

Healthcare-related infections outside the hospital: a new frontier for infection control

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SUMMARY

In all industrialized countries, an increasing number of persons are cared for outside the acute hospitals: thus, infection control programs should be adapted to the new scenario. This paper briefly reviews the epidemiological features of infections acquired outside the acute care hospital, focusing on residential homes for the elderly. An intervention study aimed at reducing the healthcare associated infections in 22 residential facilities in Emilia-Romagna region is described.

KEY WORDS: Long-term care, Infection, Control, Surveillance

INTRODUCTION

In the last decades, healthcare delivery systems have undergone substantial changes in all industrialized countries including Italy: healthcare, previously delivered almost exclusively in acute hospitals, is now delivered through a variety of services, including outpatient and ambulatory care, long-term care, rehabilitative care, and home (Jarvis, 2001). Moreover, the constant increase in the proportion of population >65 years of age is expected to have an effect on the long-term care number of beds; in several countries, the number of patients in long-term care has already overcome the number of patients in acute care hospitals (Nicolle, 2001). In Italy, in the year 2000 the Ministry of Health recorded 1687 residential facilities for the elderly, accounting for more than 35 million days of stay each year, and nearly 200,000 elderly cared for at home (Ministero della Salute, 2001). The expansion of the healthcare delivery system

generates new problems for infection control programs, due to the transmission, within the integrated network of health services, of potentially harmful microorganisms such as multidrug resistant organisms and to the challenge of controlling healthcare acquired infections (HCAIs) in settings where the continuous promotion of safe control measures is troublesome.

FREQUENCY AND IMPACT OF HEALTHCARE ASSOCIATED INFECTIONS IN NON HOSPITAL SETTINGS

The frequency of HCAIs among residents of long-term care facilities (LTC) is comparable to rates observed in acute care facilities (Nicolle *et al.*, 1996, Nicolle, 2000), as highlighted by several studies conducted both in the United States and in Europe. On the contrary, in the home care setting, available data are scarce, but the occurrence of infections seems to be lower (Rhinehart, 2001; Patte *et al.*, 2005).

The prevalence of infections in LTC facilities in different studies ranges from 2,7 to 32,7 infections per 100 residents (Smith *et al.*, 1997, Nicolle 2000); the incidence ranges from 2,6 to 7,1 infections per 1000 residents-days (any residents develops on average 1-3 infections per year) (Smith

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TABLE 1 - Recent epidemiological studies of HCAs in long-term care.

Author, year, place	Type of study	N° of facilities (n° of residents)	Infection rate	Rate by infection site [§]
Mongardi, 2003, Italy	Prevalence	49 (1926)	9.6 (weighed)	UTI 1.5 LRTI 2.9 URTI 1.5 Skin 3.1 Conjunctivitis 1.7 GI 0.4
Eriksen, 2004, Norway	Prevalence (4 surveys, 2002-2003)	203-300 (11465-17174)	6.6-7.6	UTI 3-3-3.8 LRTI 1.2-1.6 SSI 0.3-0.5 Skin 1.5-2.0
Stevenson, 2005, US	Incidence	17 (472019 resident- days)	3.64	RTI 1.75 Skin 1.10 UTI 0.60 GI 0.16
Engelhart, 2005, Germany	Incidence	1 (34793 resident-days)	6.0	RTI 2.2 Skin 1.2 UTI 1.0 GI 1.2
Brusaferro, 2006, Italy	Incidence	4 (21503 resident-days)	11.8	LRTI 2.5 Skin 2.7 UTI 3.2 GI 1.2 Conjunctivitis 1.2

[§]UTI = Urinary Tract Infections; LRTI = Lower Respiratory Tract Infections; URTI = Upper Respiratory Tract Infections; GI = Gastrointestinal infections

et al., 1997; Goldrick, 1999). The variability in these reports reflects differences in patient populations in different study institutions as well as differing surveillance definitions and methods for case ascertainment. Results of the most recent studies are reported in Table 1 (Mongardi *et al.*, 2003; Eriksen *et al.*, 2004; Stevenson *et al.*, 2005; Engelhart *et al.*, 2005; Brusaferro *et al.*, 2006). Concerning the occurrence of outbreaks, of 100 cases of infections, 10 to 20 belong to an epidemic (Garibaldi, 1999; Hoffman *et al.*, 1990); frequently, healthcare workers are also involved.

For the elderly living in these facilities, the onset of an infection represents the most common cause of hospital admission and death (Albrecht, 1999), mainly from pneumonia (Loeb, 2005). The most common sites of infection are the urinary tract, the respiratory tract, the skin, the gastrointestinal tract and the eye (Nicolle, 2001). The endemic infections are above all localized to the

respiratory and urinary tract; epidemic infections are predominantly influenza and gastrointestinal infections (Nicolle, 2001).

