Abstract: P791

Citation: Clinical Microbiology and Infection Volume 8, Supplement 1, 2002

Emerging resistance among Proteus mirabilis isolates in Europe: report from the MYSTIC program (1997-2001)

R. Jones, P. Turner, A. Mutnick

On behalf of the MYSTIC Study Group, Europe, North Liberty, USA; Macclesfield, UK

Objective:
Resistance (R) patterns that are currently problematic in Europe (EU) can vary greatly within the same species over time, among various patient populations and among geographic regions on the same continent. The results from the MYSTIC Program which monitors meropenem (MEM; a carbapenem)-R in institutions using MEM, were used to determine R differences among P. mirabilis for EU from 1997 to 2001.

Methods:
MYSTIC collected MIC results from 688 P. mirabilis strains that were classified into patient care groups: ICU (n = 426), neutropenia (NP; n = 145), general wards (n = 97) and cystic fibrosis patients (pts) (CF; n = 20). A total of 31 centers from 10 countries participated, divided into three regions (East, North, South). All testing was by reference methods and interpreted by NCCLS criteria, including screening of ESBL phenotypes (clavulanate inhibition). Six β-lactams, ciprofloxacin (CIP), gentamicin (GM) and tobramycin (TM) were tested.

Results:
Over the monitored 5 years, the R rates varied for each agent without a clear trend toward greater R. Rank order of susceptibility was: MEM (99%) > piperacillin-tazobactam (TAZ; 96%) > cefepime (95%) > ceftazidime (CAZ; 94%) > imipenem (IPM; 92%); CIP was least active (MIC$_{90}$, 4 mg/L; 86% susceptible). Unexpectedly, 3.6% of P. mirabilis were IPM-R (MIC, ≥16 mg/L). Greater was found for strains from NP and CF, for example 40-77% susceptibility to CIP. P. mirabilis in East-EU sites were significantly more R to cephalosporins (ESBL rate, 24%), but CIP-and GM-R was greatest in South-EU centers. ESBL rates were 8% in North-EU, but >20% for the other geographic regions. Carbapenems (MEM > IPM) and the β-lactamase inhibitor combination (TAZ) remained most active overall.

Conclusions:
Normally susceptible species such as P. mirabilis have emerged as therapeutic problems in EU, following R mutations compromising CIP, CAZ and aminoglycoside use. IPM also showed decreased susceptibility of nearly 7% compared to only 4% with MEM. Continued surveillance by the MYSTIC Program appears to be a prudent practice to guide effective empiric treatment regimens.
EMERGING RESISTANCES AMONG PROTEUS MIRABILIS ISOLATES IN EUROPE: REPORT FROM THE MYSTIC PROGRAMME (1997-2001)

RN Jones,1 PJ Turner,2 AH Mutnick,1 and the MYSTIC Study Group (Europe)

1The JONES Group/IMI Laboratories, North Liberty, Iowa, USA; Tufts University School of Medicine, Boston, Massachusetts, USA; and 2AstraZeneca, Macclesfield, Cheshire, UK

INTRODUCTION

For a decade, TEM or SHV-derived extended-spectrum β-lactamases (ESBLs) have been described in Europe, Latin America, South Africa, and the United States (USA). The advent of ESBL-producing strains, initially among Klebsiella spp. and Escherichia coli, has resulted in a great threat to the use of many classes of β-lactam antimicrobials. It has been well recognised that therapeutic failure occurred when patients with serious infections due to ESBL-containing organisms were treated with the new cephalosporins, penicillins, and β-lactam inhibitor combinations. Proteus mirabilis is widespread in the environment and is part of the normal flora of the human gastrointestinal tract. P. mirabilis is commonly isolated in clinical laboratories, accounting for 1.5% of bloodstream infections and 4.9% of urinary tract infections in reported studies. P. mirabilis is equally susceptible to susceptible to a large group of antimicrobials, however, resistances mediated by ESBLs have been described. Acosmicms due to ESBL-producing P. mirabilis have been reported worldwide over the past few years.

The aim of this study was to evaluate the susceptibility patterns and geographical distribution of TEM (TEM) and TEM cephalosporin antimicrobials against P. mirabilis isolates in Europe, and to assess regional variations within the defined geographically different areas using data from the MYSTIC Surveillance Programme.

METHODS

Between 1997 and 2001 a total of 688 P. mirabilis isolates was collected by the participating MYSTIC study groups. A total of 33 different medical centres in 10 countries throughout Europe (7 from the UK, 8 from Belgium, 6 from Germany, 2 from Turkey, and 1 each from the Czech Republic, Russia, Poland, Sweden, and Switzerland) participated in the study. The participating countries were further divided into three geographical regions and included: East (Czech Republic, Poland, Russia, and Turkey), North (Belgium, Germany, Sweden, and the UK), and South (Italy and Switzerland). Isolates were collected from four different patient care areas and included patients from intensive care units (ICU) (n=426), patients with neutropenia (n=145), general hospitalised patients (n=97), and cystic fibrosis patients (n=20).

RESULTS

The rank order of susceptibility for the antimicrobials tested is presented in Table 1. The highest MIC90 for all antimicrobials (≥2 mg/L) was observed for P. mirabilis isolates from Europe based on geographical regions (99.1%) and neutropenic (100.0%) patients. TAZ had the lowest rate of ESBL-phenotype occurrence (26.3%), compared with 24.4 and 23.4% in the East and South regions, respectively.

CONCLUSIONS

1. During the 5-year evaluation, MEM (MIC50, 0.25-0.5 mg/l; MIC90, 96.3-96.5%) and IMI (MIC50, 191.7%) demonstrated the most consistent potency and susceptibility rates throughout the three geographical regions. However, IFN has consistently displayed elevated resistance rates (77.2%) among ESBL-producing P. mirabilis (Table 3).

2. MEM continues to demonstrate potent activity and high MIC90 susceptibility rates (96.3-96.5%) against P. mirabilis, regardless of the presence of an ESBL-phenotype. This was superior to IMP (77.7%) (Table 2).

3. Among the agents tested, GM (86.4%), TM (85.6%), and CIP (85.9%) continue to demonstrate lower but comparable levels of susceptibility against P. mirabilis.

4. MEM demonstrates potent activity (MIC50, 0.25 mg/l) against P. mirabilis isolates that are resistant to β-lactam/β-lactam inhibitor combinations, as well as to fluoroquinolones and aminoglycosides.

5. Continued use of longitudinal resistance surveillance projects, such as the MYSTIC Programme, will provide the proactive data necessary to track changing susceptibility patterns, and suggest optimal therapeutic regimens.

ACKNOWLEDGEMENTS

The authors acknowledge the support of an educational research grant from Astellas Pharma. The participating MYSTIC study groups were: UK - Dr Masterton (Edinburgh), Dr Bint (Newcastle), Dr Hood (Thorpe Hesley); New Zealand - Dr Hopley (Wellington); USA - Dr Edmond (Boston); France - Dr Gonzalez (Nice), Dr Portaels (Liège); Italy - Dr Guglielmi (Trieste); Russia - Dr Pribilov (Moscow); Sweden - Dr Blaschke (Gothenburg); and Switzerland - Professor Bille (Lausanne).

SELECTED REFERENCES


