

# Infection Prevention

## Background on Nosocomial Infections

There are estimated to be approximately 2 million infections acquired in health care facilities annually, representing 10% of all admitted patients. Each year, an estimated 90,000 people die of nosocomial infections. The monetary cost of nosocomial infections is \$6.7 billion annually in the United States.<sup>1</sup>

In long term care facilities, infections represent the leading cause of death. Many of these infections are acquired in the long-term facility. Infections increase the cost of providing care to residents of long-term care facilities, and often result in transfer to acute care settings.

## Hand Hygiene

The most common method of transmission of pathogens in the health-care setting is via the hands of health-care workers. Hand hygiene is considered the most simple and cost-effective method of preventing nosocomial infections. It is estimated that good adherence to hand hygiene practices can prevent at least 20% of nosocomially-acquired infections.

The effectiveness of hand hygiene has been known for greater than 150 years, since Ignaz P. Semmelweis demonstrated a decrease in maternal postpartum mortality with a hand hygiene intervention. More recently, studies have shown decreased rates of nosomial infection with improvements in hand hygiene compliance. A 2000 study from Pittet showed a decrease in nosocomial infection rate from 16.9% to 9.9% in conjunction with an increase in hand hygiene compliance from 47.6% to 66.2%.<sup>2</sup>

Unfortunately, compliance with hand hygiene recommendations is relatively low, around 40%. As a result, many patients acquire preventable nosocomial infections. In surveys, many reasons are given for poor compliance, including lack of time, poor location of sinks, skin irritation, perception of higher priorities, and lack of visible soiling. In addition, observational studies have shown that health care workers over-estimate their compliance with hand hygiene recommendations.

## Alcohol-Based Hand Rubs

Alcohol-based hand rubs have a number of advantages over the traditional soap and water method of hand washing. They are faster and generally more accessible (can be carried in a pocket), and are associated with less hand irritation than soap and water. Studies have shown that alcohol-based hand rubs are better at killing many

types of bacteria than soap and water. Finally, there is less risk of re-contamination compared to using sinks, particularly sinks which rely on the user turning a faucet handle on and off.

However, there are certain instances when soap and water should be the preferred method of hand hygiene. When hands are visibly soiled, soap and water should be used to remove the debris. In addition, soap and water may be preferred when caring for patients with *Clostridium difficile* infection, as alcohol-based hand rubs do not kill the spores of this organism as well as soap and water.

## Influenza Epidemiology

Influenza is a serious disease, particularly in older populations such as residents of long-term care facilities. It is estimated that each year in the United States 36,000 people die of influenza and 114,000 people are hospitalized due to influenza or its complications.<sup>3</sup> Influenza is one of the leading causes of death due to a vaccine preventable disease.

90% of influenza-related deaths occur in the elderly population. Because of their advanced age and the presence of other co-morbid conditions, long-term care residents are particularly susceptible to influenza related morbidity and mortality. In addition, because of close contact with other at-risk individuals, outbreaks can occur in long-term care facilities. During outbreaks, up to 25-60% of residents can be affected, with fatality rates of 10-20%.<sup>4</sup>

## Influenza Vaccination Benefits

Influenza vaccination is recommended for all residents of long-term care facilities and for all health-care workers with patient contact. Influenza vaccination of residents has been shown to be 30-40% effective in preventing illness, 50-60% effective in preventing hospitalization from influenza, and 70% effective in preventing death from influenza in persons over the age of 55 years.<sup>5</sup>

Influenza vaccination of health-care workers has significant benefits to both the health-care worker and to patients under their care. Workers who are vaccinated against influenza have fewer respiratory infections, less time missed from work, fewer doctor visits, and decreased usage of antibiotics. As influenza is often transmitted from health-care workers (who may not be symptomatic at the time) to their patients, vaccination also reduces the risk of infection in patient populations. In one randomized trial in

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long-term care facilities, there was a 44% decrease in overall resident mortality rates in facilities where health-care workers were vaccinated.<sup>6</sup> In addition, outbreaks have been associated with low rates of influenza vaccination in either residents or staff members. One study showed a 60% decrease in the risk of an outbreak when staff vaccination rates were greater than 55% and resident vaccination rates were greater than 89%.<sup>7</sup>

Despite the available evidence and recommendations, only about 38% of health care workers receive influenza vaccinations annually.<sup>8</sup> Even with aggressive vaccination campaigns, only 50-70% of health care workers are vaccinated.<sup>9</sup> Influenza vaccination rates can be increased by providing easy availability to vaccination, educational campaigns which stress the importance of vaccination and dispel misconceptions about the vaccine, and by the use of measurement and feedback.

## Pneumococcal Vaccination

*Streptococcus pneumoniae* is the most common bacterial cause of pneumonia. It can cause bacteremia in up to 25% of adult patients with pneumococcal pneumonia. Elderly persons with bacteremia have a case fatality rate as high as 60%. In addition, the organism has increasing rates of antibiotic resistance.

Pneumococcal vaccination is recommended for all persons over the age of 65 and all residents of long-term care facilities. While it has not been shown to reduce the incidence of pneumonia, case-control studies have shown 56-81% effectiveness against the development of invasive disease from *Streptococcus pneumoniae*.<sup>10</sup> The effectiveness may be lower in older or immunocompromised populations than in younger, healthier individuals. In one study, there was a 54% reduced risk of pneumococcal bacteremia in immunocompetent patients, but only a 22% reduced risk in immunocompromised patients.<sup>11</sup>

## Summary

Many of the infections that affect long-term residents are potentially preventable. Hand hygiene is the single easiest and cost-effective method of preventing transmission of pathogens in health care facilities. Vaccination against influenza for both residents and health care workers has been shown to dramatically decrease overall mortality in long-term care populations. Finally, pneumococcal vaccination is effective in decreasing complications of this disease.

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