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ABSTRACT

Objectives: To assess resistance (R) trends to aminoglycosides (AGs) over ten years from a global sample of Gram-negative (GN) pathogens. This study determined the R rates of gentamicin (GEN), tobramycin (TOB), amikacin (AMK), and new aminoglycosides (APCs) in the principal GN species groups from medical centers in North America (NA), Latin America (LA), Europe (EU), Asia-Pacific (APAC), and other regions.

Methods: Non-duplicate isolates from bloodstream and respiratory tract infections were collected from 38 countries between 1998-2007 (37,671 strains) and 2005-2007 (30,380 strains) from the SENTRY Antimicrobial Surveillance Program; 1998-2007, investigators in four geographic regions contributed isolates for this study. These regions included North America (NA; 51 USA sites and 5 sites in Canada), Latin America (LA; 16 sites, six countries), Europe (EU; 46 sites, 18 countries) and the Asia-Pacific (APAC; 57 sites, 12 countries). This multicenter-based collaborative study collected 197,184 isolates from nine species/species groups including E. coli, Klebsiella spp. (9,711), Citrobacter spp. (1,977), Stenotrophomonas maltophilia (ST; 836), and Enterobacter spp. (412). A nearly equivalent number of strains were collected in NA and EU (32,994 and 34,616). The isolate numbers collected in LA and APAC were also very similar from centers in these two regions (14,666 and 14,308).

RESULTS

Bacterial isolates. During a ten year period (SENTRY Program, 1998-2007), investigators in four geographic regions contributed isolates for this study. These regions included North America (NA; 51 USA sites and 5 sites in Canada), Latin America (LA; 16 sites, six countries), Europe (EU; 46 sites, 18 countries) and the Asia-Pacific (APAC; 57 sites, 12 countries). This multicenter-based collaborative study collected 197,184 isolates from nine species/species groups including E. coli, Klebsiella spp. (9,711), Citrobacter spp. (1,977), Stenotrophomonas maltophilia (ST; 836), and Enterobacter spp. (412). A nearly equivalent number of strains were collected in NA and EU (32,994 and 34,616). The isolate numbers collected in LA and APAC were also very similar from centers in these two regions (14,666 and 14,308).

Susceptibility testing. Susceptibility testing was performed at referral laboratories (JMI Laboratories, North Liberty, Iowa, USA and The Women’s and Children’s Hospital, North Adelaide, Australia). The AGs tested each year included gentamicin, tobramycin and amikacin and isolates were processed using reference broth microdilution methods and standardized panels. The panels were manufactured by Treko Diagnostics (Cleveland, Ohio, USA). CLSI approved susceptibility breakpoint criteria were used in North America and Europe (M100-S18, Performance standards for antimicrobial susceptibility tests, Nineteenth edition, CLSI; CLSI; MT-17-A7, Methods for dilution antimicrobial susceptibility tests for bacteria that grow anaerobically, CLSI; CLSI; M7-A7, 2006). Isolates were validated against broth microdilution panels manufactured by TREK Diagnostics (Cleveland, Ohio, USA). CLSI approved susceptibility breakpoint criteria were used in North America and Europe (M100-S18, Performance standards for antimicrobial susceptibility tests, Nineteenth edition, CLSI; CLSI; M7-A7, Methods for dilution antimicrobial susceptibility tests for bacteria that grow anaerobically, CLSI; CLSI; M7-A7, 2006).

Conclusions: Significant geographic variability in AG-S was observed in the results of susceptibility testing from the different continents. Resistance to AGs was observed in all regions including North America (NA), Latin America (LA), Europe (EU) and Asia-Pacific (APAC) regions. The AG-R-mechanisms associated with these isolates were determined using the CLSI M100-S18 and M7-A7 guidelines. This study documented significant variability among AG resistance patterns in the different countries and regions.

SELECTED REFERENCES


CONCLUSIONS

• Resistance to AGs increased in all geographic regions among E. coli, the most common Gram-negative pathogen isolated in this global study (Figure 1).
• It is noteworthy that in regions outside of NA, <50% of Acinetobacter spp. and <80% of P. aeruginosa isolated during 1998-2007 were susceptible to gentamicin.
• Variability among AG susceptibility in different countries and geographic regions is likely due to the dissemination of plasmid-based AG resistance determinants such as AMEs.
• This study documented significant variability among AG resistance patterns between regions, countries and species groups which warrants continued surveillance efforts to monitor these antimicrobial agents, as new compounds in this class are studied.