Residents of long-term care facilities are frequently colonized with antimicrobial-resistant organisms, including methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant enterococci, penicillin-resistant pneumococci, extended spectrum b-lactamase-producing gram-negative organisms, and quinolone-resistant gram-negative organisms (Strausbaugh, 1996; Nicolle, 2000).

INTER-INSTITUTIONAL SPREAD OF INFECTIONS

Some years ago, Safdar and Maki reviewed 74 published studies to better understand common risk factors for nosocomial infection with methicillin-resistant *Staphylococcus aureus*, van-

comycin-resistant enterococcus, *Clostridium difficile*, extended-spectrum-lactamase-producing gram-negative bacilli, and *Candida*. The analysis showed impressive commonality of risk factors across these diverse multiresistant organisms, and one of these risk factors was inter-institutional transfer of the patient, especially from a nursing home (Safdar *et al.*, 2002).

The importance of the patient transfer between the acute and long-term care settings for the spread of infections has been emphasized by several other authors. Recently, in a study involving 45 residential facilities, Gould demonstrated that the prevalence of methicillin-resistance colonization or infection at the time of admission to the long-term care facilities was very high, probably due to microorganisms acquired during previous contacts with other healthcare facilities (Gould *et al.*, 2006). Laffan in another study pointed out that importation from acute care settings accounted for a large proportion of *Clostridium difficile* seen in LTCFs (Laffan *et al.*, 2006).

In France, a large outbreak of ESBL producing *Acinetobacter baumannii* infections, involving 53 hospitals (41 tertiary care and 12 long-term care facilities) was recognized in 2004: Belgian public authorities, alerted through the EU Early Warning and response System, early detected and controlled a cluster of three cases in a nursing home close to the border with France: this report highlights the potential for transfer of microorganisms along with patient movements within same healthcare networks, including patients from bordering countries using the same healthcare net (Naas *et al.*, 2006).

PREVENTION AND CONTROL OF INFECTION IN NURSING HOMES: AN INTERVENTION PROGRAM IN EMILIA-ROMAGNA REGION, ITALY

Several institutions and professional associations have issued recommendations for infection pre-

TABLE 2 - Basic principles for infection surveillance and control in nursing homes.

Key elements	Comments
Infection control committee (ICC)	The ICC of the Local Health Authority should be responsible for infection control in this setting
Infection control nurse (ICN)	Consultancy by the Hospital ICN and link nurses within the facility (or a dedicated nurse) should be considered
Surveillance of endemic and epidemic infections	Early detection of potential infections, timely report to the physician, a system for recording infections and analysing trend should be in place. Standardized definitions of infection are mandatory
Recommendations and written procedures	Each institution should develop its own, written procedures; in particular, the following issues should be considered: standard precautions and hand hygiene, outbreak control, isolation precautions, disinfection/sterilization, immunization of residents, control of specific infections related to invasive procedures or to person-to person transmission
Education/training	Education of the staff, residents and visitors concerning infection prevention
Antibiotic policies	Limitation of antimicrobial use; evidence-based antibiotic treatments
Immunization programs	The following immunization programs of the residents should be considered: influenza vaccine (for employee also), pneumococcal vaccine, tetanus, diphtheria

vention and control in non-acute healthcare settings (Smith *et al.*, 1997, Jenkinson *et al.*, 2006). Table 2 summarizes the basic principles for controlling infections in residential facilities.

An intervention program, aimed at the prevention of infections and pressure ulcers, was conducted in 22 residential facilities of three Local Health Authorities (LHA) of the Emilia-Romagna region: 14 facilities targeted infection control prevention, while eight targeted pressure ulcers.

The intervention consisted of the followings: a task force was created in each LHA, with the aim of reviewing the practices adopted and identifying the need for change; an educational programme was carried out involving all healthcare and social workers in each facility. The intervention is under evaluation; three dimensions have been explored: the frequency of infection, detected by means of six point-prevalence surveys; the protocols and operative procedures existing for infection-control practices, before and after the intervention; and knowledge of infection control issues by staff before and after the intervention.

The crude prevalence of infected patients, in subsequent point-prevalence surveys and in comparable periods of the year, suggests a reduction of infections transmission in these institutions: the prevalence was 13.3% and 7.7%. (before and after the intervention) in surveys carried out in spring; 16.3% and 13.0% in autumn. In particular, a decrease in the prevalence of skin infections, oral infections, respiratory infections was observed.

More detailed analyses are under way to take into account the effect of seasons and of patient case-mix.

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