Resistance Patterns of *Acinetobacter* Isolates Collected Over a 14-year Period at Sunnybrook Health Sciences Centre

Jeffrey Chan[1], Jordanne Feldberg[1], Sandra AN Walker[1,2], Christine Peragine[2]

[1]Leslie L. Dan Faculty of Pharmacy, University of Toronto, Toronto, Ontario; [2]Department of Pharmacy, Sunnybrook Health Sciences Centre (SHSC), Toronto, Ontario

BACKGROUND

Acinetobacter's propensity for developing multidrug resistance makes it a challenging nosocomial pathogen to treat.

Surveillance data from the United States and Europe suggest that *Acinetobacter* bacterial infections carry a crude mortality risk of 30 – 75%, in part as a consequence of inappropriate antibiotic selection; however, data describing patterns of antimicrobial resistance for Acinetobacter isolates in Canada are lacking.

OBJECTIVE

To identify changes in antimicrobial resistance for *Acinetobacter* spp. clinical isolates collected at Sunnybrook Health Sciences Center (SHSC) between 2002 – 2016.

METHODS

Data collection: Susceptibility data for *Acinetobacter* clinical isolates collected from SHSC inpatients between October 2002 to September 2016 were retrospectively extracted from the SHSC Microbiology database.

Analysis: Isolates were classified as antimicrobial resistant (AMR), multidrug resistant (MDR), extensively-drug resistant (XDR), and pan-drug resistant (PDR). Annual trends in ceftazidime, ceftriaxone, ciprofloxacin, co-trimoxazole, gentamicin, meropenem, piperacillin-tazobactam, and tobramycin resistance rates were analyzed using linear regression with a significance level of 0.05. Only antibiotics that were tested for susceptibility in at least 10 isolates per year were included in the analysis.

RESULTS

Of the 544 *Acinetobacter* isolates identified, 282 (52%) were collected from patients admitted to Level 3 ICUs (see Figure 1). Thirty-three percent were collected from respiratory sources, 23% from urine, 19% from blood, and 24% from other sources (see Figure 2).

Ninety-one percent of isolates were classified as antimicrobial resistant (AMR), 17% were multidrug resistant (MDR), 7% were extensively-drug resistant (XDR), and one isolate exhibited pan-drug resistance (PDR). The number of *Acinetobacter* isolates identified each year, as well as the number of AMR, MDR, XDR isolates identified each year are provided in Figure 3.

Susceptibility trends for ß-lactam antimicrobials are illustrated in Figure 3. Susceptibility to piperacillin/tazobactam and meropenem decreased over time (-2.0% resistant/year, p=0.009; and -1.3% resistant/year, p=0.142, respectively).

Susceptibility trends for ß-lactam antimicrobials are illustrated in Figure 4. Ciprofloxacin susceptibility increased over the study period (+1.4% resistant/year, p=0.086).

Cephalosporin, co-trimoxazole, and aminoglycoside susceptibilities remained relatively stable across the 14-year study period.

RESULTS

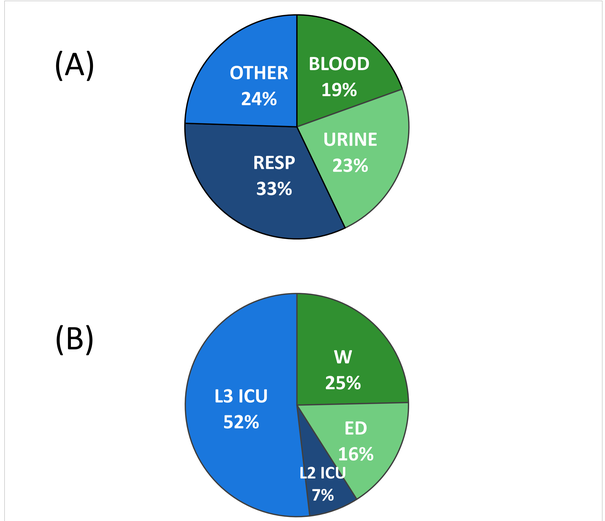

Figure 1. (A) Anatomical source of 544 *Acinetobacter* isolates. The most common source was respiratory samples which included sputum expectorant, bronchial swabs, chest tube drainages, and pleural fluid. (B) Patient location at the time of clinical specimen collection. W, ward; ED, emergency department; L2 ICU, level 2 intensive care unit; L3 ICU, level 3 intensive care unit.

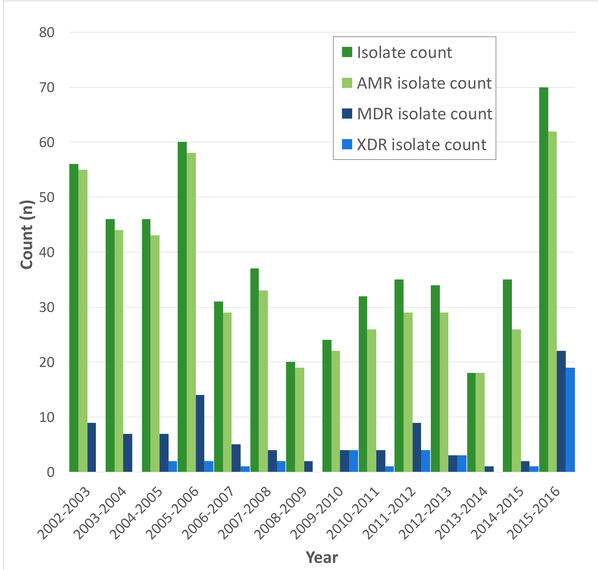

Figure 2. Number of *Acinetobacter* isolates identified each year between October 2002 and September 2016, as well as the number of *Acinetobacter* isolates classified as AROs, MDROs, and XDROs each year.

