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Strengthening Public Health in Wisconsin Through the Wisconsin Clinical Laboratory Network

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Abstract

The Wisconsin Clinical Laboratory Network (WCLN) at the University of Wisconsin–Madison is a partnership of 138 clinical and public health laboratories (as of February 2019) coordinated by the Wisconsin State Laboratory of Hygiene. This article describes the WCLN, its current activities, and lessons learned through this partnership. A laboratory technical advisory group, which consists of representatives from clinical laboratories, provides clinical laboratory perspective to the WCLN and fosters communication among laboratories. Activities and resources available through the WCLN include annual regional meetings, annual technical workshops, webinars, an email listserv, laboratory informational messages, in-person visits by a WCLN coordinator to clinical laboratories, and laboratory-based surveillance data and summaries distributed by the Wisconsin State Laboratory of Hygiene. One challenge to maintaining the WCLN is securing continual funding for network activities. Key lessons learned from this partnership of more than 20 years include the importance of in-person meetings, the clinical perspective of the laboratory technical advisory group, and providing activities and resources to clinical laboratories to foster sharing of data and clinical specimens for public health surveillance and outbreak response.

Keywords

laboratory network, public health system, Wisconsin Clinical Laboratory Network, surveillance, emergency preparedness

Clinical laboratories are important partners in any well-functioning public health laboratory system, and laboratory networks provide vital data and clinical specimens for detailed characterization to monitor and respond to public health concerns. However, studies examining approaches to strengthening relationships between public health laboratories and clinical laboratories are scarce. The Wisconsin State Laboratory of Hygiene (WSLH) at the University of Wisconsin–Madison recognized the importance of networks more than 20 years ago and has reached out to more than 130 clinical laboratories and public health laboratories to develop the Wisconsin Clinical Laboratory Network (WCLN). The purpose of the WCLN is to provide communication channels and support among clinical laboratories and public health laboratories to create a strong public health laboratory system to better serve the health of Wisconsin residents. The WCLN, which is coordinated and funded by WSLH primarily through general state funds, promotes an exchange of ideas, fosters collaboration among WCLN members, and serves as a model for other states seeking to conduct similar activities.

The first laboratory networks in Wisconsin, the precursors to the WCLN, were focused on virology and mycobacteriology and involved a limited number of clinical laboratories.^{1,2} After 9/11, the network was expanded to include all clinical laboratories and public health laboratories in the state, with an emphasis on emergency preparedness and response. The WCLN now encompasses training, enhanced communications, and public health surveillance. The network's 138 participants include 137 clinical laboratories from across the state and the Milwaukee Public Health Laboratory; the WCLN is coordinated by WSLH. Because most WCLN laboratories are clinical laboratories, we refer hereinafter to the member laboratories as "clinical laboratories," but this term also covers the Milwaukee Public Health Laboratory.

We describe the WCLN, its current activities, additional projects, and lessons learned through this partnership.³

Methods

WCLN History

Virology and mycobacteriology laboratory networks were established in 1995 and 1997, respectively,^{1,2,4} with annual conferences held to share statewide best practices, distribute educational materials, and discuss issues affecting clinical laboratories. Because of concerns about bioterrorism and all-hazards preparedness after 9/11, these networks evolved into what is now the WCLN. Early activities of the WCLN included site visits to clinical laboratories to distribute educational materials about emergency response, packaging and shipping of specimens, and biothreat agent testing. Other early activities involved biothreat agent testing exercises to improve clinical laboratories' capacity to identify or rule out biothreat agents. The exercises were similar to proficiency testing (ie, testing conducted by an external organization to determine a laboratory's ability to produce accurate results) and were followed by an audioconference and written summary of how laboratories performed on the challenge. A practical how-to guide for setting up laboratory networks was also developed and is available elsewhere.⁴

Laboratory Technical Advisory Group

The Laboratory Technical Advisory Group (LabTAG), which consists of 10-12 clinical laboratorians from throughout Wisconsin, advises the WCLN and drives much of the network's educational and training agenda. The mission of LabTAG is "to collaborate with WSLH, with an emphasis on infectious disease diagnosis, biosafety, training, and public health emergency preparedness, to improve the state of Wisconsin's clinical laboratory system, both public and private, and support the purpose of the WCLN."⁵ LabTAG includes 1 member from each of 7 designated WCLN regions across Wisconsin (ie, regions into which the Wisconsin Department of Health Services divided the state to streamline the distribution of local preparedness funding), plus at-large members. WCLN laboratorians volunteer to be LabTAG members for 3 years; at-large members (often clinical microbiologists with a doctoral degree) serve for extended periods, if they are willing.

LabTAG members participate in monthly and special project conference calls, attend an annual in-person LabTAG meeting, and serve as speakers during WCLN educational activities. LabTAG members represent the clinical laboratories in their region of Wisconsin and act as points of contact for laboratories to relay input and feedback to the WCLN. LabTAG's clinical laboratory perspective ensures that the WCLN is a partnership between clinical laboratories and public health laboratories and that the WCLN is not driven solely by the interest of WSLH. WSLH staff members facilitate LabTAG meetings and direct discussions, but clinical laboratory members provide input and make decisions.

