

# The Wisconsin Infection Prevention Center: *The Value of a Statewide Infection Prevention Center*

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**H**ealth care-associated infections (HAI), the majority of which are caused by antimicrobial-resistant organisms, pose a major threat to patient safety.<sup>1</sup> Every year 700,000 HAIs occur in acute care settings alone in the United States, causing 75,000 deaths and billions in health care costs.<sup>2</sup> Despite recent advances, there remain significant gaps in knowledge regarding HAI prevention across the spectrum of health care. For successful HAI prevention, it is essential that novel interventions are identified and tested, driven by a deep understanding of pathogenesis and transmission.<sup>1</sup> Already, emerging pathogens, particularly multidrug-resistant organisms such as carbapenem-resistant *Acinetobacter baumannii* (CRAB), threaten to put us back in the pre-antibiotic era, where we may have few, if any, medical therapies to treat life-threatening infections. Thus, research into the epidemiology of HAIs, improved understanding of antimicrobial resistance (AR), and

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the development of effective novel interventions are high priorities of funding agencies,<sup>3</sup> health care facilities, and patients.<sup>4</sup>

The scope of the problem requires high-quality, high-impact, multidisciplinary, and multicenter research.<sup>5</sup> Currently, groups often work independently on similar questions, which can pose challenges in efficiency and leveraging of resources. Geographic variation in outbreaks of organisms, such as *Clostridioides difficile* (*C difficile*) and CRAB, highlight a need for collaborations within regions to respond directly to local public health needs by coordinating and leading multiple lines of inquiry.<sup>6-8</sup> We propose that a statewide consortium to coordinate prevention and translational research activities in Wisconsin will represent an important innovation for HAI prevention research. This Center, in close collaboration with public health, will allow research to move beyond the current paradigms and will catalyze the discovery, development, implementation, and dissemination of new strategies to improve patient safety and public health. We envision this Center expanding its collaboration to neighboring states in later phases.

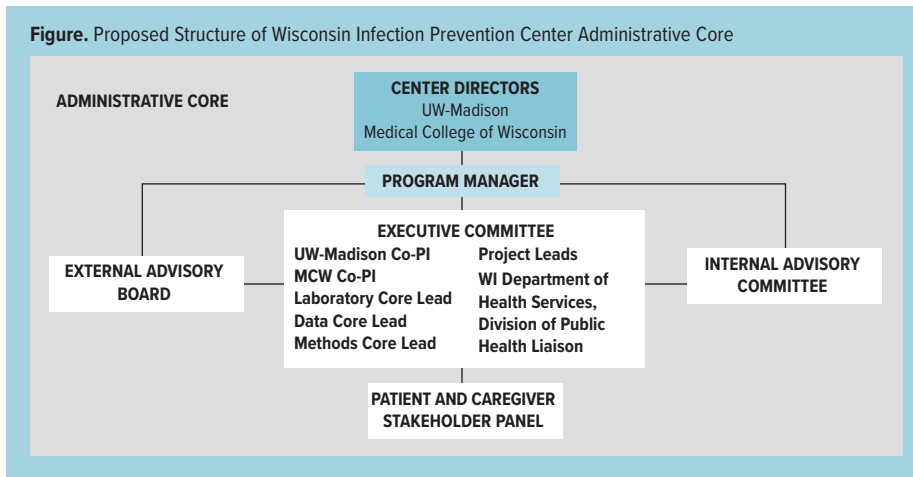
## **The Wisconsin Infection Prevention Center – A Proposal to Support High-Impact Infection Prevention Research**

The goal of the proposed Wisconsin Infection Prevention Center is to prevent HAIs and AR through high-quality and high-impact research. This Center will provide the platform and infrastructure to connect experts from a variety of disciplines alongside a coalition of academic institutions, public health agencies,

and health care systems. By leveraging and optimizing these resources, the Wisconsin Infection Prevention Center will transform HAI and AR prevention by supporting prevention and translational research in health care settings across the spectrum of care. In addition, such a center will build capacity for research in HAI and AR by training and mentoring learners in the health professions in the skills needed to undertake research within health systems and communities.

The benefits of a successful statewide center are numerous.

