



INTERNATIONAL
SOCIETY
FOR INFECTIOUS
DISEASES

GUIDE TO INFECTION CONTROL IN THE HOSPITAL

CHAPTER 13

Organizing and Recording Problems Including Epidemics

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KEY ISSUE

Surveillance is the foundation for organizing and maintaining an infection control program; the program must include personnel with exclusive dedication.

KNOWN FACTS

- Passive surveillance is not recommended; surveillance must be active and continuous. The extent (focal or hospital-wide surveillance) depends on hospital needs and resources.
- Reviewing patient records, interviewing nurses and physicians, and reviewing microbiology results give the infection control team an accurate view of the frequency and type of infections associated with healthcare. Surveillance also monitors the compliance with precautions and components of prevention bundles, such as hand hygiene, proper use of antiseptics, proper insertion and opportune withdrawal of devices, bed inclination, or detection of drug resistant organisms and *Clostridium difficile*.
- Definitions must be simple and meet hospital purposes. Hospitals without microbiology support can develop definitions based on clinical data. The Pan American Health Organization (PAHO) has published a booklet with clinical definitions. The definitions proposed by Wenzel may be useful for hospitals with limited resources.
- Hospitals without microbiology laboratory must make every effort to have one to perform, at least, critical cultures such as blood cultures.
- Reporting regularly surveillance results is an essential element for an effective infection control program.
- For benchmarking against systems such as the National Healthcare Safety Network (NHSN), the numerators of the rates focus usually on major device-associated infections (central line-associated blood stream infection, ventilator-associated pneumonia, and catheter-associated

urinary tract infection) and those associated with procedures (wound infection and postoperative pneumonia). Proper denominators are 1000 days of device use or 100 procedures. Denominators constituted by the numbers of discharged patients are inadequate to compare between institutions. Other surveillance reports can be the rate of hand hygiene compliance, the proportions of resistant bacteria, or the *C. difficile*-associated diarrhea. The recent use of molecular tests has made it possible to detect and follow respiratory viruses.

- There being no other way to detect an epidemic in the earliest stage, frequently visiting the clinical units and laboratory allows for the early detection of outbreaks.
- The frequency of hospital epidemics in developing countries is higher than the one reported in industrialized countries. This problem can be particularly severe in intensive care units because,
 1. The functioning of these units includes multiple invasive devices used without organized procedures and policies to prevent infectious complications;
 2. The improper re-use of disposable devices such as catheters, hemodialysis filters, and even needles, a practice attributed to financial limitations; and
 3. The lack of personnel with specific training in prevention and critical care.
- In developing countries, neonatal intensive care units have the highest risk for epidemics, most commonly caused by bloodstream infections due to contamination of intravascular lines or infusates (IV fluids). These risks occur due to poor standards of care, such as inappropriate handling and storage of vials used to draw for small doses of medications, use of glucose infusions that remain open in use during hours, and lack of hand hygiene in overcrowded units with a shortage of personnel. Instead of following infection control recommendations, a common practice when confronting an epidemic is to close the unit and fumigate the area; such an approach is costly and inefficient.

- The organization of an infection control program in a hospital requires determination and good relations with the clinical staff. Because cutting costs is a constant goal for most hospitals, explaining the benefits of infection control procedures will help gain support for the program. It is worthwhile to calculate the savings and the implicit improvements in quality of care derived from the program. The authorities must know that the program is solving problems instead of creating them.

Controversial Issues

Definitions of healthcare-associated infections may be controversial. Definitions must be understood as tools for surveillance and will not always concur with the clinician's view. For example, a patient with fever for a few hours and positive blood and catheter tip cultures for *Staphylococcus epidermidis* should be recorded as an infection associated with healthcare even if the clinician does not prescribe specific treatment and the fever disappears by withdrawing the line. On the other hand, clinicians tend to diagnose pneumonia more liberally than infection control personnel. Surveillance of the compliance with contact precautions is difficult and probably not effective; surveillance of inserting catheters in an aseptic fashion or daily patient decolonization are likely of higher value than that of donning gloves and gowns for hundreds of patient encounters.

General Recommendations for Surveillance

- Surveillance must be active and based on practical definitions and preventive evidence-based bundles.
- Surveillance must be continuous in wards and in the microbiology laboratory.

- For every instance of suspected hospital infection forms should be filled out recording diagnosis, age, ward, dates of admission and discharge, outcome, type of infection, and etiologic agent.
- Monthly results of surveillance should be reported to the clinical services in a simple format and the results presented at the infection control meeting. Decisions to improve infection control need to be discussed and implemented. For benchmarking, denominators must be constituted by 1000 days of device use or 100 procedures.

General Recommendations in Epidemics

- An epidemic is an infection control emergency; measures should be taken as soon as an epidemic is suspected.
- The first step in controlling an epidemic is to reinforce and monitor general recommendations of infection control in the ward where the cases are occurring. A case definition is made (e.g., *Enterobacter cloacae* bacteremia in neonates in the neonatal intensive care unit) and then current case rates are compared against previous rates (pre-epidemic period).
- After reviewing cases, additional recommendations should be given to the staff in order to prevent new cases. From evidence, sound hypothesis must be established to avoid wrong conclusions and unnecessary closure of medical wards. *Table 13.1* shows some examples of these hypotheses.
- Maintain frequent communication with the clinical staff in the unit or ward involved and give them all relevant information from your analysis.

