The Wisconsin Mycobacteriology Laboratory Network and Laboratory-Based Surveillance in Wisconsin.

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ABSTRACT

Background: In 1998, Wisconsin health care and laboratory professionals from public and private sectors formed a task group to assess the status of tuberculosis (TB) laboratory testing in Wisconsin. A major recommendation of the task group was to develop a state-wide TB laboratory network to assure consistent, high quality testing in Wisconsin laboratories that perform TB testing. The Wisconsin State Laboratory of Hygiene (WSLH) took the leadership role in establishing this network. The Wisconsin Mycobacteriology Laboratory Network (WMLN) is comprised of the WSLH and 32 other laboratories (31 private and 1 city public health laboratory) that perform some level of TB testing.

Laboratory-based Surveillance Methods: In Wisconsin, seven laboratories (including WSLH) have the capability to identify AFB-positive cultures. Three laboratories perform first-line drug susceptibility testing on *M. tuberculosis* complex (MTBC) isolates. The majority of laboratories send isolates to the WSLH or other reference laboratories for identification and drug susceptibility testing. WMLN participants send isolate data to the WSLH on a monthly basis. These data are combined with WSLH isolates and susceptibility test results to produce surveillance reports.

Results: This study summarizes five years of compiled WMLN surveillance reports including over 7600 mycobacterial isolates, 363 MTBC isolates, and MTBC drug susceptibility test results.

Conclusions: The WMLN serves as a conduit of information for state-wide mycobacterial surveillance. Through the network, information on mycobacteria isolation trends, TB incidence, and MTBC drug resistance is shared with participating laboratories, the State TB Control Program, local public health departments, and health care providers.

INTRODUCTION

A Wisconsin White Paper Report[1] and an APHL TB Task Force publication[2] recommend the development of integrated networks that include private and public health laboratories, public health departments, and health care providers. These networks are unifying systems that ensure timely laboratory testing and flow of information and test results among members of the network.

One function of a state or regional mycobacteriology network is to disseminate laboratory-based surveillance data. For over 10 years, the WMLN has collected and distributed isolation information and antimicrobial susceptibility test results. Shared data help network participants to monitor the incidence of mycobacteria isolation, *M. tuberculosis* complex isolation, and MTBC drug resistance.

METHODS

On a monthly basis, Wisconsin laboratories that perform in-house identification of mycobacteria or refer isolates to a reference laboratory (other than the WSLH) for identification send an isolate summary form to the WSLH by email or fax. This data is combined with WSLH isolation data and Wisconsin TB Control information and distributed in a monthly report. The monthly report includes the number of new MTBC isolates (and counties of isolation), number of new non-tuberculosis mycobacteria isolates (and counties of isolation), and results of all new MTBC first-line drug susceptibility tests. For this study, five years of isolate data and susceptibility test data were combined.

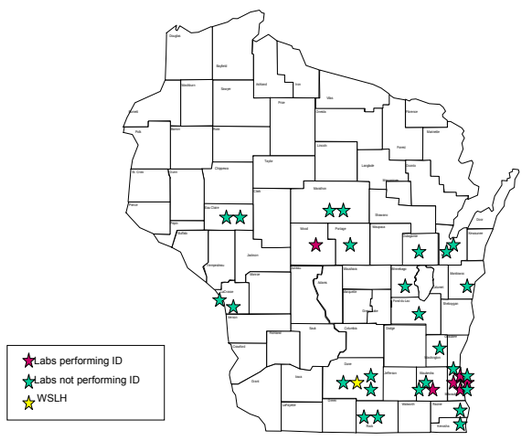

Figure 1. Map showing the location of 33 WMLN laboratories in Wisconsin. Laboratories that have the capability to identify mycobacteria are located in Milwaukee County (4 labs), Waukesha County (1 lab), and Wood County (1 lab). WSLH serves as the central reference laboratory and is located in Madison (Dane County).

