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Preface: Infection Prevention and Control in Healthcare, Part I: Facility Planning and Management xiii

Keith S. Kaye and Sorabh Dhar

Building a Successful Infection Prevention Program: Key Components, Processes, and Economics 567

Sorabh Dhar, Evelyn Cook, Mary Oden, and Keith S. Kaye

Infection control is the discipline responsible for preventing health care-associated infections (HAIs) and has grown from an anonymous field, to a highly visible, multidisciplinary field of incredible importance. There has been increasing focus on prevention rather than control of HAIs. Infection prevention programs (IPPs) have enormous scope that spans multiple disciplines. Infection control and the prevention and elimination of HAIs can no longer be compartmentalized. 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 591

Maureen K. Bolon

The medical field has long recognized the importance of hand hygiene in preventing health care-associated infections, yet studies indicate that this important task is performed only 40% of the time. Health care workers cite several barriers to optimal performance of hand hygiene, but the time required to perform this task is foremost among them. Introduction of alcohol-based hand rubs, bundled interventions, and incorporation of technologies designed to monitor and promote hand hygiene all represent promising advances in this field.

Disinfection and Sterilization in Health Care Facilities: An Overview and Current Issues 609

William A. Rutala and David J. Weber

When properly used, disinfection and sterilization can ensure the safe use of invasive and noninvasive medical devices. The method of disinfection and sterilization depends on the intended use of the medical device: critical items (contact sterile tissue) must be sterilized before use; semicritical items (contact mucous membranes or nonintact skin) must be high-level disinfected; and noncritical items (contact intact skin) should receive low-level disinfection. Cleaning should always precede high-level disinfection and sterilization. Current disinfection and sterilization guidelines must be strictly followed.

Optimizing Health Care Environmental Hygiene

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Philip C. Carling

This article presents a review and perspectives on aspects of optimizing health care environmental hygiene. The topics covered include the epidemiology of environmental surface contamination, a discussion of cleaning health care patient area surfaces, an overview of disinfecting health care surfaces, an overview of challenges in monitoring cleaning versus cleanliness, a description of an integrated approach to environmental hygiene and hand hygiene as interrelated disciplines, and an overview of the research opportunities and challenges related to health care environmental hygiene.

Outbreaks in Health Care Settings

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Geeta Sood and Trish M. Perl

Outbreaks and pseudo-outbreaks in health care settings can be complex and should be evaluated systematically using epidemiologic tools. Laboratory testing is an important part of an outbreak evaluation. Health care personnel, equipment, supplies, water, ventilation systems, and the hospital environment have been associated with health care outbreaks. Settings including the neonatal intensive care unit, endoscopy, oncology, and transplant units are areas that have specific issues which impact the approach to outbreak investigation and control. Certain organisms have a predilection for health care settings because of the illnesses of patients, the procedures performed, and the care provided.

Water Safety and *Legionella* in Health Care: Priorities, Policy, and Practice

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

Health care facility water distribution systems have been implicated in the transmission of pathogens such as *Legionella* and nontuberculous mycobacteria to building occupants. These pathogens are natural inhabitants of water at low numbers and can amplify in premise plumbing water, especially if conditions are conducive to their growth. Because patients and residents in health care facilities are often at heightened risk for opportunistic infections, a multidisciplinary proactive approach to water safety is important to balance the various water priorities in health care and prevent water-associated infections in building occupants.

Prevention by Design: Construction and Renovation of Health Care Facilities for Patient Safety and Infection Prevention

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Russell N. Olmsted

The built environment supports the safe care of patients in health care facilities. Infection preventionists and health care epidemiologists have expertise in prevention and control of health care-associated infections (HAIs) and assist with designing and constructing facilities to prevent HAIs. However, design elements are often missing from initial concepts. In addition, there is a large body of evidence that implicates construction and renovation as being associated with clusters of HAIs, many of which are life threatening for select patient populations. This article summarizes known risks and prevention strategies within a framework for patient safety.

Occupational Health Update: Focus on Preventing the Acquisition of Infections with Pre-exposure Prophylaxis and Postexposure Prophylaxis 729

David J. Weber and William A. Rutala

Health care personnel are commonly exposed to infectious agents via sharp injuries (eg, human immunodeficiency virus, hepatitis B virus, and hepatitis C virus), direct patient care (eg, pertussis and meningococcus), and the contaminated environment (eg, *Clostridium difficile*). An effective occupational program is a key aspect of preventing acquisition of an infection by offering the following: (1) education of health care personnel regarding proper handling of sharps, early identification and isolation of potentially infectious patients, and hand hygiene; (2) assuring immunity to vaccine-preventable diseases; and, (3) immediate availability of a medical evaluation after a nonprotected exposure to an infectious disease.

Informatics in Infection Control 759

Michael Y. Lin and William E. Trick

Informatics tools are becoming integral to routine infection control activities. Informatics has the potential to improve infection control outcomes in surveillance, prevention, and connections with public health. Surveillance activities include fully or semiautomated surveillance of infections, surveillance of device use, and hospital/ward outbreak investigation. Prevention activities include awareness of multidrug-resistant organism carriage on admission, enhanced interfacility communication, identifying inappropriate infection precautions, reducing device use, and antimicrobial stewardship. Public health activities include electronic communicable disease reporting, syndromic surveillance, and regional outbreak detection. The challenge for infection control personnel is in translating the knowledge gained from electronic surveillance systems into action.

Antimicrobial Stewardship for the Infection Control Practitioner 771

Jerod L. Nagel, Keith S. Kaye, Kerry L. LaPlante, and Jason M. Pogue

Antibiotic misuse is a serious patient safety concern and a national public health priority. Years of indiscriminant antibiotic use has promoted selection for antibiotic resistant bacteria and *Clostridium difficile*. This crisis has led to clinicians being faced with managing untreatable infections, often in the most vulnerable patient populations. This review summarizes the goals of antimicrobial stewardship programs, the essential members needed to initiate a program, various antimicrobial stewardship strategies, the role of the infection control practitioner in stewardship, barriers to its implementation and maintenance, approaches to measure the impact of a program, and the steps needed to initiate a program.

Infection Control in Alternative Health Care Settings: An Update 785

Elaine Flanagan, Marco Cassone, Ana Montoya, and Lona Mody

With changing health care delivery, patients receive care at various settings including acute care hospitals, nursing homes, outpatient primary care and specialty clinics, and at home, exposing them to pathogens in various settings. Various health care settings face unique challenges, requiring individualized infection control programs. Infection control programs in nursing

homes should address surveillance for infections and antimicrobial resistance, outbreak investigation and control plan for epidemics, isolation precautions, hand hygiene, staff education, and employee and resident health programs.

Preventing Hospital-acquired Infections in Low-income and Middle-income Countries: Impact, Gaps, and Opportunities

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Ana Cecilia Bardossy, John Zervos, and Marcus Zervos

In low-income and middle-income countries (LMIC) health care-associated infections (HAIs) are a serious concern. 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. In LMIC the risk of HAIs may be up to 25% of hospitalized patients. Building infection control capacity in LMIC is possible where strategies are tailored to the specific needs of LMIC. Strategies must start with simple, cost-effective measures then expand to include more complicated measures. Goals for short-term, medium-term, and long-term actions should be planned and resources prioritized.

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