Methicillin-resistant \textit{Staphylococcus aureus} in long-term-care facilities

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Abstract

Owing to a high prevalence of methicillin-resistant \textit{Staphylococcus aureus} (MRSA) among residents, long-term-care facilities (LTCFs) have become substantial reservoirs of this microorganism. Few data on the natural history of MRSA colonization in this setting are available. The cumulative incidence appears to be approximately 20% per year, and more than half of carriers have persistent colonization. Several host-related factors, such as antibiotic use, invasive devices, and poor infection control practices, increase the risk of colonization. Clinical experience suggests that subsequent MRSA infections are neither frequent nor severe while colonized residents are living in an LTCF; however, when admitted to an acute-care centre, colonized individuals may spread MRSA to other patients and may develop severe infections. Therefore, the epidemiological impact of the high prevalence of MRSA in these centres is more relevant than the clinical impact of this colonization for an individual resident. Standard precautions should be applied as routine infection control measures for all residents of LTCFs, whereas barrier precautions, cohorting, decolonization and other measures should be undertaken only for controlling outbreaks of MRSA infection.

Keywords: Methicillin-resistant \textit{Staphylococcus aureus}, long-term-care facilities, review


Introduction

Over the past two decades, there have been profound changes in healthcare delivery systems, especially in the USA, but also in the European Union. The number and size of acute-care facilities have decreased, as has the number of admissions, length of stay, and some medical or surgical activities classically performed in acute-care hospitals. At the same time, there has been a shift of activities to the outpatient setting, and the magnitude of care delivered at home or within nursing homes has grown dramatically [1]. Long-term-care facilities (LTCFs) constitute a heterogeneous group of institutions that provide care to a large number of patients with different needs, including those with mental or psychiatric diseases, patients placed for convalescence within nursing homes, elderly individuals who reside permanently in community LTCFs, and those who are disabled or ill. Moreover, patients in LTCFs discharged from acute-care hospitals frequently have invasive devices, and may be colonized with multiresistant microorganisms, such as methicillin-resistant \textit{Staphylococcus aureus} (MRSA), \textit{Acinetobacter baumannii}, or extended-spectrum \beta-lactamase-producing \textit{Enterobacteriaceae}, among others [2].

In this new scenario, ‘nosocomial’ infections may occur not only in acute-care hospitals but also in the other settings where healthcare is delivered. The term ‘healthcare-associated infection’ is now commonly used for these infections, and hospitals are no longer the only healthcare facilities requiring infection control activities [3].

Although infections in LTCFs are frequent, no extensive studies on this topic are available in the literature [4]. Host-related factors, such as poor functional status, mental impairment, alterations in mobility or swallowing, and urinary incontinence, are especially associated with a higher risk of developing infections. The most commonly reported infections are: respiratory infections, often related to aspiration; urinary tract infections; and skin and soft tissue infections [5]. A major problem related to multiresistant microorganisms is the spread of MRSA strains. This is true for both acute-care hospitals and LTCFs—MRSA is endemic in the majority of both [3,6,7]. Given increasingly common patient exchange between facilities in the healthcare setting and acute-care hospitals, it is relevant to determine the magnitude of MRSA colonization in LTCFs, because it might influence the infection control practices implemented by hospitals [8].

Usually, guidelines for the prevention of MRSA transmission in acute-care hospitals are well established, but there is often a lack of these recommendations for LTCFs [9]. Among the different profiles of LTCFs, this review will focus
on community LTCFs, which are particular institutions intended for the promotion of a healthy lifestyle for elderly people, a steadily-growing segment of the population. Unlike in acute-care hospitals, discharge of patients from community LTCFs is not a goal, whereas promoting comfort and an optimal social environment, and preserving the functional status of the residents, are major objectives. Importantly, in these institutions, financial resources for infection control activities are minimal; the staffing is suboptimal, care is provided by nurses or by nurse-assistants, and verbal orders, rather than written orders, are common.

Prevalence and Incidence of MRSA Colonization in Community LTCFs

The classic studies on the prevalence of MRSA colonization in LTCFs were performed more than 10 years ago in Veterans’ Affairs (VA) facilities in the USA. These studies showed a high prevalence of colonization among residents, with rates ranging from 13% to 35%. Major sites of colonization were nares and wounds, and, in some institutions, up to 80% of decubitus ulcers were colonized [10,11]. Although these studies were of great value, VA institutions are not representative of the standard type of community LTCF because, by definition, all the residents are male, and usually they are younger and sicker than the average LTCF resident. Thus, the epidemiology of MRSA in these facilities should be differentiated from that in community LTCFs [12]. In addition to US studies, some European studies have recently been performed that have evaluated the prevalence of MRSA colonization in LTCFs. These studies report prevalences of MRSA colonization of 22% in the UK [13], 21% in France [14], 16.8% in Spain [15], 9.3% in Slovenia [16], 8.6% in Ireland [17], and 1.1% in Germany [18]. These figures are usually lower than those reported in studies concerning the VA facilities [10–12,19]. Although these studies generally reflect the endemic situation of MRSA within LTCFs, there is, remarkably, a wide variation in the prevalence of MRSA colonization among community LTCFs. Differences in colonization rates may depend on several factors, such as the prevalence of MRSA in the referral acute-care hospitals, the characteristics of the resident population, and the quality of the infection control practices at the LTCF [19].

One study from Germany reported a colonization prevalence of 11% during a large outbreak due to a strain of community-acquired MRSA (CA-MRSA) [20]. To date, the presence of CA-MRSA in LTCFs has been infrequent; however, this situation may change in the near future. In a 2004 publication from San Francisco, approximately 4% of CA-MRSA clinical isolates originated in nursing homes [21], and a cluster of CA-MRSA infections was noted in five of 76 residents in a nursing home in Finland [22].

