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The Initial Hospital Response to an Epidemic

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The last decades have been characterized by the appearance of a substantial number of newly recognized or novel infectious agents and by the re-emergence of infectious diseases with a global impact. The objective of this article is to briefly describe the model of hospital response for early diagnosis and prompt management of patients with highly contagious infectious diseases. We reviewed the main components of hospital preparedness in response to clustering of highly contagious diseases. A model for the initial hospital response to an epidemic in our referral Institute is discussed. Prompt recognition and identification is the initial and indispensable step in facing any communicable diseases, regardless of whether it is a prevalent, a newly emerging one or deliberately released. The importance of developing and implementing nontraditional methods of public health surveillance and a system that allows a wide and immediate dissemination of information and exchange of views on risk assessment and risk management are highlighted. Case identification and laboratory capabilities and isolation procedures are the essential components for an initial hospital response. The recent bioterrorist events and the worldwide outbreaks of highly contagious infectious diseases have evidenced the need for institutional preparedness at each hospital and for identification of referral centers for patient isolation and of laboratories with adequate capabilities. Moreover, hospitals should develop a plan for coordinating all hospital components to respond to critical situations deriving from the admission of patients with highly contagious infectious diseases.

Key Words: Hospital, Preparedness, Emerging infectious diseases, Surveillance, Communication.

Introduction

The last decades have been characterized by the appearance of a substantial number of newly recognized or novel infectious agents and by the re-emergence of infectious diseases with a global impact (1). Among them are included novel agents such as HIV and the human variant Creutzfeldt-Jakob Disease (2), re-emerging organisms such as those responsible for outbreaks of viral hemorragic fevers (VHF) in Africa (3–5), as well as those related to bioterrorism such as the deliberate release of anthrax in the U.S. (6). Moreover, expanding international travel has enhanced the movement and the speed of diffusion of infectious agents, as dramatically demonstrated by the epidemic observed in 2003 due to the novel SARS-associated coronavirus (7,8).

Agents with a potential severe and pandemic impact such as the avian influenza virus H5N1 currently circulating in Asia are under surveillance (9–11). Almost all of these infectious diseases have a significant link to the hospital setting that often represents the case of resonance for community epidemic events. Hospitals serve as important settings for identification of these threatening agents and play important roles in addressing these threats.

The objective of this article is to briefly describe the model of hospital response for early diagnosis and prompt management of patients with highly contagious infectious diseases, their recognition in case of clustering among hospitalized patients, and the infection control procedures to minimize the risk for the healthcare workers and the spread to the community. Moreover, the model of a referral hospital for the management of highly contagious diseases will be presented.

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Steps towards a Correct Hospital Response to an Epidemic

Recognition and Surveillance

Prompt recognition and identification is the initial and indispensable step in facing any communicable disease, regardless of whether it is a prevalent, a newly emerging one or deliberately released. Whether in the community or in the hospital setting, early detection of the occurrence of any communicable or infectious diseases rests on the primary healthcare worker who recognizes the first unusual patients. Indeed, before any response can be mounted, the event has to be detected, recognized and then identified as requiring special action. Detection requires clinical awareness, timely surveillance and often cleverness.

The importance of developing and implementing nontraditional methods of public health surveillance has been recently highlighted in view of the increasing concern related to the emergence and re-emergence of naturally occurring or deliberately delivered transmissible diseases.

Several surveillance systems have been proposed. Advantages and disadvantages of these different systems have been previously reviewed (12–16).

Apart from ongoing surveillance systems, several of the recent outbreaks were first suspected and brought to the attention of the public health officials by astute clinicians who identified a cluster of cases among in-patients and an epidemiological or microbiological or clinical link between these cases.

Several recent major outbreaks have been brought to the attention of public health authorities when unusual clustering of illness was recognized in hospitalized patients. This was the case of the recognition of unusual incidence of *Pneumocystis jiroveci* pneumonia among in-patients that prompted the identification of the HIV/AIDS epidemic in the early 1980s (17).

After the 1976 outbreak of Legionella infections in Philadelphia (18), several outbreaks were identified, thanks to the recognition of unusual clustering, including an outbreak occurring on a passenger cruise ship (19).

In the outbreak of Hantavirus pulmonary syndrome in 1993 in the southwestern U.S. (20), a clustering of cases was observed by the Indian Health Service, and physicians were requested to report cases meeting the clinical case definition that was adopted.

In the large outbreak of *Escherichia coli* O157:H7 infections in the state of Washington, recognition by the hospitalization of multiple patients with hemolytic-uremic syndrome was crucial, and public health surveillance through state-mandated reporting of *E. coli* O157:H7 infection as was carried out in the state of Washington was critical for prompt outbreak recognition and control (21).

Hospital administrators should be aware of the need for establishing hospital surveillance aimed at early detection of cases and clusters of severe unexplained infections that might signal the emergence or re-emergence of public threat. Focus of this kind of surveillance is represented by transmissible diseases clustering and by novel or unusual illnesses, even as sporadic case. Unusual illness may (a) occur in patients presenting with signs or symptoms that do not fit any recognizable clinical picture, (b) be of known etiology but not usually expected to occur in a specific geographical area or setting where it has been observed, (c) show unexpected behavior, e.g., failure to respond to standard therapy, or (d) be of unknown etiology.

An outbreak is said to occur where the number of cases observed is greater than the number expected over a given time period, and cases are linked by epidemiological or microbiological features.

Whenever hospital health professionals are involved with cases of an unusual illness, reporting to national authorities should follow local regulations. Certain prescribed diseases, including cholera and yellow fever, are subject to the International Health Regulations reporting guidelines. The local health authority forwards the initial report to the next superior jurisdiction.

A system that allows a wide and immediate dissemination of information and exchange of views on risk assessment and risk management is crucial for timely public health action. In this regard, an important lesson derived from the multicountry outbreak of SARS. The disease originated in November 2002 from Guandong province in China and emerged only after some months when the World Health Organization (WHO) launched an international alert in February 2003. Soon after the alert, as a direct result of globalization, several countries and regions notified of cases of SARS.

As of July 2003, when the WHO announced the containment of the epidemic, a total of 8,500 cases and 916 deaths had been reported; the major impact was sustained by southeast Asian countries and Canada. The severe consequences of the few months lost because of delayed notification have been stressed by the exceptional results obtained after the international community become aware of the SARS threat. Indeed, the prompt identification of a novel coronavirus as the etiologic agent of SARS and the implementation of hospital-based, national and international control measures demonstrated the power of coordinated integration of efforts and capabilities and of shared information.

As the first epidemic ended, scattered new cases have been promptly reported, and a surveillance system proposed to promptly highlight a possible re-emergence of the disease (22–25).

In the last years a great opportunity derived from the exploitation of the speed and ubiquity of the Internet to serve as an early warning system for the detection of emerging disease outbreaks. Several web sites are available to help health professionals and consumers find current, accurate information on the topic and should be consulted daily by dedicated hospital personnel (26–28). In fact, the World