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Keith S. Kaye and Sorabh Dhar

Strategies for Effective Infection Prevention Programs: Structures, Processes, and Funding  531
Sorabh Dhar, Avnish L. Sandhu, Amanda Valyko, Keith S. Kaye, and Laraine Washer

Successful Infection Prevention Programs (IPPs) consist of a multidisciplinary team led by a hospital epidemiologist and managed by infection preventionists. Knowledge of the economics of health care–associated infections (HAIs) and the ability to make a business plan is now essential to the success of programs. Prevention of HAIs is the core function of IPPs with impact on patient outcomes, quality of care, and cost savings for hospitals. This article discusses the structure and responsibilities of an IPP, the regulatory pressures and opportunities that these programs face, and how to build and manage a successful program.

Hand Hygiene, an Update  553
John M. Boyce

Hand hygiene by health care personnel is an important measure for preventing health care–associated infections, but adherence rates and technique remain suboptimal. Alcohol-based hand rubs are the preferred method of hand hygiene in most clinical scenarios, are more effective and better tolerated than handwashing, and their use has facilitated improved adherence rates. Obtaining accurate estimates of hand hygiene adherence rates using direct observations of personnel is challenging. Combining automated hand hygiene monitoring systems with direct observations is a promising strategy, and is likely to yield the best estimates of adherence. Greater attention to hand hygiene technique is needed.

Disinfection and Sterilization in Health Care Facilities: An Overview and Current Issues  575
William A. Rutala and David J. Weber

All invasive procedures involve contact by a medical device or surgical instrument with a patient’s sterile tissue or mucous membranes. The level of disinfection is dependent on the intended use of the object: critical, semicritical, or noncritical. New issues and practices can affect the risk of infection associated with devices and surfaces. Endoscopes continue to represent a nosocomial hazard. The contaminated surface environment in hospital rooms is important in the transmission of health care–associated pathogens. Thoroughness of cleaning must be monitored and no-touch room decontamination technology should be used. In
general, emerging pathogens are susceptible to currently available disinfectants.

Health Care Environmental Hygiene: New Insights and Centers for Disease Control and Prevention Guidance 609

Philip C. Carling

Recent research has significantly clarified the impact of optimizing patient-zone environmental hygiene. New insights into the environmental microbial epidemiology of many hospital-associated pathogens, especially Clostridioides difficile, have clarified and quantified the role of ongoing occult pathogen transmission from the near-patient environment. The recent development of safe, broadly effective surface chemical disinfectants has led to new opportunities to broadly enhance environmental hygiene in all health care settings. The Centers for Disease Control and Prevention has recently developed a detailed guidance to assist all health care settings in implementing optimized programs to mitigate health care-associated pathogen transmission from the near-patient surfaces.

Outbreaks in Health Care Settings 631

Geeta Sood and Trish M. Perl

Outbreaks and pseudo-outbreaks in health care settings are complex and should be evaluated systematically using epidemiologic and molecular tools. Outbreaks result from failures of infection prevention practices, inadequate staffing, and undertrained or overcommitted health care personnel. Contaminated hands, equipment, supplies, water, ventilation systems, and environment may also contribute. Neonatal intensive care, endoscopy, oncology, and transplant units are areas at particular risk. Procedures, such as bronchoscopy and endoscopy, are sources of infection when cleaning and disinfection processes are inadequate. New types of equipment can be introduced and lead to contamination or equipment and medications can be contaminated at the manufacturing source.

Water Safety and Health Care: Preventing Infections Caused by Opportunistic Premise Plumbing Pathogens 667

Shantini D. Gamage, Meredith Ambrose, Stephen M. Kralovic, and Gary A. Roselle

Health care facility water systems have been associated with the transmission of opportunistic premise plumbing pathogens such as Legionella and nontuberculous mycobacteria. These pathogens can enter a building’s water system in low numbers and then proliferate when conditions are conducive to their growth. Patients and residents in health care facilities are often at heightened risk for opportunistic infections, and cases and outbreaks in the literature highlight the importance of routine water management programs and occasions for intervention to prevent additional cases. A multidisciplinary proactive approach to water safety is critical for sustained prevention of health care–associated water-related infections.
Reimagining Construction and Renovation of Health Care Facilities During Emergence from a Pandemic 697
Russell N. Olmsted

The built environment has been integral to response to the global pandemic of severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). In particular, engineering controls to mitigate risk of exposure to SARS-CoV-2 and other newly emergent respiratory pathogens in the future will be important. Anticipating emergence from this pandemic, or at least adaptation given increasing administration of effective vaccines, and the safety of patients, personnel, and others in health care facilities remain the core goals. This article summarizes known risks and highlights prevention strategies for daily care as well as response to emergent infectious diseases and this parapandemic phase.

