Prevalence of Antimicrobial Resistance of Community Urinary Isolates against First-line Antimicrobial Agents Commonly Used in the Treatment of Uncomplicated Urinary Tract Infections, and Impact of Age on Resistance Rates

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ABSTRACT

Monitoring trends of antimicrobial resistance is critical for guiding appropriate treatment of infection. The purposes of this study were (1) to investigate the prevalence of current antimicrobial resistance in community urinary isolates against first-line agents commonly used for the treatment of uncomplicated urinary tract infections (UTIs) in non-hospitalized patients, (2) to determine whether rates of resistance varied by different age groups.

METHODS

Isolates were identified from urine cultures prospectively from July 2009 to December 2009, and were tested against appropriate antimicrobials by disk diffusion susceptibility testing, in accordance with CLSI guidelines. Resistance rates were determined for amoxicillin (AM), ceftriaxone (CF), ciprofloxacin (CIP), gentamicin (GM), nitrofurantoin (NOR), norfloxacin (NOR), and trimethoprim/sulfamethoxazole (TMP/SMX), for all isolates and by patient age groups (<1 year old, 1-18, >18-30, >30-40, >40-50, >50-65, >65-75, >75 years).

RESULTS

A total of 4,290 isolates were tested including Escherichia coli (n = 2,805), Enterococcus faecalis (n = 218), coagulase-negative staphylococci (n = 106), Citrobacter spp. (n = 332), Morganella morganii (n = 26), Proteus spp. (n = 42), Staphylococcus aureus (n = 4), and Pseudomonas aeruginosa (n = 2) species. Resistance rates for AM, CF, CF, PM, GM, NOR, and TMP/SMX were 44%, 31%, 12%, 9%, 12%, 50, and 50%, respectively. Higher resistance rates were associated with increasing age. FM was the agent with the lowest resistance rate.

CONCLUSION

Current resistance patterns of community urinary isolates indicate that rates of antimicrobial resistance increase with age, and that FM is the most likely of the antimicrobials in this study to have a favorable antibacterial outcome in the empiric treatment of uncomplicated UTIs.

INTRODUCTION

Increasing resistance in clinical isolates, including an increase in the prevalence of multiresistant extended-spectrum beta-lactamases (ESBL) and of multidrug-resistant Staphylococcus aureus, has been previously described in both community and hospital settings.1 Knowledge of antimicrobial resistance may influence the empiric treatment of infection and the development and implementation of treatment guidelines. However, accurate and comprehensive data are scarce on current resistance rates in organisms implicated in uncomplicated urinary tract infections (UTIs), and recent reports on resistance in urinary isolates have involved few and less diverse clinical isolates, or focused on Escherichia coli as the most frequent isolate.2,3

In order to provide a more comprehensive picture of the diverse pathogens isolated and to monitor current trends of their antimicrobial resistance, we aimed to investigate the prevalence of resistance in community urinary isolates against first-line agents commonly used for the treatment of uncomplicated UTIs in non-hospitalized patients, and to determine whether rates of resistance varied by different age groups.

METHODS

Of 22,933 urine specimens submitted for culture from July 1, 2009 to December 31, 2009, a total of 4,290 isolates (18.7%) from the 2,049 patients (47.5%) for whom one or two isolates were identified by standard criteria4 and tested against appropriate antimicrobials by disk diffusion, in accordance with published guidelines of the Clinical and Laboratory Standards Institute (CLSI).5 Organisms not recommended by CLSI for antimicrobial susceptibility testing were excluded from the study.

Resistance rates were determined for amoxicillin (AM), ceftriaxone (CF), ciprofloxacin (CIP), gentamicin (GM), nitrofurantoin (NOR), norfloxacin (NOR), and trimethoprim/sulfamethoxazole (TMP/SMX). Patient age groups were defined as follows: <1, 1-18, >18-30, >30-40, >40-50, >50-65, >65-75, >75 years.

RESULTS

The organisms and number of isolates tested in this study are listed in Table 1. AM was the most frequently isolated organism (46%), non-ESBL E. coli bacteria accounted for almost 50% of all isolates tested for antimicrobial susceptibility in this study. The purpose of this study was to determine whether rates of resistance varied by different age groups.

As seen in Table 2, the overall resistance rates for AM, CF, CF, PM, GM, NOR, and TMP/SMX were 44%, 31%, 12%, 9%, 12%, 50, and 50%, respectively. There was a trend toward higher resistance rates with increasing age (Table 2). This may reflect the use of older agents in older patients, or it may reflect the use of older agents in older patients.

CONCLUSIONS

1. Current resistance patterns of community urinary isolates show a trend towards higher resistance rates with increasing age.

2. Nitrofurantoin exhibited excellent in vitro activity against the common uropathogens identified in this study.

3. Increasing resistance in clinical isolates, including an increase in the prevalence of multiresistant ESBL and multidrug-resistant S. aureus, has been previously described in both community and hospital settings.1

REFERENCES


ACKNOWLEDGMENTS

We thank Tommy Li for excellent technical and personal lay-out assistance. This work was supported in part by Ontario Canada of Thermo Fisher Scientific, Bio-Medica (Canada), and Ciba Canada.

Table 1: Organisms Tested in this Study

Table 2: Number of Resistant Isolates and Rates of Resistance by Age Group*