A Private Sector Approach to Surveillance of Antimicrobial Resistance: The SMART Study

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Study Objectives

• To monitor the in vitro susceptibility of clinical bacterial isolates to antimicrobials in complicated intra-abdominal infections and complicated urinary tract infections worldwide.
• To identify early changes in susceptibility patterns of community- or hospital-acquired organisms, including those that produce extended-spectrum β-lactamases (ESBLs).

Study Methods

• Isolates are identified to the species level and are shipped and tested as a central study laboratory.
• Each site contributes up to 150 isolates (100 from IAIs, 50 from UTIs) of facultative gram-negative bacilli (from different patients) with intra-abdominal infections.
  - Include unique initial isolates
  - Urinary tract infection isolates collected since 2009
  - Community-acquired and nosocomial infections defined
  - Isolates recovered when hospitalization was >48 hours considered community acquired
  - Isolates recovered after >24 hours of hospitalization considered hospital acquired
• Micro-broth dilution method for detection
• Tryptic Soy Broth with Glycerol and Chocolate Agar Slants for the storage and shipping of isolates
• A centralized database of SMART study findings is maintained by International Health Management Associates, Inc. of Schaumburg, IL.1

Antibiotics Panel2,3,4

<table>
<thead>
<tr>
<th>Ampicillin/subactam5</th>
<th>Piperacillin/tazobactam</th>
<th>Piperacillin</th>
<th>Ceftazidime</th>
<th>Cefepime</th>
<th>Cefotaxime</th>
<th>Ceftriaxone</th>
<th>Cefoxitin</th>
<th>Cefuroxime axetil</th>
<th>Aztreonam</th>
<th>Ciprofloxacin</th>
<th>Aminoglycosides</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESBL-positive (%)</td>
<td>70.0%</td>
<td>30.0%</td>
<td>30.0%</td>
<td>55.5%</td>
<td>30.0%</td>
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Results

SMART Study: Susceptibility of Community- and Hospital-Acquired ESBL-Positive K pneumoniae in China, 2007

• Smart Study: Distribution of Enterobacteriaceae Worldwide (2009)

- In 2009, both intra-abdominal (IA) and urinary tract infection (UTI) isolates were collected (IAI=9173;UTI=1201).
- SMART Study: Susceptibility of ESBL-Positive E coli Worldwide, 2002 to 2009
- SMART Study: Susceptibility of ESBL-Positive and ESBL-Negative K pneumoniae in Asia Pacific Region, 2007
- SMART Study: Prevalence of ESBL-Positive E coli Worldwide, 2002 to 2009
- SMART Study: Frequency of ESBL-Positive Isolates by Country (Asia Pacific Region), 2007

Summary

• Merck/MSD has supported development of one of world’s largest surveillance studies of antimicrobial resistance
• Has provided country, regional, and global data to inform guideline development and clinical decision-making
• Open platform provides significant research opportunity for local investigators

Acknowledgments

Thanks to the SMART investigators around the world, whose efforts make this program possible.

Selected references


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