out problems with local drinking water sources, and consider such information in diagnosis, treatment and counseling.

3.1.2 Key Points for Anticipatory Guidance

The working group identified a number of more specific areas which could be encompassed by outreach efforts directed at HCPs:

- *Basic Water Safety:* HCPs should note that drinking water served by public systems in the United States (i.e. those that fall within the SDWA definition) is generally considered safe⁽⁶⁾ for most people most of the time. Information on the compliance of local water utilities with laws and regulations would help provide data to HCPs; such information will be available in CCRs.
- *Vulnerable Populations:* Some segments of the population are more at risk from possible illness from drinking water⁽⁶⁾; in some cases even drinking water that meets applicable federal and state standards. HCPs need to be aware of who those populations are and take steps to advise them of these risks.
- *Outbreak Recognition:* Outbreaks of waterborne illnesses do periodically occur. If drinking water is not routinely considered as a possible etiology (causative factor) by HCPs during diagnosis, recognition of an outbreak could be delayed or possibly missed altogether. The outbreak could then afflict more people than would otherwise be the case. Clinicians, laboratory staff, and pharmacists can each be the first to recognize an increase in background rate of diarrheal disease which could be attributed to an outbreak.
- *Acute and Chronic Effects:* Potential drinking water health effects are not limited to acute disease effects, such as gastrointestinal illness associated with microbiological pathogens. Outbreaks associated with chemical contaminants have occurred, and longer term exposure to chemical contaminants such as arsenic and radon are of concern. While research to date is inconclusive, many patients are concerned about longer term health effects from the byproducts of drinking water disinfection. Information and guidance to HCPs would help them respond to such specific issues.
- *Laws and Regulations:* While some HCPs might appreciate knowing about basic federal and state drinking water laws, they would be more concerned if there are deficiencies or violations of drinking water systems which serve their clients. Any local training or outreach to HCPs should mention these issues as well as suggest a possible response to patient concerns.
- *HCPs as Community Leaders:* Many HCPs are community leaders and can serve in roles beyond patient/client outreach and education. These include providing peer education with HCP colleagues and organizations, involvement in community education, participation in Source Water Assessment/Protection programs, and active engagement with local water providers and public health agencies in assessing needs for infrastructure investments in supply and treatment technologies. HCPs can also play a more proactive role in smaller communities where CCRs are not distributed by mail.
- *Other Water Sources:* Water from private wells and certain smaller water supply systems may not be covered by federal or state safety requirements. The burden of testing and treatment may fall on the homeowner or property owner. HCPs should be aware of testing and treatment options available to patients/clients in these situations.
- *Alternatives to Tap Water:* Since bottled water and home treatment devices are considered by many consumers as alternatives to tap water, HCPs need to understand the benefits and shortcomings of these alternatives. HCPs need to be able to provide or to direct patients/clients to reliable information on different point-of-use device performance, other treatment alternatives (e.g., boiling water), and bottled water safety. Such information should accommodate contaminant-specific concerns.
- *Other Paths of Exposure to Contaminants:* Contaminants may be transmitted by a variety of means in addition to drinking water. HCP communication should address disease prevention comprehensively for these contaminants (i.e., in the case of *Cryptosporidium* include drinking water, recreational water, food, contact with animals, and sexual/hygiene practices).

- *Needs and Opportunities for Disease Monitoring and Reporting by HCPs:* It would be beneficial if HCPs are sensitized to the importance of appropriate testing and reporting of illnesses which might be linked to drinking water system problems. Interested HCPs can play an important role in helping public officials strengthen disease surveillance and reporting efforts, and build better ties between health officials and water utilities. Clinicians, laboratory staff, and pharmacists have important data which can be shared and used to establish a baseline rate of diarrheal disease in a community.

