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The accuracy and validity of a weekly point-prevalence survey for evaluating the trend of hospital-acquired infections in a university hospital in Turkey☆

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SUMMARY

Objective: To evaluate the validity of a weekly point-prevalence survey (WPS) by comparing it with a prospective-active incidence survey (PIS).
Methods: WPS and PIS were conducted at a tertiary referral hospital between January and December 2006. Each Wednesday, an infection control team reviewed all clinical records of patients with hospital-acquired infections (HAIs) by WPS. Routine PIS was conducted with daily visits by the same team. The Rhame and Sudderth formula was used for converting the data between WPS and PIS.
Results: During the study period, 1287 HAIs were detected in 37 466 patients by WPS. The mean observed prevalence and calculated prevalence were 5.42% and 5.45%, respectively. The reanimation intensive care unit (ICU) (49.4%) and burns unit (27.6%) had the highest prevalence rates. Pneumonia (0.94%) and urinary tract infections (0.37%) were the most frequent infections. Overall 602 HAIs were detected in 545 patients by PIS. The mean observed incidence and calculated incidence were 2.42/1000-admissions and 2.41/1000-admissions, respectively. The Critical care ICU (37.0/1000-admissions) and burns unit (24.8/1000-admissions) had the highest incidences of HAI. Pneumonia (0.64/1000-admissions) and urinary tract infections (0.37/1000-admissions) were the most frequent infections.
Conclusions: This study confirms a close relationship between prevalence and incidence data. WPS may be a useful method for following HAIs when PIS cannot be performed.

1. Introduction

Hospital-acquired infections (HAIs) are an important cause of morbidity and mortality, as well as significantly increased hospital stays, additional antibiotic utilization, and healthcare costs.[1–6] The surveillance of HAIs is a crucial component of a qualified infection control program and is widely accepted as a primary step in the control of HAIs.[1,6–13] The difficulties associated with surveillance of HAIs have led to a variety of methodological approaches, which many experimental studies have tested.[9,13,14] For example, the incidence survey is regarded as the most powerful method, and a gold standard for evaluating the burden of HAIs. However, incidence studies are expensive because data have to be collected over a long period and require more experienced investigators.[6,8,11] However, point-prevalence studies are less expensive and time-consuming, and can be performed more easily than incidence studies.[6–8,13–16] In addition, these studies increase awareness of the problem at hospitals and are widely accepted and recommended by many investigators, particularly when they can be repeated at regular intervals.[7,10,17]

The repeated prevalence survey is used to evaluate an infection control program, follow the trends of HAIs, measure the adverse effects and costs of HAIs, and determine the rate of device and antibiotic usage.[8,16] In developing countries, because of limited resources, the repeated point-prevalence survey may be a good alternative for the surveillance of HAIs.

The aim of this study was to determine the trend and extent of HAIs by weekly point-prevalence survey (WPS), and examine the accuracy and validity of WPS by comparing this method with a prospective-active incidence survey (PIS).

2. Methods

2.1. Setting

This study was performed across all departments of Dicle University Hospital (DUH) between January and December 2006.

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DUH is an 1150-bed tertiary referral center, and the largest hospital in the southeast of Turkey. The hospital is 25 years old and has 33 separate clinics, including a reanimation intensive care unit (ICU) and a burns unit. Annually, about 40 000 patients are treated at DUH, and in 2006, the proportion of hospitalized patients was 77%.

During 2006, WPS and PIS were conducted across all departments of the hospital by the central infection control committee, and all hospitalized patients were included in the study. For WPS data collection, the central infection control committee was composed of a surveillance team, including a specialist physician, two resident physicians, and two infection control nurses. The team was experienced and trained in HAIs. Hospital wards were classified into two general types: surgical and internal clinics. The Critical care ICU and the burns unit were classified as surgical clinics. Subsequently, the team was divided into two groups including a resident physician and a nurse, and employed to record HAI data in both the surgical and internal clinics. This study was directed by the specialist physician, who was a member of the central infection control committee.

2.2. Definitions and data collection

The diagnosis of HAIs was made according to the Centers for Disease Control and Prevention criteria[18] and the National Nosocomial Infections Surveillance System methodology.[19] Asymptomatic bacteriuria was not categorized as an HAI.

Each Wednesday during the prevalence study, WPS was performed by the team. On this day the team reviewed the clinical and laboratory records of all hospitalized patients. Patients were detected according to positive cultures, symptoms of infection, and antibiotic treatment for HAIs. Patient data were recorded on a standard form, including the total number of hospitalized patients and the number and types of HAI. The rates of HAI in all clinics were then calculated. PIS was performed based on patient clinical and laboratory records by the same team with daily visits to all departments of the hospital. Positive cultures from patients were obtained from the central microbiology laboratory by the team. Subsequently, the team visited all patients at the bedside with their clinic physician and nurses. All cases with HAI were recorded on a standard form. If a patient had symptoms and signs of infection, the medical and nursing notes, microbiology reports, temperature, and antibiotic treatment charts were reviewed. Urinary tract infections, pneumonia, surgical site infections, bacteremia, sepsis, burn infections, wound infections, catheter-related infections, intraperitoneal infections, abscess, empyema, meningitis, and orthopedic prosthesis infections were recorded by both WPS and PIS. The team filled out a worksheet for each patient diagnosed with HAI. The data recorded on the standard forms were then transferred to a Microsoft Office Excel 2003 spreadsheet (Microsoft Corp., Redmond, WA, USA).

