Healthcare-associated infections (HAIs) are infections that patients acquire during the course of receiving treatment for other conditions. The Centers for Disease Control and Prevention (CDC) estimates that in hospitals alone HAIs account for approximately 2 million infections and 90,000 deaths annually [1]. Studies have shown that HAIs are associated with at least $4.5 billion dollars in excess healthcare costs annually [1, 2].

HAIs typically affect patients who receive medical or surgical treatments or have reduced host defenses because of age, underlying diseases, or other conditions. For many years, the highest rates of infections were observed in intensive care units (ICUs) [1, 3]. However, surveys conducted by CDC in academic centers have shown that procedures that pose a risk to infections are also frequent outside ICUs. For example, a study to determine the prevalence of central venous catheter (CVC) use in six medical centers revealed that 7–39% (mean 24%) of non-ICU patients had CVCs [4].

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The frequency of HAI varies by body site. In the United States from 1990 to 2004, the most frequent HAIs reported to the National Nosocomial Infections Surveillance system overall were urinary tract infections (34%), followed by surgical site infections (17%), bloodstream infections (14%), and pneumonia (13%) [5].

In the past decade, the delivery of care in the United States has shifted from the acute, inpatient hospital to a variety of settings such as outpatient, long-term care, and home health settings [6]. Because of this shift, guidelines for surveillance and prevention of infections developed for hospitals need to be revised and tailored appropriately for these new settings. Recent HAI outbreaks in outpatient settings investigated by CDC highlight a lack of basic infection control in these settings; unsafe injection practices, reuse of syringes and needles, and contamination of multiple-dose medication vials were associated with transmission of infections [7].

CDC’s role in infection control

CDC is an agency within the Department of Health and Human Services in the United States Government. In general, the authority for regulation and oversight of public health and healthcare in the United States rests with the individual states; however, CDC provides a national focus for disease prevention and control, environmental health, and health promotion and education activities.

The mission of CDC is to promote health and quality of life by preventing and controlling disease, injury, and disability. Ensuring patient and healthcare worker safety is a major part of this mission.

To protect patients, protect healthcare personnel, and promote safety, quality, and value in the healthcare delivery system, CDC provides national leadership for the following areas: surveillance and healthcare outcomes, outbreaks in healthcare settings, emerging infections, antimicrobial resistance, clinical microbiology, laboratory quality, water quality in healthcare settings, and effectiveness of prevention interventions. CDC is also involved in the preparedness and response of healthcare settings to emerging infections and bioterrorism events. This effort involves recommendations to protect patients, healthcare personnel, and visitors and the healthcare environment (e.g., surfaces and water).

A federal advisory board of 14 external infection control experts, the Healthcare Infection Control Practices Advisory Committee (HICPAC), provides advice and guidance to CDC and the Secretary of the Department of Health and Human Services regarding the practice of healthcare infection control and strategies for surveillance and prevention and control of HAIs in United States healthcare facilities. One of the primary functions of the committee is to issue guidelines and recommendations for preventing and controlling HAIs.

Surveillance of HAIs

The National Nosocomial Infections Surveillance (NNIS) system was developed by CDC in the early 1970s to monitor the incidence of HAIs and their associated risk factors and pathogens. The only national
system for tracking HAIs, NNIS is a cooperative, nonfinancial relationship between hospitals and CDC. This voluntary reporting system has grown from about 60 hospitals at inception to approximately 300 today. Initially, NNIS conducted hospital-wide surveillance for HAIs. However, in 1986, NNIS surveillance shifted to four patient care areas with the highest infection rates and the collection of data that allowed risk adjustment and comparison of rates across hospitals [8]. The four areas of NNIS were adult and pediatric ICU, high-risk nursery, surgical patient, and antimicrobial use and resistance [3]. NNIS standardized HAI definitions, the collection of risk factors for surgical site infections (SSI), and the use of denominators such as days of device utilization to enable comparisons across institutions [3].