3.2 Basic Health Care Provider Training on Environmental Health Should be Strengthened to Include Drinking Water

Section 3.1 of this report presents a number of principals and actions which can help inform practicing HCPs on drinking water in their day-to-day role as health care counsels. It has been made known to the Working Group that a fundamental issue is the need to improve the knowledge base for doctors, nurses, and other HCPs on environmental health issues, including drinking water. Training in schools, and for practicing HCPs in continuing education and re-certification programs, is key to changing key clinical practice behavior relevant to drinking water. These approaches offer the most lasting response to help HCPs reduce the adverse health impact of drinking unsafe water. The Working Group supports strengthening this basic understanding, and suggests that this issue should be addressed on a multi-media, multi-problem basis.

To meet these overall goals, education and training programs to inform health care providers about waterborne illness should be designed for three specific stages in the clinical process: 1) practice environment, 2) diagnostic testing, and, 3) reporting. Educational tools and methods should be specially designed for each of these levels of the clinical process to achieve well-defined, stage-specific expected outcomes.

3.2.1 Improving the Health Care Practice Environment

The practice environment encompasses all patient interactions that might be relevant to drinking water. These interactions include management of acute illness due to exposure to contaminated drinking water, evaluation of common symptoms (e.g., diarrhea) that may be caused by drinking water, and response to concerns about drinking water. Training methods targeted at the level of the patient interaction should increase the ability of health care providers to appropriately recognize, report, treat, and prevent as well as educate patients about issues associated with drinking water. An effective strategy at this stage requires a two-part approach: 1) expand the knowledge base of health care providers in drinking water, and 2) address the barriers to integrating drinking water issues into usual clinical practice. Strategies for education and training should consider how to overcome potential barriers that may prevent health care providers from addressing drinking water issues with their patients.

Historically, there has been very little health care provider training on environmental health in medical schools, nursing schools, and other learning institutions. Consequently, health care providers do not generally include environmental exposures in the evaluation of most symptoms or have difficulty responding to questions on environmental health issues. Examples of tools and methods which could foster knowledge and practice skills⁽⁷⁾ include:

- Take an environmental health history
- Recognize the signs, symptoms, diseases and sources of exposure relating to drinking water
- Identify risk factors for exposure to contaminated drinking water and health effects
- Understand key environmental/occupational principles, epidemiology and population-based health
- Identify the informational, clinical and other resources available to help address patient and community drinking water health problems and concerns

- Demonstrate awareness of the health concerns and problems in communities where patients live and work
- Provide patient education/guidance including risk communication
- Understand the legal and ethical responsibilities of seeing patients with concerns about drinking water

While the above points may seem obvious to many, a variety of barriers may prevent integration of drinking water skills and knowledge into practice⁽⁸⁾. These would need to be considered by EPA as it approaches the issue of education from a broad perspective:

- Lack of time for HCPs to become involved in drinking water health problems which may be complex and time consuming
- No reimbursement for time spent
- Overwhelming administrative tasks
- Potential for needing to interact with legal system which is discouraging
- Philosophical, political, social or cultural deterrents (e.g. disagree with environmental activists)
- Do not agree with data on environmental illness
- Lack of confidence in patient's compliance (follow-up testing)
- Lack of a systematic method for incorporating the skills into practice
- Lack of peer or staff support

3.2.2 Improving Diagnostic Testing

The next stage in the clinical process that requires specific training approaches covers the issue of diagnostic testing. Laboratory diagnosis is fundamental to the recognition and investigation of individual illnesses as well as outbreaks. Investigations of suspected outbreaks associated with *Cryptosporidium* and *Giardia* in drinking water, for example, have been shown to hinge on appropriate ordering and testing for these specific ova and parasites. Health care providers may not be aware of the need and benefit of certain laboratory tests to define etiologic agents which might be related to drinking water problems. There also may be constraints with managed care organizations approving such tests, or with finding appropriate, affordable laboratories. Outreach, awareness and education strategies should, therefore, include not only laboratory organizations but health care management groups as well.

3.3.3 Improving Reporting of Disease

The third stage for specific educational intervention is reporting of potential waterborne illness. Health care providers may be the first to recognize an increase in diarrheal illness in a community. Reporting increased illness to the local or state health department (even prior to laboratory diagnosis) enables timely public health intervention.