Persistent carriers are considered to be a group at higher risk of MRSA transmission, but there are few data on the relative frequency of persistent vs. transient carriers. In VA studies, approximately 65% of colonized residents in LTCFs have persistent MRSA carriage, 25% transient carriage, and 15% intermittent carriage. Similar results have been reported from community LTCFs in Spain [10,23] (Fig. 1). Recently, Mody et al. [24] found that more than one-half of community LTCF residents were colonized by MRSA, often with multiple-site colonization. ExTRANAsal colonization increases significantly with the use of invasive devices.

There are few studies addressing the incidence of MRSA acquisition during a stay in an LTCF. Murder et al. [11] reported an incidence of approximately 10%. In a longitudinal Spanish study, the annual incidence of MRSA coloni-
Factors Associated with MRSA Colonization in Community LTCF Residents

There is general agreement about the risk factors for MRSA colonization in community LTCF residents. The most important are host-related, such as advanced age, poor functional status, different comorbidities, invasive devices, and decubitus ulcers, the last being the most common wound among residents [10,15]. Some antecedents, including prior MRSA colonization, prior antibiotic therapy, prior hospitalizations, and transfer from an acute-care hospital, are also relevant [13,15,16,25,26]. Finally, specific characteristics of LTCFs, such as the size of center, a low ratio of nurses to beds, and the location of the facility in a deprived area, have been associated with MRSA carriage [13,26,27]. A stay of more than 6 months in an LTCF has been found to be a risk factor for MRSA colonization [26], but this has not been confirmed in all studies [17,18].

Clinical Relevance of MRSA Colonization in Community LTCFs to Development of MRSA Infections

MRSA-colonized patients have a higher risk of developing staphylococcal infections than carriers of methicillin-susceptible S. aureus or non-carriers. In the hospital setting, this risk has been well described [28,29], but it has been little explored in LTCFs. However, data indicate that MRSA colonization in LTCFs may have different and less severe consequences than in acute-care hospitals. MRSA carriers have a 30–60% risk of developing an infection during hospitalization in an acute-care hospital, whereas this risk is only 5–10% during a stay at an LTCF [19,30]. This difference is probably best explained by the fact that patients admitted to acute-care centres undergo more invasive procedures. Few studies have addressed MRSA infections in different types of LTCFs, and most have reported a low rate of MRSA infections among patients in these facilities. Bradley [19] reviewed six US studies, performed between 1990 and 1997, that addressed the development of MRSA infections in LTCFs. Overall, the incidence of infections was 6.5%, the associated mortality was 1%, and most infections were skin and soft tissue infections. In one of these studies, Murder et al. [11] showed that the development of MRSA infections and the mortality rate were clearly more frequent among MRSA carriers, with relative risks of 3.6 and 2, respectively. Most studies, however, indicate that a relatively small number of patients require hospitalization or die as a consequence of MRSA infections, which are usually non-severe. The most frequently reported MRSA infections among residents in LTCFs are skin and soft tissue infections, whereas the bloodstream infection rate is approximately 10% [19,30]. Few longitudinal studies have been performed to evaluate the risk of developing MRSA infections among colonized residents in LTCFs. In a recent prospective study performed in community LTCFs in Spain, the incidence of MRSA infections among MRSA-colonized patients was found to be 0.12/1000 patient-days. Fifteen episodes of MRSA infection occurred during an 18-month period, mostly skin and soft tissue infections related to decubitus ulcers, and only two patients required hospital admission [23].

On the other hand, the admission of MRSA-colonized residents to an acute-care hospital may have an important negative impact. Patients from LTCFs and those with readmissions to acute-care hospitals account for a large part of the burden of hospitalized MRSA carriers. Transfer from LTCFs is a risk factor for having MRSA infection upon admission to hospital, or for infection during hospitalization [31]. These infections may be severe, with few and expensive therapeutic options, and elevated morbidity and mortality. Accordingly, patients transferred from LTCFs should be considered to be at high risk of MRSA carriage and included in a screening programme at admission for early MRSA detection [8,31,32] and rapid implementation of infection control measures. For this reason, control strategies need to be coordinated between LTCFs and acute-care hospitals.

When MRSA is identified as the causative microorganism of infections within a LTCF, the presence of an outbreak should be ruled out.

Control Measures

The nature of control measures to limit the spread of MRSA in LTCFs is still controversial [9,33], especially because, for most residents, the facility is their home. In these institutions, financial resources for infection control activities are minimal, the staffing is suboptimal, and sophisticated diagnostic methods are lacking. In addition, the clinical impact of MRSA colonization among residents appears to be limited. Therefore, applying individualized and easy-to-implement infection control precautions, together with the promotion of a healthy lifestyle for
residents, is considered to be the best option in a non-epidemic setting. Accordingly, standard precautions should be applied for the care of all patients. Enhanced efforts to prevent the development of decubitus ulcers is important, given that they are related to both high rates of MRSA colonization and infection. It is also very important to avoid non-recommended measures, especially those that may pose additional difficulties in the transfer of residents between facilities or produce an increase in the workload of staff. Thus, transfer of patients from acute-care hospitals to LTCFs should be neither delayed nor restricted because of MRSA carriage, and detection and decolonization of residents or healthcare personnel is not necessary unless an MRSA outbreak occurs. The effectiveness of decolonization with nasal mupirocin has not been demonstrated among this population, because of the high rate of recolonization [34]. On the contrary, in identified outbreaks of MRSA infection, most authorities recommend the implementation of contact precautions similar to those applied in acute-care hospitals [9,19,30].

These recommendations are based on clinical experience and the limited data existing in the literature (Table 1). The implementation of each measure should be individually assessed for every facility, taking into account different epidemiological situations.

### Transparency Declaration

None.

### References