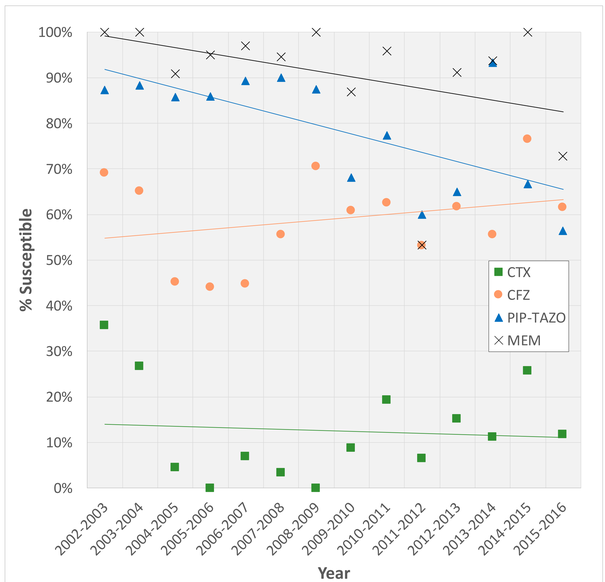

Figure 3. Susceptibility of *Acinetobacter* isolates to ß-lactam antimicrobials each year from October 2002 to September 2016. CTX, ceftriaxone; CFZ, ceftazidime; MEM, meropenem; PIP-TZO, piperacillin-tazobactam.

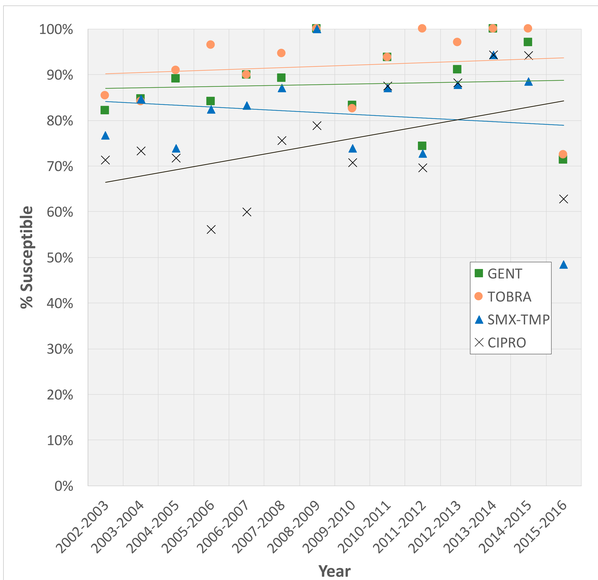

Figure 5. Susceptibility of *Acinetobacter* to non-ß-lactam antimicrobials each year from October 2002 to September 2016. CIPRO, ciprofloxacin; GENT, gentamicin; TOBRA, tobramycin; SMX-TMP, co-trimoxazole (sulfamethoxazole-trimethoprim).

DISCUSSION

This is the first study to evaluate trends in the *Acinetobacter* susceptibility over an extended period of time in Canada.

Most isolates identified were hospital-acquired (73%). Most were isolated from respiratory specimens (53%) collected from patients admitted to ICUs (59%), which is consistent with literature.[1]

Approximately one fifth of isolates (17%) displayed resistance to ≥3 antibiotic classes and were classified as multi-drug resistant (MDR). The high number of isolates and spike in MDR and extensively drug resistant (XDR) cases in 2015-2016 coincides with an *Acinetobacter* outbreak at our institution.

The decrease in piperacillin-tazobactam and meropenem susceptibility concurs with the increased use of these agents at our institution over time. Similarly, the increase in ciprofloxacin-susceptibility concurs with institutional decreases in ciprofloxacin use over time.

Limitations:

- Single center study–susceptibility patterns observed in this study may not be generalizable to other institutions.
- Heterogeneity in the number of isolates identified and tested in each year—the number of isolates tested for a given antibiotic ranged from 10-70 isolates per year. Observations with <30 isolates should be interpreted with caution, as small numbers may bias the group susceptibilities.

CONCLUSION

This study adds to the existing body of literature on *Acinetobacter* resistance and is the first to evaluate trends in the susceptibility of this opportunistic pathogen over an extended period of time in Canada.

Given that *Acinetobacter* commonly exhibits multidrug resistance, knowledge of Canadian resistance trends provides valuable guidance in the selection of appropriate empiric antimicrobial agents to treat these infections.

ACKNOWLEDGEMENTS

Leslie Dan Faculty of Pharmacy Shaping Student Life and Learning Academic Conference Grant

Interested in a copy of this poster or other Sunnybrook Posters from this or previous years?

You can download posters from the site identified below or Scan the QR code on the right.

https://metrodis.org/posters-sunnybrook-pharmacy

DISCLOSURES

No author has any conflict of interest related to this study

REFERENCES

1. Public Health Agency of Canada. Canadian Antimicrobial Resistance Surveillance System—Report 2016. Published 2016. Accessed 09 Sept 2019 from https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/drugs-health-products/antibiotic-resistance-antibiotique/antibiotic-resistance-antibiotique-2016-eng.pdf