A comprehensive strategy to inform health care providers about waterborne disease and symptoms should include many strategies with their specific expected outcomes targeted at defined stages of the clinical process. The overall outcome for this educational effort is multi-dimensional (knowledge increase and behavior change). Strategies therefore need to be multi-dimensional extending beyond usual written modes of information dissemination as discussed in Section 3.2.

3.3 Messages Should be Targeted on a Patient Group or Audience Basis

In several meetings and conference calls, the Working Group grappled with the question of what "messages" need to be communicated to HCPs. The group considered whether there was one or more clear pieces of information that needed to be transmitted to HCPs. In such a case, the emphasis for EPA would then be less on the information, and more on the mechanisms for communicating that information to the field. Examples in the health care field were cited, including the role of the microorganism *H. pylori*

as a causative agent in stomach ulcers, and environmental lead and children. The answers regarding drinking water issues were found to be rather straightforward in some cases (such as the health effects of nitrates on infants) and more complex or unresolved in other cases (such as the possible link between disinfection byproducts and spontaneous abortions). The set of messages will continue to change as more information is uncovered about contaminants under regulatory consideration, as well as those which are candidates for regulation.

The Working Group was pleased to see EPA making significant progress in communicating health effects information to the public, an effort that supports both regulatory development and the Consumer Confidence Reports. Much of this information is available on an individual contaminant basis, which serves many purposes. The Working Group felt, however, that a significant unfulfilled need is for patient-specific, concise information packages.

HCPs receive enormous amounts of reports and other information, and are challenged in sifting through this volume to find what is relevant for their specific patients. Clarity and focus is needed to reach HCPs. If they are treating people with asthma, for example, they will respond best to information focused on asthmatics. EPA and CDC has developed guidance on drinking water issues for immune-compromised patients, and EPA has in draft form, a brochure on children and drinking water. This is an approach which should continue and be expanded, such as for women of child-bearing age and the frail elderly. Outreach is most effective when the messages are aggregated to a given population group, such as those on non-public water supply systems, or in areas with known waterborne illness or drinking water risk (e.g. concentrations of arsenic or radon above standards). The Working Group discussed a number of possible patient groups/audiences for targeted outreach, including patients who:

- have a weakened immune system, HIV or AIDS
- are on chemotherapy
- are elderly and in poor health
- are infants
- take long-term, oral steroids for skin conditions, arthritis, etc.
- are on dialysis
- have had a transplant
- are members of under-served or disadvantaged populations with substandard health care, limited education or limited health care access
- are chronic disease sufferers (e.g., end-stage congestive heart failure, renal failure)
- have poor nutrition

The Working Group recognized that outreach to these audiences or patient groups would cut across the contaminant-specific information products historically produced by EPA and others. The Working Group *for illustrative purposes only*, marked up the following matrix showing several groups versus contaminants of concern. Note that this analysis was done only for the purpose of exploring the idea, and *should not be considered as technically accurate*. The intersects are marked by an "X" where the effect is a health concern, and "?" where there is uncertainty to be explained in the outreach materials.

Patient Group & Possible Risk	Severely Immuno-compromise	Women of Child-bearing age	Infants	Frail Elderly	Non-PWSS & Private Wells	General Population
E. coli & Cryptosporidium	X		X	X	X	
Lead		?	X			?

Acute chemical (e.g. arsenic)	X	X	X
Disinfection byproducts	?		?
Nitrates		X	
Radon		X	

Regarding information presentation, the Working Group felt that succinct fact sheets could be prepared along the following topics:

- Background to the issue
- How great is the risk (on a relative or absolute basis)?
- Where is the risk found (e.g. what types of systems, utilities, or settings)?
- What is considered "reasonable avoidance behavior"?
- Why is there uncertainty (e.g. accuracy of certain tests)?
- Where to go for more information (e.g. government and non-government Web sites or data bases; medical literature, etc.)?