Hospital participation in NNIS was restricted due to limitations in resources for support and an emphasis on larger hospitals; however, in 2005, NNIS is integrating with two other CDC networks (dialysis and healthcare worker surveillance) into the National Healthcare Safety Network (NHSN) [9, 10]. NHSN is a web-based system that will allow broader participation of hospitals and other healthcare facilities over time and improve the utility of surveillance for prevention and quality improvement. NHSN can support HAI prevention efforts through the collection of process measures as performance indicators (e.g., the use of sterile barrier precautions during catheter insertion).

The value of using electronic databases to monitor HAIs has been demonstrated [10, 11]. In a study conducted to compare computer algorithms to traditional surveillance, rates of bloodstream infections were obtained using pharmacy and laboratory data stored in an electronic database. Such rates were comparable to rates obtained by infection control practitioners [10].

Public reporting of HAIs in the United States

An increasing public awareness of the serious problem of HAIs has led to a call for public disclosure of healthcare infection rates in the United States. Since 2002, seven states (Illinois, Pennsylvania, Missouri, Nevada, New York, Virginia, and Florida) have enacted legislation mandating hospitals and other healthcare organizations to publicly disclose HAI rates. Similar legislative efforts are underway in several other states. Advocates of mandatory public reporting of HAIs believe that making such information publicly available will enable consumers to make more informed choices about their healthcare and improve overall healthcare quality by reducing HAIs. However, others have expressed concern that the reliability of public reporting systems may be compromised by institutional variability in the definitions used for HAIs or in the methods and resources used to identify HAIs.

There is insufficient evidence at this time to recommend for or against public reporting of HAIs

HICPAC conducted a scientific literature review to evaluate the merits and limitations of HAI reporting systems. No published information on the effectiveness of public reporting systems in reducing HAIs was found, and HICPAC concluded that there is insufficient evidence at this time to recommend for or against public reporting of HAIs. However, HICPAC provided recommendations, based on established principles for public health and HAI reporting systems, to assist policymakers, program planners, consumer advocacy organizations, and others tasked with designing and implementing public reporting systems for HAIs [12].

HICPAC recommends that persons who design and implement such systems (1) use established public health surveillance methods when designing and implementing mandatory HAI reporting systems; (2) create multidisciplinary advisory panels, including persons with expertise in the prevention and control of HAIs, to monitor the planning and oversight of HAI public reporting systems; (3) choose appropriate process and outcome measures based on facility type and phase in measures to allow time for facilities to adapt and to permit ongoing evaluation of data validity; and (4) provide regular and confidential feedback of performance data to healthcare providers. HICPAC will update these recommendations as more research and experience become available.

Monitoring both process and outcome measures and assessing their correlation is a comprehensive approach to quality improvement. Standardized process and outcome measures for national healthcare performance for hospitals, nursing homes, and other settings have been endorsed by several agencies and organizations, including CDC, other United States federal agencies, such as the Center for Medicare and Medicaid Services and the Agency for Healthcare Quality and Research, and other organizations such as the Joint Commission for Accreditation of Healthcare Organizations.

Outbreaks

CDC is responsible for providing epidemiologic and laboratory assistance when investigating outbreaks that occur with products, devices, or practices in hospitals and other healthcare settings. Healthcare epidemiologists, infection control experts, and other professionals in healthcare settings can contact CDC for assistance in an outbreak investigation. In most cases, assistance is provided by phone. However, medical epidemiologists from CDC may also conduct on-site investigations in collaboration with local and state health departments.

Recent outbreak investigations have resulted in recall of several contaminated products, such as heparin flushes, powdered infant formula, and allograft tissue. In order to alert healthcare and public health professionals and assess the scope of the problem, information about outbreaks related to contaminated products is shared through alert notices via the Health Alert Network (HAN), a nationwide program to link local, state, and federal public health officials, or Epi-X, a CDC-sponsored, web-based communications system that enables CDC officials, state and local health departments, and other public health professionals to access and share preliminary health surveillance information quickly and securely.

Antimicrobial resistance

The frequency of HAIs associated with antimicrobial-resistant pathogens has increased substantially over the past deca-