



MDCH Results from 2004 Antibigram Data

Introduction

The Michigan Department of Community Health collects antibiogram data from hospital laboratories throughout Michigan for the surveillance of susceptibility levels among specific antibiotic-bacterial organism combinations. The results reported here are from data collected and analyzed from antibiograms submitted in 2004.

Background

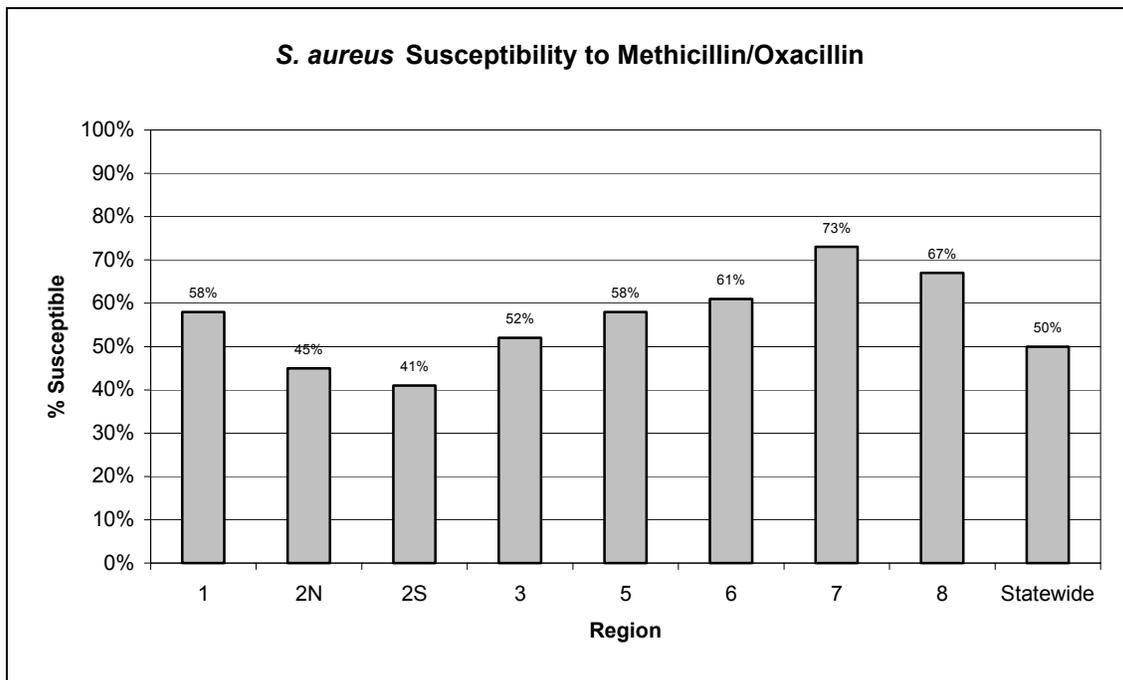
Antibiograms are the aggregate percentages of organisms susceptible to various antibiotics on a hospital formulary and are usually presented on an annual basis. The main purpose of this information is to guide empiric antimicrobial therapy before specific patient culture results are available. The organisms included on a hospital antibiogram are those most commonly seen as cause of infection within the institution's network and the drugs included are those most commonly prescribed within the same network.

Methods

The organisms and corresponding antibiotics analyzed from the 2004 antibiograms for this report are: *Staphylococcus aureus* susceptible to methicillin/oxacillin, *Streptococcus pneumoniae* susceptible to penicillin, and *Enterococcus* unspecified, *faecium*, and *faecalis* susceptible to vancomycin. Comparison procedures were run to identify differences in mean percentage susceptibility between regions and between individual regions and the mean statewide data.

