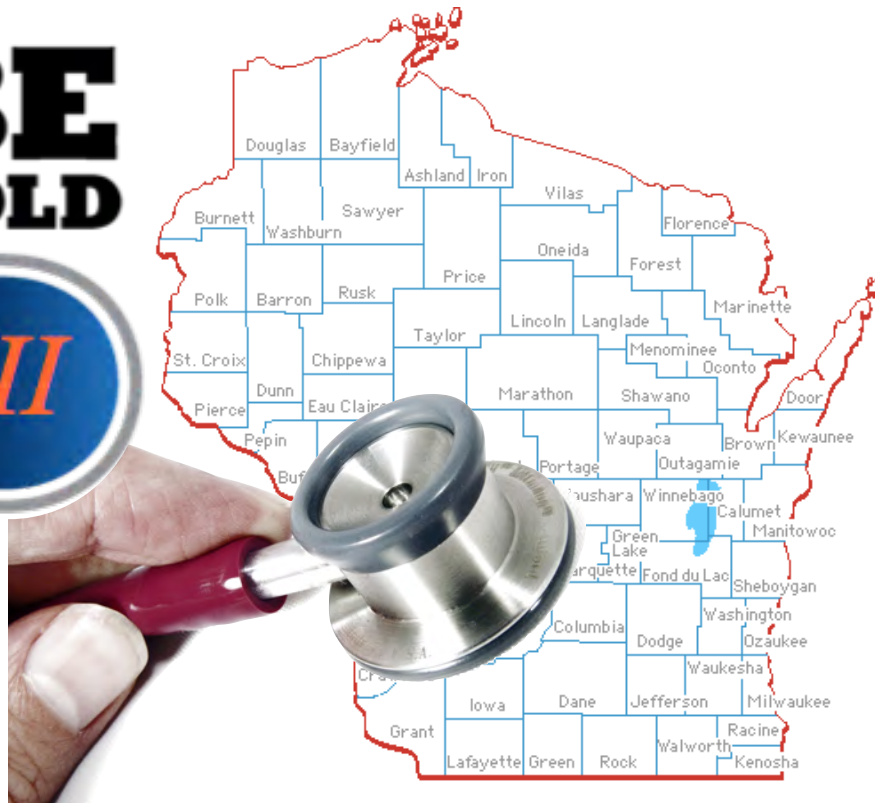




ACCELERATE WISCONSIN

A COMPETITIVE WISCONSIN, INC. INITIATIVE

**BE
BOLD**



HEALTH CARE IN WISCONSIN



Spring 2017

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Preface: Competitive Wisconsin, Inc. and the BE BOLD Initiatives

In 2017, Competitive Wisconsin, Inc. will celebrate its 36th year with two signal events that underscore the importance of the work being done by one of Wisconsin's premier public-private collaborations. The first is the release of these BE BOLD III: Accelerate Wisconsin recommendations on how to turbo-charge Wisconsin's already high-performing food manufacturing and health care clusters. The second will be the initiation of the widely anticipated private-sector driven BE BOLD IV strategic examination of how to recruit the thousands of new workers Wisconsin needs to support and grow its economy and protect its quality of life.

The BE BOLD initiatives began in 2010 when Competitive Wisconsin, Inc. decided to enhance its traditional research-based policy development analysis process by making it more visible to the media and the public and more effective in terms of legislative outcomes and policy development. In pursuit of those two goals, BE BOLD initiatives are built on research and analysis that enjoys significant public exposure and robust opportunities for input from both the general public and the businesses and publics affected by the recommendations. All BE BOLD initiatives are also predicated on the assumption that since sound research and public input should be focused on issues that warrant analysis and can lead to improvements in public policy, each initiative should include an organized effort to engage policy makers in the process and ultimately to encourage legislative action in support of the recommendations. For example:

- *BE BOLD I: The Wisconsin Prosperity Strategy* was grounded in comparative analytical research done by Deloitte; and informed by a variety of public outreach efforts including the work of the Wisconsin Way; three Wisconsin Economic Summits co-hosted by the UW System, Competitive Wisconsin, Inc. and the Wisconsin Education Business Roundtable; and input from more than 50 business and public organizations and associations that participated in a series of BE BOLD Strategic Planning Group meetings. Policy makers and experts participated in the process and BE BOLD I's recommendations "...transformed and energized economic development in Wisconsin, including the creation of the Wisconsin Economic Development Corporation (WEDC), the retooling of Wisconsin's economic development incentives, the development of a state marketing program and the identification of a statewide inventory of certified sites for business development."¹
- *BE BOLD II: Growing Wisconsin's Talent Pool* was also based on comparative analytical research, this time done by ManpowerGroup; and was also informed by a variety of public outreach efforts, including numerous Executive Committee meetings; more than two dozen regional briefings; three Wisconsin Economic Summits; and numerous meetings of a BE BOLD II Strategic Planning Group that included more than 80 public organizations, private businesses and associations. BE BOLD II's recommendations significantly and positively influenced the development and implementation of what is now



¹ Find the full BBI report at <http://www.competitivewi.com/cwi/index.php/be-bold-i-2010>

known as the Wisconsin Department of Workforce Development's Fast Forward program and of the Academic Career Plan requirements and infrastructure in the state's PK-12 schools.²

- *BE BOLD III: Accelerate Wisconsin* remains true to all of these objectives and operating principles. It is focused on enhancing the ability of Wisconsin's major industrial clusters to thrive in Wisconsin while competing and prospering even more effectively in a constantly changing world. To that end, Competitive Wisconsin, Inc. and the BE BOLD Council, working with the University of Wisconsin System, the University of Wisconsin–Madison and the Wisconsin Economic Development Corporation, identified food manufacturing and health care as the two examples of employment clusters demonstrating significant and sustainable job growth and capacity for wealth creation upon which *BE BOLD III: Accelerate Wisconsin* would focus. The clusters were studied sequentially. *BE BOLD III: Accelerate Wisconsin: Part 1 – Food Manufacturing*, was released in mid-April 2017. This document contains *BE BOLD III: Accelerate Wisconsin: Part 2 – Health Care*.



² Find the full BBII report at <http://www.competitivewi.com/cwi/index.php/be-bold-ii-2012>

Accelerate Wisconsin: Health Care Executive Summary

Healthy citizens, families, and workers with access to quality health care are all essential components of Wisconsin's economic infrastructure. Wisconsin health care providers have enthusiastically embraced their responsibility to lead Wisconsin's continuous improvement effort in delivering quality health care and pride themselves on being active, innovative, effective members of Wisconsin's economic community.

Being active, innovative and effective in today's health care world is absolutely necessary, but it's not easy, and most providers will tell you that they are grappling with three specific issues affecting their ability to help people build the healthy Wisconsin everyone wants, employers need and that the economy must have. The three issues are interrelated. Each represents both a threat to public health and an opportunity to address the issue in a manner that could not only improve public health, but also strengthen Wisconsin's economic wellbeing.³

Issue 1: Workforce Shortages

The most immediate and visible issue is the shortage of health care professionals and providers. In 2016 the Association of American Medical Colleges released a report indicating that, "Under every combination of scenarios modeled, the United States will face a shortage of physicians over the next decade ... The projections show a shortage ranging between 61,700 and 94,700, with a significant shortage showing among many surgical specialties."⁴ A 2011 Wisconsin Hospital Association study reported that Wisconsin needed 900 new doctors a year to meet existing demand and concluded that even if one assumed the current recruitment and retention patterns could be sustained, only 800 of those needed would be found and the state would be short at least 100 doctors each year.

The nurse shortage is equally acute and the deficit numbers are much larger. In 2013, for example, the Bureau of Labor Statistics estimated that the 2012 nurse population would have to grow nearly 20 percent to meet demand in 2022. That projection would require the training and hiring of more than 1 million new nurses, 525,000 to replace nurses retiring from the profession and 526,800 to meet growing demand.⁵ The projected national shortages are confirmed in a series of reports issued by the Wisconsin Center for Nursing that indicate that Wisconsin will be short more than 1,000 new nurses every year for the next 20 years.⁶

To address these workforce shortages, the BE BOLD III Health Care Strategic Planning Group (HC-SPG) recommended that Wisconsin recognize Wisconsin's physician and nurse shortages as urgent, time-certain, systemic challenges that represent a genuine threat to the state's public and economic health that can best be addressed collaboratively on a statewide basis. To that end, the HC-SPG developed a set of operating assumptions (see p.33) and based on those operating assumptions recommends charging the Wisconsin Council on Medical Education and Workforce (WCMEW) with convening a multi-sector

³ All recommendations were informed by research done at the UW-Madison, the Wisconsin Economic Development Corporation, the Wisconsin Hospital Association, the Wisconsin Council on Medical Education and Workforce, Deloitte Consulting, and others cited in this report.

⁴ https://www.aamc.org/newsroom/newsreleases/458074/2016_workforce_projections_04052016.html The report aggregates the shortages in four broad categories: primary care, medical specialties, surgical specialties, and other specialties. By 2025, the study estimates a shortfall of between 14,900 and 35,600 primary care physicians. Non-primary care specialties are expected to experience a shortfall of between 37,400 and 60,300 physicians.

⁵ <http://www.aacn.nche.edu/media-relations/fact-sheets/nursing-shortage>

⁶ http://www.wisconsincenterfornursing.org/documents/2014%20WI%20RN%20Forecast%20Model%20Update_FINAL%20Oct%2031%202016.pdf

consortium – consisting of WCMEW, employers and community leaders – tasked with defining challenges and proposing outcome and cost effective **systemic** proposals on how best to address Wisconsin’s short- and long-term physician and nurse shortages.

The HC-SPG believes that the systemic proposals will involve systemic changes that will require funding and, in keeping with the BE BOLD tradition, boldly recommends that Wisconsin think of this necessary investment in public health and economic wellbeing as the surest road to revenue that can only be generated if these jobs are filled. We are not talking about creating jobs. We are talking about filling jobs and creating taxpayers.⁷

Issue 2: Population Health

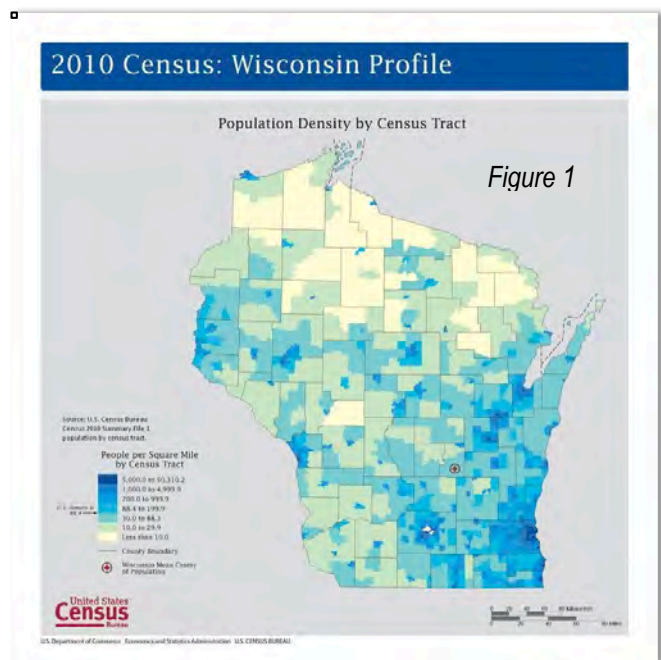
Scientific and technological advances are revolutionizing the diagnostic, treatment, and delivery elements of the health care system. Concerns about cost; the emergence of Big Data mining as a analytical tool; and politics are changing what gets measured, how it gets measured, who gets paid what for it, and who will pay what for it.

In this mind-boggling storm of change, three challenges have emerged around population health, including:

Challenge No. 1: The decision to shift from a treatment volume-based reimbursement system to an outcomes-based reimbursement system for health care forces a recognition that environmental, economic and lifestyle choices are contributing factors that determine the health of the patient seeking care and the care options available to his/her health care provider. A growing awareness that these factors represent a sort of “societal preexisting condition” is driving a major re-assessment of the factors affecting public health and what exactly constitutes “health care.”

To address this challenge, the HC-SPG calls for the creation and empowerment of a collaborative systemic infrastructure focused holistically on improving population health. (see pp. 45-46).

Challenge No. 2: Demographic realignments (see Figure 1) and economic pressures are exacerbating the challenges health care providers face and affecting their ability to adjust to the need to address community-wide health issues.



⁷ Assume, for example, that it takes two years to train an Associate Degree Nurse at a cost of \$4,000 to \$6,000. Assume also that that nurse will probably step into a job that pays about \$40,000 a year and that he or she would be willing to agree to work in Wisconsin for a specified period of time (say 5 years) in exchange for a tuition-free education. The state’s cost would be \$4,000 to \$6,000 plus the time use of money charges. But after the two years, the state’s payback would be direct taxes on \$200,000 of the nurse’s income and indirect taxes resulting from the ripple effect of the nurse’s spending. Now multiply all the numbers by 1,000 – i.e. 1,000 nurses needed a year – so \$4 to \$6 million+ in costs with \$200 million in income.

To address this challenge, the HC-SPG recommends creating a collaborative of existing and new sources tasked with scaling up and systematizing existing best practices; developing new approaches and strategies; identifying systemic efficiencies; and developing and marketing commercial products and applications related to addressing the challenges and opportunities of the target populations (see p. 47-48)

Challenge No. 3: While recognizing that addressing the economic, social and behavioral phenomena that adversely affect community health is a critical step toward more comprehensive health care, it requires understanding that: a) doing so will have minimal, if any, impact on current patient outcomes for some time; b) that achieving economic, social and behavioral changes that positively affect community health outcomes will take time and money; and c) that the investments required to make progress on this front must either come from existing budgets, which may affect current patient outcomes, or from some new source of revenue.