Occupational Health Update: Approach to Evaluation of Health Care Personnel and Preexposure Prophylaxis 717
Erica S. Shenoy and David J. Weber

An effective occupational health program is a key aspect of preventing exposure to infectious agents and subsequent infection, as well as evaluation and management of postexposure prophylaxis and infections in health care personnel (HCP) by educating HCP regarding proper handling of sharps, early identification and isolation of potentially infectious patients, implementation of standard and transmission-based precautions, and offering counseling of HCP regarding nonroutine prophylaxis. Occupational health services (OHS) must also apply standardized processes for determining when exposures have occurred and providing appropriate management, and provide immediate availability of a medical evaluation following a nonprotected exposure to an infectious disease.

Occupational Health Update: Evaluation and Management of Exposures and Postexposure Prophylaxis 735
Erica S. Shenoy and David J. Weber

Health care personnel (HCP) are at risk of exposure to infectious agents depending on their job duties and other factors. Risks include percutaneous exposure to blood-borne pathogens via sharp injuries (eg, human immunodeficiency virus, hepatitis B virus, hepatitis C virus); exposure by direct contact, droplet, or airborne transmission of pathogens through direct patient care (eg, pertussis, invasive meningococcus infections, tuberculosis); and through indirect contact transmission related to the contaminated health care environment (eg, Clostridioides difficile). Occupational health programs must effectively identify and respond to potential exposures and provide guidance to HCP on postexposure prophylaxis.

Computer Informatics for Infection Control 755
Michael Y. Lin and William E. Trick

Computer informatics have the potential to improve infection control outcomes in surveillance, prevention, and public health. Surveillance activities include surveillance of infections, device use, and facility/ward outbreak detection and investigation. Prevention activities include awareness of
multidrug-resistant organism carriage on admission, identification of high-risk individuals or populations, reducing device use, and antimicrobial stewardship. Enhanced communication with public health and other health care facilities across networks includes automated electronic communicable disease reporting, syndromic surveillance, and regional outbreak detection. Computerized public health networks may represent the next major evolution in infection control. This article reviews the use of informatics for infection control.

Antimicrobial Stewardship and the Infection Control Practitioner: A Natural Alliance
Shiwei Zhou, Jerod L. Nagel, Keith S. Kaye, Kerry L. LaPlante, Owen R. Albin, and Jason M. Pogue

Antibiotic overuse and misuse has contributed to rising rates of multidrug-resistant organisms and Clostridioides difficile. Decreasing antibiotic misuse has become a national public health priority. This review outlines the goals of antimicrobial stewardship, essential members of the program, implementation strategies, approaches to measuring the program's impact, and steps needed to build a program. Highlighted is the alliance between antimicrobial stewardship programs and infection prevention programs in their efforts to improve antibiotic use, improve diagnostic stewardship for C difficile and asymptomatic bacteriuria, and decrease health care–associated infections and the spread of multidrug-resistant organisms.

Behind Every Great Infection Prevention Program is a Great Microbiology Laboratory: Key Components and Strategies for an Effective Partnership
Paul Lephart, William LeBar, and Duane Newton

A great clinical microbiology laboratory supporting a great infection prevention program requires focusing on the following services: rapid and accurate identification of pathogens associated with health care–associated infections; asymptomatic surveillance for health care–acquired pathogens before infections arise; routine use of broad and flexible antimicrobial susceptibility testing to direct optimal therapy; implementation of epidemiologic tracking tools to identify outbreaks; development of clear result communication with interpretative comments for clinicians. These goals are best realized in a collaborative relationship with the infection prevention program so that both can benefit from the shared priorities of providing the best patient care.

Updates on Infection Control in Alternative Health Care Settings
Lisa Sturm, Michelle Flood, Ana Montoya, Lona Mody, and Marco Cassone

Patients increasingly receive care from a large spectrum of different settings, placing them at risk for exposure to pathogens by many different sources. Each health care environment has its own specific challenges, and thus infection control programs must be tailored to each specific setting. High-turnover outpatient settings may require additional considerations, such as establishing patient triage and follow-up protocols, and broadened cleaning and disinfection procedures. In nursing homes, infection control programs should focus on surveillance for infections and
antimicrobial resistance, outbreak investigation and control plan for epi-
demics, isolation precautions, hand hygiene, staff education, and
employee and resident health programs.

Health Care-Acquired Infections in Low- and Middle-Income Countries and the Role of Infection Prevention and Control 827
Gina Maki and Marcus Zervos

Health care–associated infections (HAIs) account for many morbidity and mortality worldwide, with disproportionate adverse effects in low- and middle-income countries (LMIC). Many factors contribute to the impact in LMIC, including lack of infrastructure, inconsistent surveillance, deficiency in trained personnel and infection control programs, and poverty-related factors. Therefore, optimal approaches must be tailored for LMIC and balance effectiveness and cost in the control of HAIs.