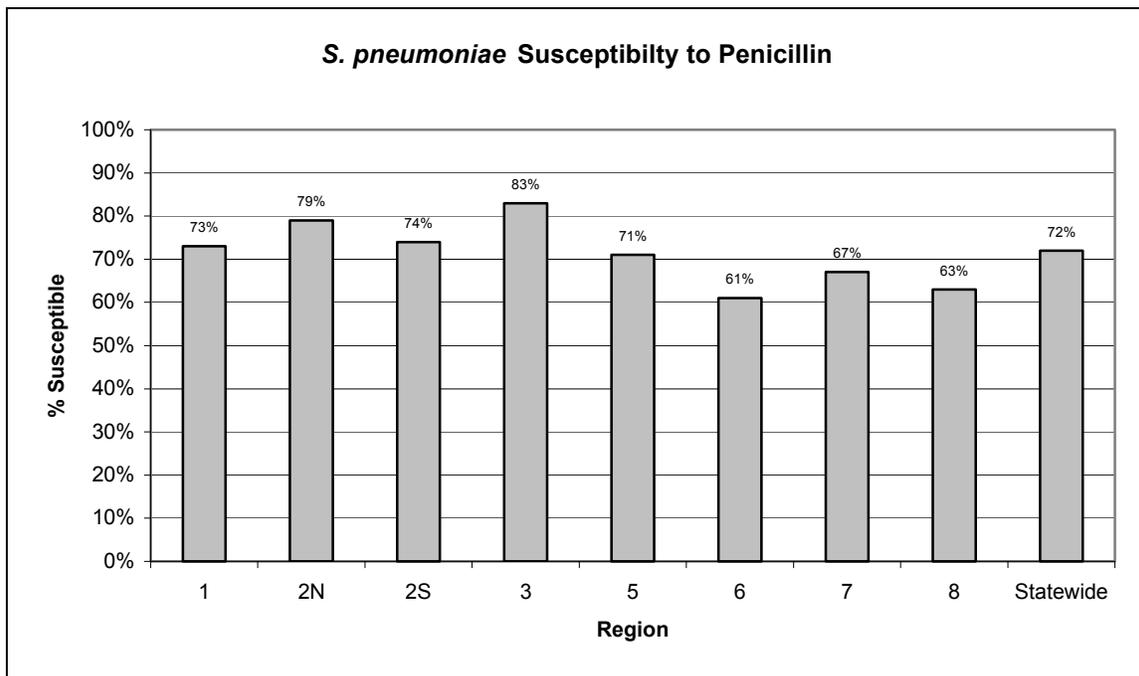
***Staphylococcus aureus* Susceptibility to Methicillin/Oxacillin**

Eighty-four hospital antibiograms contributed to the *S. aureus* susceptibility to methicillin/oxacillin analysis. The statewide average susceptibility is 50%, and the range across the regions is 41-73%. Regions 2-North (Southeast Lower Michigan) and 2-South (Southeast Lower Michigan) are significantly ($p<0.05$) lower in *S. aureus* susceptibility to methicillin/oxacillin compared to Regions 6 (Western Lower Michigan), 7 (Northern Lower Michigan), and 8 (Upper Peninsula). Region 7 susceptibility data is also significantly ($p<0.05$) higher than statewide data. There is no significant difference in *S. aureus* susceptibility to methicillin/oxacillin between any other regions or between the other regions and statewide data. The average proportion of *S. aureus* susceptible to methicillin/oxacillin in Michigan is comparable to the weighted average of 57.7% susceptible, calculated from data reported in the 2004 National Nosocomial Infections Surveillance (NNIS) System Report¹ (*S. aureus* susceptible pooled means: ICU=47.1%, Non-ICU=54.0%, OP=68.9%). The 2003 statewide average *S. aureus* susceptibility to methicillin/oxacillin was 60.4% ($n=47$), and the range across the regions was 48.4-75.4%.



