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## A research agenda for infection prevention in home healthcare

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### Keywords

Home healthcare; Infection prevention

### BACKGROUND

Home healthcare (HHC), defined as healthcare provided to a person in his/her own home, is one of the most important healthcare services in the nation, with increasingly complex care being provided.<sup>1</sup> Between 2013 and 2014, over 4.9 million patients received care from 12,400 HHC agencies in the United States,<sup>2</sup> and most HHC patients (83%) are elderly.<sup>3</sup> In 2013, about 3.5 million Medicare beneficiaries received HHC at a cost of \$17.9 billion.<sup>4</sup> HHC is the fastest growing healthcare sector in the nation because 1) the American population is aging; 2) with bundled payments, discharges from hospitals occur earlier, and there are financial incentives for treating patients at home; and 3) often patients prefer to be cared for at home when possible.<sup>5</sup> Indeed, the U.S. Bureau of Labor Statistics predicts that the demand for HHC personal aides will grow 38% from 2014 to 2024, which is much faster than the average for all other occupations.<sup>6</sup>

### PREVALENCE OF INFECTIONS IN HHC

Infection outbreaks, particularly those involving septicemia, among HHC patients have captured national attention over the years,<sup>7–9</sup> and new infections are emerging.<sup>10–12</sup> Because of the importance of infection prevention, in 2014 the Centers for Medicare and Medicaid Services (CMS) issued a memo to HHC surveyors outlining infection control breaches that should be reported to state departments of health.<sup>13</sup> The Joint Commission has also identified infection prevention and control as a national patient safety goal for HHC.<sup>14</sup> However, some HHC agencies are struggling to develop infection control programs.<sup>15</sup>

In a previous systematic review of 25 studies examining the prevalence of infections in HHC, researchers reported infection rates varied dramatically (range, 5%–80%) based on the type of infection studied and the patient populations included.<sup>16</sup> However, most of these

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studies focused on patients who received parenteral nutrition treatment, had small sample sizes, and were methodologically flawed. As HHC expands and becomes more complex, the evidence base also needs to expand and include a more representative group of patients.

In a previous study, HHC infection rates were examined using a 20% random sample (n = 199,462) of 2010 national Outcome and Assessment Information Set (OASIS) data.<sup>3</sup> The OASIS dataset, a standardized reproducible assessment instrument developed by a CMS-funded national research program, provides information on home health patients' health status, demographics, socioeconomic status, medical history, living environment, and caregiver characteristics from all Medicare-certified home care agencies. That study found that in 36,269 unplanned hospitalizations of HHC patients, approximately 17% were the result of an infection. The most common infections associated with unplanned hospital admissions were respiratory and deep tissue, followed by urinary tract; intravenous catheter-related infections were the least reported. Agency-level infection rates varied widely, ranging from 0% to 100%. However, infection rates narrowed to between 0% and 34% after excluding agencies that had fewer than 5 patients. This variation may be due to heterogeneity of populations, differences in the infection prevention and control practices adopted by the agencies, differences in reporting practices and definitions, and/or other yet unidentified factors. However, the data were limited to those infections identified by HHC clinicians and reported in OASIS that led to hospitalization, which is likely to substantially underestimate the problem. Furthermore, to our knowledge, no studies have estimated the long-term health outcomes and healthcare use associated with infections that occur while patients receive HHC services. Data are needed to inform future investments in infection prevention in HHC.

## INFECTION PREVENTION GUIDANCE FROM OTHER SETTINGS

In the 1970s, the Centers for Disease Control and Prevention (CDC) national study, "Study on the Efficacy of Nosocomial Infection Control,"<sup>17</sup> measured how hospital infection control programs were structured and how infection control processes were being implemented. Site visits were conducted, and infection rates were identified using administrative data. This study was the first to demonstrate associations among infection rates in hospitals, the infrastructure of infection control programs, and the processes of care. Findings from this seminal study changed hospital infection control practices. A national study of infections in HHC is needed.