WCLN Activities

Activities of the WCLN fall into 4 main categories: training and education, facilitating communication, public health surveillance, and emergency response. To address training and education, the WCLN provides continuing education credits (Professional Acknowledgment for Continuing Education [PACE]) through webinars and several full-day training events throughout the year. LabTAG helps plan training events, and members frequently serve as speakers and subject matter experts. LabTAG members and WSLH staff members attend a 1-day technical workshop every spring; recent topics have included antimicrobial susceptibility testing and molecular diagnostics. One-day training sessions are also held in the summer, with the topic alternating each year between performance and interpretation of Gram stains and training in packaging and shipping specimens. One-day conferences on virology and mycobacteriology are held annually, and 1-day WCLN regional meetings are held each fall in 3 locations around the state. Regional meetings include lectures and discussions on topics of interest, surveillance updates from WSLH, and progress reports on additional projects, such as a recent statewide assessment of biosafety practices.⁶ WSLH coordinates annual webinars, and speakers include WSLH staff members, LabTAG members, and invited speakers. During meetings and webinars, WCLN members suggest topics for future meetings and webinars to ensure the input of laboratory members outside of LabTAG.

Multiple activities facilitate communication among WCLN members. The workshops, trainings, and regional meetings provide in-person networking opportunities, and there is no cost to attend. Local and state public health epidemiologists and infection preventionists are present at several of these activities. WSLH sends a monthly newsletter to all WCLN laboratories to share information or guidance, announce WCLN activities, and highlight recent news items. WSLH coordinates an email listserv for clinical laboratorians to use to discuss technical issues among members of the Wisconsin laboratory community. Lastly, the WCLN coordinator, a WSLH employee with a clinical laboratory background whose full-time job is that of coordinator, visits 10-20 clinical laboratories each year to stay current with the needs and challenges of clinical laboratories and to foster personal connections with clinical laboratorians, management, and medical directors.

Clinical laboratories provide surveillance data, samples, and bacterial isolates to WSLH. WSLH then collates the data and shares them with clinical laboratories, by posting surveillance reports on the WSLH website⁷ and in weekly email summaries. This surveillance encompasses bacteriology (antibiotic-resistant bacteria and invasive bacterial infections), mycobacteriology, virology (influenza and other respiratory pathogens), and molecular gastropathogen surveillance.

During regional meetings, WSLH covers emergency preparedness and response topics such as biosafety, biosecurity, and packaging and shipping of specimens. WSLH also coordinates annual emergency response communication drills in which messages are sent from WSLH to clinical laboratories, and the times of both message receipt and response to WSLH are tracked. Lastly, WSLH offers biannual bioterrorism agent testing exercises free of charge to clinical laboratories.

Outcomes

Summary of Activities

Since its inception, the WCLN has held 27 virology meetings, 20 mycobacteriology meetings, and 15 annual WCLN regional meetings (since 2004), each with 30-100 attendees. Monthly teleconferences have been held since 2001. As part of coordinating the WCLN, WSLH has sent more than 350 newsletters, shared regular surveillance summaries for more than 20 years, provided proficiency testing challenges at least annually since 2001, and led emergency response communication drills annually since 2002.

Communication

Achieving the WCLN's original goal of fostering communication among laboratories across Wisconsin has paid many dividends. In our experience, the personal connections made through WCLN reduce barriers to conversation and ensure smooth communication among laboratories despite a competitive fiscal environment and frequent acquisitions and consolidations. WCLN communications from WSLH to clinical laboratories have been leveraged many times for outbreak response, including a pertussis outbreak during 2003-2004,⁸ the H1N1 influenza pandemic of 2009, Ebola preparedness in 2014, and an outbreak of *Elizabethkingia* in 2016.⁹

Communication from clinical laboratories to WSLH is also strong: clinical laboratories look to WSLH for guidance in instances of cross-contamination, false-positive mycobacteria results, and an outbreak or public health concern. For example, the director of a clinical laboratory reached out to WSLH the same day a *Methylobacterium* isolate was presumptively identified and associated with a contaminated lot of hyaluronic acid,¹⁰ which allowed WSLH to issue a timely informational memorandum alerting clinical laboratories to this association.

Platform for Additional Projects

The WCLN is useful for addressing biosafety and the need for a statewide summary of antimicrobial resistance patterns. Biosafety has been a recent priority because of the 2014 Ebola outbreak and funding from CDC to bolster biosafety practices in laboratories. As part of this focus on biosafety, in 2015, WSLH coordinated a statewide assessment of biosafety practices in more than 100 clinical laboratories in Wisconsin.⁶ The WCLN infrastructure was essential in facilitating laboratory participation in this project, and a follow-up assessment is underway to determine if progress has been made to fill gaps in biosafety.

