Journal of Hospital Infection (2006) 63, 211–215

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Incidence of hospital-acquired infections in Italian long-term-care facilities: a prospective six-month surveillance

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Received 12 October 2004; accepted 9 January 2006
Available online 5 April 2006

KEYWORDS
Hospital-acquired infections;
Long-term-care facilities; Risk factors;
Incidence

Summary This study presents results from a six-month prospective surveillance of hospital-acquired infections in four Italian long-term-care facilities (LTCFs). Eight hundred and fifty-nine patients were enrolled and 21 503 person-days were observed. Two hundred and fifty-four hospital-acquired infections (HAIs) occurred in 188 patients. The overall infection rate was 11.8 per 1000 person-days. The most frequent infections were urinary tract infections (3.2 per 1000 person-days), lower respiratory tract infections (2.7 per 1000 person-days) and skin infections (2.5 per 1000 person-days). Risks related to HAI in a multi-variate regression model were: length of stay $\geq$28 days [odds ratio (OR) 3.5, 95% confidence intervals (CI) 2.4–5.0]; presence of a device (OR 2.0, 95%CI 1.3–3.0); Norton scale $<$12 (OR 1.8, 95%CI 1.2–2.6); and being bedridden (OR 1.7, 95%CI 1.08–2.6). The presence of HAI increased the median length of stay (31 days vs 20 days, $P < 0.01$) without a significant influence on fatal outcome (OR 1.4, 95%CI 0.7–2.7).

Introduction

Long-term-care facilities (LTCFs) comprise a heterogeneous group of institutions that provide a wide variety of services to diverse groups of patients, most of whom are elderly.[1,2] Infections in the LTCF population are a major source of morbidity and mortality.[3] They are often difficult to

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doi:10.1016/j.jhin.2006.01.012

diagnose[4–7] and although definitions of infection vary from study to study, the most commonly used are those of Association for Professional in Infection Control (APIC).[8] Since patient populations are often dissimilar, and the level of surveillance may vary from one setting to another, reported prevalence ranges from 2.4% to 32.7% and incidence ranges between 2.6 and 9.5 infections/1000 resident-days.[6,9–11] Most studies report prevalence data as these are easier to collect, but rates tend to be higher than incidence rates because infected patients have longer hospital stays.[7] In Italy, two prevalence studies have suggested a prevalence ranging from 7.5% to 12.8%.[12,13] Incidence data for Italy have not been published. Therefore, this study aimed to assess the incidence of hospital-acquired infection (HAI) and risk factors in Italian LTCF patients.

Methods

This study enrolled four LTCFs in North-Eastern Italy, comprising a total of 144 beds. All consecutive admissions from 12 May to 12 November 2003 were enrolled, and the follow-up period ended on 30 November 2003. After a pilot study and ad hoc training, LTCF nurses assessed patient data on a daily basis and an external supervisor checked the data for completeness and quality.[13]

At each admission, patient name, sex, date of birth, admission date, comorbidity, cause of admission, antibiotic therapy, urinary catheter, community infections and Norton scale (a standardized instrument that measures the risk of developing pressure ulcers; scores <12 are considered at risk) were recorded on a standardized form.[14]

Patients were checked daily for evidence of infection, which was categorized as community or hospital acquired according to APIC definitions.[8] These LTCF patients were admitted after an evaluation was made by a team including a General Practitioner, a local health district medical officer and nurses.

Statistical methods

The incidence of infection was calculated as the number of infections during the stay in the LTCF per 1000 person-days. Exposure to devices was calculated as the device utilization rate (DUR) using the number of patient-days (the total number of days that patients spent in the LTCF during the selected period) as the denominator and the number of device-days (the total number of days that patients were exposed to any device) as the numerator.

Statistical analysis was performed using SPSS Version 12.0. For continuous variables, Mann Whitney U-test was used. Non-continuous variables were compared using Chi-squared test. Independent predictors of infection were determined using multiple logistic regression as the clinical exposures of patients extended the total length of stay.

To explore the influence of HAI on mortality, univariate analysis was performed using the following variables: sex, age, length of stay, Norton scale, bedridden status, community-acquired infections, HAI, devices, cancer, cardiorespiratory disease, diabetes and neurological disease. Those positively associated with death (Norton scale <12, presence of devices, cancer, cardiorespiratory disease and HAI) were included in a multiple logistic regression model to explore independent predictors of mortality. This model was used because clinical exposures extended the total length of stay.

Results

This study involved 859 patients and 21 503 person-days. The mean age of the study population was 79.6 years [standard deviation (SD) 11.6, mode 83, median 81], 66.8% (574/859) were females, and the mean length of stay was 29.6 days (SD 53.3, mode 20, median 22).

Reasons for admission were: neurological diseases (32%), chronic inflammatory disease (24%), postsurgery convalescence (22%), cancer (10%), other causes (diabetes, cardiovascular diseases, etc.) (12%) and social problems (3%).

Patients were admitted from home in 446 cases (51.9%), and the remainder were admitted from acute hospitals. The most prevalent comorbidities were: neurological diseases (41.6%), diabetes (24.1%), cardiorespiratory syndromes (19.4%) and cancer (17.2%).

There were 328 infections of which 74 were community acquired and 254 were LTCF acquired. Overall, 188 patients (21.8%) had an HAI (incidence 11.8/1000 patient-days); 42 patients had multiple infections. Table I shows the incidence of specific HAIs and community-acquired infections.

Table II gives the general characteristics of the population and their correlation with HAI risk. Urinary catheters, subcutaneous lines and percutaneous endoscopic gastrostomy tubes with DURs of 0.16, 0.10 and 0.04, respectively, were the most