- Foster collaboration among scientific leaders with multidisciplinary expertise in broad substantive and methodologic areas (eg, epidemiology, microbiology/microbiome research, pharmacy, infectious diseases, mathematical modeling, and bioinformatics).
- Provide infrastructure to extend the reach of public health agencies – connecting and engaging health care systems, research groups, and academic institutions in a research agenda targeted to public health needs.
- Cultivate the next generation of HAI and AR researchers through didactic and experiential learning. Mentor junior investigators in HAI- and AR-relevant methods and connect them with resources to supplement their development to ultimately expand the workforce for HAI and AR prevention.
- Undertake patient- and other stakeholder-centered research to meet and respond to the needs of HAI and AR in Wisconsin.<sup>4</sup>



### An Innovative Research Agenda Supported by a Collaborative Infrastructure

Wisconsin provides an excellent “real world” setting in which to conduct HAI prevention research that will support broad translation throughout the state and other regions. Led by investigators at the University of Wisconsin (UW)-Madison and the Medical College of Wisconsin (MCW), the Wisconsin Infection Prevention Center will build a coalition with the Wisconsin Department of Health Services/Division of Public Health, the Wisconsin State Laboratory of Hygiene, and health systems (eg, UW Health, Froedtert Health, Marshfield Clinic Health System). This coalition provides care to over 2 million residents of Wisconsin and beyond. By connecting the expertise of the investigators and clinicians in public health, translational research, epidemiology, and clinical trials across these institutions, the Wisconsin Infection Prevention Center will serve as a valuable resource to the state – allowing investigators to nimbly adapt to emerging pathogens and target research directly to HAI/AR issues of highest priority (eg, the ongoing CRAB outbreak in Wisconsin post-acute care settings).<sup>7</sup> Table 1 outlines a proposed research agenda demonstrating both the innovative nature of the questions, as well as the direct application of these topics to public health in Wisconsin.

The Wisconsin Infection Prevention Center’s multidisciplinary activities will be supported by an infrastructure of an administrative and several scientific cores.

An Administrative Core will be charged with leadership, communication, and coordination of key partners to meet scientific goals. The Administrative Core’s main roles will be (1) lead-

ing/overseeing Center activities (eg, ensuring optimal resource utilization and coordination of research efforts); (2) providing regulatory support for all affiliated research activities; (3) soliciting, reviewing, and selecting projects to meet the Center’s scientific goals; (4) identifying opportunities for training and mentoring junior investigators; and (5) evaluating the overall Center and adjusting strategies accordingly in close collaboration with state’s public health authorities. Multiple interacting entities will support these roles (Figure). The Wisconsin Infection Prevention Center will be co-led by principal investigators from both UW-Madison and MCW to ensure participation and parity from both of these leading research institutions. An Executive Committee (EC) will oversee all administrative, programmatic, and financial aspects of the Center – developing research agendas, providing decision-making around project execution, engaging collaborators, and ensuring coordination between and among scientific cores and investigators to meet goals. Notably, the EC will include liaison(s) to the Wisconsin Department of Health Services/Division of Public Health – allowing for the Center to directly coordinate responses to HAI and AR issues alongside these public health agencies. An Internal Advisory Committee and External Advisory Board will collaborate with the EC to guide overall activities, ensure access to resources, and provide strategic leadership. In addition, a Patient and Caregiver Stakeholder Panel will contribute their perspective to the EC to apply a patient-focused lens to all Center activities.

Three Scientific Cores (Laboratory, Methods, and Data) will provide centralized resources and support for projects:

- 1) The Laboratory Core will be responsible for executing lab components of all Center projects.
- 2) The Data Core will collaborate with investigators throughout the lifespan of research studies to provide statistics and data management support (eg, in experimental design, development of key study endpoints, sample size estimation, statistical analysis plan, monitoring of study conduct, statistical analysis of study data, reporting study results, and publication of findings).
- 3) The Methods Core will provide a platform for investigators to access specialized research expertise (eg, epidemiology, clinical trials, human factors engineering, health services research, health economics, informatics, and observational study design) and engage additional experts to successfully complete high-quality studies.

The availability of expertise within these cores provides an ideal learning laboratory for junior investigators – mentees will gain hands-on experience in a wide variety of HAI and AR prevention methods and topics (Table 1). Faculty mentors will assist mentees not only in developing individual career development plans, but also in connecting mentees with Center members and resources that will support career goals and development. Given the rising urgency of HAI and AR prevention research, the training provided by the Wisconsin Infection Prevention Center will be an opportunity to cultivate promising researchers and provide the necessary experience to sustain this high-impact research in the future.