RESULTS

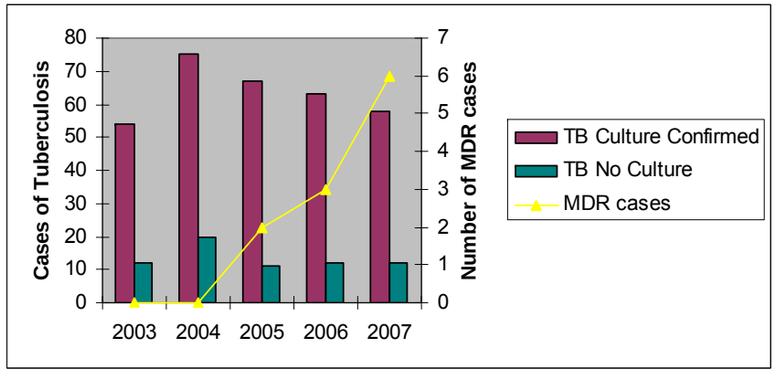

Figure 2. Number of Report Verified Cases of Tuberculosis (RVCT) and Culture-confirmed cases of TB in Wisconsin, 2003-2007. RVCT data is reported by the Wisconsin Division of Public Health, TB Control Program. There were 384 new cases of tuberculosis in Wisconsin over the 5 year period, 317 (82%) culture confirmed. There were 2 MDR TB cases in 2005, 3 cases in 2006 and 6 cases in 2007.

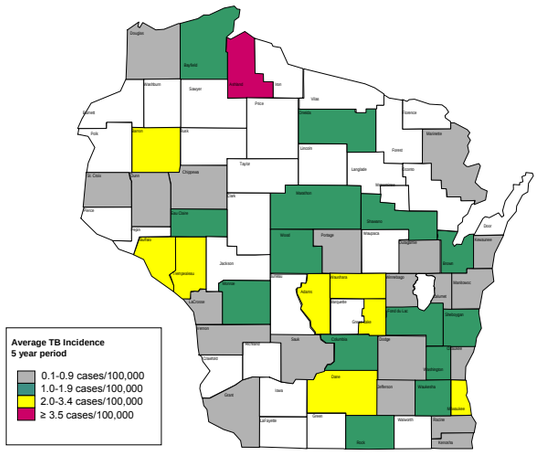

Figure 3. Average number of TB cases (RVCT) by County in Wisconsin, 2003-2007, per 100,000 population. Ashland was the only county that exceeded the CDC target rate of 3.5 cases/100,000 with 3 TB cases in the 5 year period. Milwaukee County had 145 cases during the 5 year period, and Dane County had 48 cases. All counties were below the 2006 national rate of 4.6 cases/100,000[3].

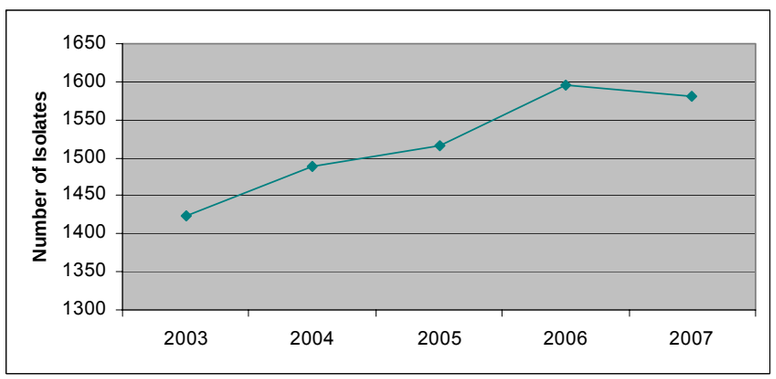

Figure 4. Wisconsin Mycobacteria isolates reported per year through the WMLN, 2003-2007. There were 7602 total isolates.