To address this challenge, the HC-SPG recommends (see p. 49):

- initiating a comprehensive statewide public information and education campaign targeted at employees and employers dedicated to promoting adoption of proven best practice wellness and prevention care insurance plans. The costs of the campaign should be financed with state funds and tax-deductible private sector employer funds. The statewide education and information campaigns should be augmented with local and regional efforts.
- adopting a statewide transitional funding plan.

Issue 3: Research, Development and Investment

Entrepreneurs know that opportunity lies at the intersection of need and vision and capacity. In recent years, it has become more and more apparent that health care, particularly that of the aging, is generating a major and growing need. Companies like Epic, Exact Sciences, Promega and dozens of others in Wisconsin developed scientific and technological capacity to create their own opportunities and now employ thousands of Wisconsin residents and taxpayers.

The emerging demands of the population health marketplace referenced above will potentially create a larger and equally important demand for goods and services and cures and miracles and for some way to access them on and/or deliver them to our mobile devices. The need is clearly there. Wisconsin has the necessary research and development skills. The question is whether or not we have the vision and whether or not we can attract capital to implement the vision and seize opportunity.

To address these issues, the HC-SPG recommends developing a health care management ecosystem (e.g., similar to that emerging in Wisconsin around water management) tasked with, among other things:

- creating a centrally located innovation hub that can provide opportunities for entrepreneurs to network and learn in the pre-start-up phase and supporting commercialization with public and private sector engagement;
- incentivizing collaboration between private and public organizations; and
- promoting specific investment opportunities and tax incentives that will increase investments in technology infrastructure and tools.

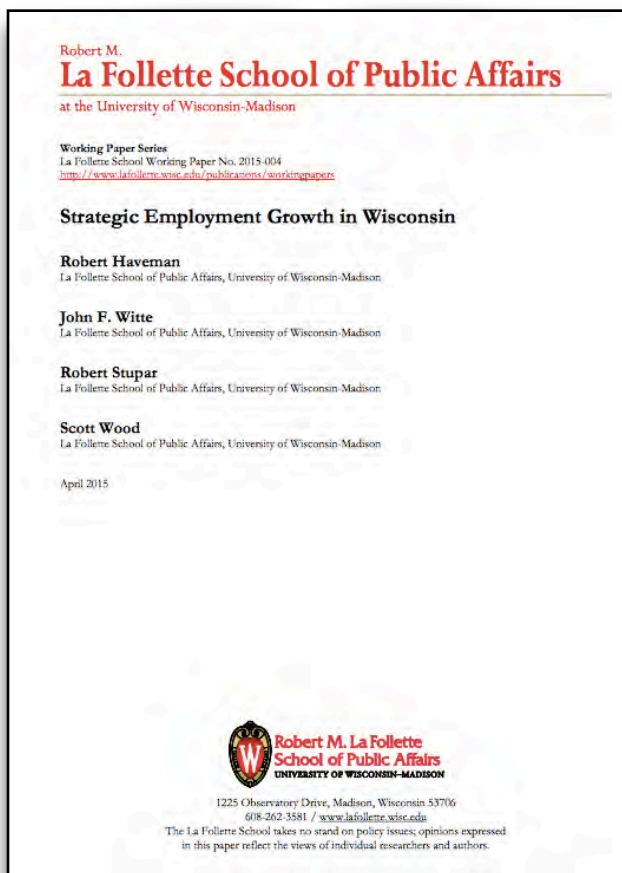
Accelerate Wisconsin: Scope, Objectives and Methodology

BE BOLD III: Accelerate Wisconsin was tasked by the BE BOLD Council and Competitive Wisconsin, Inc. with:

- identifying two private-sector clusters that were performing well in Wisconsin;
- examining what was and was not working for those clusters in Wisconsin;
- identifying other states where those two clusters were performing as well as or better than they were in Wisconsin;
- determining whether or not there were best practices or innovations shaping or informing the relationship between those clusters and governments in those states that might help turbocharge the two clusters being studied in Wisconsin; and,
- developing bold recommendations that will address the challenges and opportunities identified in the process while also advancing Competitive Wisconsin, Inc.'s specific objectives for the BE BOLD III initiative, including raising the per capita income in Wisconsin; developing a strong, sustainable talent pool; enhancing the ability to get products to market; and maximizing the responsible use of resources.

BE BOLD III's research methodology included:

- a study of past, current and future job and wealth growth in Wisconsin designed to provide a preliminary identification of clusters that were performing well in Wisconsin. Dr. John Witte and Dr. Bob Haveman, both UW–Madison emeritus professors and former directors of the La Follette School of Public Affairs, conducted this study with financial support from both the University of Wisconsin System and the University of Wisconsin–Madison. The study identified three job and wealth growth areas including food and beverage vendors, health care, and business services;⁸
- a study by researchers at the Wisconsin Economic Development Corporation designed to provide additional data on the clusters identified in the UW–Madison study, particularly as the information related to Competitive Wisconsin Inc.'s BE BOLD III interest in higher per capital income and the development of a sustainable talent pool. This research led to the decision to focus BE BOLD III's efforts on Wisconsin's food manufacturing and health care clusters;
- separate Deloitte Consulting facilitated meetings with business leaders, association executives, academic experts and relevant state agency personnel from Wisconsin's food manufacturing and health care clusters. These meetings were dedicated to providing industry leaders and experts to talk about: a) what was and was not working for their companies and industry in Wisconsin; b) what they saw as major opportunities and challenges facing their clusters; and c) which states or areas would be worth exploring for new ideas and best practices; and



⁸ Research reports are available at <http://wiroundtable.org/bb3.html>

- separate Deloitte comparative analytical studies of each cluster based on guidance from Competitive Wisconsin, Inc. and from the meetings with industry leaders and experts.

BE BOLD III's public outreach and input thus far includes:

- periodic meetings with, and briefings for, cluster companies and institutional organizations representing the clusters;
- periodic briefings with, and briefings for, leaders of governmental bodies and agencies;
- fourteen *BE BOLD III: Accelerate Wisconsin* preliminary briefings held around the state and co-hosted by Competitive Wisconsin, Inc., local University of Wisconsin campuses, local Wisconsin Technical College System campuses, local chambers of commerce and local units of government;



BE BOLD III Preliminary Briefing Session

- local media briefings; and
- the convening of the BE BOLD III Food Manufacturing and Health Care Strategic Planning Groups to review, comment upon and develop recommendations based upon the research and public input referenced above.

BE BOLD III's future public outreach and input will include:

- a series of WisconsinEye broadcasts featuring panels of business leaders, policy makers and experts discussing and answering questions on the BE BOLD III recommendations;
- a series of presentations open to the media around the state for Regional Economic Development organization members and other local business organizations;
- print and broadcast editorial board meetings around the state; and,
- briefings for policy makers and elected officials.

Accelerate Wisconsin: Why Health Care

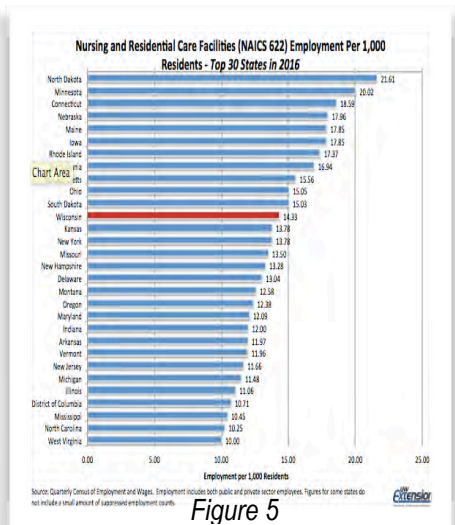
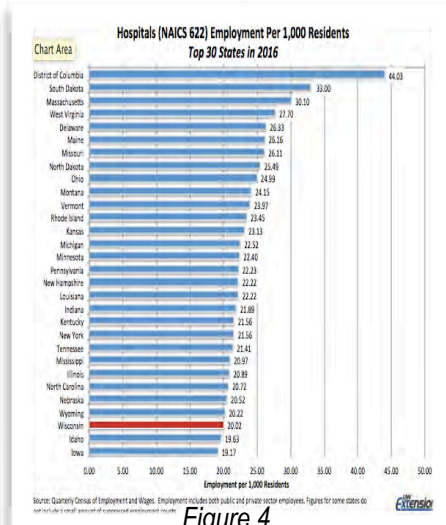
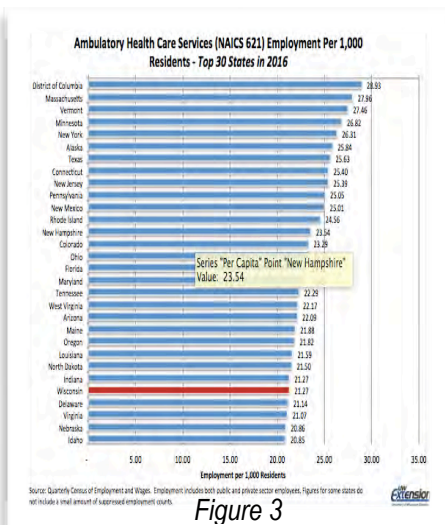
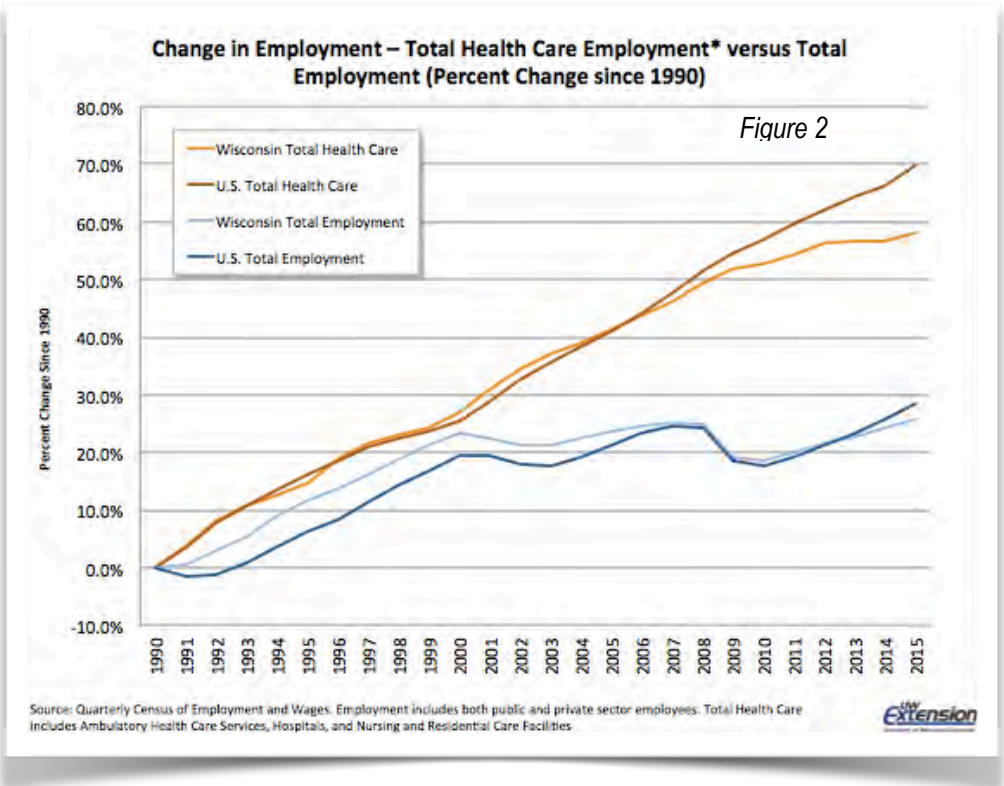
Strong consistent job growth

Wisconsin's seasonally adjusted workforce at the end of 2016 was approximately 3.1 million strong. More than 400,000 of those Wisconsin workers — nearly one in eight — are employed in health care. They and their employers comprise an economic engine that generated 7.8% of Wisconsin's Gross Domestic Product in 2015.

Growth in health-care related employment has outpaced growth in other sectors of employment in Wisconsin every year since 1990 (see Figure 2). As a result, Wisconsin now ranks in the top 30 states in the nation in ambulatory care (see Figure 3), hospital (see Figure 4), and nursing and residential home care facilities (see Figure 5) employment. (See charts below)

Stable employment

It is important to note that employment growth in health care is a national



phenomenon (see Figure 6) and, from Wisconsin's point of view, it is also important to note that with the exception of nursing and residential care, health care employment tends to be more stable than other forms of employment (see Figure 7).

Economic development needs

Wisconsin is confronting significant workforce shortages. Both the public and the private sectors need to do what they can to maximize the ability of the state's existing population to qualify for the jobs Wisconsin's employers need filled so they can find the jobs they want here in Wisconsin.

However, because Wisconsin's existing workforce-aged population is not large enough to meet likely employer needs, the public and private sectors must also collaborate on strategies that increase worker retention and recruitment. And, accessible, affordable high-quality health care is absolutely essential to the state's workforce retention and recruitment efforts.

