Background: Surveillance and control of hospital antimicrobial (AM) use are intended to limit AM resistance. Using 10 different indicators for AM monitoring, we aimed to measure AM use in nine intensive care units (ICUs) in Montréal.

Methods: AM prescriptions for all patients admitted to participating ICUs (3 neonatal, 2 pediatric, 4 adult) between April 2006 and March 2010 were measured retrospectively using 10 different indicators of AM use. These indicators were obtained by combining 5 numerators (defined daily doses [DDDs], recommended daily doses [RDDs], agent-days, exposed, and number of courses) with 2 denominators (patients’ days and admissions). Indicators were computed for by class of AM, in accordance with the Anatomical Therapeutic Chemical Classification System, and were stratified by year and ICU type. Poisson regression was used to estimate time trends and differences in AM use by type of ICU.

Results: Overall, ranking of AM use by class was similar, regardless of the indicator used. When RDDs, exposed and courses were used, the most frequently used AM classes were cephalosporins, followed by penicillins and aminoglycosides. Using agent-days, penicillins came first, followed by aminoglycosides and penicillins and β-lactam inhibitors. With RDDs, more variations were observed. From 2006 to 2010, a decrease was observed in aminoglycosine, penicillin and quinolone use, while carbapenem and macrolide use remained stable. Compared to adult ICUs, 1) aminoglycosides and penicillins use was higher in both neonatal and pediatric ICUs; 2) carbapenem, glycopeptides and quinolones use was lower; 3) cephalosporin and macrolide use was lower in neonatal ICUs and higher in pediatric ICUs.

Conclusion: Frequency of AM prescribing varied in time and across ICU types, but these trends often varied depending on indicators used. A standard set of indicators would facilitate surveillance of AM use in a population.

Introduction

Surveillance and control of hospital AM use are intended to limit selection and spread of AM resistance.

Objective

Using 10 different indicators of populational AM use, we aimed to measure AM use in nine ICUs.

Methods

STUDY DESIGN AND POPULATION

A standard set of indicators would facilitate surveillance of AM use in a population.

NUMERATORS

AM prescriptions [class J01 of the Anatomical Therapeutic Chemical classification system (ATC)]

Doses and days of treatment prescribed to be used on the ICU admission or discharge dates, or in-between, were included.

Definitions of numerators:

1. Defined daily doses (DDDs): number of prescribed doses, using standard values specified in version X of the ATC/DDD

2. Recommended daily doses (RDDs): number of prescribed doses using standard values recommended in the 2008 Sanford Guide, the 2012 Red Book, The Montreal Children’s Hospital Pediatric Drug Formulary and Nelson 2011. Weight of pediatric patients was accounted for (mg/kg).

3. Agent-days: number of patient-days when each specific AM agent was prescribed.

4. Exposed: number of patients who were prescribed an AM agent, regardless of quantity or duration

5. Courses: number of distinct periods of consecutive days when a patient was prescribed a specific AM

DENOMINATORS

1. ICU admissions: included transfers from other wards

2. Patient-days: ICU admission and discharge days each counted for half a day

STATISTICAL ANALYSES

Additive poisson regression modeling, adjusting for either time trend or ICU type (adult ICUs as reference).

RESULTS

Antimicrobial Use in Nine Intensive Care Units, Using Ten Different Indicators

Élise Fortin, PhD(c) 1, 2, Robert W. Platt, PhD, 1, Patricia Fontela, MD PhD, 1, Milagros Gonzales, MSc, 1 David L. Buckingham, MD PhD, 1 Philippe Ovetichkine, MD MSc 5 and Caroline Quach, MD MSc 6

1. Epidemiology, Biostatistics, and Occupational Health, McGill University, Canada; 2. Institut National De Santé Publique Du Québec, Canada; 3. Pediatric Intensive Care, The Montreal Children’s Hospital, Canada; 4. Division of Infectious Diseases, Department of Pediatrics, The Montreal Children’s Hospital, Canada; 5. Department of Pediatrics, Division of Infectious Diseases, CHU Sainte-Jeanne – Université of Montreal, Canada.

References

1. Aminoglycosides
2. Penicillins
3. Cephalosporins
4. Glycopeptides
5. Carbapenems
6. Others
7. Monobactams
8. Quinolones
9. TMP-SMX

ABBREVIATIONS:

ADM: admissions; PDL: patient-days; PBL: penicillins and β-lactamase inhibitors; TMP-SMX: trimethoprim-sulfamethoxazole

Table 1. Antimicrobial use time trends, using ten indicators.

Table 2. Differences in antimicrobial use between ICU types, using ten indicators.

Contact information

Caroline Quach, MD MSc
PhD(c)
Infectious Diseases Division and Occupational Health
McGill University Health Centre
Montreal, Quebec, Canada
Email: caroline.quach@mcgill.ca
Phone: 1-514-666-7000 ext 319

Elise Fortin, PhD(c)
Epidemiology, Biostatistics and Occupational Health
McGill University
Montreal, Quebec, Canada
Email: elise.fortin@mail.mcgill.ca
Phone: 1-514-934-1934 #22620

Acknowledgements

This study was supported by a grant from the Réseau hospitalier universitaire de santé Montréal. The authors declare no conflict of interest.

Conflict of interest

None.

Support

None.

© 2012 Elsevier Inc. All rights reserved.