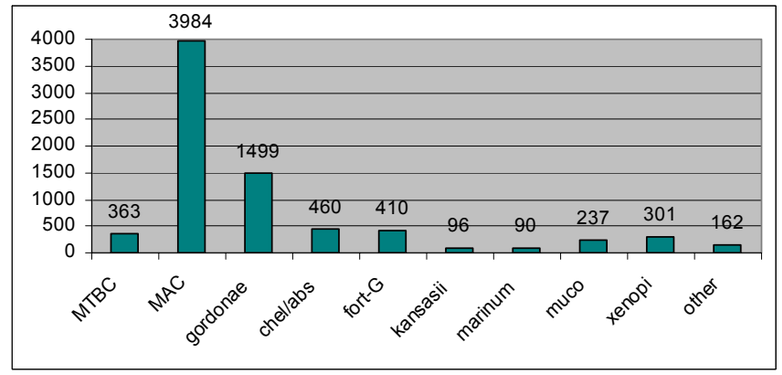

Figure 5. *Mycobacterium* isolates reported through the WMLN by species, 2003-2007. There were 7602 total isolates. The number of MTBC isolates represents 317 Wisconsin patient isolates and 46 out-of-state (IL and MN) patient isolates. chel/abs = *M. chelonae/M. abscessus*, fort-G = *M. fortuitum* group, muco = *M. mucogenicum*

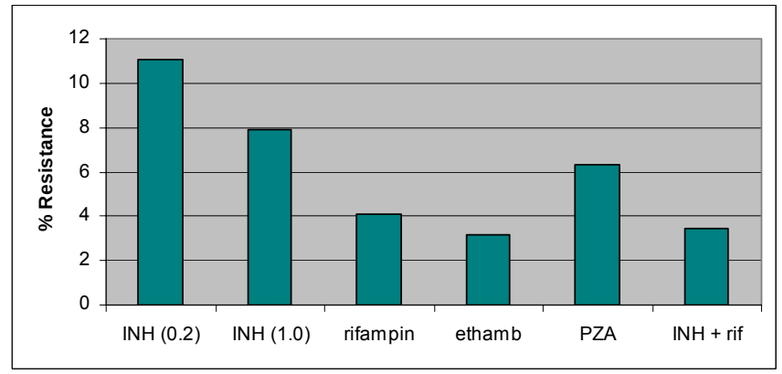

Figure 6. Percentage of Wisconsin MTBC Isolates resistant to first line drugs: INH (0.2 ug/ml), INH (1.0 ug/ml), rifampin (1.0 ug/ml), ethambutol (5.0 ug/ml) and PZA (100 ug/ml). Susceptibility testing was performed using the BACTEC MGIT 960 system. Wisconsin has an overall MDR rate of 3.47% for the 5 year period. There have been no XDR TB cases in Wisconsin.

SUMMARY AND CONCLUSIONS

- **The WMLN consists of 33 laboratories in Wisconsin that perform some level of mycobacteriology testing (Figure 1).**
- **Wisconsin laboratory-based surveillance reports are compiled at the WSLH and sent to WMLN members, public health partners and health care providers on a monthly basis.**
- **There were 384 new Report Verified Cases of Tuberculosis reported in Wisconsin during the 5 year period of 2003-2007. 317 (82%) of these cases were culture-confirmed (Figure 2).**
- **Ashland County had the highest average TB incidence (3.63 cases/100,000), with 3 cases in the five year period (Figure 3).**
- **There were over 7600 new mycobacteria isolates (MTBC and non-tuberculous mycobacteria) reported through the WMLN (Figures 4 & 5).**
- **On average, 7.88% of Wisconsin MTBC isolates were resistant to INH (1.0 ug/ml) and 4.1% were resistant to rifampin over the five year period (Figure 6). 3.47% of WI MTBC isolates were resistant to at least INH and rifampin, above the 2006 national average of 0.9%[3].**
- **Wisconsin experienced a marked increase in MDR-TB over the five year period (Figure 2). In 2007, 8.5% (6/70) of Wisconsin TB patients had MDR-TB.**
- **Laboratory-based surveillance data can help monitor the incidence of tuberculosis disease and other mycobacterial infections within a state or region.**
- **By monitoring antimicrobial susceptibility test results through laboratory-based surveillance, trends in resistance can be observed. This information can assist health care providers in drug selection for more effective treatment of patients and patient contacts.**

REFERENCES

1. Wisconsin State Laboratory of Hygiene. 1998. Laboratory Testing for Tuberculosis in Wisconsin: Current Status and Recommendations for Improvement. Madison, WI
2. Association of Public Health Laboratories. 2004. The Future of TB Laboratory Services. Washington, DC
3. www.cdc.gov/tb