On the last point, the sense of the Working Group is that EPA and other U.S. Government information sources should make available, or provide references or links to, all relevant research reports on health and drinking water. This set can be broader than those studies considered fully peer-reviewed and included in technical support for regulatory action. Early or preliminary research results should be noted as such. The Working Group felt that HCPs should be given all the help they can if they decide to review the range in literature relevant to patient needs, and not just restricted to reports "cleared" by government agencies.

3.4 Links With HCP Networks Should be Strengthened

As pointed out earlier, the HCP community includes several million practitioners of wide ranging interest, expertise, and position. It would be an impossible task to try and reach them directly and effectively. The development and distribution of outreach materials will be greatly enhanced through partnerships with HCP organizations and networks. While some national organizations work actively with EPA on drinking water, pesticides, fish consumption, and other environmental health issues, additional partnerships should be explored. Activities with these groups could include:

- Engagement of the leadership of key national HCP professional organizations on the need for stronger links between the communities.
- Participation at national or regional meetings to foster awareness of the Consumer Confidence Reports, and basic drinking water and health fundamentals. This could be greatly enhanced by forming a cadre of experienced drinking water and health specialists who can give presentations. Speakers bureaus could be supported by making available standard information packages and flexible slide presentations. [\(9\)](#)
- Providing input on fact sheet language regarding, for example, health effects or reasonable avoidance behavior.
- Distribution of information materials via direct mailings, Web site posting, inserts in newsletters, special sessions at national meetings, etc..

EPA is developing a candidate list of Health Care Provider organizations. The list includes the constituent groups the organizations represent, contact information, names of journals, newsletters and reports, major meetings, priorities for outreach, and other

information. The addresses have been added to the Office of Ground Water and Drinking Water's mailing lists, which are supplied to staff when they plan communication strategies. The group believes that some of these linkages with networks will be sustained over the long term, and some will be shorter-term to focus on specific products. In either case, the Working Group is enthusiastic about the potential benefits from closer linkages between the health care and drinking water communities. EPA must use variety of approaches to partnership, and learn what works and what does not.

4.0 Possible Health Care Provider Training and Outreach Activities

4.1 Introduction

The Working Group recognizes that HCPs typically face more severe health care concerns than drinking water contamination. Nevertheless, many in the public are very concerned about drinking water issues and will continue to seek advice from their HCPs. We also recognize that EPA and its partners on implementation (states, public health officials, water utilities, etc.) have a formidable job meeting SDWA requirements within current and projected budgets. Nevertheless, the Working Group believes that a long-term effort to educate and inform HCPs on relevant drinking water issues should be incorporated into SDWA implementation programs. A number of candidate projects and activities were discussed by the Working Group over several time frames⁽¹⁰⁾, which follows from the discussion in Section 3 above.

4.2 Possible Activities to be Initiated in the Near Term

There are two main purposes for this set of example projects; which could be started in the next two to three years and then be ongoing: (1) responding to patient questions which arise from the Consumer Confidence Reports, waterborne disease outbreaks, claims of water filter and bottled water advertisers, etc., and (2) to set the stage for longer-term HCP partnerships.

- Concise, patient group-specific information packages; emphasizing risk characterization, assessment and avoidance. These materials could be distributed by HCP professional associations as well as EPA and CDC. EPA should try to present health effects information (including avoidance behavior) in as clear and simple language as is possible. The Working Group suggests that EPA draw on a wide range of reference sources, and note where the results of cause/effect research have been validated by peer-reviewed work, and where there is still emerging science, scientific debate on findings, and significant uncertainty.
- Adding such HCP information to EPA and CDC Web sites, with linkages to numerous organizations and groups.
- A "needs assessment" of targeted HCP groups (particularly doctors and nurses) to see how best to reach them with information on drinking water. This could be done as part of a wider EPA effort looking at other environmental health issues such as contaminated fish and pesticide poisoning. Such an assessment could include formative research (qualitative assessment, message testing, strategy feedback, etc.) and ongoing assessments of message, audience, and effects for each targeted health care provider group.
- Pilot projects for HCP outreach and education; to sharpen both messages and outreach products, as well as ensure relevance. These can be focused on specific patient groups, or areas where drinking water contamination is of relatively greater health concern. It could include developing local information resources to assist HCPs with specific drinking water topics pertinent to their

community (e.g. taste and odor findings which do not constitute health risk). The pilot projects could be carried out by non-government and professional organizations as well as government groups.

