Editorial

Nosocomial Infections Surveillance

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Nosocomial infections are a major worldwide public health problem. In some countries the true magnitude of the problem may not be recognized. Nevertheless, when susceptible hospitalized individuals have contact with microbes, some will develop infections. It may be difficult for a country's health authorities to be sensitive to this situation due to the enormity of other health and social problems. But there is increasing recognition of the impact nosocomial infections have on the healthcare system, and there is increasing interest in initiating institutional infection control programs.

Healthcare professionals are dedicated to do the patients no harm and, in this instance, to reduce the occurrence of nosocomial infections to the lowest possible level. Initial attempts at control and prevention included the incorporation of generic measures into patient care routines with varying degrees of success. However, the increasing demands on the scarce healthcare resources available made it necessary to be more efficient and direct in control and prevention actions. In order to improve our efforts, we recognized the usefulness and necessity to incorporate disease surveillance into our routine patient care activities. The importance of surveillance in reducing the incidence of nosocomial infections is well documented in the literature.[1-3] The Institute of Medicine, in a recent report,[4] called for increasing the collection of nosocomial infection surveillance data in order to increase our knowledge of nosocomial infections. In our initial surveillance enthusiasm, we incorporated comprehensive or total surveillance throughout the hospital. However, the realities of life came dramatically (and at times traumatically) into the picture and the "bandwagon" of surveillance was appropriately challenged.[5]

Surveillance may be defined as the continued collection of data appropriate to defining the problem, collation and analysis of these data, and preparation and distribution of a summary report to those with an interest in and/or a need to be informed about the problem. A logical endpoint to surveillance is formulating control and prevention measures from interpretation of the analyzed data. Without a specific action, surveillance is purely archival; that is, the data increases use of shelf space, but does not decrease the occurrence of disease.[6]

The surveillance activity must be a dynamic, flexible, sensitive, specific, timely, representative, and cost-effective program. It must provide the necessary data for purposes of control and prevention, but not at the cost of total immersion of the infection control personnel so they cannot participate in other important and related activities, such as education, investigations, consultations, guideline development, and research. The level of surveillance maintained should be determined by the magnitude of the problem, the availability of resources, the level of staff concern, and the type of data anticipated to be necessary in order to develop an effective infection control program. Modifications of comprehensive hospital surveillance have been developed and include selective surveillance, sentinel surveillance, high-risk-area surveillance, spot surveillance, unit directional surveillance, rotating

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Brachman PS. Nosocomial infections surveillance. Infect Control Hosp Epidemiol. *1993;14:194-196.*

surveillance, and priority-directed surveillance.[7] The Centers for Disease Control and Prevention (CDC) through the National Nosocomial Infection Surveillance System (NNIS) has developed another method of maintaining surveillance of nosocomial infections.* Hospitals participating in this voluntary program incorporate one of four surveillance components into their hospital surveillance activity. These components are hospitalwide, adult and pediatric intensive care units, high-risk nursery, and surgical patient surveillance.

Surveillance data have multiple uses. The prime use is for the control and prevention of hospital-acquired infections among patients, hospital personnel, and visitors. These data may also be used for resource allocation, accreditation, medical-legal reasons, research, intra- and interhospital comparisons, and to evaluate the effectiveness of control procedures.

Initially, nosocomial infection problems were recognized within developed countries, and procedures for control and prevention were developed, tested, and promoted. Less developed countries have more recently begun to appreciate the problem and to dedicate resources to their control and prevention. They frequently wish to emulate the actions of more developed countries without going through the prerequisite developmental stages. They note the type of programs in other countries and proceed to initiate a program, at times without adequate planning. Lima et al, in their article in this issue,[9] state that "in 1983, the Brazilian Ministry of Health decreed that every hospital must have a committee for nosocomial infection control, but relatively few hospitals have invested in a program for the prevention and control of nosocomial infections." In other countries, similar governmental pronouncements have been made without guidelines regarding the function, composition, and responsibilities of such a committee, and how it is to accomplish its objectives. It is difficult for a hospital to be responsive to this type of "decree" without more guidance.

A valuable method to assist a country or a hospital in defining the nature of the nosocomial infection problem is a prevalence study or studies. The World Health Organization has developed a protocol[10-11] to assist hospitals in conducting such studies and emphasizes that a prevalence study is not a substitute for surveillance, but can provide data to help identify the nature of the problem and how to initiate the next level of necessary action.