Workforce supply challenges

Wisconsin's ability to continue to provide accessible, affordable, high quality health care is directly affected by the ability of Wisconsin's health care providers to develop and retain the workforce it needs. And, at the moment, like many of Wisconsin's employment clusters, health care is facing serious workforce shortages. Just

looking at the age of the workforce and probable retirement issues, for example, in 2015 nearly one in every four hospital and ambulatory care employees was 55 or older (see Figure 8), suggesting that these two sectors will need to replace nearly 60,000 workers within the next 15 years (see Figure 9).

This challenge is complicated by the fact that demand for health care is increasing as Wisconsin's senior population continues to grow and the job of finding physicians, nurses and other health care employees to

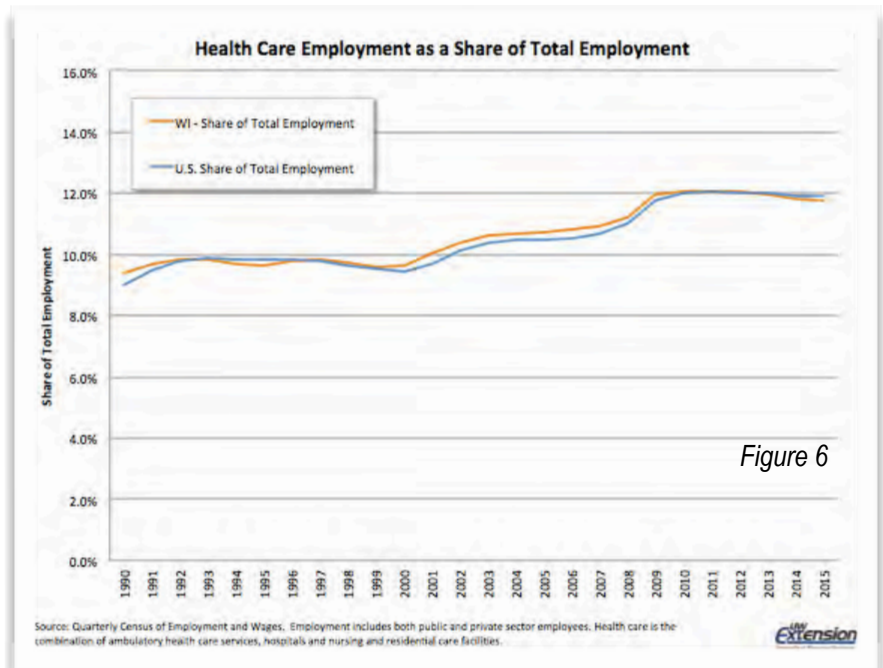


Figure 6

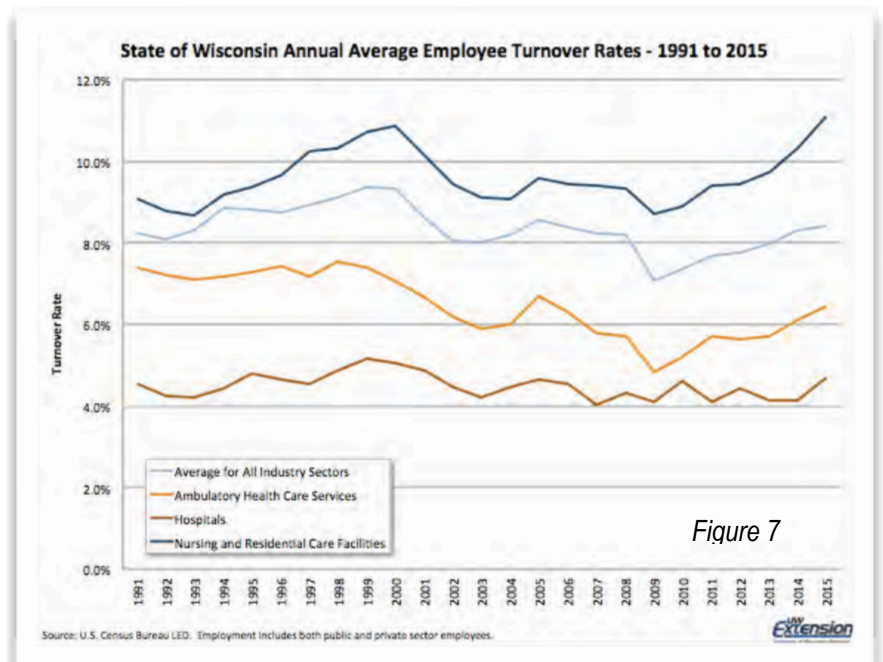
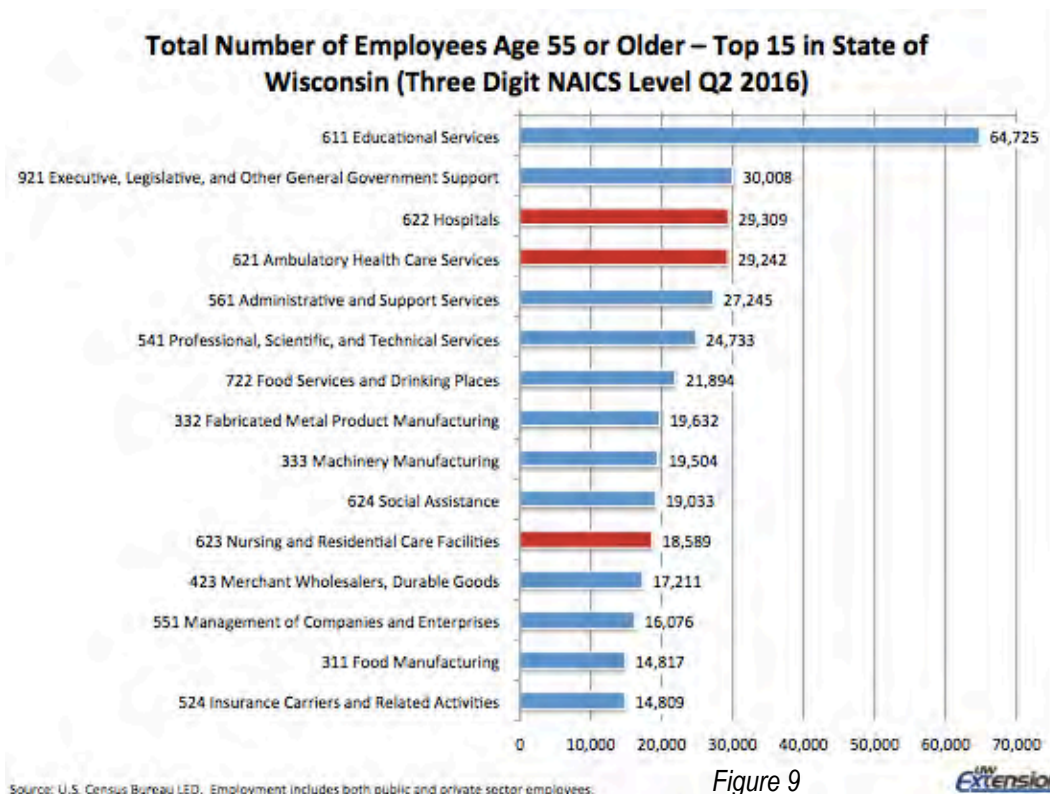
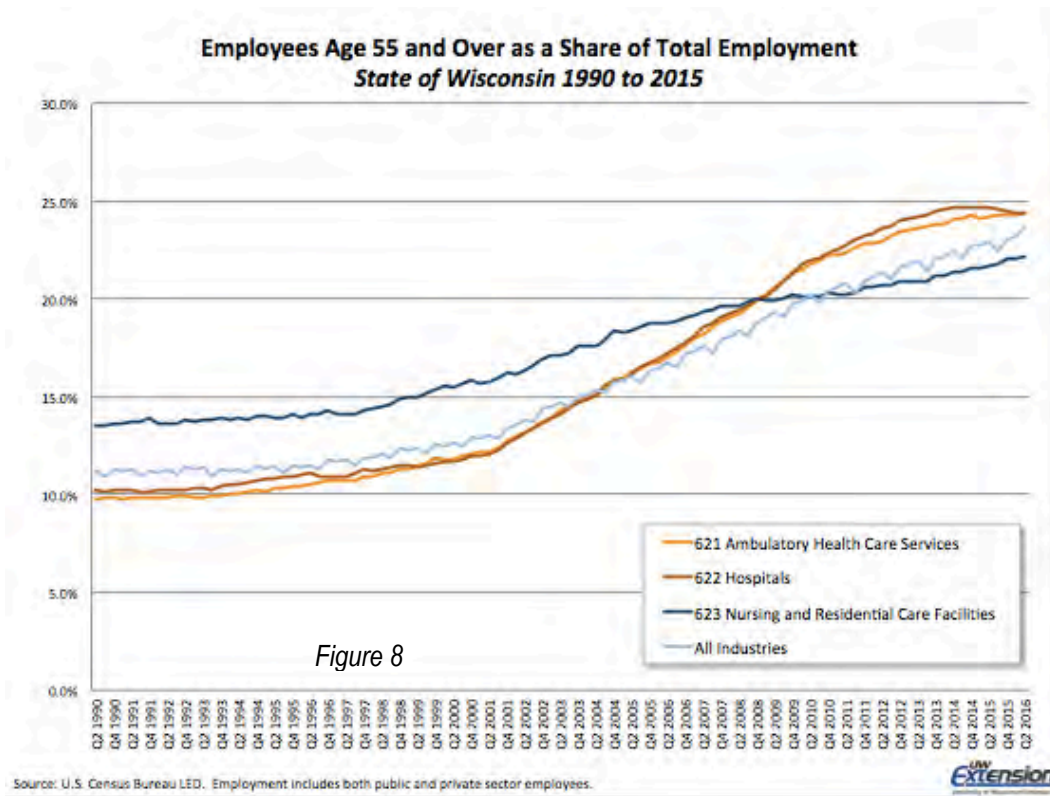


Figure 7

meet the growing and changing needs continues to get more difficult, particularly in Wisconsin's rural areas.



Accelerate Wisconsin: Health Care — What’s Working and What’s not

What’s Working and What’s Not Working for Health Care Providers in Wisconsin: Initial Thoughts

In April of 2016, Deloitte convened two three-hour meetings of health care provider leaders and academic experts, one in Milwaukee and one in Madison, to share their views on how doing business in Wisconsin worked, or didn’t work, for them.

At these meetings, health care providers identified a number of positive elements in their Wisconsin experience, including:

- widespread recognition both in-state and out that Wisconsin citizens have access to high-quality health care;⁹
- significant leadership of, and engagement with, the development, adoption and implementation of innovative practices;¹⁰ and



⁹ Deloitte specifically noted the fact that Wisconsin is: a) recognized for maintaining low hospital readmission rates; b) serves as a national model for the Center for Disease Control for reducing infections; c) ranked in the top 10 for insurance coverage, due to a low uninsured rate (5.6% in 2015 according to the Gallup Well-Being Poll); d) enjoys strong health insurance industry performance; and e) highly ranked for its locally controlled community organization hospitals in rural areas.

¹⁰ Deloitte specifically noted the fact that Wisconsin: a) has an advanced and continuing focus on quality and price of care over fee for service model; b) had a Managed Medicaid system in place prior to the Affordable Care Act; c) has integrated, statewide delivery networks that utilize HMO focusing on quality and price; c) is a leader in the adoption of new technologies to expand telemedicine capabilities; d) is working on integrated screenings for behavioral and physical health (e.g., Bellin Health in Green Bay and Access Community Health Centers in Madison); and e) has medical malpractice policies and patient compensation funds that create favorable liability environment for physicians and patients.

- a developing culture of collaboration among health care providers linked to care for patients and public policy improvements.¹¹

Health care providers also identified issues of concern, including workforce shortages that are already serious and will adversely affect public health if not addressed sooner rather than later (see Figure 10). “It’s a demographic piece,” said one provider, noting, “Our nursing faculty is really old. Where are we going to find their replacements?”¹²

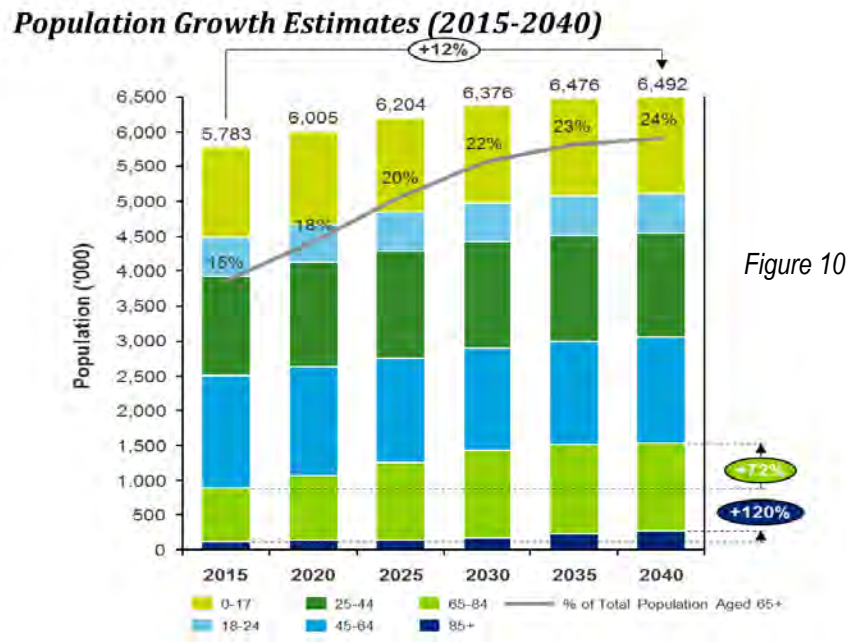


Figure 10

Source: Wisconsin Department of Administration

“It’s not just that we don’t have enough people in the pipeline,” said another, “There is a growing dissatisfaction from doctors and nurses with the hours and the amount of after-hours work. That’s also a

¹¹ Deloitte specifically noted the fact that Wisconsin health care collaborations have led to: a) legislative funding for Graduate Medical Education and health care provider partnerships to increase medical residencies, emphasizing key physician areas (primary care, psychiatry, general surgery); b) policies that expanded scope of care for pharmacists, physical therapists, and advance practice nurses to remove barriers to team-based model of care to address workforce shortages and demographic changes; and c) state and university partnership that have effectively advanced funding and community partnerships (e.g., Collaborative for Healthcare Quality (WCHQ) provides transparency and accountability; public/private partnership in Wood and Marathon counties to increase nurses pipeline; collaboration within system to improve mental health and planning for end-of-life care).

