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Invited Minireview

Importance of National Institute of Infectious Diseases and Institutes of Public Health on Control of Infectious Diseases in the New Century

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SUMMARY: As the incidence of infectious diseases has recently decreased, we are faced with new problems, such as emerging and re-emerging infectious diseases, food poisoning, zoonosis, and bio-terrorism. In light of these new conditions, the National Institute of Infectious Diseases, the Local Institutes of Public Health, public health offices, and other medical organization must maintain close relationship in order to protect the health and safety of the citizens.

Introduction

Local Institutes of Public Health were established as research centers to solve public health problems following the end of the Second World War. For the last 50 years, it has been engaged in conducting research and examination and testing, offering instruction programs and guidance and epidemiological analyzes and providing information. While there has been a dramatic improvement in public health, as witnessed by the elimination of infectious diseases, reductions in mortality, and the extension of life expectancy, new health problems have been emerging. Thus the function of Local Institutes of Public Health has been reinforced so that they can respond to new health crisis, treat emerging and re-emerging diseases, food-borne infectious diseases, zoonoses, NBC (nuclear, biological, and chemical) terrorism, as a scientific and technological support center.

Example of recent infectious disease outbreak in Saitama Prefecture

1. An outbreak of diarrhea due to enterohemorrhagic *Escherichia coli* at a kindergarten (1)

Upon receiving a report on October 18, 1990, from a hospital stating that "five children from a single kindergarten were hospitalized with diarrhea and two have already succumbed (with complications of hemolytic-uremic syndrome [HUS] and disseminated intravascular coagulation [DIC])", the local public health office went into action. It was learned that there had been sporadic incidences of diarrhea and passing of bloody, mucous stools among the students at this school starting around October 8th. After a field day held on October 10th, the number of absent children suddenly jumped to 22 by the 18th. It was found that well water was used for drinking at this kindergarten. In order to detect the pathogens, the Saitama Institute of Public Health immediately launched a stool examination and testing of the quality of the well water. By the 20th, the results of the analysis of the 55 samples collected (including those from 42 children in the kindergarten) became available. No cholera organism, dysentery bacillus, *Salmonella*, *Vibrio parahaemolyticus*, or *Campylobacter* was detected; however, enterohemorrhagic *E. coli* O157 was isolated from seven of the 42 kindergarten children (16.7%) and other pathogenic *E. coli* from 10 (23.8%). There were 149 patients from this kindergarten (total number of kindergarten children, 182, 81.9%). Their symptoms included diarrhea (96.6%), abdominal pain (69.1%), fever (48.3%), and passing of bloody, mucous stools (18.1%). *E. coli* was isolated from the well water on the 22nd. It was concluded that the first mass outbreak of enterohemorrhagic *E. coli* O157 involving 319 patients (including 149 kindergarten children) in Japan was caused by drinking of the well water, which was contaminated by the water purification tank and consumed by the kindergarten children and their families on the field day held on October 10th.

2. Mass incidence of diarrhea caused by *Cryptosporidium* in a town (2)

On June 10, 1996, the local public health office was alerted by a report from a local public health center stating that a large number (167) of children from local elementary and junior high schools were absent due to diarrhea and abdominal pain. Upon initiating an investigation, the Saitama Institute of Public Health suspected food poisoning or infections of the intestinal system and launched a testing program to isolate the probable pathogenic bacteria or viruses. On the following day (the 11th), the condition had spread to the local inhabitants. An analysis of the local water supply yielded residual chlorine, while no bacteria or viruses that could have caused the diarrhea were detected. It was suspected that a Protozoa was responsible for the outbreak and the focus was shifted on the 14th to isolation of protozoans. On June 17th, *Cryptosporidium* was identified in 22 of the 34 fecal samples (64.7%); and on the 20th the same organism was isolated from the town's water supply. With advice from an authority in the field, it was decided to switch the town's water supply completely over to water supplied by the prefecture. By July 18th, the number of individuals with symptoms fell to zero and it was confirmed that the town's water was now completely free of *Cryptosporidium*. On the 19th, it was declared that the town's water supply was potable. According to a survey conducted regarding the prevalence of cryptosporidiosis in

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this town with a population of 13,800, there were 8,812 inhabitants with symptoms of diarrhea among the 12,345 respondents (71.4%). Since then, the Ministry of Health and Welfare has implemented a policy to prevent cryptosporidiosis by providing citizens with a safe water supply.

3. Recent O157-related incidence

* During an incident of food poisoning at a health care facility for the elderly in 2000, the O157 organism was isolated from fresh radish pickled in salt and malt. During a 2001 occurrence at a special home for the elderly, the organism was isolated from the patients' fecal samples but not from any specific food items. Therefore it was not certain whether it was food poisoning or an infection transmitted through other routes.

* During an O157 food poisoning incident caused by consuming cubed steaks that were sold through a restaurant chain in the Kinki District (western Japan) between February and March 2001, the O157 organism was isolated from the merchandise at the warehouse of the manufacturer located in Saitama Prefecture (central Japan).

* An O157 food poisoning that occurred at a community center for the support of independent children in the summer of 2001, the results of the epidemiological investigation and the study conducted by the Metropolitan Tokyo Government pointed to Korean flavored pickles as the probable source of bacterial contamination. With the cooperation of the local inhabitants, the organism was isolated from pickles of the same lot (3). During this incident, the Saitama Institute of Public Health, with the cooperation of the field epidemiology training program (FETP) of the National Institute of Infectious Diseases, participated in the investigation. It appears that an increasing number of mass incidences have developed in welfare facilities or those that involve large population groups, where it is difficult to determine whether the infection has been transmitted through contaminated food or through other routes.

The current local public health problems and the role of the Institutes of Public Health

A marked improvement has been seen in the state of infections that have been a long-standing problem in Japan. However, policies concerning infections are extremely important in relation to new social phenomena, such as an increase in the aged population, the popularity of imported food, and more active international exchanges. The immediate problem may be related to emerging and re-emerging infections, zoonoses, food poisoning and infections, NBC terrorism, and human involvement in environmental pollution. Local Institutes of Public Health recognize that their most urgent project is to establish a system to manage future health crises, and it places a high priority on research for the development of test methods, surveys and the collection and dissemination of information that is most pertinent for the present age. Local Institutes of Public Health are also entrusted to publicly show the basis of public health administration and propose the future direction for public health activities. In order to achieve these goals, the institutes must cooperate with local public health offices and the National Institute of Infectious Diseases in carrying on their projects. It is very important when investigating the cause of a disease, to obtain accurate test results as soon as possible, but it is also important to recognize the significance of epidemiological studies and to determine a system through which an epidemiological process may be comprehensively understood.

Conclusions

The Local Institutes of Public Health have taken on the responsibility of managing regional health crises and practicing preventive medicine as a scientific and technological support center. The National Institute of Infectious Diseases has performed the responsibility of suppressing infectious diseases on a national level. At present, the function of Local Institutes of Public Health must aid in the prevention of infectious diseases and control the infectious diseases that are emerging throughout the world which are spread by humans, food, and animals. Therefore, reference services, research activities, surveillance of infectious diseases, and international cooperation that are functions of the National Institute of Infectious Diseases must be continually enhanced. Furthermore, as an organization responsible for protecting the health and safety of the populace, the National Institute of Infectious Diseases, the Local Institutes of Public Health, public health offices, and other medical organizations must continually maintain close relationships, share new information, strive to improve their capacity to solve common problems, and implement preventive measures for the state of public health.

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