- More routine coordination meetings between drinking water professionals and national, regional, and state HCP organizations; to learn about each others roles and responsibilities, and discuss possible areas of mutual interest.
- Increased participation by drinking water specialists at national, regional, and state HCP meetings and workshops.
- Training materials that provide HCPs with an appreciation of the various routes of environmental exposure that can result in the transmission of acute and chronic disease causing agents. EPA and CDC could work in partnership with Government and non-Governmental organizations and professional organizations on these.
- Formation of task forces and expert groups to plan for longer term HCP education initiatives. These can include the senior-management or policy level to achieve broader understanding and basic commitment.
 - Establish a group of HCPs and representatives of HCP organizations to provide feedback and evaluation on effectiveness of these education initiatives.

4.3 Possible Longer-Term Activities

It was clear to the Working Group that both university/graduate curriculum as well as that for practicing HCPs, should be augmented to include more information on environmental health, including drinking water issues. This is not a "new" observation⁽¹¹⁾, and has been the recommendation from a number of studies and task forces. EPA is currently looking at expanding its intra-agency coordination efforts to address longer-term education and practice change for all environmental health concerns. The Working Group strongly supports this, believing that only multi-media and cross-sector efforts would be successful.

This multimedia/partnering approach is recommended since: (1) EPA has a relatively small number of staff trained as health care providers or in public health, (2) several EPA offices have promising initiatives to reach health care providers regarding specific environmental health hazards, (3) The Institute of Medicine has made recommendations to Congress that environmental health should be integrated into basic nursing and medical school education (see previous footnotes), and this recommendation has not been substantially addressed, and (4) several federal agencies and national professional organizations have been involved in addressing this issue. Particular outcomes from this effort could include:

- Encouraging medical, nursing, and other HCP schools to expand their curriculum on the recognition, avoidance, and treatment of environmental health problems. This could include the provision of the actual training materials⁽¹²⁾.
- Curriculum enhancement of continuing education programs for practicing HCPs.
- Enhancing standard medical and nursing reference manuals.
- Preparing training materials through expert groups and professional organizations.
- Establishing advisory bodies to oversee curriculum integration.
- Expanding environmental health internships.

5.0 Supporting Documents

This report is the final product from the deliberations of the NDWAC Health Care Provider Outreach and Education Working Group. Preparatory materials and interim working papers are available from EPA if needed by NDWAC, and include:

- Background materials for the December 1998 and June 1999 full Working Group meetings held in Washington, DC.
- Summaries of Conference Calls held in January, April, and September 1999.
- A working draft slide show on drinking water and health issues prepared by several members of the Working Group.

6.0 Acknowledgments

The official Working Group liaisons to the full NDWAC (Jeff Griffiths and David Spath) would like to express their gratitude to the members of the Working Group for sharing their diverse expertise, and working through particular issues or recommendations in a number of small group efforts. This intersection of health care and drinking water professionals was a fascinating and enlightening first step in what we believe will be a fruitful longer-term partnership across the sectors. We would also like to thank Ron Hoffer and Sherri Umansky, the (respectively) Designated Federal Official and Deputy DFO for this Working Group, who helped make the process go as professionally as it did. Finally, facilitation support for full Working Group meetings and several conference calls was provided by Paul DeMorgan of the Keystone Center.

7.0 Attachments

1. List of Working Group Members and Liaisons
2. Additional background discussion on waterborne disease from infectious agents

Attachment 1

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Attachment 2

Additional Background Discussion on Waterborne Disease from Infectious Agents*

Diarrhea and abdominal cramping are the most likely symptoms to arise following the ingestion of a waterborne infectious agent. However, diarrhea and abdominal cramping are not specific to waterborne infectious agents and may be due to exposures by other routes (e.g., foodborne, person-to-person) or to non-infectious causes. Diarrhea and abdominal cramping may be mild and self-limited, and not lead a person to seek medical care.

