

mation on public health issues (bioterrorism, long-term care, cost, and cost-benefit assessment) and infection control in facilities that have fewer resources. Many of the 57 authors are from countries other than the United States and Canada, so the perspective is broad. The intended readers are well-educated professionals in infection control who are quite fluent in technical English. The text covers important clinical issues adequately and shines when presenting technical subjects and management of infection control programs. Some chapters would be more interesting than others to readers of *RESPIRATORY CARE*, such as the chapters on nosocomial pneumonia, occupational exposure to blood-borne pathogens, prion diseases, and issues about reprocessing equipment and instruments.

The book has several strengths: it is meticulously referenced and indexed, many of the chapters are by several very experienced authors (rather than one), and the material is well organized. Readers who want to know what data support the authors' recommendations will be very pleased with the quality of research cited. That said, there are many unanswered research questions. In the 13-page chapter entitled "Nosocomial Pneumonia", 202 references are cited, and still nearly a page of text is filled with controversial issues that are as yet insufficiently investigated. For example, how is the cost/benefit for invasive pulmonary diagnostic tests calculated? Should tap water or sterile water be used to rinse reusable, semicritical, disinfected respiratory devices? Should we rinse small nebulizers used on the same patient? What should be the change frequencies for various items, such as breathing circuits? Is it sufficient to put on clean gloves just before contact with mucous membranes of ventilated patients, or should sterile gloves be used? These questions reflect major research gaps, not faults in the chapter.

The book is divided into 5 parts:

- Part I offers perspectives on the history of infections associated with health care, global issues, cost, evidence-based medicine, the role of the infection-control nurse, long-term care, and bioterrorism.
- Part II presents information resources, including a wonderful compendium of valuable Internet sites, surveillance systems, epidemiologic methods and mathematical

modeling, telemedicine for hospital epidemiology, and managing antibiotics.

- Part III covers specific diseases and organisms, vancomycin and beta-lactamase resistance, hepatitis C, tuberculosis, prion diseases such as Creutzfeldt-Jakob disease, and the potential for gene therapy in infection control.
- Part IV covers infections at the major sites: catheter-associated infections of the urinary tract and bloodstream, nosocomial pneumonia, infections at surgical sites, infections associated with mechanical circulatory devices, opportunistic infections in transplant patients, and preventing infections in neonatal intensive care units.
- Part V describes new approaches to problems that infection control programs frequently face: immunization programs for personnel, managing occupational blood exposures, outbreak investigation, molecular epidemiology, hand hygiene, reprocessing items, medical waste management, and ambulatory care.

As is always true with books that have many contributors, the chapters differ in quality and organization, so the book is optimally useful for readers in a hurry. For example, even a relatively inexperienced infection control professional could extract enough information from Chapter 31, "Efficient Management of Outbreak Investigations," to conduct an investigation of an epidemiologic cluster of possibly related infections. However, that chapter doesn't address managing a similar circumstance on which infection control personnel spend considerably more time: investigating exposures among patients and personnel. Readers could use Chapter 27, "New Vaccines and Vaccination Programs for Hospital Staff Members," to evaluate or plan a hospital immunization program, but Chapter 25, "Modern Approaches to Preventing Surgical Site Infections," would not be as useful for evaluating a program to prevent surgical site infections. Chapter 25 is interesting and well written, but like several others, not as useful as it could be.

The final chapter is an inspiring section by Richard Wenzel, entitled "Leadership and Management for Healthcare Epidemiology." He advocates a consensus-driven strategy that integrates the financial health of the enterprise (whether it be a business, de-

partment, or program) with customer satisfaction, solid internal business procedures, and employee satisfaction. This results in a balanced environment and generates philosophical discussion. In a nutshell, this is the heart of Wenzel's scholarly, academic approach to infection prevention and to management of health care epidemiology programs in health care facilities.

Semicritical procedures (ie, that involve contact with intact mucous membrane) and critical procedures (ie, that enter normally sterile tissue) increase the risk of nosocomial infections among patients and personnel, and every health care department that conducts those procedures should have a good infection-prevention reference in their library.

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Hospital Infection: From Miasmas to MRSA. Graham AJ Aylliffe and Mary P English. Cambridge, United Kingdom: Cambridge University Press. 2003. Soft cover, illustrated, 274 pages, \$38.

For much of human history medical care for the seriously ill, if available at all, occurred in one's residence or possibly elsewhere, but not in a hospital. Even by the 1750s when Dr Thomas Bond and Benjamin Franklin solicited funds for a place to house and treat the sick and poor in Philadelphia, the only people receiving medical care outside the home were those residing in almshouses and prisons. Hospitals had a longer history in Europe, going back to ancient Greece and Rome, but for much of their existence they mostly served the poor, and many were primarily religious institutions that offered treatment of the soul rather than the body. Although conditions differed locally and historically, staying home for illnesses was probably safer, since infections

in hospitals were undoubtedly rife, especially since several patients often shared a single bed and the facilities were frequently crowded, stuffy, and unclean. As Graham Ayliffe and Mary English delineate in their fascinating history of hospital infections, by the end of the 18th century the importance of sanitation, ventilation, and adequate space had become apparent in Europe, even though the prevailing theory implicated miasmas—corrupt air—as the source of infection, not interpersonal contact, fomites (inanimate objects), or live elements—whether microbes or vectors—such as insects. As was often true in the history of nosocomial infections, people instituted disease-control procedures that were effective but rested on erroneous theories.