The CDC has provided significant leadership concerning the control and prevention of nosocomial infections. The Hospital Infections Program at the CDC has for years played an evolutionary role in working with groups, institutions, and individuals to develop the most appropriate technology to apply to the problem of nosocomial infections. In the 1970s, they conducted the Study of the Efficacy of Nosocomial Infections Control (SENIC)[12] in order to determine the effectiveness of nosocomial infection surveillance and control programs in the United States. The results of this study clearly indicated the importance of surveillance in reducing the incidence of at least the four most prevalent nosocomial infections (surgical wounds, urinary tract infections, primary bloodstream infections, and lower respiratory tract infections). The NNIS program[8] has been instrumental in developing important data defining the problems that have lead to the development of guidelines and educational programs.

Surveillance must be developed as part of an overall hospital infection control program.[13] The program must be supported by the hospital's administration and accepted by the staff. An infection control committee, representative of the hospital's staff, has to be functional, with a clear mandate including goals and objectives. The full-time infection control staff should consist of one infection control practitioner for each 250 patients (some feel this ratio is too small), access to a hospital epidemiologist, and clerical and laboratory support. The committee has to have authority to conduct surveillance and investigations and the ability to implement appropriate control and prevention measures.

Lima et al[9] mention the potential difficulties in implementing control measures that could lead to financial savings for the hospital. Correcting the problems mentioned (unstructured and overcrowded wards, inadequate water supplies, and scarce resources) are complex and difficult. However, the development of a continuing education program directed at the hospital's healthcare workers and emphasizing proper hygienic techniques may have an immediate and long-lasting impact on the nosocomial infection problem, despite scarce resources.

Lima's article[9] is important in that it reports on a method of conducting surveillance for nosocomial infections in a medium-sized, crowded, city, teaching hospital that has hygienic deficiencies and limited resources. These circumstances are not unique to this community; they are the norm in many hospitals throughout the world. The surveillance methodology that they tested, "selective surveillance," represents an attempt to perform this critically important activity under difficult circumstances with limited resources. They "trained" one full-time and one half-time nurse "regarding the epidemiology, surveillance, and control of nosocomial infections during a two-week period." Lacking from their

discussion is how these two persons were trained, information that will be of interest to other institutions with similar problems. They used the CDC definitions of infections,[14] which I assume was appropriate for their hospital, but which may have to be modified for use in other hospitals. The patients under surveillance were those who had a specific risk factor identified by "resident physicians." Considering the multiple pressures on these resident physicians, working in this busy, crowded, undersupplied hospital, how timely, faithfully, and accurately did they fill out the risk-factor forms?

The authors not only calculated rates per 100 discharges, but incorporated "incidence density" as defined by the number of infections per 1,000 patient care days. This latter calculation gives a more accurate reflection of the true risk because it quantifies risk by length of time of actual exposure. There are other values that could also be derived, such as specific procedures risk rates[8,15] that may provide more meaningful information than the hospital's overall nosocomial incidence rate. The use of computers in the data processing system increases the opportunities for more in-depth analysis of surveillance data.[16]

An important and integral part of any surveillance system is the preparation and distribution of an interpretive report. This was part of their program, including reporting to the hospital administration who must be kept in the information loop. Their support is critically important to the surveillance and control program.

Evaluation of a surveillance system is an important element of a surveillance activity. Not only does evaluation provide data that allow the determination of sensitivity, specificity, and predictive values, but it should also include a determination as to whether the goals and objectives of the surveillance system are being accomplished.[17] Lima et al did conduct evaluation studies and provided information concerning the sensitivity, specificity, and predictive values. They also evaluated the accuracy of filling out the risk-factor indicator forms and determined that during the month following this study, 11% of the patients surveyed had a risk factor but the form was not filled out on them.

The authors compare spontaneous or passive surveillance (pre-1988) with their active surveillance method and noted (using intensive care unit data) that approximately 100% more infections were reported during active surveillance (11.6/100 patients versus 24.8/100 patients). This is not unexpected and demonstrates the increased sensitivity of an active surveillance program as compared to a passive system. A problem that many surveillance programs have is the difficulty in assessing the nosocomial infection rate among patients after discharge from the hospital. This becomes more of a problem as the length of hospitalization is shortened.

Nosocomial infections will continue to occur even in a hospital with the most rigorous control program in place. Surveillance remains the major activity necessary to monitor the control program and especially to identify changes in risk factors that may result in an increase in the incidence of infections. As the SENIC study demonstrated, surveillance is key to an effective control program. Lima's report demonstrates how a useful surveillance activity can be developed despite resource problems and a "risky environment."

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