

Evolution of Antimicrobial Resistance in Nosocomial Gram Positive Pathogens in Ontario, Canada.

C.A. Fleming, K. Green, H. Richardson, M. Saginur, D.E. Low, *A. McGeer,
 Mount Sinai Hospital, Toronto, Ontario, Quality Management Program-Laboratory Services (QMP-LS), Toronto, Ontario

Allison McGeer
 Mount Sinai Hospital
 Dept. of Microbiology
 600 University Avenue
 Toronto, Ontario
 M5G 1X5
 amcgeer@mtsinai.on.ca

ABSTRACT

Background: *S. aureus* and enterococci are the most common pathogens causing nosocomial infection: methicillin-resistant *S. aureus* (MRSA) and vancomycin-resistant enterococci (VRE) are causing an increasing proportion of infections worldwide. In Ontario, expert bodies have recommended screening and isolation precautions in acute care facilities (ACF) to attempt to control transmission of these pathogens. QMP-LS has conducted annual surveys since 1995 in order to assess changes in the incidence of these pathogens in the province.

Methods: Each year since 1995, QMP-LS mails a questionnaire to all licensed clinical microbiology laboratories in Ontario (popn 11M). Labs report the number of patients identified as colonized or infected with MRSA and VRE, as well as details of laboratory protocols for identifying MRSA and VRE, and hospital control programs.

Results: 98-100% of laboratories respond each year. The proportion of hospitals complying with provincially-recommended screening programs has increased from 75% in 1998 to 97% in 2000; 71% of ACF perform additional screening of high risk in-patients. Despite this, the number of patients colonized or infected with MRSA continues to increase. Of the identified patients in 2000, 32% were infected (up from 21% in 1998), and 184 (2%) were bacteremic. Overall, 70% of patients were thought to have acquired MRSA in an ACF, 14% in a long term care facility (LTCF), and 15% in the community. In contrast, VRE were first identified in Ontario in 1993. The number of identified patients increased until 1998, but has decreased for two consecutive years. In 2000, nearly one-third of all VRE-colonized patients identified were part of two defined outbreaks. In 2000, only 20 patients were identified as infected with VRE and 1 was bacteremic. 96% of VRE colonized patients were thought to have acquired VRE in an ACF, 3% in a LTCF, and <1% in the community.

Conclusions: Despite province-wide control programs, rates of nosocomial MRSA infections continue to increase in Ontario. In contrast, control programs appear to have been successful in reducing the rate of VRE colonization and infection in the province.

INTRODUCTION

Antimicrobial resistance is an increasing problem in hospitals worldwide, and Ontario is no exception. Since the early 1990s, hospitals in Ontario have been working to control the dissemination of resistant strains of *S. aureus* and enterococci, the two most common pathogens causing hospital-acquired infections.

METHODS

The Quality Management Program-Laboratory Services (QMP-LS) of Ontario was established in 1974 (known as LPTP until 2000) under the authority of the Ontario Ministry of Health and Long-Term Care to examine and evaluate the proficiency of the performance of tests in licensed clinical laboratories.

In 1995, QMP-LS initiated an annual survey of licensed clinical microbiology laboratories in the province of Ontario, in order to assess changes to the incidence and epidemiology of antimicrobial resistance in the province. Each year, all laboratories are mailed a questionnaire which asks for information about the number of patients identified as colonized or infected with MRSA and VRE, as well as information about laboratory and hospital screening programs for these organisms. Information about resistance in *Enterobacteriaceae* has been added in the last two years. Results are entered in Excel, and analysed in Excel and SAS.

This poster summarizes data from the initial six surveys. Response rates have ranged from 93-100%. In 2000, all 117 (89 hospital-based, 17 private and 11 public health) licensed bacteriology laboratories responded.

RESULTS: MRSA

In 2000, all but 2 of 117 Ontario microbiology laboratories reported the identification of at least one MRSA. Both laboratories in which MRSA was not identified are in northern Ontario and serve hospitals <50 beds. The remaining laboratories identified a total of 9,345 patients colonized or infected with MRSA (Figure 1). Most of the 1999/2000 increase occurred in the metropolitan Toronto area (Figure 2).

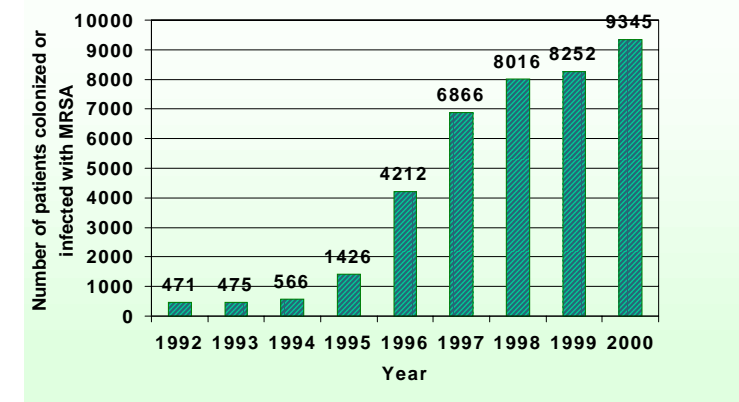


Figure 1. Number of patients colonized or infected with MRSA in Ontario, 1992 to 2000.

