

Perspectives on the use of scientific knowledge for public health practice

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Abstract

Achieving the goal of increasing quality and years of healthy life is fundamentally based on success in the practice of public health. As our life style changes with time and as public health issues become more global, the practice of public health is enhanced to meet new challenges. In addition to addressing infectious diseases, environmental concerns are gaining attention. New challenges require the modification of the methods of investigations, use of new technologies and application of real-time management of public health emergencies. In many situations, collaborations at the local, regional, national and global levels are needed. This manuscript provides a summary of the approaches to address certain crucial environmental health concerns towards the goal of increasing quality and years of healthy life.

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Introduction

Success in public health practice requires effective application of multidisciplinary expertise. The expertise ranges from investigations to identify environmental causes for health concerns, communicating the scientific information precisely to the impacted community and individuals, to effective management of the problem for disease prevention. As scientific knowledge advances, public health scientists are able to apply new technologies to address health concerns, and to tackle concerns that often have complex etiology and multiple disease pathways. Understanding the application of specific

scientific knowledge to the effective improvement of public health is critical to the success of the practice.

Different types of public health concerns

The practice of public health has always played a crucial role in improving the quality of life and life expectancy in the human population. In the past, public health efforts have focused on the prevention of acute illnesses from exposure to infectious agents and from high concentrations of environmental toxic substances. In developed countries, these short-term public health problems have become manageable and they are not typically wide-spread concerns anymore. Consequently, some of the focus on public health has shifted to issues such as the prevention of long-term illnesses from exposure to low concentrations of environmental toxic

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substances, hazardous situations that exist due to modern life-styles, and illnesses from previously unconceivable incidences such as terrorist activities. The new focus requires a paradigm shift in the practice of public health that involves changes in the design of investigations, use of new technologies, and application of real-time management of emergency cases. An overriding mechanism that ensures success in addressing public health concerns is the efficient translation of scientific knowledge into public health practice.

A continuing public health concern is the health impact of hazardous waste sites on surrounding communities. Of utmost concern are sites that have not been properly prepared to keep hazardous waste materials, e.g. industrial and military waste, from spreading into neighboring communities and contaminating natural resources. In the US and some other nations, this concern is being systematically addressed. In the US, for example, there are approximately 1500 hazardous waste sites of high concern (USEPA, 1996); approximately 14 million people live within 1 mile of at least one of these sites (ATSDR, 1999). Successfully resolving community health concerns about hazardous waste sites requires that the public health community thoroughly document and understand the basis for community concerns, including concerns about the health and social impacts of the contamination. This requires the meaningful and sustained involvement of community members in the entire public health investigation process. A special issue publication on evaluating health hazards has been published (Lichveld et al., 2000). On the other hand, reliable scientific basis for health concerns needs to be generated as good scientific data are necessary for making sound public health decisions. As mentioned earlier, a multidisciplinary approach is required to generate useful data. In the US, this is achieved via extensive collaboration among different federal agencies, e.g. Agency for Toxic Substances and Disease Registry, Environmental Protection Agency, National Center for Environmental Health, and National Institute of Environmental Health Sciences. A special issue publication on interagency collaboration has been published (Spengler et al., 2002).

Environmental health concerns are not contained by geographic and political boundaries. However, specific health concerns may require unique approaches for resolutions. For example, health concerns differ in countries with hot climate, such as Egypt, compared with countries with cold climates, such as Russia. Populations with different cultures may interpret the seriousness of a specific environmental health problem differently. It is important to address the questions on how different life styles, cultures and occupational practices affect health, and on how international collaborations achieve harmony in hazard communication and disease prevention. In fact, working with

international partners on resolution of public health problems is both meaningful and rewarding. A special issue publication on international collaborations has been published (Falk et al., 2003).

In this issue, additional challenges and opportunities for translating scientific knowledge into public health practice are highlighted.

Development of strategies for disease prevention

A persistent complication in environmental health investigations is the lack of reliable historical and/or background exposure information. Without such information, it becomes difficult to determine whether the current exposure is excessive and is responsible for any observed health problems. Therefore, a program was initiated to develop a national exposure data base (Pirkle et al., 2005). This multi-year program monitored the presence of over 100 environmental chemicals in serum, blood and urine in the US population. The data reveal which environmental chemicals get into Americans, which subgroups in the population are most affected, and which chemical exposures have changed with time. Therefore, the data will be helpful in documenting success in public health effort to reduce Americans' exposure to potentially harmful chemicals and in contributing to the interpretation of findings from public health investigations.

Valuable strategies for prevention of disease are developed based on systematic evaluation of real-life situations. Along the Great Lake region in the US, sport fishing is a major recreational activity. However, excessive consumption of Great Lakes fish can cause exposure to certain toxic substances via the food chain. Consequently, fish consumption advisory guidelines have been developed and made available to the public. However, the public awareness of such guidelines has not been equal across the population demography (Ashizawa et al., 2005). For example, awareness of fish advisories has been particularly low among women. Therefore, a new strategy has been developed to make special effort to reach the under-informed subgroups in the population.

Lead exposure remains an important environmental health problem, especially among children. Therefore, a national goal has been set to eliminate blood lead levels of $>10\ \mu\text{g}/\text{dl}$ in children who are younger than 6 years old by the year 2010. This achievable goal can be accomplished only with dedicated effort and with innovative approaches. One approach is to expand and to access local blood lead data in addition to relying on national data to redefine specific priority areas and subpopulations for blood lead reduction programs (Meyer et al., 2005).

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