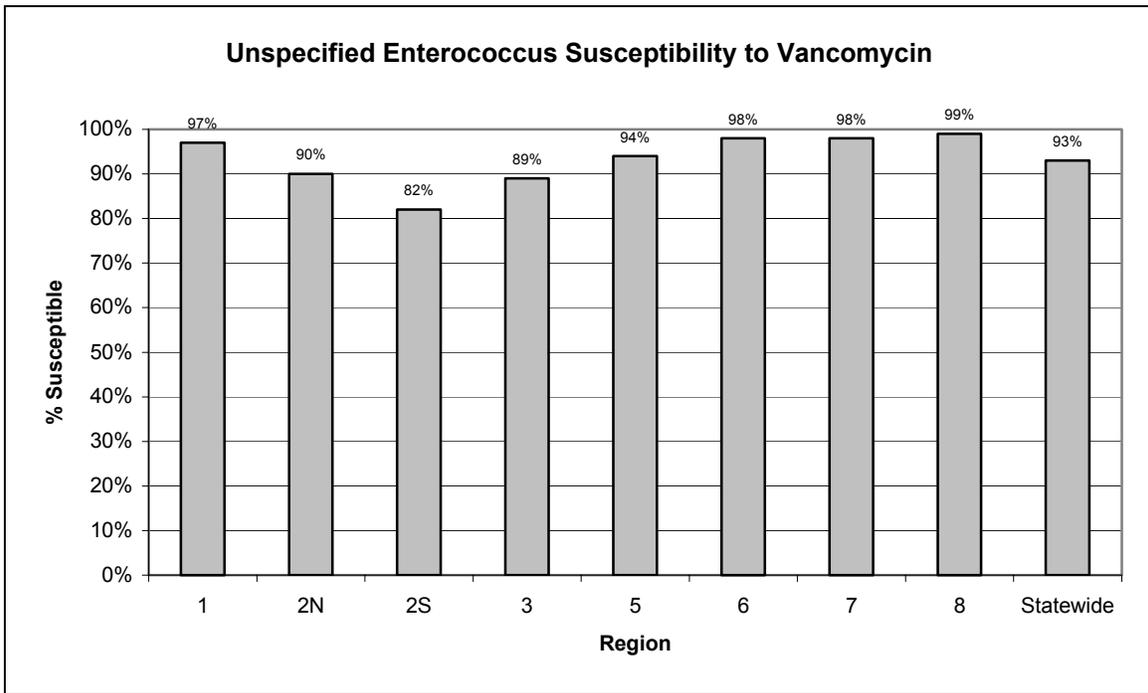
***Streptococcus pneumoniae* Susceptibility to Penicillin**

Sixty-five hospital antibiograms contributed to the *S. pneumoniae* susceptibility to penicillin analysis. The statewide average susceptibility is 72%, and the range across the regions is 61-83%. There is no significant difference in *S. pneumoniae* susceptibility to penicillin between any regions of Michigan or between the regions and statewide data. The average proportion of *S. pneumoniae* susceptible to penicillin in Michigan is slightly lower than the weighted average of 82.4% susceptible, calculated from data reported in the 2004 NNIS System Report¹ (pneumococci susceptible pooled means: ICU=81.1%, Non-ICU=81.8%, OP=83.2%). The 2003 statewide average *S. pneumoniae* susceptibility to penicillin was 77% (n=30), and the range across the regions was 68.2-86.5%.