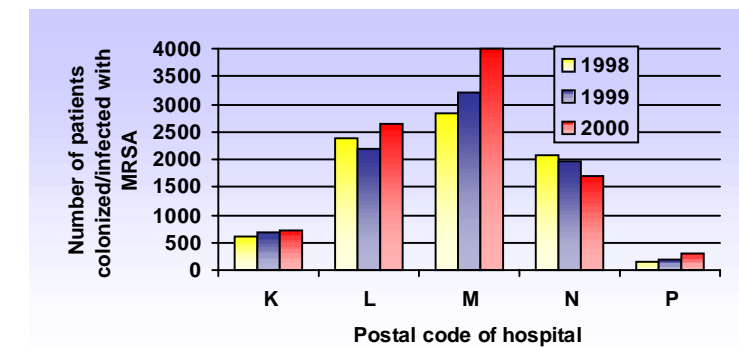


Figure 2. Trends in the incidence of MRSA in different geographic regions of Ontario.

Over the last four years, the percentage of patients whose site of acquisition (e.g nosocomial, nursing home, or community) can be determined has been decreasing steadily – in 2000, site of acquisition was specified for only 42% of patients. For those patients for whom data were available, site of acquisition is shown in Figure 3.

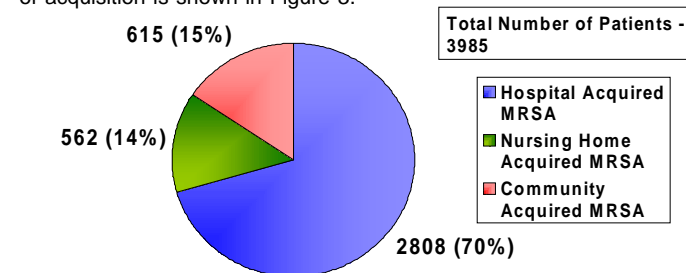


Figure 3. Source of MRSA Acquisition

RESULTS: MRSA (cont'd)

Although the great majority of isolates represent colonization rather than infection, the persisting increase in rates is of concern. Of even greater concern is that the percentage of patients infected is increasing (Figure 4). The number of reported MRSA bacteremias has also continued to increase: from 135 in 1998 to 144 in 1999 and 184 in 2000.

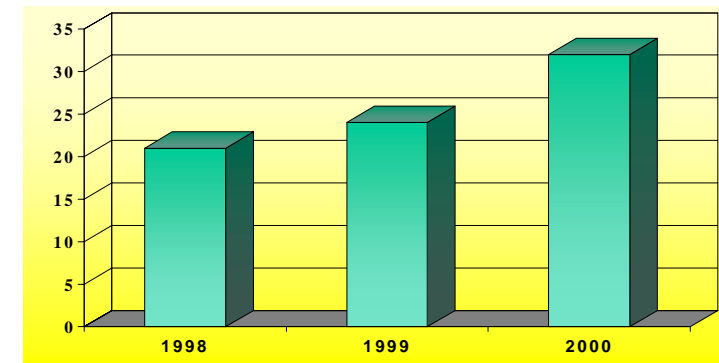


Figure 4. Percentage of identified patients reported to be infected, 1998-2000

Data on screening programs were reported for 216 hospitals. Of these, all reported having an admission screening program for MRSA, and 199 (92%) reported an admission screening program consistent with current Ontario recommendations: that is, screening patients who have been in a health care institution (hospital or nursing home) within the past six months. Sixty-five percent (146/224; no change from 1998/9) reported performing intermittent prevalence screens of in-patients.