¹² Deloitte specifically noted that; a) Wisconsin’s aging statistics suggest that there will be a serious provider shortage (e.g., a projected 72 percent increase of the 65+ population and a 120 percent increase in the 85+ population between 2015 and 2040); b) Wisconsin pipeline of labor for nurses, primary care physicians, and psychiatrists does not meet expected demand based on population growth (e.g., projections estimate a 20,000 shortage of nurses by 2035; Wisconsin will “be about 3,000 short of MDs by 2025;” shortage of faculty to educate nurses and physicians in schools due to difficulty attracting and retaining top faculty).

piece of the puzzle and it's another reason we will have shortages and are having trouble recruiting into the system.”

Health care providers also talked about an urgent need to enhance prevention and improve population/community health.¹³

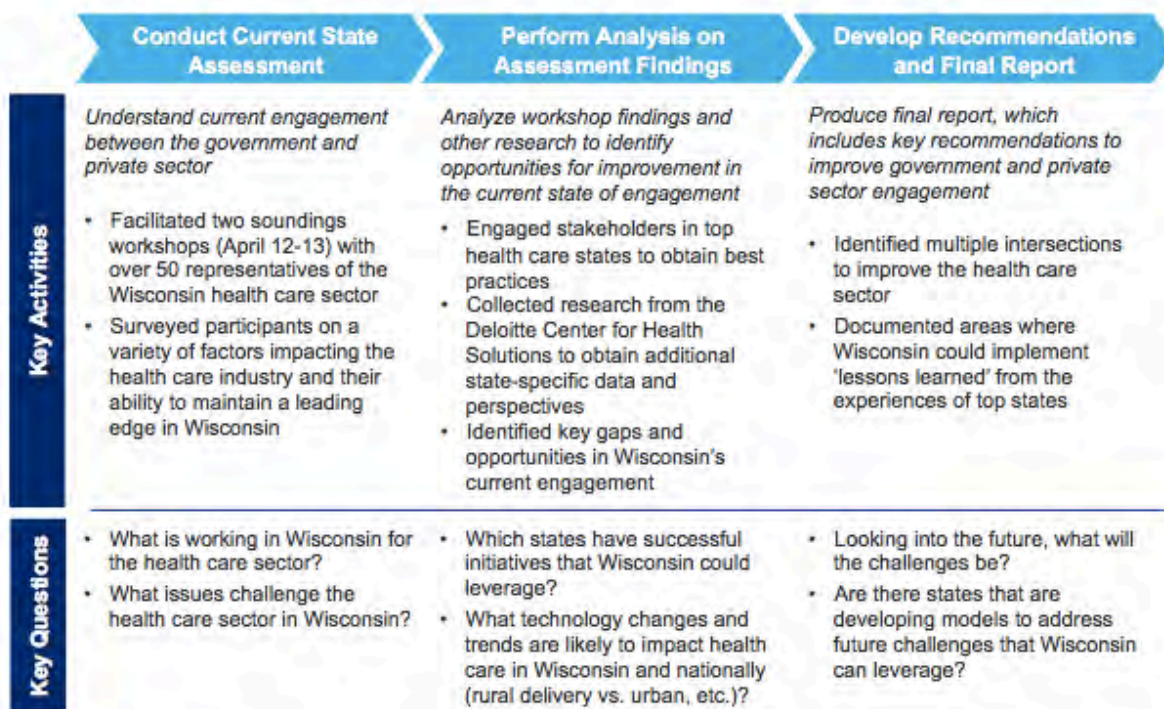
¹³ Deloitte specifically noted that; a) Wisconsin ranked 24th in national community population health in 2015; b) the need for increased partnerships with community and state agencies, and businesses focused on improving population health; and c) the need for programs to shift from reactive to prevention such as chronic disease prevention programs.

Accelerate Wisconsin: Health Care — The Deloitte Research Assignment

Research Objectives: Based on the input from the two listening sessions and other research, CWI engaged Deloitte Consulting, LLP to conduct further research focused on how successful the intersection or “touch points” and potential for opportunities between government (state and local) and the private sector are and could be in stimulating growth in the health care sector. Persuaded that there was sufficient research on the health care workforce-related issues, CWI asked Deloitte to concentrate its work on the

Deloitte's Assessment Approach

Deloitte's approach provides an overview of the process to understand Wisconsin's key intersections and opportunities for improvements in health care



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challenges and opportunities related to population health and research and development.

Scope of Work and Methodology

The BE BOLD III Health Care Assessment included the following activities:

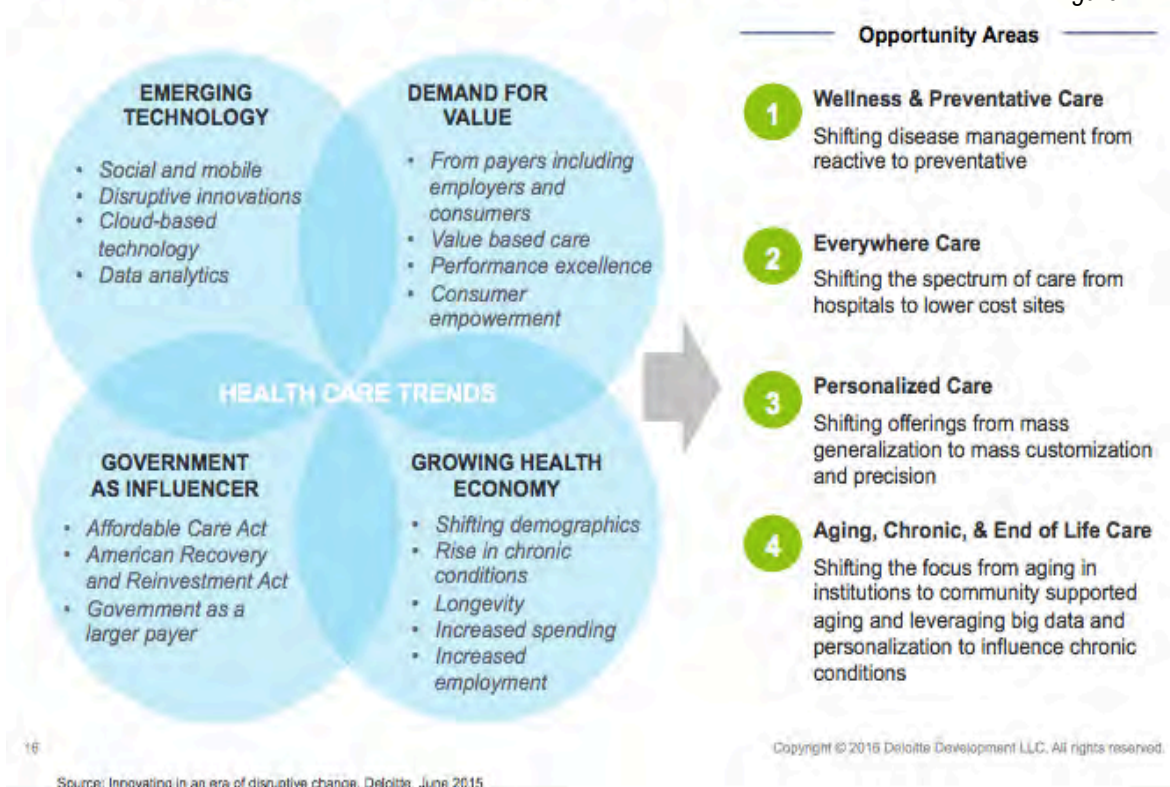
- conducting stakeholder engagement workshops to evaluate intersections between government and health care;
- identifying where health care providers commonly interface with government across seven key intersections, as it relates to population health and research, development, and investment;
- analyzing workshop findings to determine the current state of the initiatives, identify opportunities for improvement, and understand any future opportunities (see Figure11);

- identifying other top tier, or leading-practice programs that Wisconsin could learn from and/or leverage from other states to further stimulate the industry (NOTE: States identified include: California, Colorado, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Minnesota, Nebraska, North Carolina, Ohio, Oregon, Rhode Island, Tennessee and Washington);
- deriving insights into the most impactful health care factors (see Figure 12);
- developing key recommendations based on findings to improve the intersections between government and health care (see Figure 13 and Figure 14); and,
- aligning each state program or initiative to a prospective recommendation to address the identified gaps or areas of opportunity in Wisconsin within population health and research, development and investment.

The Convergence of Trends in Health Care

Four of the identified, overarching trends challenge the traditional health care market and create new opportunities for innovation within Population Health

Figure 11



Based on the assessment findings and analysis of Wisconsin’s key intersections, Deloitte identified areas of opportunity related to Population Health (Prevention Control, Access to Care, and Talent Availability), Research and Development, and Investment, and leveraged those findings to develop 15 recommendations likely to influence Population Health; four recommendations related to Research and Development; and five recommendations to help promote further Investment in the health care sector. (see Appendix A: Deloitte Wisconsin Health Care Report)

Opportunities for Improvement Align to Health Care Trends

The clear alignment of Wisconsin's opportunities for improvement and health care trends allow Wisconsin to improve current and develop new programs to address population needs

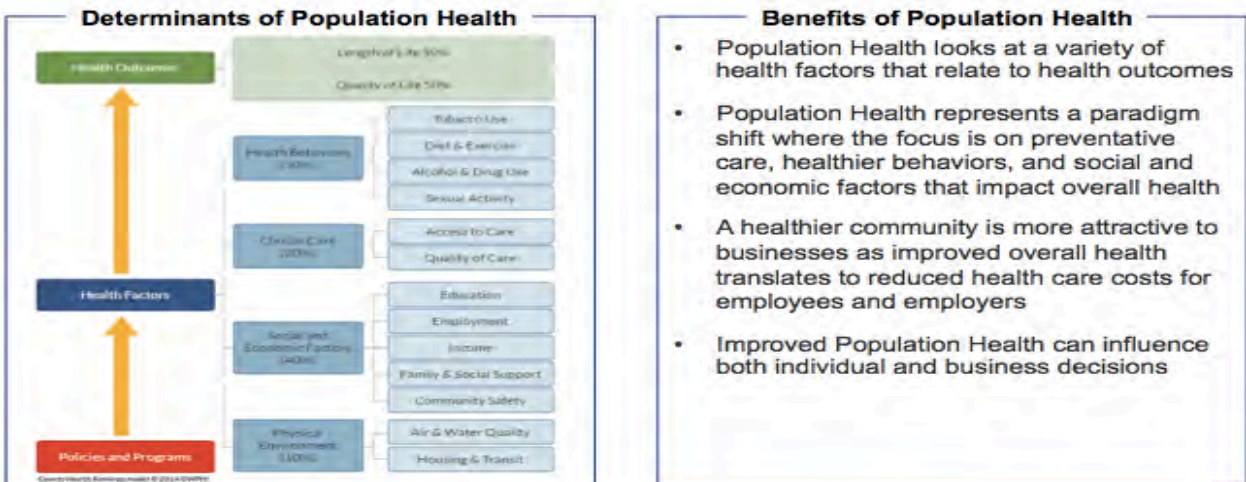


17 Figure 12

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The Importance of Population Health

Population Health focuses on how health factors, policies and programs impact health outcomes based on a pattern of determinants, which can translate into a healthier community



The BE BOLD III Assessment focuses on identifying the drivers or inhibitors to expansion within health care, more specifically Population Health, in Wisconsin

19 Figure 13

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Task One – Population Health: Identifying the options for achieving better community and employee health that impacts employer and employee costs and retention efforts.

The Deloitte research documents a broad and very impressive range of positive interaction between health care, government and education related to population health in Wisconsin (see Appendix A, pp. 22-34). The research also identified three areas in which there were opportunities for improvement, including:

- Prevention – Deloitte concludes that there is a need to increase and augment partnerships with the community, state, and businesses which improve population health and that Wisconsin may need to shift from reactive to preventative care programs (e.g., sponsor chronic disease prevention programs) to align with health care trends.
- Access to Care – Deloitte concludes that: 1) Wisconsin has experienced a drop in structural access to health care with patients that reported getting the help or advice they needed the same day they contacted their health provider; 2) reimbursement funding of 101 percent is integral for Critical Access Hospitals where any change in reimbursement policy may adversely impact quality and access to care for patients in rural communities; 3) a perceived over-regulation related to telemedicine usage could impede advancements which have been instrumental in expanding and increasing efficiency of care delivery and 4) challenges to access to care in rural communities include both a lack of infrastructure (e.g., broadband) and transportation difficulties and difficulty attracting physicians and nurses to rural health care communities
- Talent and workforce availability – see Appendix A, pp. 39-41

Based on assessment findings, Deloitte developed recommendations to address the identified opportunities for improvement in key intersections for population health, including:

- Incentivize collaboration between private and public organizations.
- Invest in recruitment, training, and funding for patient care coordinators.
- Establish Guidelines for Children Nutrition and Physical Health.
- Expand workforce certifications to allow for greater scope of care.
- Enact legislation to expand high-speed internet coverage.
- Establish Nurse-Family Partnership.
- Develop and enable health care opportunities for low-access communities.
- Re-evaluate policies to support team-based care model.
- Fund financial incentives to attract and retain nurses and physicians for in-demand areas.
- Increase residencies and provide support to attract and retain medical school students.
- Fund clinical training for high-priority health professions.
- Promote the availability of health care and access to high quality of life.
- Fund internships to retain medical students post-graduation.
- Train and expand the use of Community Health Workers.
- Collaborate in key sectors.

