Infections in Nursing Homes

Epidemiology and Prevention Programs

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KEYWORDS

- Nursing home • Infection control • Infection prevention
- Multidrug-resistant organisms • Epidemiology • Hand hygiene

KEY POINTS

- Nursing homes (NHs) are unique environments with challenges for infection control and prevention. Risk factors for infection in NH residents include resident-level, environmental/institutional-level, and therapy-related factors.
- There are between 1.6 and 3 million infections in NH residents every year; the most common are urinary tract infections, lower respiratory tract infections, skin and soft tissue infections, and gastroenteritis.
- Antibiotic stewardship programs complement national diagnostic and therapeutic guidelines toward the goal of preventing antibiotic overuse and decreasing the rate of multidrug-resistant organism (MDRO) infections.
- The infection control preventionist is essential to enforce compliance with hand hygiene, device care, and increase awareness of MDROs.
- Multimodal interventions including barrier precautions, active surveillance for MDROs and infections, and NH staff education have been proven to be effective.

INTRODUCTION

Nursing homes (NHs) provide health care to people who are unable to manage independently in the community, in 2 different circumstances: for chronic care management and for short-term rehabilitative services after an acute care hospital stay. In the United States, there are presently more people in NHs than in acute care hospitals. Many of these patients are recovering from very serious events and are at high risk for

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complications, including infections. Infections cause an important share of morbidity and mortality in NH residents, despite being preventable.[1,2] Urinary tract infections (UTIs), lower respiratory tract infections (LRTIs), skin and soft tissue infections (SSTIs), and gastroenteritis (GE) are the most common infections in this setting, and their diagnosis can be delayed owing to inadequate fever response, lack of specific symptoms and signs, and sampling and testing difficulties. These factors may combine in leading to prolonged and unnecessary antibiotic therapy.

NH residents are more likely to receive antibiotics than any other individual class of drugs[3] and account for at least 20% of all adverse drug reactions experienced.[4] Multidrug-resistant organisms (MDROs) are increasing and colonize about 35% of residents, but their prevalence varies greatly depending on geographic location and characteristics of the resident population.[5] For this reason, it is imperative to customize prevention strategies to the characteristics and local epidemiology of the facility. For example, a facility with an unacceptably high rate of UTIs may benefit more from UTI prevention programs than a facility with high methicillin-resistant *Staphylococcus aureus* (MRSA) colonization rates. Integral to developing an intervention is the recognition of common infections and MDROs epidemiology within the facility. Knowledge of general and specific risk factors for infections is necessary to choose appropriate surveillance protocols capable of defining infection rates.

RISK FACTORS FOR INFECTION IN NURSING HOMES

Older adults are at greater risk for infections owing to their frailty, comorbidities, and prolonged stay in an institutional setting where medical supervision from physicians and physician extenders is generally lower and use of common spaces within the facility is higher, compared with hospital settings. Risk factors can be difficult to recognize and manage in NHs because of the lack of availability of state-of-the-art diagnostics. Risk factors for infection in NH residents can be broadly categorized as resident-level, environmental/institutional-level, and therapy-related factors, such as in the use of antibiotics.

Resident-level Risk Factors

Older age predisposes residents to infection for many reasons, such as senescence of the immune system, loss of integrity of the physical barriers to entry of microorganisms, and difficulty in performing hygiene. When the need for medical care arises, close physical interactions with caregivers may facilitate transmission of pathogens. Moreover, because infections present with atypical or nonspecific symptoms, diagnosis and ensuing therapy may be delayed, leading to poor outcomes and increased hospital transfers.[6] *Immunosenescence* describes key alterations in innate and adaptive immunity that develop with aging.[7] Not only does this affect the response to infections, including latent chronic infections (eg, tuberculosis, herpes zoster), it also affects response to immunization to infection (eg, pneumococcal or influenza vaccination).[8] Some key indicators of immunosenescence are the inversion of the CD4/CD8 ratio and reduced cytotoxicity of natural killer cells with a compensatory increase in quantity. There is some evidence of gender differences and impact of latent viral infections, such as cytomegalovirus infection, on the rate of development of immunosenescence.[9]

The ability of the skin and mucous membranes to act as barriers to systemic infections is compromised by aging owing to biochemical and cell signaling changes. In the intestinal mucosa, for example, a single layer of cells is exposed constantly to a high burden of microorganisms. Its functional integrity depends on a very complex network

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