Point prevalence survey of antimicrobial utilization in a Canadian tertiary-care teaching hospital

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Abstract *Objectives:* Inappropriate antimicrobial use can promote antimicrobial resistance, which is associated with increased patient morbidity and mortality. Identifying the pattern of antimicrobial use can provide data from which targeted antimicrobial stewardship interventions can be made. The primary objective was to identify the prevalence of antimicrobial use at a tertiary care teaching hospital with both acute and long-term care patients.

Methods: A point prevalence study was conducted on July 19th, 2012. Data on antimicrobial utilization, indication for prescribing, duration of therapy, and frequency of infectious disease or antimicrobial stewardship consultations were collected using a customized integrated stewardship database (SPIRIT) and prospective chart review.

Results: One or more antimicrobial agents were ordered in 31% and 4% of acute care and long-term care patients, respectively. Respiratory and urinary tract infections were the most common indication for antimicrobial therapy in both acute and long-term care. About 25% of surgical prophylaxis orders were prescribed for greater than 24 h.

Conclusion: This prospective point prevalence survey provided important baseline information on antimicrobial use within a large tertiary care teaching hospital and identified potential targets for future antimicrobial stewardship initiatives.

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A multi-center point prevalence survey should be considered to identify patterns of antimicrobial use in Canada and to establish the first steps toward international antimicrobial surveillance.

1. Introduction

Antimicrobial resistance is an unavoidable consequence of antimicrobial use and is correlated with the overall use of these agents [1,2]. It has been reported that approximately one third of patients admitted to hospital receive an antimicrobial agent during their hospital stay [3–5]. This is particularly problematic when up to 50% of all courses of antimicrobial therapy are deemed unnecessary [4,6,7]. Antimicrobial resistance is increasing and is a concern because it is associated with increased patient length of hospital stay, mortality, and cost. [8,9] Since both frequent and prolonged use of antimicrobial agents may promote the emergence of resistance [10,11], antimicrobial stewardship is recommended as a means of reducing antimicrobial resistance, along with lowering the risk of adverse drug events, treatment complications, and institutional costs [7,12]. It is important for institutions to understand their patterns of antimicrobial use to identify appropriate stewardship interventions that have the greatest likelihood of impacting institutional antimicrobial utilization and therefore, the aforementioned consequences of antimicrobial use.

We conducted a point prevalence survey to quantify antimicrobial utilization and determine patterns of use at a Canadian tertiary care teaching hospital and affiliated long-term care facility. It is hoped that this information will serve as a baseline for future point-prevalence surveys, and provide a measure of the effect of antimicrobial stewardship interventions. The primary objective of this survey was to determine the prevalence of patients in the hospital and residing in the associated long-term care facility who were receiving at least one antimicrobial agent, and the prevalence of individual antimicrobial orders on the survey date. The secondary objective of this study was to describe the pattern of antimicrobial prescribing (choice of antimicrobial agent, indication, and duration of therapy).

2. Methods

The point prevalence survey was conducted at Sunnybrook Health Sciences Centre, a 1212-bed adult teaching hospital in Toronto, Ontario,

Canada, with acute care facilities and an adjoining veteran's long-term complex care facility. The hospital's programs include aging, trauma, oncology, neurosciences, women and babies, cardiac and musculoskeletal diseases. There is a multi-disciplinary antimicrobial stewardship program (ASP), which prospectively audits the use of targeted antimicrobials and consults with prescribers on days 3, 7, and 14 of therapy [13,14]. Targeted antimicrobials include fluoroquinolones, third generation cephalosporins, carbapenems, aminoglycosides, vancomycin, and piperacillin-tazobactam. At the time of the survey, ASP services were being provided to most acute-care inpatient units but not to the long-term care units.

The survey was conducted on July 19, 2012, and included inpatients who were receiving a systemic antibacterial, antifungal, or antiviral agent on that day. Neonates, emergency room patients who were not yet admitted, palliative care patients, and obstetric patients were excluded from the survey. Orders for anti-retroviral, anti-tuberculous, and anti-parasitic medications were also excluded from the survey.

Patients were identified through the Stewardship Program Integrated Resource Information Technology (SPIRIT) database, which receives inputs in real time from the hospital's pharmacy, microbiology, hematology and biochemistry laboratories and the admission/discharge and transfer databases [14]. The data elements of interest were abstracted directly from the SPIRIT database and supplemented by prospective review of electronic and paper charts by an infectious diseases physician or pharmacist with the aid of a standardized electronic form.

Prevalence in this study was determined using the number of patients receiving at least one antimicrobial agent or a number of antimicrobial orders as the numerator, and the total number of inpatients (excluding patients previously described) as the denominator standardized to 1000 patients on the study day. Antimicrobials in this survey were presented as classes defined by the Anatomical Therapeutic Chemical (ATC) classification system from the World Health Organization (WHO) Collaborating Centre for Drug Statistics