[NOTE: For recommendation details and case examples, see Appendix A, pp. 49-56.]

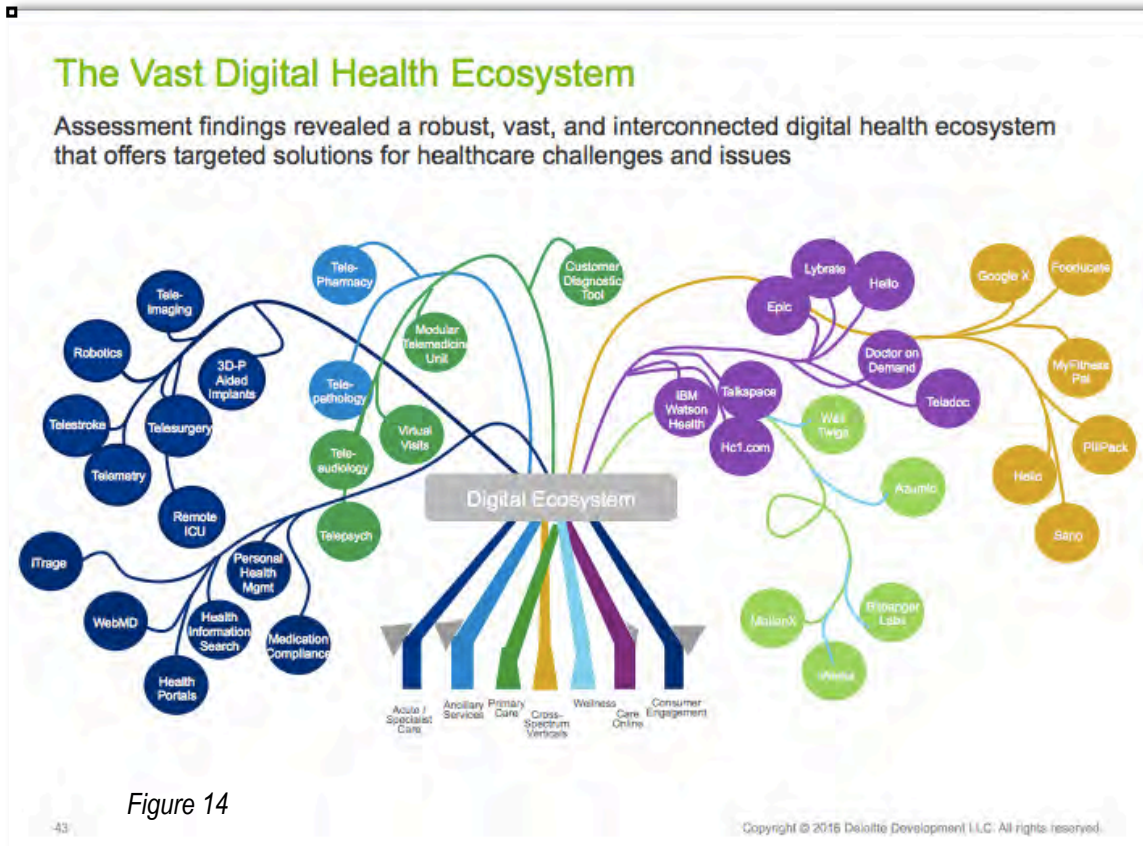
Task Two: Research, Development, and Investment: Understanding the potential to encourage health care technology and R&D efforts that impact where and how companies choose to incubate and grow (see Figure 14)

Based on assessment findings, Deloitte developed recommendations to address the identified opportunities for improvement in key intersections for research, development, and investment, including:

- Build a Learning and Innovation Ecosystem.
- Create entrepreneurship and incubation hub.
- Host an Innovation conference.
- Survey entrepreneurs to understand and reduce barriers to success.

- Promote specific investment opportunities and tax incentives.
- Enact policies to support crowdsourcing.
- Adopt private sector investment strategy to maximize existing funds.
- Increase investments in technology infrastructure and tools.
- Survey private sector investors on needs.

[NOTE: For recommendation details and case examples, see Appendix A, pp. 57-60.]



Accelerate Wisconsin: Health Care Cluster Input — The BE BOLD III Health Care Strategic Planning Group

With the UW–Madison and WEDC data and the Deloitte report in hand, Competitive Wisconsin, Inc. and the BE BOLD Council invited representatives of Wisconsin’s health care sector to review the data and research findings as members of the BE BOLD III Strategic Planning Group and to discuss and assess recommendations on how best to address the challenges and opportunities identified.

More than 75 health care providers and insurance executives, educational leaders, government representatives, association executives and workforce development experts, among others, joined the BE BOLD III Health Care Strategic Planning Group (HC-SPG). The HC-SPG began with two Deloitte-facilitated soundings workshops in Madison and Milwaukee; convened as a group in four half-day sessions in Madison; and members of the HC-SPG met individually and in small groups with each other and with Competitive Wisconsin, Inc. and BE BOLD Council representatives. Ultimately, the HC-SPG developed recommendations dedicated to addressing Wisconsin’s health care challenges and opportunities in three areas, including workforce and talent development; population health; and research, development and investment. (See Appendix C for a list of participants.)

Accelerate Wisconsin: Health Care Strategic Planning Group

Workforce Recommendations

The following recommendations are based on the Deloitte findings and the input provided by members of the BB III Health Care Strategic Planning Group at its various collective and individual meetings.

Like most Wisconsin employers, health care providers face a variety of workforce challenges, including shortages in critical health care professions that potentially threaten the providers' abilities to deliver quality care, meet changing patient needs and/or address the increasingly important opportunities to improve community health.

Wisconsin has a national reputation for delivering high-quality, high-value care, an economic development asset recognized across the state for its important role in attracting and keeping employers. Obviously any diminishment of Wisconsin's ability to deliver quality health care represents not just a threat to patient wellbeing, but it also makes it more difficult for employers to recruit and retain the workforce they need to sustain economic growth. For all of these reasons, health care workforce shortages need to be viewed as a uniquely critical and time-sensitive issue that must be addressed sooner rather than later.

A 2011 Wisconsin Hospital Association (WHA) study reported, for example, that Wisconsin needed approximately 900 new physicians *a year* to meet existing demand. WHA noted at the time that Wisconsin health care providers were only able to achieve that goal by annually recruiting more than 700 physicians a year from outside the state and employing another roughly 140 to 150 new graduates from Wisconsin medical colleges. Based on its findings, the WHA concluded that Wisconsin would need *another* 100 doctors a year to meet expected growth in demand.

That same report found that if a Wisconsin student attends medical school and completes an in-state residency, there is an 86 percent chance that student will practice in Wisconsin. Using that data, WHA embarked on an aggressive agenda to advocate for state funding for, and support within, the hospitals and health systems to create new or expand existing graduate medical education (GME) programs.

Since 2012, the Wisconsin Council on Medical Education and Workforce (WCMEW) and the WHA have been instrumental in creating new funding for GME in the 2013-2014 biennial state budget and in the 2017-2019 state budget. The funding to date has helped to create more than 73 new residencies in high-demand specialties including psychiatry, primary care and general surgery.

Health care organizations are transforming care across all settings to utilize integrated health care teams. Enabling team-based care teams to be successful requires state policy makers to understand how burdensome regulations on reimbursement and billing processes, combined with out-of-date licensure requirements pose barriers to team-based care. State government must recognize its role in eliminating regulations that do nothing to improve care, but rather are creating unnecessary challenges to implementing team-based care.

And, in 2016 the Association of American Medical Colleges released a report indicating that, "Under every combination of scenarios modeled, the United States will face a shortage of physicians over the

next decade...The projections show a shortage ranging between 61,700 and 94,700, with a significant shortage showing among many surgical specialties.”¹⁴

The nurse shortage is equally acute and the deficit numbers are much larger. In 2013, for example, the Bureau of Labor Statistics estimated that the 2012 nurse population would have to grow nearly 20 percent to meet demand in 2022. That projection would require the training and hiring of more than 1 million new nurses, 525,000 to replace nurses retiring from the profession and 526,800 to meet growing demand.¹⁵

The projected national shortages are confirmed in a series of reports issued by the Wisconsin Center for Nursing (WCN) that indicate that Wisconsin will be short more than 1,000 new nurses every year for the next 20 years.¹⁶ (see Figure 15)

Wisconsin Nurses Supply and Demand 2014 - 2040 *Figure 15*

| | 2014 | 2015 | 2020 | 2025 | 2030 | 2035 | 2040 |
|---------------|--------|--------|--------|--------|---------|---------|---------|
| Supply | 65,100 | 65,500 | 66,400 | 65,900 | 65,300 | 65,000 | 64,900 |
| Demand | 65,100 | 65,600 | 70,200 | 75,700 | 82,000 | 88,100 | 92,600 |
| Gap | 0 | -100 | -3,800 | -9,800 | -16,700 | -23,100 | -27,700 |
| % Gap | 0% | 0% | -6% | -15% | -26% | -36% | -43% |

Health care providers around the state, in cooperation with the Wisconsin Hospital Association, the Wisconsin Medical Society (WMS) and the Wisconsin Nurses Association (WNA), have researched these workforce shortages, identified specific needs, and embraced new collaborative local and regional partnerships to expedite the recruitment, training, and certification of physicians and nurses.

The following initiatives and publications are examples of this activity:

- WHA publishes an annual report on hospital workforce shortages, and recommends policy actions.
- In 2015, WMS published a report on physician satisfaction and burn-out, and suggested ways to stave off an increase in physician retirement and out-migration.
- WCMEW published a 2016 report “A Work In Progress”, reporting on future physician shortages, and making recommendations across five major policy areas.

¹⁴ https://www.aamc.org/newsroom/newsreleases/458074/2016_workforce_projections_04052016.html The report aggregates the shortages in four broad categories: primary care, medical specialties, surgical specialties, and other specialties. By 2025, the study estimates a shortfall of between 14,900 and 35,600 primary care physicians. Non-primary care specialties are expected to experience a shortfall of between 37,400 and 60,300 physicians.

¹⁵ <http://www.aacn.nche.edu/media-relations/fact-sheets/nursing-shortage>

¹⁶ http://www.wisconsincenterfornursing.org/documents/2014%20WI%20RN%20Forecast%20Model%20Update_FINAL%20Oct%2031%202016.pdf

- WCN publishes annual reports on RN and LPN surveys, looking at nursing supply and satisfaction of Wisconsin's nursing workforce.
- In 2016, WNA published "Patient-Centered Team-Based Care in Wisconsin: A Working Conceptual Model", intended to assist health care professionals, students enrolled in health care careers and educators in learning more about this emerging model of care.

These efforts have generated positive results in both informing the public and helping create policy initiatives. However, they have been carried out largely by each organization for its own purposes, not necessarily with an eye toward Wisconsin's health care workforce as a whole. Future efforts should focus on statewide, comprehensive needs.

Sample BE BOLD III Health Care Strategic Planning Group Commentary

Participants in the BE BOLD III Health Care Strategic Planning Group recognize that despite these praise-worthy and innovative efforts, without an even more robust and innovative approach to these challenges, Wisconsin will continue to face a serious shortage of essential health care personnel. Consider, for example, the following sampling of comments from a January 2017 Strategic Planning Group discussion:

"I think we are stuck in this recipe of we need more education and placing greater demands on faculty and education system. We need to think of things broader and think of new ways to fund it."

"[There are] multiple ways to intervene. We have a uniquely older cohort of teachers and we need to think of other ways to address it."

"Retention is often thought of as supply and that should be on the table."

"[We may be] limiting our creativity. We need to rethink how we use our nursing faculty and advanced trainers and MAs."

"Has anyone modeled the shortage in detail ... when we describe the shortage are we at the backend or where we are currently?"

"We have the capacity to do dynamic modeling. DWD has various capacities and do have some forecasting models, but there has not been resources to do that and do different dynamic modeling on both the supply and demand side."

"Have we looked at distance learning? Have we looked at year-long calendars? Have we looked at rethinking delivery mechanisms? Right now the consumers are you (the hospitals, clinics) but the funding is through taxpayer dollars, government, education infrastructure. You have a bottleneck ... funding is getting scarcer and you have aging teaching faculty. Has anyone looked at getting nurses and taping lectures or best practices for online teaching or distance learning?"