When diarrhea is mild, most people do not seek medical care. Self-medication with an over-the-counter anti-diarrheal drug is the most likely thing done by someone with diarrhea. If a person does opt to see their HCP, the diagnosis of a specific cause of the diarrhea may be of little use to the HCP in the care of that patient. Even when a stool specimen is submitted for laboratory testing, *Cryptosporidium* testing is often not done in a routine ova and parasite laboratory examination. The number of laboratory-confirmed infections during documented waterborne disease outbreaks is generally small. For all of these reasons, HCPs, including laboratorians and pharmacists, may be the first to recognize an increase in diarrhea in their community, even in the absence of laboratory-confirmed cases of a specific infection.

Waterborne outbreaks of infectious disease occur in various situations. Water treatment (e.g., disinfection, filtration) can fail because of a malfunction, or can be overwhelmed by a sudden large increase in infectious agents entering the source water for the drinking water system. *Cryptosporidium* is notable for its ability to survive chlorination. Some water systems which use water derived from underground sources are not disinfected at all, and can transmit disease when contaminated water leaks into the well (e.g., during a flood). Cross connections can occur, which allow waste water (including human sewage and/or chemicals) to enter the drinking water system. Small water systems often lack sophisticated monitoring and treatment and may be at greater risk for transmitting a waterborne disease agent.

*** Note that this discussion was prepared by Working Group member Jim Miller during the final round of comments; it has not been reviewed by the Working Group.**

1. 1999, National Environmental Education & Training Foundation, "The National Report Card on Safe Drinking Water Knowledge, Attitudes, and Behaviors. Washington D.C., 55 pgs.
2. U.S. Bureau of Labor Statistics SIC database as of July 27, 1999
3. While the Working Group directs its recommendations to NDWAC, and then to EPA, it is assumed that implementation goes beyond EPA's responsibility and budget. Collaboration is assumed with CDC, other Federal organizations, and partners in the HCP field both within and outside of government agencies.
4. More background information on this issue is included as Attachment 2, as well as in "*Cryptosporidium* and Water: A Public Health Handbook", prepared in 1997 by the

Working Group on Waterborne Cryptosporidiosis, and available from the Division of Parasitic Diseases, CDC-NCID, Atlanta, Georgia.

5. One member suggests that it may be more precise to communicate about levels of relative health "risk" for specific water consumer populations than to communicate more broadly about water "safety." The Working Group held only limited discussion on this point, but readers of this revised draft might wish to consider how this alternate "risk" terminology might substitute where there are currently references to water "safety" in this document. The member also notes as a practical matter that patients/clients may be more interested in guidance about whether or not they should drink their water, rather than whether or not their water is "safe."

6. As noted in Section 3.3 of this report.

7. This list is meant to be illustrative only, and is consistent with recommendations by the Institute of Medicine in their 1993 report "Environmental Medicine and the Medical School Curriculum" Washington, DC, National Academy Press.

8. Adapted from Pope, A.M., and Rall, D.P. (Editors). 1995. Environmental Medicine: Integrating a Missing Element into Medical Education, Washington DC, National Academy Press.

9. A few members of the Working Group prepared a generic slide show on drinking water to assist its members who are participating in HCP meetings this year; the full NDWAC consider whether (and in what form and venue) the slide show should be made available for wider use.

10. As noted throughout this document, while EPA is the principal audience for the Working Group's findings and recommendations, it is not assumed that all (or perhaps even a majority) of these can or should be carried out by EPA *per se*. Instead, it is assumed that these would be considered by EPA, CDC, and numerous professional organizations and advocacy groups for implementation within available budgets and priorities.

11. See footnotes #7 and #8 for example

12. Working Group members cited several examples, including the CDC/EPA biannual summary of waterborne disease outbreaks, ATSDR's updated case studies in environmental medicine, presentation materials for medical/nursing school classes, and continuing education programs.