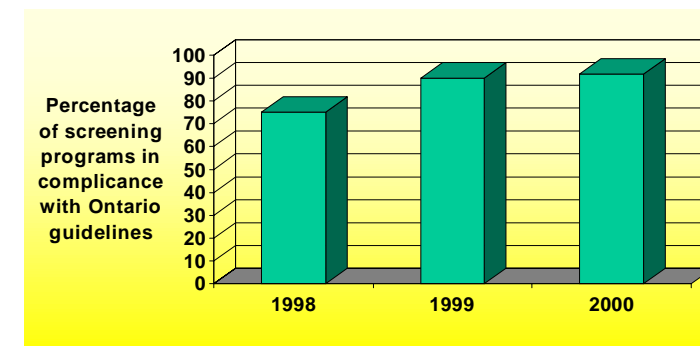


Figure 5. Percentage of screening programs in compliance with Ontario guidelines

In the 224 hospitals reporting on screening sites, all reported obtaining nasal swabs, 203 (91%) obtained wound/skin lesion swabs, and 207 (92%) obtained groin, perineal or rectal swabs. The majority of hospitals (176/224, 79%) reported routinely screening the combination of nasal, wound/skin lesion, and rectal swabs; the second most frequent combination reported was nasal, wound/skin lesion, and perineal swabs (13, 6%).

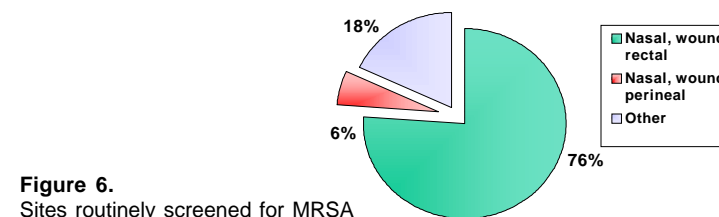


Figure 6. Sites routinely screened for MRSA

RESULTS: VRE

In 2000, the overall number of patients colonized or infected with VRE decreased significantly (Figure 7). More than half of VRE-colonized patients were reported from Eastern Ontario (postal code K, Figure 8). A significant fraction of these patients were part of two outbreaks resulting from at-risk patients not being screened on hospital admission. The great majority of patients (96%) were judged to have acquired their VRE in acute care hospitals (74% in the hospital reporting the patient, 26% in another hospital); 3% were thought to have acquired VRE in a nursing home, and <1% were thought to have acquired their VRE in the community

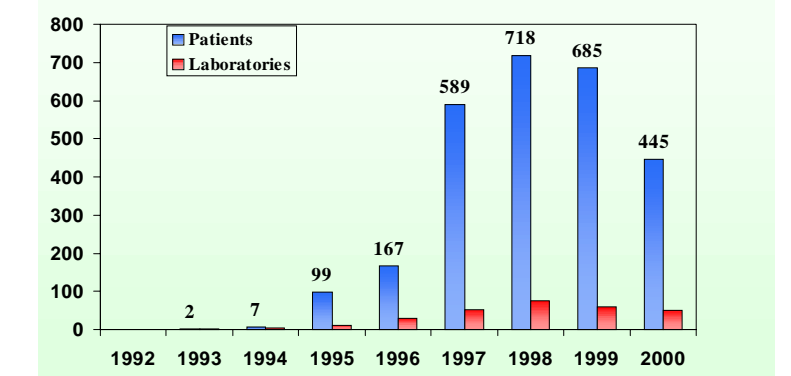


Figure 7. Incidence of VRE in Ontario, 1992 to 2000. Open bars represent the number of new patients colonized or infected with VRE in each year; .

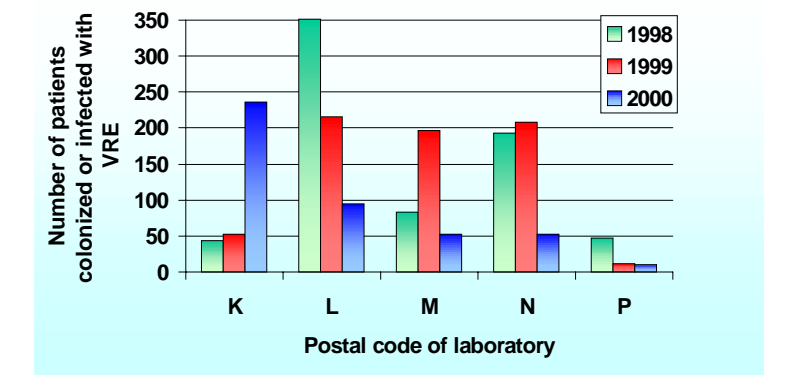


Figure 8. Trends in the incidence of VRE in different geographic regions of Ontario.

CONCLUSION

The investment which Ontario microbiology laboratories and infection control programs have made in antibiotic resistance control programs has been associated with a significant decrease in VRE in the province. However, rates of infection with MRSA continue to increase. The most likely reason for the difference is related to the timing of control efforts: it is easier to control transmission when the number of colonized patients is small. Control of VRE will require continuation of current effort, but appears to be successful. Success in control of MRSA will require a re-evaluation of current programs, and continued investment in a better understanding of MRSA transmission and its control. While this may be difficult, there is increasing evidence that this investment will be cost-effective, and good reason to hope that Ontario will be able to successfully follow Denmark's lead in reductions of gram positive pathogens.