While some similarities in infection prevention and control across settings exist, there are also important differences. First, HHC is provided in a less controlled environment than other healthcare settings and is usually limited by space and resources. Therefore, common infection prevention and control processes, such as effective decontamination, may not be possible in the home. Additionally, unlike in hospitals, in the home there is less technology, including laboratory and other medical examination services, making the diagnosis of infection more difficult. The presence of pets and/or pests in patients' homes can pose infection risks.<sup>18</sup> Second, HHC services are intermittent in nature (i.e., nurses usually visit the home for short periods of time), and much of the actual care is provided by patients themselves, family members, and/or aides who usually have little or no formal infection

prevention and control training. Therefore, socioeconomic status and household characteristics (e.g., education, income, and support networks), which are important predictors of health outcomes, likely affect infection risk.<sup>19–21</sup> Third, the patient may be in and out of the home and receive care by other providers (e.g., clinic staff), making the attribution of an infection to any one setting difficult. Last, similar to what is found in nursing homes but different from hospitals, HHC agencies are mandated to have someone responsible for infection prevention; however, most often this professional is not a full-time certified infection preventionist.<sup>22,23</sup> Kenneley surveyed 423 HHC clinicians and found that: 1) more than 75% indicated that their agencies did not have a full-time infection preventionist; 2) 33% of the infection preventionists working in HHC had other responsibilities within the agency; and 3) there was great variation of infection control procedures across agencies.<sup>24</sup> Considering these differences, a “healthcare-associated infection” may be a difficult attribution to confirm in the HHC setting. Nevertheless, better understanding of best practices of infection prevention in HHC is needed.

## CURRENT HHC INFECTION PREVENTION GUIDELINES

Consensus recommendations first published in 1999 and subsequently in 2006 called for standardized approaches for infection prevention and control in HHC.<sup>25,26</sup> In collaboration with the CDC and the Joint Commission, this publication was updated in 2014.<sup>27</sup> The recommended infrastructure and policy categories are listed in Table 1. Unfortunately, consensus recommendations do not necessarily translate into clinical practice. Furthermore, many of these guidelines were created over 10 years ago and are based on expert opinion, since evidence in this area is sparse.<sup>28–30</sup> As recommended, some HHC agencies have developed educational tools to help patients, families, and staff learn more about infection prevention in the home and promote hand hygiene<sup>31</sup>; however, it is not clear if use of these tools is widespread. Considering the differences between HHC and other settings, applying infection control guidelines primarily established from evidence in hospitals is likely to be inappropriate.

## RECOMMENDATIONS

In summary, previous estimates of infections in HHC patients are likely to underestimate the problem. With increasing demand for HHC services, more complex patient needs, and the emergence of new infections, a better understanding of this problem is needed. Furthermore, current HHC infection control guidelines are based on expert opinion and evidence from inpatient settings, yet the HHC environment is different from other healthcare settings. To mitigate preventable infection risk, a better understanding of infections and how best to implement infection prevention and control in HHC is necessary. Additionally, considering the emergence of multidrug-resistant organisms and increased focus on antibiotic stewardship programs in hospitals and nursing homes,<sup>32–34</sup> understanding antibiotic use and/or overuse in HHC is crucial. Research is needed to fill these significant knowledge gaps and generate evidence to inform clinicians, managers, policymakers, and future practice guidelines on the problem of infections and how best to mitigate risk.

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**Table 1**Recommended infection control practices in home healthcare<sup>27</sup>**Infrastructure**

Staffing: Roles and responsibilities, experience, training

Resources: Committees, decision-making tools, technology, supply availability

**Policies****Patient Care**

General: Infection surveillance, identification, and reporting, hand hygiene, patient/family education

Urinary tract: Urinary catheter insertion, maintenance, and replacement

Respiratory: Influenza and pneumonia prevention, vaccination, intravenous catheter-related (i.e., catheter insertion and maintenance), antisepsis

Deep tissue (i.e., wounds): Wound management technique, cleaning and disposal of supplies

**Employee**

Employee immunization: Requirements, incentives to promote vaccination

Employee training: Methods, frequency, content