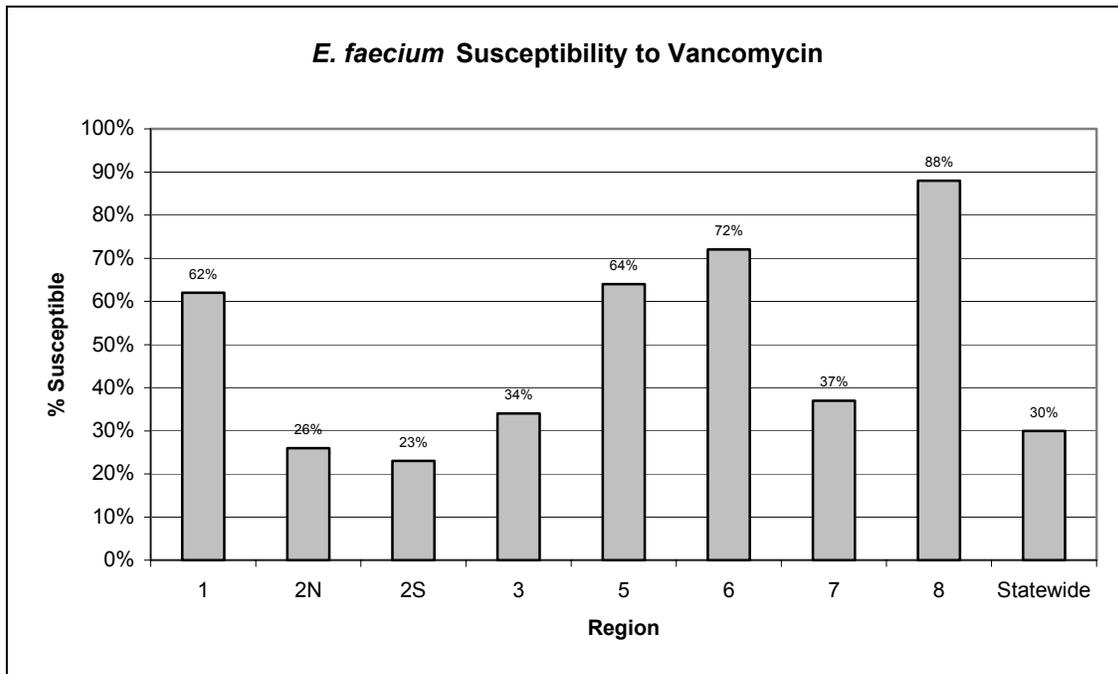
Unspecified Enterococcus Susceptibility to Vancomycin

Twenty-five hospital antibiograms contributed to the unspecified Enterococcus susceptibility to vancomycin analysis. The statewide average susceptibility is 93%. The range of susceptibility across the regions is 82-99%. There is no significant difference in unspecified Enterococcus susceptibility to vancomycin between any regions of Michigan or between the regions and statewide data. The average proportion of unspecified Enterococcus susceptible to vancomycin in Michigan is comparable to the weighted average of 90.1% susceptible, calculated from data reported in the 2004 NNIS System Report¹ (Enterococcus spp susceptible pooled means: ICU=86.1%, Non-ICU=88.0%, OP=95.4%). The 2003 statewide average unspecified Enterococcus susceptibility to vancomycin was 92.4% (n=19), and the range across the regions was 81.0-99.5%.



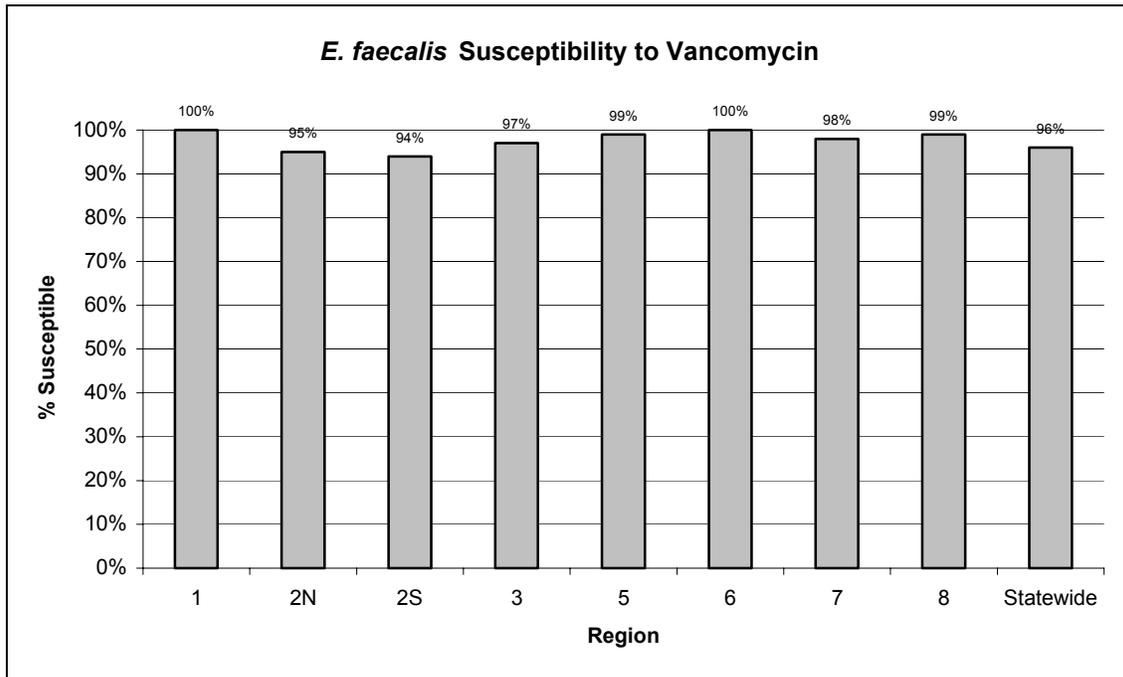
***Enterococcus faecium* Susceptibility to Vancomycin**