The authors describe how the problem of typhus, a Rickettsial disease spread by lice, led to major insights in preventing serious infection, especially in military hospitals. John Pringle (1707–1782), a British army surgeon, emphasized the importance of avoiding overcrowding and providing good ventilation, sanitary quarters, and fresh clothing. He recommended burning patients' garments when they arrived, and he was among the first to assert that hospitals were potentially dangerous places for the ill. He still believed, however, that ventilation was the preeminent element in preventing the spread of typhus, although he obviously recognized the importance of contagion (person-to-person spread).

At about the same time, James Lind (1716–1794), a naval physician who also made pioneering contributions to the description, understanding, and treatment of scurvy, recognized that filthiness was the most important factor in typhus. He thought that fomites, such as clothing and bedding, could disseminate the disease, and he encouraged fumigation and airing of clothing and bedding. He also emphasized the importance of preventing disease among the medical staff by wearing waxed linen outer clothing, placing in their noses pledgets of lint soaked in camphorated spirits, and disinfecting hands before and after patient contact. His interventions nearly eliminated typhus in the British navy.

These lessons from the military did not permeate other practices of the medical profession, unfortunately, and devastating nosocomial infections occurred elsewhere. Puerperal fever became a major problem in

the 18th Century, as more women, mostly the poor, gave birth in hospitals rather than at home. Several clinicians had impressive insights into the contagiousness of puerperal fever, including Oliver Wendell Holmes (1809–1894). In 1847 a Hungarian, Ignaz Semmelweis (1818–1865), who practiced in Vienna, realized that clinicians transmitted the infection to women via their hands and demonstrated that the incidence plummeted dramatically if clinicians washed their hands in chloride of lime before contact with patients. His discovery, regrettably, had little impact on hospital practice, however, because he failed to publicize his results through talks and writing, perhaps because of his difficulty with the German language. Only after Louis Pasteur (1822–1895) discovered in 1879 that microbes cause puerperal fever, and the germ theory of disease developed from that discovery, did obstetricians adopt the practices necessary to prevent this streptococcal infection.

Infections were also an immense problem in surgery, especially from battle injuries, which often led to amputations. During the Crimean War (1853–1856), when conditions in hospitals were appallingly filthy, Florence Nightingale (1820–1910) went (in 1854) to the largest facility housing British casualties, and with a relentless emphasis on hygiene and nutrition, reduced the death rate from disease and infected wounds from over 40% to 2% in 6 months. Even later in her life, when the germ theory had gained credence, however, she refused to abandon her belief that miasmas were responsible for infections, and she ridiculed the idea of contagion and microbes. Once again, appropriate infection-prevention practices were implemented even though they relied on false beliefs about the cause of disease.

In the 1860s Joseph Lister (1827–1912) made a major contribution to controlling surgical infections. He introduced *antiseptic* techniques by applying carbolic acid to wounds, instruments, dressings, sponges, and sutures—a practice that reduced the mortality rate of his operations from 46% to 15%. He did not use mask, gloves, cap, or gown, which were elements of aseptic surgery that became prominent later in the 19th century and early 20th century as insight was gained into infection transmission, sterilization techniques, and quantitative bacteriology.

In their discussion of the 20th century the authors emphasize the contributions to the control of infection by vaccination, the discovery of antimicrobial agents, and further developments in disinfection and sterilization techniques. They also describe the new problems of antibiotic resistance, the emergence of novel organisms such as human immunodeficiency virus and *Legionella* species, and unprecedented difficulties related to disinfecting heat-labile instruments, such as the fiberoptic bronchoscope. What emerges from their survey of current conditions is that despite enormous advances in the understanding and control of hospital infections over the last century, the issues remain complex, and it is often unclear what approaches are worthwhile in trying to control nosocomial pathogens such as vancomycin-resistant enterococci and methicillin-resistant *Staphylococcus aureus* (the MRSA of the book's title). As they state, "infections are multifactorial and controlled trials of individual factors are often not practical or cost-effective. Control of infection is an art as well as a science."

The authors write well and concisely, and understanding the book requires little medical knowledge. Their work displays a remarkable erudition, which they enliven with illuminating and sometimes amusing background information and anecdotes about the people who contributed to the understanding of hospital infections. The illustrations are clear and appropriately chosen. Overall, it is an excellent, enlightening book available at an attractive price.

For me, though, the work flagged a bit towards the end, perhaps because the material is more familiar, but also because it included details about the founding of various organizations, which I found uninteresting. In addition, I wished that the authors had devoted a bit more space to *Clostridium difficile*, a very common hospital pathogen, the epidemiology of which is well-delineated; its characteristics of hardness and easy transmissibility are major obstacles in preventing serious nosocomial infection. Its species name, *difficile*, is appropriate: like many other hospital infections, its control is difficult indeed.

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