The WCLN has also been used for antimicrobial resistance projects. After the 2014 annual LabTAG meeting, LabTAG members were charged with requesting a facility-specific antibiogram (ie, a table summarizing the percentage of bacterial pathogens susceptible to various antibiotics) from each WCLN facility in their region. Antibiograms from 72 WCLN entities were forwarded to a central LabTAG contact for data compilation and analysis at the state level and in the 7 WCLN regions. An analysis of more than 150 000 organism-antimicrobial combinations revealed geographic differences in antimicrobial resistance in Wisconsin.¹¹

The initial antibiogram work formed the basis for the Surveillance of Wisconsin Organisms for Trends in Antimicrobial Resistance and Epidemiology (SWOTARE) program. Potential limitations of the antibiogram-based surveillance include procurement of primary data for the antibiogram (particularly as it relates to variability in local susceptibility testing),¹²⁻¹⁵ construction of the antibiogram,¹⁶⁻¹⁸ and the fact that not all antibiograms from the previous Wisconsin study¹¹ contained common organisms and/or antimicrobial agents. To avoid these issues, SWOTARE was developed to systematically assess antimicrobial resistance patterns by using a single standardized testing facility.¹⁹ The WCLN's infrastructure helped facilitate SWOTARE; the WCLN leveraged its connections to recruit study sites. Three microbiology laboratories in each WCLN region forward quotas of clinically important organisms annually to a centralized testing facility, which uses a reference broth microdilution method²⁰ to compare resistance profiles by location and time. Study sites are also asked to provide limited demographic information with each submitted isolate, so that epidemiologic associations with antimicrobial resistance in Wisconsin can be investigated.²¹

Lessons Learned

Value-Added Resources

The WCLN has helped strengthen public health surveillance and outbreak response in Wisconsin. To support the WCLN, the WSLH has provided training, education, fee-exempt testing, and surveillance summaries to clinical laboratories, which has increased clinical laboratory participation in sharing data and clinical specimens with WSLH for surveillance and outbreak response. For example, WSLH received isolates from 100% of 89 culture-confirmed tuberculosis cases identified in 2016 and 2017 and isolates or specimens from 3871 of 3983 (97%) reported *Salmonella*, Shiga toxin-producing *Escherichia coli*, and *Listeria* cases in 2015 through 2017. Clinical laboratory participation in WSLH requests to share data and clinical specimens has led to robust surveillance, which has benefited both the WSLH and state epidemiologists.

LabTAG is crucial to the WCLN's success. Allowing LabTAG members a strong voice in discussions and establishing agendas ensures that network activities are relevant and beneficial to all clinical laboratories.

In-person meetings and site visits by the WCLN coordinator to clinical laboratories and annual in-person meetings also contribute to the success of the WCLN. The in-person nature of LabTAG meetings fosters personal connections that facilitate group functions for the rest of the year, when meetings are held by conference call only. Furthermore, the rate of brainstorming and collaborative nature of the in-person meetings allow for rapid progress; during the 1-day meeting, the previous year's activities are reviewed in detail and the next year's activities are planned.

The direct laboratory-to-laboratory communication between WSLH and clinical laboratories is also important. It enables WSLH to receive necessary data and specimens without overly burdening clinical laboratories. WSLH does not share clinical laboratory contact information with other agencies; rather, WSLH acts as the intermediary when other agencies seek to contact WCLN members.

Logistics of Network Facilitation by WSLH

Three important logistical aspects of WSLH's network coordination are (1) having a WCLN coordinator, (2) providing fee-exempt materials to ship surveillance specimens, and (3) offering complementary testing to clinical laboratories. The WCLN coordinator is critically important to the function of the WCLN. The coordinator must have a clinical background to relate to clinical laboratory experiences and culture. It is also important that WSLH provides fee-exempt specimen collection kits and specimen transport, because providing them eliminates barriers for clinical laboratories to contribute specimens to WSLH for ongoing surveillance. Finally, to be the best possible partner with clinical laboratories and engender goodwill and continued partnership through the WCLN, WSLH does not compete with clinical laboratories for diagnostic testing; rather, it offers complementary testing, with the knowledge that competing with clinical laboratories for testing does not engender cooperation.

Challenges to Maintaining the WCLN

One challenge to maintaining the WCLN is securing funding for network activities. The WSLH recognizes the importance of the WCLN to its work as the state's public health laboratory. As such, continued support and funding of the network are a WSLH priority, but securing consistent funding can be a challenge. Another challenge to maintaining the network is clinical laboratory consolidation and "leaning," or doing more work with fewer people, which makes it difficult for clinical laboratorians to attend WCLN activities. However, providing PACE credits for trainings, meetings, and webinars adds value; as such, supervisors are more likely to approve time off to attend them. Another challenge with consolidation is that fewer laboratories perform microbiology testing now than in the past. Because the WCLN is necessarily focused on microbiology for infectious disease surveillance, outbreak response, and biothreat preparedness, the WCLN is beginning to lose its relevance for laboratories that no longer perform microbiological testing. To address this issue, the network is considering

ways to engage generalists in additional clinical laboratory disciplines, including inviting non-microbiology experts to give webinars.

Conclusions

The WCLN can serve as a model for other public health laboratorians looking to implement laboratory networks in their states. The WCLN has been important to the mission of WSLH during the past 2 decades. Despite challenges, ongoing support from both clinical laboratories and WSLH indicates that the network will continue to be useful in the future.

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