Forty-eight hospital antibiograms contributed to the *E. faecium* susceptibility to vancomycin analysis. The statewide average susceptibility is 30%. The range of susceptibility across the regions is 23-88%. Regions 2-North and 2-South are significantly ($p < 0.05$) lower in *E. faecium* susceptibility to vancomycin compared to Regions 6 and 8. Region 3 (Thumb Area) is significantly ($p < 0.05$) lower in *E. faecium* susceptibility to vancomycin compared to Region 8. Region 8 susceptibility data is also significantly ($p < 0.05$) higher than statewide data. There is no significant difference in *E. faecium* susceptibility to vancomycin between any other regions or between the other regions and statewide data. The 2003 statewide average *E. faecium* susceptibility to vancomycin was 47.1% ($n=24$), and the range across the regions was 32.9-100%. A national comparison of species specific enterococcus susceptibility data is not available at this time.



***Enterococcus faecalis* Susceptibility to Vancomycin**

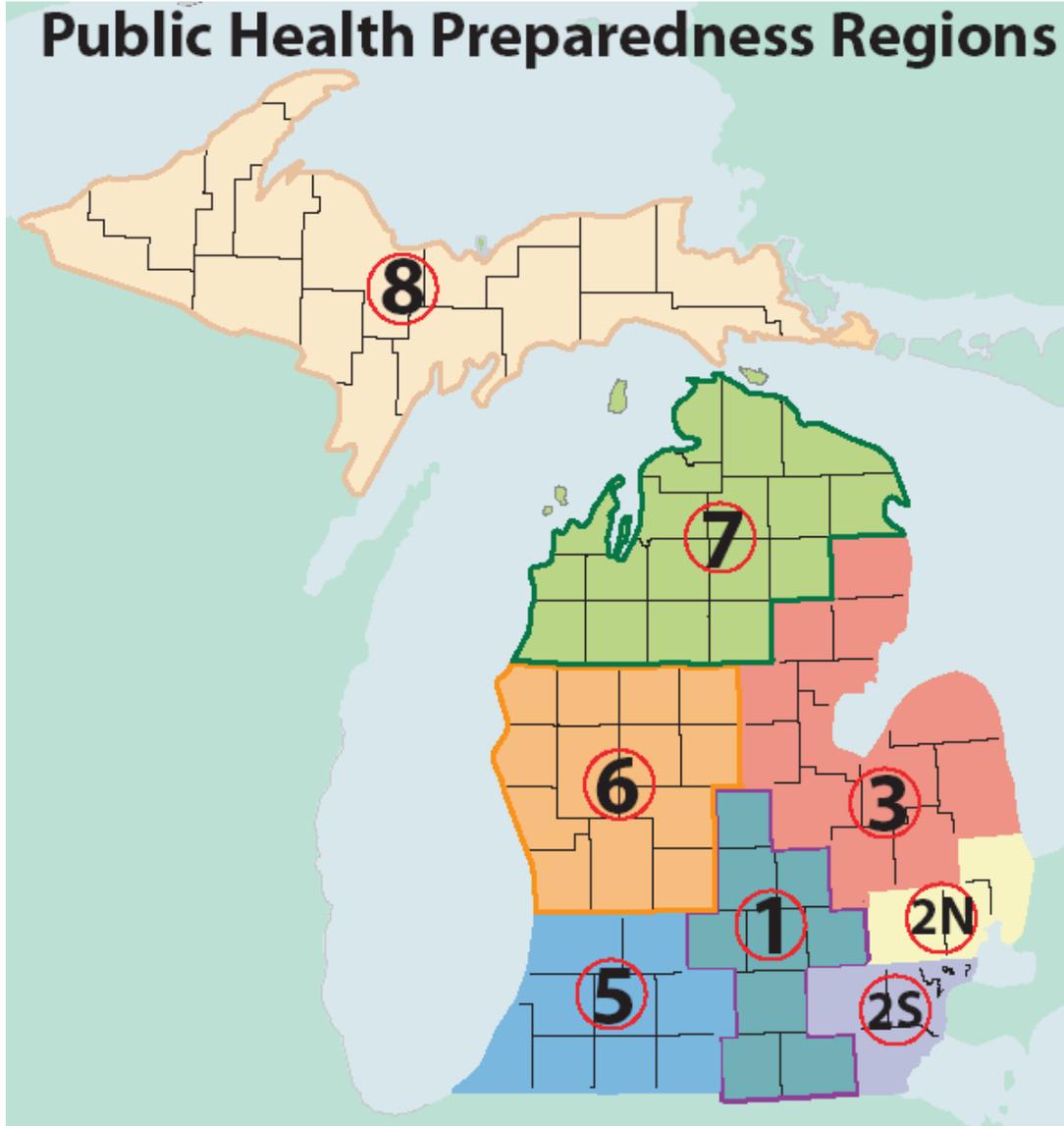
Sixty-five hospital antibiograms contributed to the *E. faecalis* susceptibility to vancomycin analysis. The statewide average susceptibility is 96%. The range of susceptibility across the regions is 94-100%. There is no significant difference in *E. faecalis* susceptibility to vancomycin between any regions of Michigan or between the regions and statewide data. The 2003 statewide average *E. faecalis* susceptibility to vancomycin was 97.3% (n=33), and the range across the regions was 94.7-100%. A national comparison of species specific enterococcus susceptibility data is not available at this time.



As stated previously, the *S. aureus* susceptibility to methicillin/oxacillin and the unspecified enterococcus susceptibility to vancomycin reported in Michigan in 2004 are comparable to data reported nationally. The *S. pneumoniae* susceptibility to penicillin reported in Michigan in 2004 is lower than national data, possibly indicating slightly higher penicillin resistance levels in this organism in our state.

The comparison of Michigan antibiogram data between 2003 and 2004 reveals a notable decrease in the *S. aureus* susceptibility to methicillin/oxacillin and the *E. faecium* susceptibility to vancomycin. This two-year comparison also reveals a slight decrease in *S. pneumoniae* susceptibility to penicillin. Susceptibility levels to vancomycin remained similar between 2003 and 2004 for unspecified enterococcus and *E. faecalis*. The noted decreases in susceptibility levels may indicate a true rise in resistance levels within some regions. However, they may also be a result of lower numbers of reporting hospitals in 2003 and differences in the size and type of hospitals that reported from 2003 to 2004.

Figure 1. Michigan Public Health Preparedness Regions



References:

¹ NNIS System Report available at: <http://www.cdc.gov/ncidod/dhqp/pdf/nnis/2004NNISreport.pdf>