"We do distance learning with Marshfield. We have been doing it for about 25 years. The advantage of that ... the nurses that go through the distance education program stay in the same area (by about 82 percent). So they become the workforce for that area. We are looking at immersion curricula. Canada uses year-long education. UW Deans have looked into that. Comment about PhDs or DNP for teaching ... we have our accrediting bodies that are national. We can't have anyone less than PhD level nurses teaching graduate-level nurses. And for undergrads, masters nurses can teach theory and clinical and Masters can teach 2-year colleges. We don't have control over that. Wisconsin doesn't control that. The field controls that. We have been looking at creative ways of keeping the PhD in the classroom with adjunct instructors in the clinical, with the course coordinated by a doctorally prepared nurse ."

“At Madison college. The 2-year program, they can be taught by masters-prepared teachers. We don’t have a lot of online courses because most need clinical training and in-person training. When you get to the BSN level, that is when you can move to online and we have some course like that. The BSN completion program (Bachelor of Science in Nursing) at UW are all online. They are doing online at the higher levels. They start with us and end at UW online.”

“We have been talking about this issue for a long, long time. There is a drive for more highly degreed nurses but the accrediting organizations tie our hands as to how creative we can be. Certification and regulation limits how we can use our educated nurses and limits our innovation. For instance, when nurses are educated in the area they tend to stay in the area. We know the same is true for docs. Knowing that, the Governor has been talking about performance-based funding in the UW System. Would this help Chancellors reallocate dollars to in-demand professions and needs-based education funding? More efficient and effective use of dollars because there is not going to be more funding sources or revenue.”

“At UW–Eau Claire we have developed an academic master plan to look at programs that need growth, to be maintained or going away. We have been looking at how demand is driving where our money goes. Society is driving some of those decisions. The more in-demand professions, we shift monies to it and others go away. We know we are not gaining funding so we have to look at more partnerships and public/private collaborations to develop sustainable programs. We need sustaining funds that don’t disappear. We don’t want a one-time push of funds. Governor’s staffer is asking about our Nurses for WI partnership, because they were in the process of crafting a specific budget item for this.”

Structural and Systemic Challenges in the Health Care Workforce Pipeline

PHYSICIANS

Two institutions in Wisconsin offer physician education, the Medical College of Wisconsin (MCW), a private medical school located in Milwaukee, and the University of Wisconsin School of Medicine and Public Health (UW), Wisconsin’s publicly funded medical school located in Madison. These two institutions graduate about 350 doctors a year. Approximately 37 percent of these graduates stay in Wisconsin. The cost of becoming a physician varies but currently falls somewhere between \$166,000 and \$180,000, which many if not most aspiring physicians accrue as debt while in school.

1. Medical School Recruitment and Admissions Policies

Studies have shown that physicians are more likely to practice in a state when they are graduates of both an undergraduate college or university and a graduate of a medical school in that same state. For Wisconsin physicians who graduate from both Wisconsin undergraduate college and medical school, the retention rate is over 60 percent, compared to 37 percent when only attending one of our medical schools. Admission policies are an important factor in this regard.

Recent data from the Association of American Medical Colleges (AAMC) show that 49 percent of MCW and 61 percent of UW students admitted in 2016 were from the state of Wisconsin. The MCW figures are higher than the national average of 31 percent for private medical schools, while UW’s percent of in-state admissions is at 61 percent, lower than the national average of 78 percent for publicly funded medical schools.

2. Medical School Special Programs

Special programs, those that are outside of or embedded within traditional medical school curriculum, are additional methods for targeting admissions to potentially increase the percentage of graduates that will be retained.

Both MCW and UW have created special programs within their existing medical schools. MCW has done this with its Community Medical Education program, opening two new campuses in Green Bay and Wausau. Each campus will be graduating 25 students per year. The concept is to have medical students experience community-based medicine, thereby increasing the likelihood that they will practice in a community-based setting after graduation. Each campus gives preference to Wisconsin residents. For each of the first classes (2015 in Green Bay and 2016 in Wausau), over 90 percent of those admitted were Wisconsin residents. It is too soon to measure how successful this program will be in retaining physicians in Wisconsin, as the first graduations will take place in 2018, but the admissions policies are a good indication of what to expect.

UW's Wisconsin Academy for Rural Medicine (WARM) program was created in 2006, and targeted Wisconsin residents who expressed interest in practicing in rural areas of Wisconsin. In 2016, 87 percent of those admitted, or 20 out of a total of 23, were from Wisconsin. The WARM program has had success during its existence, showing good results for retaining physicians in Wisconsin. Recent results, however are concerning, with only 42 percent of WARM graduates matching to Wisconsin GME programs in 2017.

3. Graduate Medical Education

Graduate Medical Education (GME) is the clinical training required of physicians after they graduate from medical school. The training period is between three and 10 years - depending on the specialty. The location of a physician's GME experience is an even greater predictor of where they will ultimately practice than the medical school location: 46 percent for GME versus 37 percent for medical school. But when a physician graduates from both a Wisconsin medical school and a Wisconsin GME program, the retention rate is 71 percent.

Wisconsin's GME programs have undergone a significant expansion over the past three years, largely as a result of a state-funded grant program passed into law in 2013. The grants are targeted at increasing the number of rural GME programs in primary care, psychiatry and general surgery, and require a 50 percent match from grantee organizations. The grants have resulted in 79 new GME positions in rural areas across Wisconsin.

4. Education and Training Infrastructure

While the growth of both undergraduate programs and GME is positive, they are placing increasing demands on training resources, including the need for faculty and clinical sites for seeing patients. Health care organizations that are new to education and training will not have those resources readily available.

ADVANCED PRACTICE CLINICIANS

Advanced practice clinician (APC) refers to a class of medical providers, including physician assistants (PAs) and nurse practitioners (NPs). NPs and PAs are qualified health care professionals who provide patient care while working under the supervision of, or in collaboration with, a physician. They have been certified to perform many of the same tasks as a doctor.

APCs undergo extensive medical education. NPs hold advanced degrees in nursing, and PAs undergo a three-year education program. Both are nationally certified and state-licensed medical professionals. APCs are therefore capable of diagnosing and treating patients, and hold prescriptive privileges in all 50 states. While distinct from each other in a number of ways, together they represent a healthcare workforce of medical professionals that are essential to our healthcare delivery system. APCs are also involved in medical education, mentoring, and research.

The number of advanced practice clinicians has been increasing. The Bureau of Labor Statistics estimates that the number of physician assistants and nurse practitioners in the health care workforce will both grow by over 30 percent between 2014 and 2024.

According to multiple studies, APCs – as important members of care delivery teams – help improve quality and increase access to care, as well as achieve cost savings. The role of APCs has become important in medical subspecialties, intensive care units, and emergency departments. However, even more critical is their role in primary care, where they have played a prominent part of addressing the primary care shortage.

In Wisconsin, there are over 4,700 nurse practitioners and nearly 3,000 physician assistants. They are involved in treating virtually every patient condition across all care settings; although it is important to note that primary care is their predominate place of practice. Because of their increasingly important roles in patient care, demand for APCs is high: in 2015, the vacancy rate for hospital-based NPs was 11.2 percent, while the rate for hospital-based PAs was 10.8 percent.

And their future importance is expected to be even greater in meeting patient needs. The projected shortfall in Wisconsin of between 2,000 to 4,000 physicians by 2035 will mean a multi-pronged solution will be necessary; including more effective population health management, effective use of technology, and increasing the roles of APCs in patient care.

Increasing use of APCs in patient care will be an important element of addressing the physician shortage. One way of calculating the impact is to consider the ratios between physicians and APCs. In Wisconsin, the ratios are 4.8 physicians for each PA and 3.2:1 for NPs.

Nationally, the average ratios are 7.2 physicians for each PA and 3.6:1 for NPs. There are a number of reasons for the difference between Wisconsin and the national averages: a robust education system for APCs, a higher percentage of primary care physicians with APCs in their practices (71.5 percent versus the national average of 53 percent), and a higher percentage of large group practices, where high-APC usage is common.

Given the already low physician/APC ratios and high usage of APCs, it would be realistic to assume that the ratios in Wisconsin will not change dramatically over the next 20 years. But even if we assume our relatively low ratios remain in place, we would need to increase our APC supply by 50 percent to 94 percent by 2035 to fill the projected gaps in physician supply.

The impact of filling the gaps in the physician workforce with APCs would require significant increases in resources to our education and training system. It would also require a review of scope of practice regulations.

NURSES

Aspiring nurses pursue one of five degrees. The Wisconsin Center for Nursing indicates that there are 12 institutions of advanced learning offering Licensed Practical Nursing (LPN) degrees; 22 offering Associate Degree Nursing (ADN) degrees; 20 offering Bachelor of Science in Nursing (BSN) degrees; 16 offering BSN completion and accelerated program degrees; 14 offering Master of Science in Nursing (MSN) degrees; eight offering Doctor of Nursing degrees; and three offering PhDs in Nursing degrees. Collectively, these institutions graduate about 3,000 people a year, presumably distributed roughly as displayed in Figure 16 below.¹⁷

¹⁷ http://www.wisconsincenterfornursing.org/documents/index_docs/Nursing%20Education%20Research%20Brief.Final%20071814.pdf

Highest Degree Earned

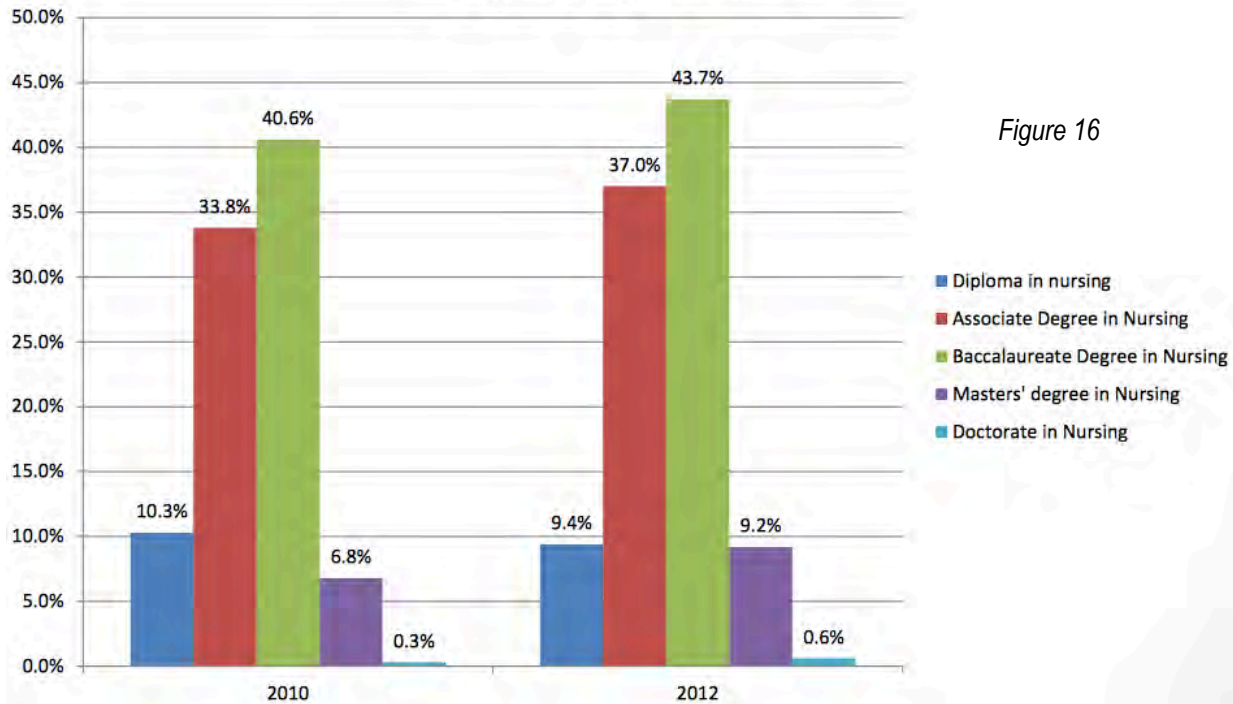


Figure 16

The cost of a nursing degree education in Wisconsin varies depending on the degree being sought, whether the student is attending a public or a private institution, and whether the student is paying resident or non-resident tuition. Some very rough calculations would suggest, for example, that a student could get a public university resident tuition LPN degree for \$4,000 to \$6,000 or an ADN degree for somewhere between \$8,000 and \$14,000 and non-resident tuition costs between \$12,000 and \$15,000.¹⁸ A BSN degree would run somewhere between \$16,000 and \$40,000 at a public university and \$80,000 to \$144,000 at a private institution. LPN salaries in 2014 averaged \$42,490. RN (ADN/BSN degrees) salaries averaged \$66,640.¹⁹

Based on the Wisconsin Center for Nursing estimates, Wisconsin will be short 3,700 nurses by 2020, 9,800 nurses by 2025, and 16,700 by 2030. The education, training and certification of the new nurses Wisconsin needs over the next 25 years <http://www.allnursingschools.com/articles/registered-nurse-vs-licensed-practical-nurse> is currently complicated by five issues, including: 1) access to faculty; 2) availability of practicum sites; 3) student recruitment; 4) cost of addressing issues 1 and 2; and 5) the impact on all of the above if Wisconsin needs or decides to achieve an 80 percent BSN degree nursing population.

1. Access to teaching faculty

The American Association of Colleges of Nursing reported in 2014 that, “U.S. nursing schools turned away 68,938 qualified applicants from baccalaureate and graduate nursing programs in 2014 due to an insufficient number of faculty, clinical sites, classroom space, clinical preceptors, and budget constraints. Almost two-thirds of the nursing schools responding to the survey pointed to faculty shortages as a reason for not accepting all qualified applicants into baccalaureate programs.”

