

workers; (2) the use of antiviral medications for early treatment and for prophylaxis as part of outbreak control, especially for high-risk patients and in high-risk settings like nursing homes or hospitals; and (3) infection control (surveillance and droplet precautions) for symptomatic patients. Controversial infection-control issues have been the questionable role of airborne spread of influenza and the need to mandate influenza vaccination of health care workers because of the embarrassingly low rates of vaccination in this high-risk group.

With the occurrence of localized outbreaks of avian (H5N1) influenza in Asia over the past few years, concerns about potential pandemic influenza led to (1) recommendations for universal “respiratory hygiene and cough etiquette” (basically, “cover your cough”), as described and promoted in the CDC’s 2007 *Guideline for Isolation Precautions*, and for “source containment” (e.g., use of face masks and spatial separation) for outpatients with potentially infectious respiratory illnesses; (2) re-examinations of the value in the 1918–1919 influenza pandemic of nonpharmacologic interventions, such as “social distancing” (e.g., closing of schools and community venues); and (3) debate about the level of respiratory protection required for health care workers (i.e., whether to use the higher-efficiency N95 respirators recommended for airborne isolation rather than the surgical masks used for droplet precautions).

In the spring of 2009, a novel strain of influenza virus—H1N1 or “swine flu” virus—caused the first influenza pandemic in four decades. Recombinant events that create new strains (e.g., H7N9) continue to challenge global efforts at infection control and vaccine development (Chap. 224).

#### NOSOCOMIAL DIARRHEA

A new, more virulent strain of *C. difficile*—NAP1/BI/027—emerged in North America, and overall rates of *C. difficile*-associated diarrhea (Chap. 161) have increased, especially among older patients, in U.S. hospitals during the past few years. *C. difficile* control measures include judicious use of all antibiotics, especially fluoroquinolone antibiotics that have been implicated in driving these changes; heightened suspicion for “atypical” presentations (e.g., toxic megacolon or leukemoid reaction without diarrhea); and early diagnosis, treatment, and contact precautions. To improve diagnosis, use of more sensitive polymerase chain reaction–based rather than enzyme immunoassay–based testing of diarrheal stool is now recommended, with resultant artificial doubling of infection rates in some hospitals. Preliminary data suggest a role for probiotics in the prevention of *C. difficile*-associated diarrhea in patients in whom systemic antibiotic therapy is being initiated. Fecal transplantation has had dramatic results in the treatment of relapsing cases of *C. difficile*-associated diarrhea (Chap. 161). Successes with fecal transplants and probiotics have called attention to the potential role of manipulation of the intestinal microbiome as a broader infection-control strategy.

Outbreaks of norovirus infection (Chap. 227) in U.S. and European health care facilities appear to continue to increase in frequency or at least in reporting, with the virus often introduced by ill visitors or staff. This pathogen should be suspected when nausea and vomiting are prominent aspects of bacterial culture–negative diarrheal syndromes. Contact precautions may need to be augmented by aggressive environmental cleaning (given the persistence of norovirus on inanimate objects), prevention of secondary cases in cleaning staff through an emphasis on the use of personal protective equipment and hand hygiene, and active exclusion of ill staff and visitors.

#### CHICKENPOX

Infection control practitioners institute a varicella exposure investigation and control plan whenever health care workers have been exposed to chickenpox (Chap. 217) or have worked while having or during the 24 h before developing chickenpox. The names of exposed workers and patients are obtained; medical histories are reviewed, and (if necessary) serologic tests for immunity are conducted; physicians are notified of susceptible exposed patients; postexposure prophylaxis with a preparation of varicella-zoster immune globulin (VZIG) is considered for immunocompromised or pregnant contacts, with

administration as soon as possible (but as long as 10 days after exposure) (Table 217-1); varicella vaccine is recommended or preemptive use of acyclovir is considered as an alternative strategy in other susceptible persons; and susceptible exposed employees are furloughed during the at-risk period for disease (8–21 days or, if VZIG has been administered, 28 days). Routine varicella vaccination of children and susceptible employees has made nosocomial spread less common and less problematic.

#### TUBERCULOSIS

Important measures for the control of tuberculosis (Chap. 202) include prompt recognition, isolation, and treatment of cases; recognition of atypical presentations (e.g., lower-lobe infiltrates without cavitation); use of negative-pressure, 100% exhaust, private isolation rooms with closed doors and at least 6–12 air changes per hour; use of N95 respirators by caregivers entering isolation rooms; possible use of high-efficiency particulate air filter units and/or ultraviolet lights for disinfecting air when other engineering controls are not feasible or reliable; and follow-up testing of susceptible personnel who have been exposed to infectious patients before isolation. The use of serologic tests, rather than skin tests, in the diagnosis of latent tuberculosis for infection control purposes has become common, mostly for logistic reasons. As tuberculosis once again is on the decline in the United States, we need to remember that the price of freedom—in this instance, from a communicable disease—is eternal vigilance.

#### GROUP A STREPTOCOCCAL INFECTIONS

The potential for an outbreak of group A streptococcal infection (Chap. 173) should be considered when even one or two nosocomial cases occur. Most outbreaks involve surgical wounds and are due to the presence of an asymptomatic carrier in the operating room. Investigation can be confounded by carriage at extrapharyngeal sites such as the rectum and vagina. Health care workers in whom carriage has been linked to nosocomial transmission of group A streptococci are removed from the patient-care setting and are not permitted to return until carriage has been eliminated by antimicrobial therapy.

#### FUNGAL INFECTIONS

Fungal spores are common in the environment, particularly on dusty surfaces. When dusty areas are disturbed during hospital repairs or renovation, the spores become airborne. Inhalation of spores by immunosuppressed (especially neutropenic) patients creates a risk of pulmonary and/or paranasal sinus infection and disseminated aspergillosis (Chap. 241). Routine surveillance among neutropenic patients for infections with filamentous fungi, such as *Aspergillus* and *Fusarium*, helps hospitals to determine whether they are facing environmental risks. As a matter of routine, hospitals should inspect and clean air-handling equipment, review all planned renovations with infection control personnel and subsequently construct appropriate barriers, remove immunosuppressed patients from renovation sites, and consider the use of high-efficiency particulate air intake filters for rooms housing immunosuppressed patients.

A major multistate iatrogenic outbreak of meningitis, localized spinal or paraspinal infection, and arthritis due to *Exserohilum rostratum* was recognized in 2012 and traced to contamination of an injectable preservative-free steroid product produced by a single compounding pharmacy (Chap. 241).

#### LEGIONELLOSIS

Nosocomial *Legionella* pneumonia (Chap. 184) is most often due to contamination of potable water and predominantly affects immunosuppressed patients, particularly those receiving glucocorticoid medications. The risk varies greatly within and among geographic regions, depending on the extent of hospital water contamination and on specific hospital practices (e.g., inappropriate use of nonsterile water in respiratory therapy equipment). Laboratory-based surveillance for nosocomial *Legionella* should be performed, and a diagnosis of legionellosis should probably be considered more often than it is. If nosocomial cases are detected, environmental samples (e.g., tap water)