Table 13.1 Evidence-Based Working Hypothesis to Study and Control Common Hospital Outbreaks

<i>Outbreak</i>	<i>Working hypothesis</i>
<i>Gram-negative bacteremia in neonates</i>	Contaminated intravenous lines infusates
<i>Candidemia</i>	Contaminated parenteral nutrition solutions
<i>Ventilator-associated pneumonia</i>	Contaminated respiratory equipment
<i>Streptococcal surgical site infection</i>	Healthcare worker carrier of group A streptococcus
<i>Tuberculosis</i>	Exposure to TB patient without effective respiratory protection
Diarrhea in children <i>without effective precautions</i>	Exposure to rotavirus (or other viruses)
<i>Clostridium difficile diarrhea</i>	Prolonged use of antibiotics and absence of adequate source control
<i>Multidrug-resistant Gram-negative infection</i>	Antibiotics used without supervision

SUMMARY

- Organizing and recording infectious problems, including epidemics, are the foundation for infection control. By reducing infections associated with healthcare, surveillance is an integral part of the program for continuous quality improvement. Hospital-wide surveillance is needed to start a program of infection control and to identify the highest-risk areas, although there is a trend to focus surveillance in high-risk areas, specifically intensive care units, because of the efficiency for detecting the most severe infections and outbreaks. Current programs are oriented not only to record infections (the usual result of a bad process) but also to ensure the use of “bundles” of evidence-based actions to avoid central line and infusate (IV fluids)-associated bloodstream infections, surgical-site infections, ventilator associated pneumonias, catheter-associated urinary tract infections, drug-resistant organisms, and *Clostridium difficile* diarrheas. Molecular techniques have allowed the recent surveillance of respiratory viruses.
- Control of epidemics requires a reinforcement of general measures of infection control. The infection control team should talk to the personnel on the wards, emphasizing and monitoring hand hygiene, isolation practices, and stringent adherence to procedural recommendations and to the components of evidence-based preventive bundles. Depending on the characteristics of the outbreak, specific recommendations must be given according to working hypothesis.

REFERENCES

1. Dudeck MA, Weiner LM, Allen-Bridson K, et al. National Healthcare Safety Network (NHSN) Report, Data Summary for 2012, Device-Associated Module. *Am J Infect Control*. 2013; 41(12):1148–6. doi: 10.1016/j.ajic.2013.09.002.

2. Gastmeier P, Stamm-Balderjahn S, Hansen S, et al. How Outbreaks Can Contribute to Prevention of Nosocomial Infection: Analysis of 1,022 Outbreaks. *Infect Control Hosp Epidemiol* 2005 ;26(4):357–61.
3. Hong KB, Oh HS, Song JS, et al. Investigation and Control of an Outbreak of Imipenem-Resistant *Acinetobacter baumannii* Infection in a Pediatric Intensive Care Unit *Pediatr Infect Dis J*. 2012; 31(7):685–90. doi: 10.1097/INF.0b013e318256f3e6.
4. Kaier K, Wilson C, Hulscher M, et al. Implementing Strategic Bundles for Infection Prevention and Management. *Infection*. 2012; 40(2):225–8. doi: 10.1007/s15010-011-0186-5.
5. Macías AE, Muñoz JM, Galván A, et al. Nosocomial Bacteremia in Neonates Related to Poor Standards of Care. *Ped Infect Dis J* 2005; 24(8):713–16.
6. Morgan DJ, Wenzel RP, Bearman G. Contact Precautions for Endemic MRSA and VRE. Time to Retire Legal Mandates. *JAMA* 2017; 318(4):329-330. doi: 10.1001/jama.2017.7419.
7. Ostrosky-Zeichner L, Báez Martínez R, Rangel-Frausto S, et al. Epidemiology of Nosocomial Outbreaks: 14-Year Experience at a Tertiary Care Center. *Infect Control Hosp Epidemiol* 2000; 21(8):527–9.
8. Ponce de León Rosales S, Macías AE. Global Perspectives of Infection Control. In: *Prevention and Control of Nosocomial Infections (4th Edition)*, RP Wenzel (Ed). Baltimore: Lippincott Williams & Wilkins, 2003; 14–32.
9. Uppal S, Bazzi A, Reynolds RK, et al. Chlorhexidine-Alcohol Compared with Povidone-Iodine for Preoperative Topical Antisepsis for Abdominal Hysterectomy. *Obstet Gynecol* 2017; 130(2):319–327. doi: 10.1097/AOG.0000000000002130.
10. Wenzel RP. Management Principles and the Infection Control Committee. In: *Prevention and Control of Nosocomial Infections (2nd Edition)*, RP Wenzel (Ed). Baltimore: Williams & Wilkins, 1993; 207–13.

11. Wenzel RP, Thompson RL, Landry SM, et al. Hospital-Acquired Infections in Intensive Care Patients: An Overview with Emphasis on Epidemics. *Infect Control* 1983; 4(5):371–5.
12. Zaidi M, Sifuentes J, Bobadilla M, et al. Epidemic of *Serratia marcescens* Bacteremia and Meningitis in a Neonatal Unit in Mexico City. *Infect Control Hosp Epidemiol* 1989; 10(1):14–20.