2.3. Interconversion of incidence and prevalence data

The Rhame and Sudderth formula[20] was used for converting the data from incidence to prevalence, and vice versa. According to this formula, the prevalence rate of HAIs was calculated as follows: $P = I \times [(LN - INT)/LA]$, where P is prevalence, I is incidence, LN is the length of hospitalization of patients having one or more HAI, INT is the average interval between admission and onset of the first HAI for patients having one or more HAI, and LA is the average length of hospitalization of all the hospitalized patients during the study period.

2.4. Statistical analysis

For each week during the study period, HAI prevalence was calculated as the ratio of the number of HAIs to the total number of hospitalized patients on the day of the WPS. The mean prevalence for the year was calculated by averaging the weekly prevalences. The mean prevalences were presented with a range (minimum–maximum) of observed prevalences. Mean prevalence for the year was also calculated as 'biweekly' and 'monthly' (by considering only data from every second or every fourth week, respectively). The incidence of HAIs was calculated as the ratio of the number of HAIs to the number of patient admissions (per 1000-admissions) in 2006. Statistical analyses were carried out using SPSS software, version 13.0 (SPSS Inc., Chicago, IL, USA).

3. Results

During the study period, 1287 HAIs were detected in 37 466 patients by WPS. According to WPS results, the mean weekly observed prevalence rate of HAIs was 5.42% (range 1.9–8.4%) over the study period. According to the biweekly and monthly results, the mean observed prevalence rates of HAIs were 5.5% (range 3.2–8.4%) and 5.4% (range 3.2–7.1%), respectively. Figure 1 shows the trend of weekly mean prevalence rates of HAIs for internal clinics and surgical clinics during the study period. According to WPS results, pneumonia (0.94%), urinary tract infections (0.37%), and bacteremia (0.35%) were the most frequent infections (Table 1). The Critical care ICU had the highest prevalence rate (49.4%), followed by the burns unit (27.6%), neurology (10.5%), and the general surgery ICU (8.4%) (Table 2).

During the same study period, a total of 40 100 patients with 249 000 admissions were examined by PIS. A total of 602 HAIs

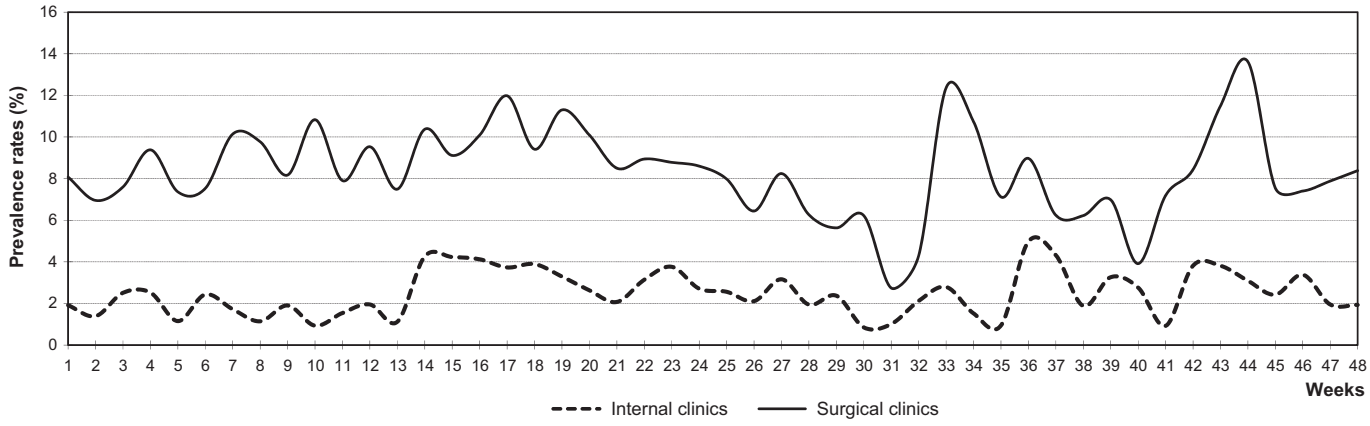

Figure 1. The trend of weekly mean prevalence rates of hospital-acquired infections (HAI) for internal clinics and surgical clinics during the weekly point-prevalence survey study.