### Launching and Sustaining a Center to Move Beyond the Current Paradigms of HAI and AR Research

Given the ambitious goals of the Wisconsin Infection Prevention Center, initial funding is necessary to (1) allow investigators protected time to develop Center infrastructure and (2) fund high-impact clinical and translational research projects (Table 1). To support our activities, the Center will actively seek funding from the Centers for Disease Control and Prevention, the Agency for Healthcare Research and Quality, the National Institutes of Health, and foundations such as Advancing a Healthier Wisconsin and the Wisconsin Partnership Program. Upon

launch of the Wisconsin Infection Prevention Center, regular evaluation of the Center's goals and metrics will be critical to ensuring progress towards a high-impact translational research agenda (Table 2). All entities within the Administrative Core will play important roles in monitoring scientific and administrative progress and developing strategies for future research directions to ensure that the Center's research is targeted towards innovative and high-impact questions in response to the public health crises posed by HAI and AR.

Wisconsin has long been a leader in clinical innovation and public health. The proposed Wisconsin Infection Prevention Center will further cement the state as a regional and national powerhouse in infection prevention research. With the infrastructure and platform to support a broad research and translation agenda, the Wisconsin Infection Prevention Center will focus on novel interventions – prioritizing approaches where there is potential for broad population impact. Given its proposed coalition of institutions, health care networks, and public health agencies, the Center will be able to directly align with public health priorities – thus its work will be immediately applicable to the needs of the state and beyond.

In summary, we strongly believe that the Wisconsin Infection Prevention Center will leverage the talent in our state institutions, fostering multidisciplinary collaborations and research with close coordination with the state's public health authorities, ultimately benefiting all Wisconsinites.

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**Table 1.** Proposed Initial Research Agenda for Wisconsin Infection Prevention Center

Lead Institutions	Research Aim
MCW, WSLH	Examine the epidemiology, environmental contamination, skin microbiome, and prevention interventions in Milwaukee-area post-acute care patients colonized with CRAB.
UW, MCW	Evaluate biomarkers as predictors of <i>Clostridioides difficile</i> infection, characterize testing methodology on antimicrobial prescribing, and establish geographic patterns of <i>C difficile</i> strains in Wisconsin.
UW, MCW, WDHS/WDPH	Characterize the post-acute health care networks in two Wisconsin counties to identify regional opportunities to interrupt the interinstitutional spread of AR bacteria.
UW	Identify modifiable risk factors for community-onset, health care-associated AR pathogens by leveraging the statewide Survey of the Health of Wisconsin and linking to the electronic health records of multiple health care systems. <sup>9</sup>
UW, MCW	Use machine learning to develop a tool for predicting the likelihood of infection due to resistant organisms.
MCW, WSLH, WDHS/WDPH	Evaluate prospective real-time whole genome sequencing on the epidemiology of CRAB at the state level in Wisconsin to determine if this strategy is more effective and cost-effective for surveillance and outbreak investigations.
UW, MCW	Determine how dietary fiber supplementation, compared to no supplementation, affects <i>C difficile</i> infection rates, the gut microbiome, and host immune response in individuals with a recent history of <i>C difficile</i> .

Abbreviations: CRAB, Carbapenem-Resistant *Acinetobacter baumannii*; MCW, Medical College of Wisconsin; UW, University of Wisconsin-Madison; WDHS, Wisconsin Department of Health Services; WDPH – Wisconsin Department of Health Services, Division of Public Health; WSLH – Wisconsin State Laboratory of Hygiene.

**Table 2.** Goals and Indicators to Evaluate Wisconsin Infection Prevention Center Impact and Capacity Building

Goal	Indicator/Measure
Increased capacity to conduct HAI/AR prevention research	<ul style="list-style-type: none"> <li>100% of mentees successfully complete mentoring program</li> <li>Center projects meet all aims</li> <li>100% of faculty engage in at least 1 Center activity each year</li> </ul>
Increased HAI/AR prevention scientific output	<ul style="list-style-type: none"> <li>Minimum of 3 peer-reviewed articles/abstracts/presentations at scientific meetings and conferences for each Center project</li> </ul>
Improved collaboration with other HAI/AR prevention researchers	<ul style="list-style-type: none"> <li>Active partnerships with state, regional, and national groups conducting HAI/AR prevention research</li> <li>Active engagement with health care facilities networks for HAI/AR research</li> <li>Each co-principal investigator serves on a working group for national HAI prevention consortia</li> </ul>

Abbreviations: AR, antimicrobial resistance; HAI, health care-associated infection.

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