Nosocomial infections: Importance of surveillance for hospital acquired infections in India: A review of methodology

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Abstract
Nosocomial infections play a huge role in increasing the mortality and morbidity rates of Indian statistics. In the present day global standards, the prevalence of nosocomial infections in India is highly un-acceptable. There is a need for a streamlined strategy and protocol to tackle this issue. Every medical set up in our country needs to follow a fixed protocol for surveillance of hospital acquired infections and this will in turn prevent infections and also generate data which will help us improve our infection control rates as per global standards.

Keywords: Nosocomial infections, strategy, protocol

Introduction

Surveillance of Hospital Acquired Infections (HAIs) is the most important element of a successful Infection Control Programme. The rates of HAIs measure the quality and safety of patient care at a particular hospital or facility. A surveillance system to identify problems and priorities and to evaluate the effectiveness of Infection Control Activities should be implemented.

Epidemiological surveillance is the 'ongoing systematic collection, analysis and interpretation of all aspects of occurrence and spread of a disease essential to the planning, implementation and evaluation of control measures, closely integrated with the timely dissemination of these data to those who need to know'.[1,2]

The ultimate aim of surveillance is the reduction of nosocomial infections and their costs.[3] The seminal SENIC (Study on the Efficacy of Nosocomial Infection Control) project, conducted in the United States, indicated that a highly efficient surveillance and Infection Control System reduced the infection rates by almost one-third.[4]

Advantages of Hospital Infection Surveillance System:
1. The outcome of an infection control programme carried out in the hospital can be evaluated.
2. The effectiveness of a particular infection control procedure or routine can be measured.
3. The size of the problem to be tackled can be known.
4. The size of the at-risk groups or patients and their demographic characteristics can be known and preventive measures to be taken can be planned out accordingly.

5. Data on the at-risk group population, pathogens encountered in a particular hospital environment and their antibiotic drug susceptibility can be collected and develop strategies to control and prevent nosocomial infections accordingly.
6. The disease trends can be monitored and an impending outbreak in an hospital can be prevented or controlled.
7. The incidence, prevalence and at-risk specific rates can be calculated and can be used for intra and inter hospital comparisons.

Methods of Surveillance
A Surveillance system can perform best when there is a systematic planning, data collection, data analysis, data interpretation, communication of data and finally periodical evaluation of the surveillance system itself.
Trained investigators and standardized definitions are essential part of a surveillance system.
Planning and Formulation of Protocols[5,6]
An initial assessment is to be carried out for choosing the infections to be surveyed. This includes:
1. A defined population or patients of the health care setting that is monitored for the purpose of surveillance.
2. The type of infections and their frequency in that particular hospital.
3. The frequency and duration of monitoring.
4. Methods for data collection, data analysis, feedback and dissemination.

Methods:
1. Microbiological reports are most common source of surveillance information in hospitalized patients.
2. Other common methods involve daily scrutiny of laboratory reports and analysis of micro organisms potentially associated with HAI and other information such as their antibiotic resistance pattern .The advantages with this method are simplicity, time efficiency, rapid identification of targeted pathogen and resistance profile, sensitivity for blood stream infections or UTIs and early detection of outbreaks. The disadvantages include low sensitivity for non culturable microorganisms like viruses and incidence of HAI cannot be calculated because not all infections are sampled.
3. Laboratory records and Clinical assessment play an important role in improving the data quality.The Infection Control Nurse(ICN) along with the infection control staff, the laboratory personnel and the clinicians should collaborate to facilitate an exchange of information and for better diagnosis of HAI.
4. A laboratory based liaison should be appointed who involves primarily the ICN (Infection Control Nurse) who follows up the laboratory confirmed infected patient. The ICN also visits the high-risk wards to review patients who are considered infected but whose samples are not sent to the laboratory.
5. Infection Prevalence studies carried out by investigators at a specific point of time(point prevalence study) or over a defined period of time(period prevalence study)in hospitalized patients. Review of medical and nursing charts, clinical history, risk factors, microbiological profile, antibiotic resistance pattern is done. These studies are useful before initiating surveillance to help prioritise accordingly the at-risk patients, infections.
6. Incidence study or prospective identification of new infections (incidence surveillance) is done by monitoring patients over a period of time in a defined population or after their discharge in case of surgical site infections. Incidence surveillance helps to calculate attack rates, incidence rates and infection ratio.
7. Targeted Surveillance include site-specific surveillance for certain infections that are high in priority, area specific surveillance such as ICUs, and priority-oriented surveillance in a specific facility.

Data Collection and Analysis

Data collection requires information from multiple sources. Trained investigators perform the data collection.

Analysis of data includes population description, risk exposure and infection frequency, calculation of rates, comparison of patient groups (with significance testing), comparison of rates over time, comparison between units and hospitals.

Computerization of data collection and analysis ensures better data quality and rapid feedback. It also ensures in detection of 'alert'organisms, specific infections, changes in infection rates over time and changes in resistant patterns.

Calculaton of rates is carried out by dividing a numerator(number of infections or infected patients)by a denominator(at-risk population or number of patient-days of risk).Prevalence and incidence indicators estimate the frequency of infection. The infection rates are communicated to the Infection Control Team(ICT) on a regular basis.

Feedback/Dissemination:

Feedback information to the clinicians and hospital staff has an important influence in sustaining Infection Control Activities. The feedback should be prompt, relevant and should aim for maximum impact on infection prevention.

Evaluation of Surveillance System

Validation of surveillance methods and data should be undertaken at regular intervals and determine if initial objectives are attained. A good surveillance system should be simple, flexible, acceptable, consistent, sensitive, specific and at reasonable cost.

Surveillance of Infection in Staff:

Surveillance in HCW is especially needed for blood-borne pathogens, enteric infections, MRSA and tuberculosis.

Environmental and Equipment Surveillance:

Routine bacteriological sampling of floors, walls, sufaces and air is rarely indicated unless there is an outbreak of infection.

Routine monitoring of sterilization and some disinfection processes is often necessary. Sampling of treated equipment or fluids is less value than process control. After chemical disinfection of certain specialized equipment (e.g., respiratory ventilators), it may be advisable to confirm by bacteriological sampling that no pathogens are detected.

A recent advancement in HAI surveillance is the use of molecular methods to identify and type organisms, hence identifying the clonal nature of apparent outbreaks.

The Centers for Disease Control and Prevention(CDC) has recently initiated 'e-surveillance' which records information about HAIs and multiresistant microbes in the form of coded information, which can be translated into meaningful data. This has facilitated nationwide comparison of rates and trends in nosocomial infections and antimicrobial resistance.[7]

Conclusion

Surveillance for hospital acquired infections should be made mandatory in all medical set-up's across our country. This will be immensely helpful to raise our medical standards to new heights. There is a need to create urgent protocols to be followed across all hospitals. A multi-specialty team should be created to monitor and maintain data for creating national and local institutional protocols.

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