¹⁸ <http://www.degreeinursing.com/schools/wisconsin/>

¹⁹ <http://www.allnursingschools.com/articles/registered-nurse-vs-licensed-practical-nurse/>

That same year, the Milwaukee Journal Sentinel reported that, “In 2012-13, 50 percent to 80 percent of qualified undergraduate students who applied to nursing schools at UW–Madison, UW–Eau Claire, UW–Milwaukee and UW–Oshkosh were denied admission because there were not enough qualified nursing faculty members to teach them, according to the UW System.”

Sample Strategic Planning Group Commentary

“Teaching salaries are significantly lower than what a nurse can make in the practice sector/hospital. Salaries are not competitive. Yes, I just lost a nurse faculty. She actually broke contract (which is rare in academia) to go across the street at a health care organization and get paid \$45,000 more into the six figures. I can’t afford to pay my teachers that much. They get extremely higher pay outside of academia.”

“We know the same is true for docs. Knowing that, the Governor has been talking about performance-based funding in the UW System. Would this help Chancellors reallocate dollars to in-demand professions and needs-based education funding? More efficient and effective use of dollars because there is not going to be more funding sources or revenue.”

“We need the higher-level training but if the bottleneck is having not enough faculty to train for BSNs ... start with the greater need first. Train the ADNs with Master-level faculty, focus on that, get them operationalized ... then work on the higher-level degrees once the ADNs are on the ground filling the positions. The later goal is working on getting teaching faculty to train the BSNs. If we need more ADNs, then focus on educating faculty to teach them, first, then start teaching. Put BSN faculty on hold for a time (or change focus). We know we need them all, so it’s not rejecting the end goal. It’s just prioritizing the goals, focus and funding in more effective, strategic (and faster) manners.”

“We have been advancing our clinical training to a higher and higher degree. We have 4-year degreed nurses but we also have 2-year (associate degreed nurses). Nursing that happens in a clinic is very different than what happens in an inpatient setting. The intensity of nursing in an inpatient setting is only going to increase over time. Is there a bifurcated solution? Can we enhance and increase the ADN program because we can teach them w/o masters-prepared teachers? Increase that pool of nurses and from that larger pool, pull out and train up/educate a smaller pool. We try to solve everything with a nurse but maybe we don’t need it to be it. Can we meet needs without nurses or highest degreed nurses?”

“We have a very real issue. I have talked to my doctors and nurses and basically they don’t care on the degree they just need bodies at this point. More is critical. My biggest issue with degree differentiations is the difference between an NP and a PA. I know why we use them (NP or nurse anesthetist) because they function at a very high level without the need for higher/doctor degree. So in regard to ADN vs. BSNs, right now we don’t have the faculty to teach for a BSN and we are keeping them in school longer to get a BSN when we need them now. Our workforce needs them now, not in four years. We are creating a problem by requiring a higher degree. We don’t pay differently for BSNs vs. ADN in a lot of areas and in central WI they are driving the need for ADN. The pressure my nurses feel to get a BSN is unreal and it’s not necessary. I would like to see us get behind our ADNs.”

“We should be more aggressive in working with our schools. We need options for our students that are not in the 8 to 5 normal class schedule. We struggle with this. It is a crucial need for employees.”

“So are you saying the premise is that the barrier to educating ADN’s is that we don’t have funding to pay for instructors or funding for the schools to train ADN’s? I don’t think that question is applicable to the current problem.”

“I’m trying to figure out if funding is a barrier? Somewhere there is a mix of solutions that includes funding challenges.”

“My understanding ... There is a limit to the number of instructors who have interest or available to teach the courses we need and there are a limited number of practicum opportunities.”

“Yes, I think that is easy to do. We are already doing it. Like I said the last two years of BSN completion program is online at UW campuses. But we need more online courses available. Centralized clinical training center also makes sense. So we don’t duplicate equipment or experiences and pool clinical training resources.”

2. Access to practicum sites

The nursing profession requires training outside of the classroom in order for nurses to apply for their licenses. This training, called a practicum, typically includes a mixture of hands-on clinical experience, lab work, and classroom education. It is usually undertaken at the college level, and often in masters or other post-graduate programs, and under the supervision of a mentor.

Because nurses need practicum sites (generally clinical settings), an increase in the number of nurse graduates implies a corresponding increase in the number of clinical sites that would be able to support the required training, as well as for mentors or faculty. The available capacity for such training among health care providers or systems is not known at this time.

Sample Strategic Planning Group Commentary

“...So it is to our benefit to have clinical training on site to retain employees.”

“So if there is a limited number of faculty or clinical opportunities, is there a way to redesign the program so that you can take courses online (more students to faculty ratio spread across the state) then separate out the clinical practice to local areas. Take course online then do clinics in local area.”

“... Centralized clinical training center also makes sense. So we don’t duplicate equipment or experiences and pool clinical training resources.”

“Focus on clinical piece is very warranted. How we approach the physician part/training of that is similar. We need to focus on building partnerships for clinical applications and education. Most of the training is coming outside of classroom or the traditional setting. We have a good blueprint for that (at least on the physician side) through the Rural

Wisconsin Health Initiative proposal. It is about building consortiums or partnerships for clinical applications and training.”

“Operational needs. Simulation center is not only great in initial training but is also a revenue generator along with meeting our needs. We were also able to decrease orientation for our nurses in the operational setting in hospitals nurses by 2.5 weeks with use of the simulation center. So here is some revenue dollars generated. Now we need help from educators on some critical thinking decisions and delivery gaps. You can help us a lot right now in shortening up our orientation timeframe with use of centers plus helping us with some critical decision making. Real issues right now. We should fund our educators to help us meet critical thinking needs/skills instead of us taking on that role.”

3. Student recruitment

At the moment, student recruitment in Wisconsin is complicated by the issues with access to education, training and certification referenced above. Put simply, right now Wisconsin does not lack people who want to be nurses and physicians, it lacks the capacity to educate and certify those people in a manner which allows health care providers to keep pace with growing demand and retirements. In addition, health care, like others sectors of the economy, will need to more closely align its future student recruitment efforts with its current and future patient and community health needs.

Sample Strategic Planning Group Commentary

“More of analytic comment vs. policy.... The current system is responding to it but the rate of return changes as more and more retire. That is happening at a faster pace than our system is reacting to it. Our systems are not looking far enough down the road. There is massive redistribution problems coming in 10 years.”

“We also need options for nontraditional students and adults. We have to encourage them to go into the field and spread the word that is an attractive career. There are adults out there who are not currently connected to their current career and who would be interested in changing to the nursing field, but it is daunting to do that when they still need to work to put a roof over their heads, afford to pay for additional education and find the time to take on schooling. We need options for them. And another six years in school is not a good option. We need to not eliminate the desire for a BSN, but there has to be flexibility (and time) in how they start their first two years and finish those last two years.”

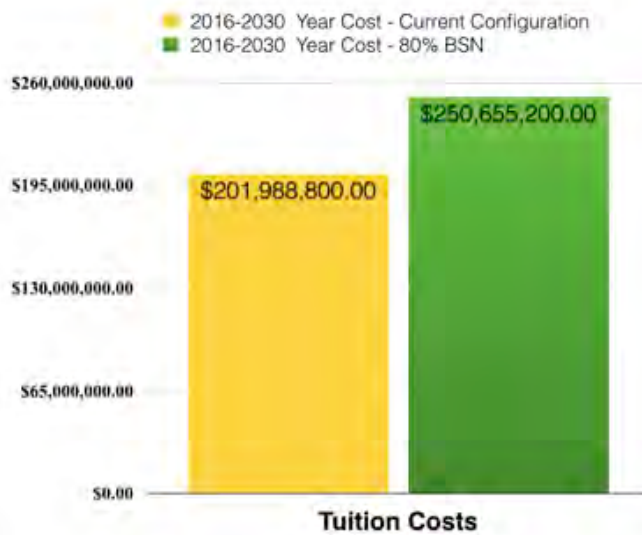
“Maybe we get those adults fast tracked to an ADN ... they make \$70,000 a year but then we as employers, employ them 2/3 of the time and pay for them to finish the BSN use the other 1/3 time for education.”

4. Costs: Student Tuition

Based on the tuition estimates and degree distributions referenced above, it will cost more than \$200 million over the next 15 years to meet the need projected for that time period.

That number could increase to as much as \$250 million if Wisconsin commits to achieving 80 percent BSN degrees (see Figure 17)

Figure 17



Sample Strategic Planning Group Commentary

“If the only way to fix it is to work within the current structure and constraints, we are dealing with those kinds of issues. So we are going to lose, based on our current tax structure. We can’t compete. If we can’t do it with our existing base then, we have to compete with pay structure and pay that amount and we

have to identify a different revenue stream to do it. The revenue/funding is limited and there is nothing that exists that is going to change in the next 10 years. We also have to understand why we are not getting the nurses. Is it strictly pay?”

“We don’t want to see a decline in ADN nurses. We need all nurses on deck and we want to support ADNs to become BSNs. Why is that important? Because in rural areas they are BSN run. There are no ADN community health nurses and that is the direction we are going. Also in ADN program there is no leadership curriculum. That is important in our future health care world. I am critical of putting dollars in ADN program when we need to put dollars into BSN completion program. I am continuing to see ADN nurses being unemployed because needs have changed and employers are looking for BSN nurse. Do we want to increase our 2-year degree nurse if no one will hire them?”

“I just want to correct that ... In the 2-year state curriculum (tech colleges) there is management and leadership in curricula but there is not community or public health curricula. I think it should be added. I agree the need for BSN is increasing, but I have to agree with Tim that we need to increase 2-year nurses ASAP to meet certain needs of workforce today and in the near future. I think we need to increase that pool to meet today’s workforce needs. As well as look at faculty needs to train ADNs. I see a great need in the central Wisconsin area for ADNs.”

“I don’t think we made the case that a BSN is where we need to be and ADNs are not needed. We do need BSNs but I think we need to look at curricula for both. Some are not all leadership or management material nor do they want to be. So there is a need for high-level thinking ADNs so let’s look at the curricula for both.”

“The premise is there are not going to be enough BSNs. If there were enough BSNs this wouldn’t be an issue. Back in the day, we couldn’t find lab techs so we created them ourselves. We took HS students who really loved sciences and fed them into the tech colleges for a training and two-year degree and got them into the workforce immediately to fill the need. We got state approval to do it in a unique way (faster with a certain degree) because they just were not around and we needed them ASAP. We needed to be innovative. So it sounds like there are not going to be enough BSNs so what are the

solutions? If we try to build a big pocket of BSNs or MSNs we are still not going to have enough. The more we are going to not meet the need and then we are forced to fill them with untrained nurses.”

“We have personal motivation for training on site. Let’s say we hire them with little education and we train them for the next six years, educate them and put them through schooling or clinical training ... we now have six years invested in them, they have been an employee with us for six years (we obtained six years of employment from them), chances are ... once they are finished with education and training, they will stay with us. If they don’t stay, then that is our fault. But likely they will stay and we have a solid, well-educated employee. Even if they leave, that person is now marketable and helps other providers/the profession. So it is to our benefit to have clinical training on site to retain employees.”

“Are there ways to incentivize employers to pay for education or training for nurses? So I’m trying to figure out if there is funding mechanism or benefit for provider to pay for education? Or can you incentivize different budgeting options, or obtain investments, or ... funding options, tying education or training to quality health care.”

Workforce Recommendations

A. Strategy

Address Wisconsin’s physician and nurse shortages as urgent, time-certain, systemic challenges that represent a genuine threat to the state’s public and economic health and that can best be addressed collaboratively on a statewide basis.

B. Operating Assumptions

- Immediate productive engagement with the issue of physician and nurse shortages is essential to the effective management of the problems.
- A unifying collaborative strategy can be more effective in addressing the challenges and empowering local and regional efforts than multiple stand-alone partnerships focused on local and regional manifestations of the broader challenge.
- Efficiencies of scale, cost and operational efficiency can be achieved in recruitment, information dissemination and management, and practicum accessibility.

C. Tactics

- * **Employers should call for, support and join a private-sector-driven effort to develop and implement a comprehensive millennial/young worker retention and recruitment strategy that addresses the cost of living, access to and cost of education/training, and quality of life, as well as the cost of doing business.**
- * **Create a multi-sector consortium – consisting of WCMEW, employers and community leaders – tasked with defining challenges and proposing outcome and cost effective systemic proposals on how best to address Wisconsin’s short and long-term physician and nurse shortages. [Note, for example, the cost estimates related to the nursing shortages in Figures 18 and 19 below.]**

Figure 18

2. Unfilled jobs and Wisconsin's tax base - Nurse Shortages 2017-2025

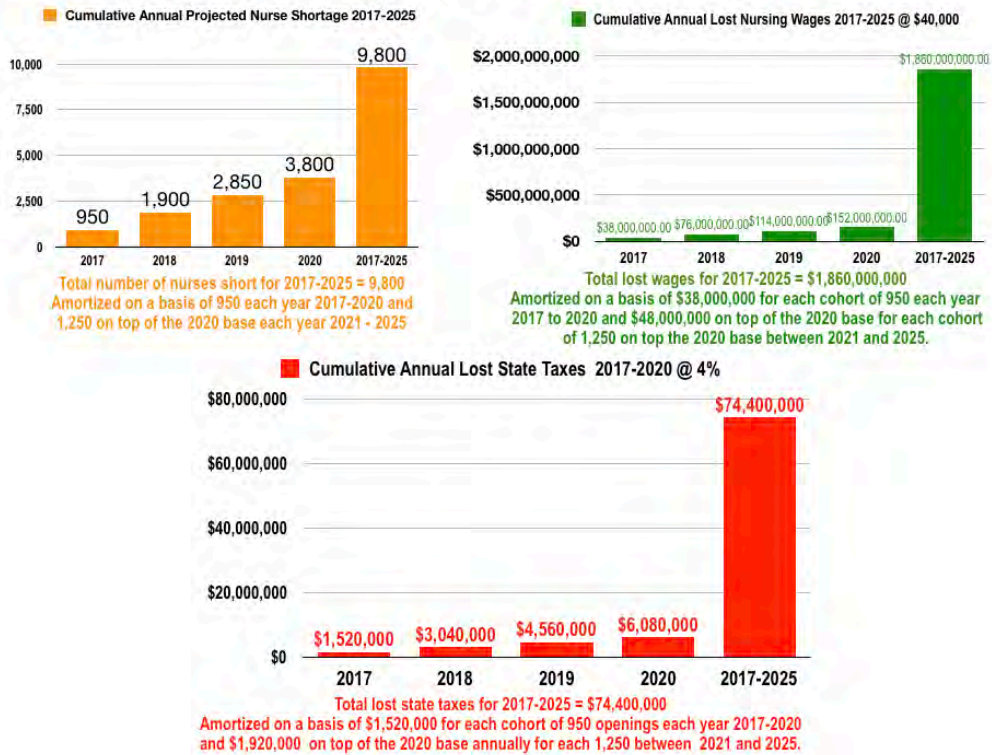
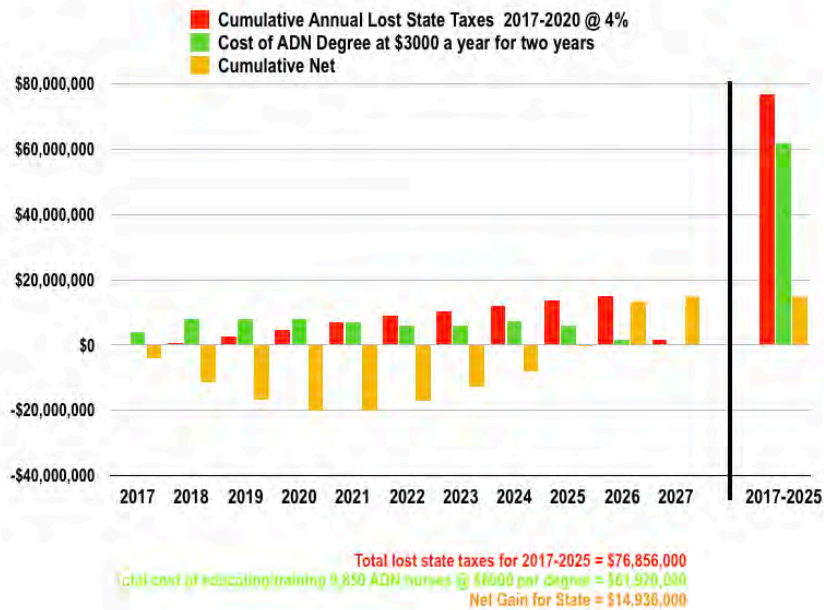


Figure 19

3. Estimated cost of Educating/graduating needed ADN nurses - 2017-2027



*** Focus the first-phase of the consortium’s work on addressing the following challenges and questions:**

- a. *Challenge:* Wisconsin’s two medical schools currently graduate about 350 physicians a year. At the moment, only about 150 (i.e., 37 percent) of the graduates stay in Wisconsin.

Why does Wisconsin not get more of these graduates to stay? What efforts have we made to make physician careers attractive to Wisconsin grade school/high school/college undergraduates? How do the admissions policies of our medical schools affect physician retention? What would it take to get the 100 additional physicians Wisconsin needs annually from the pool of graduates produced by our two medical schools? Are there successful examples of providers and/or state/communities providing student debt relief, tax credits, or other incentives as a recruitment tool?

- b. *Challenge:* Wisconsin needs to maintain a sufficient number of graduate medical education (GME) positions.

Questions: How can we keep expanding the number of GME positions to correspond to the increases underway in Wisconsin’s undergraduate medical schools, and to help retain our medical school graduates? Do we need to increase or modify current programs or policies? Is there sufficient training infrastructure – faculty, clinical sites, and curriculum – to enable expansion? Should new funding for GME allow for partial use of the funds to create additional education infrastructure for clinical training sites and faculty development in other health professions, such as registered nursing, certified nursing assistants and advanced practice professionals, to name just a few? Given that workforce shortages are cyclical, how do we develop funding sources and education facilities that are flexible and can adapt to the rapidly changing health care environment?

- c. *Challenge:* Wisconsin schools of nursing are currently turning away students because they lack the faculty to teach them.

Questions: Are the faculty shortages equally severe across all of the nursing degree programs (i.e., LPN, ADN, BSN, MSN, PhD)? Are the faculty shortages equally severe across all of the institutions offering nursing degree programs (i.e., UWS campuses, WTCS campuses, private colleges, etc.)? Have there been any successful efforts to apply technology to offset faculty shortages (e.g., distance learning, flipped classrooms, etc.)? Are there faculty scheduling, space availability, and/or access to equipment issues complicating or exacerbating access to faculty issues everywhere or on specific campuses? Has anyone modeled the faculty shortages based on any or all these questions and/or on a timeline reflecting geographic and practice specialty needs over time? Twenty-one states now allow two year colleges to grant bachelor’s degrees in order to meet the demands of the local

economies, such as Wisconsin's nursing needs. Should Wisconsin allow the 16 technical colleges in Wisconsin to grant BSN degrees?

- d. *Challenge:* Wisconsin schools of nursing are currently turning away students because their access to the practicum facilities required to license them is limited?

Questions: What are the major factors inhibiting the time/number of placements available at practicum facilities? Is limited access to practicum facilities a problem everywhere in the state (e.g., rural, urban, north, south)? Is limited access to practicum facilities a problem for all nursing students (e.g., ADN, BSN, MSN, specialty degree nurses)? Have there been any successful regional partnerships developed to improve access to practicum facilities? Have there been any successful efforts to redesign the practicum experience to address the inhibiting factors? Has anyone looked at merging the practicums into the employment experience?

- e. *Challenge:* Wisconsin health care providers are losing physicians and nurses to retirement and outmigration.

Questions: How big a factor are retirement and outmigration in the physician/nurse shortage numbers? What is driving physician and nurse outmigration? Are there best practices for retention that we should expand upon? Has anyone looked at creating a retirement "glide-path" that might include a one or two-year stint helping with faculty shortages or practicum oversight personnel?

- f. *Challenge:* Wisconsin health care delivery is constantly changing, including increasing use of teams.

Questions: Is the education and training infrastructure properly configured to produce clinicians adequately prepared for these newer forms and techniques? How should we go about ensuring that both educational institutions and clinical sites have the proper curriculum?

Health care organizations are transforming care across all settings to utilize integrated health care teams. Enabling team-based care teams to be successful requires state policy makers to understand how burdensome regulations on reimbursement and billing processes, combined with out-of-date licensure requirements pose barriers to team-based care. How do we help state government recognize its role in eliminating regulations that do nothing to improve care, but rather are creating unnecessary challenges to implementing team-based care.

- g. *Challenge:* Health care systems, particularly those located in rural communities, are having increasing difficulty in recruiting or training allied health professionals.

Questions: How can we leverage the existing education structure to meet these needs? How can rural health systems, with lower volumes, and fewer resources, gain the economies of scale to justify creation of training programs in their regions.

- h. Challenge:* With any significant increase in the numbers of physicians and nurses needing clinical training, there is a greater likelihood of increased competition for sites and a need for enhanced coordination.

Questions: What resources can be created to help coordinate training between clinical sites? Are there best practices that can be drawn upon?

- i. Challenge:* There are a variety of financial challenges complicating Wisconsin's ability to address physician and nurse shortages.

Institutional Questions: Are flexible employment options available for your institutions for addressing some of Wisconsin's physician and nurse education needs? How long would it take and what would it cost to fully staff your physician and nursing educational efforts? How long would it take and what would it cost to address the shortage of clinical training opportunities?

Student Questions: When one factors in room and board, books, etc. what is a reasonable assessment of the costs for becoming an MD; an LPN; an ADN; an MSN? Are there programs that allow students to get an ADN and then work as they earn a BSN or work for a time with the understanding that they will get some time off (sabbatical?) to pursue a BSN in the future? Are there BSN programs that give course credit for time spent working as an ADN? Are there any major loan, grant or scholarship programs dedicated to addressing the need for greater ethnic and geographic diversity in the professions? Are there any major loan, grant or scholarship programs dedicated to addressing concerns about the student debt burden?

Employer Questions: How will the projected physician and nurse shortages affect your ability to attract employees or decision to locate in certain communities? Can you place a dollar value on physician and nurse retention over the next five years; 10 years?

Local Government Questions: How will the projected physician and nurse shortages affect economic development in your community over the next five years? Can you place a dollar value on physician and nurse retention over the next five years; 10 years? Can you place a dollar value in terms of consumption, property taxes and other income that would accompany filling the projected shortages in your area?

State Government Questions: How will the projected physician and nurse shortages affect economic development in Wisconsin over the next five years? Can you place a dollar value on physician and nurse retention over the next five years; 10 years? Can you place a dollar value in terms of

consumption; income taxes and other income would accompany filling the projected shortages in your area?

- * **Based on the information gained, focus the second-phase of the consortium's work on developing and examining options and addressing the challenges and questions related to the options, including by way of example:**

Physician Shortages:

- *Objectives*
 - Address Wisconsin's immediate physician shortages.
 - Keep focus on sustaining long-term growth in physician supply.
 - Make Wisconsin a top destination of choice for medical school graduates.
- *Strategic components*
 - Change UW admissions policies to favor applicants from Wisconsin.
 - Target Wisconsin's current medical college students.
 - Continue to support lower tuition.
 - Continue student debt forgiveness and/or compensation in exchange for a defined time commitment to practicing in Wisconsin.
 - Advanced education credits.
 - Quality of professional life.
 - Favorable malpractice climate.
 - Quality of personal life.
 - Cost of living.
 - Target medical college students from region and elsewhere.
 - Student debt forgiveness or compensation in exchange for a defined time commitment to practicing in Wisconsin.
 - Advanced education credits.
 - Quality of professional life.
 - Quality of personal life.
 - Cost of living.
 - Expand the current GME grant program.
 - Create new funding, with local match, to build out health care training infrastructure. Give preference to programs that incorporate inter-professional training and clinical practice.
 - Create a system to match learners with clinical sites and to coordinate training sessions/rotations.
- *Financing possibilities*
 - Creation of a Health Care Investment Public-Private Partnership funded with:

- The first five years of state and local taxes paid by each physician who benefits from the programs referenced above;
- Investments from health care providers; and
- Investments from communities such as the program created by Aspirus in Wausau.

Nursing Shortages:

- *Objectives*
 - Address Wisconsin's immediate nursing shortages.
 - Keep focus on sustaining long-term growth in nurse supply.
 - Make Wisconsin a top destination of choice for nursing school graduates.
- *Strategic components*
 - Focus on addressing the short-term nursing shortages (i.e., 3,700 needed by 2020) with ADN.
 - Set the ADN graduation goal for the 2017-19 and 2018-2020 classes at 1500 per class.
 - Aggressive recruitment based on geographic and patient population needs.
 - Student debt forgiveness or compensation in exchange for a defined time commitment to practicing in Wisconsin.
 - Advanced education credit toward a BSN degree for time spent as an ADN.
 - Expansion of opportunities to meet advanced practicum requirements by granting some credit for ADN time and experience.
 - Quality of professional life.
 - Quality of personal life.
 - Cost of living.
 - Create new state funding, with local match, to build out health care training infrastructure.
 - Maintain efforts to increase use of inter-professional training and clinical practice.
 - Focus on addressing the mid-term nursing shortages (i.e., 6,100 needed between 2021 and 2025) with ADNs
 - Set the ADN graduation goal for the 2020-22, 2021-2023 and 2022-24 classes at 1200 per class.
 - Aggressive recruitment based on geographic and patient population needs.
 - Student debt forgiveness or compensation in exchange for a defined time commitment to practicing in Wisconsin.
 - Advanced education credit toward a BSN degree for time spent as an ADN.

- Expansion of opportunities to meet advanced practicum requirements by granting some credit for ADN time and experience.
- Quality of professional life.
- Quality of personal life.
- Cost of living.
- Creation of a Health Care Investment Bank funded with:
 - The first four years of state and local taxes paid by each nurse who benefits from the programs referenced above;
 - Investments from health care providers; and
 - Investments from communities.

Allied Health Professionals:

- *Objectives*
 - Address Wisconsin's need for allied health professionals trained to use the latest technologies and practices.
- *Strategic components*
 - Leverage existing resources to create economies of scale.
 - Incentivize the creation of allied health education consortia.
 - o Bring together groups of providers and educational institutions.
 - o Create education and training infrastructure to include curriculum, trainers, and clinical experiences.
 - o Require 50 percent match.
 - o Give preference to rural regions.
- *Financing Possibilities*
 - Creation of a state-funded grant program that includes matching funds from Wisconsin communities or regions.

Population Health Recommendations

The following recommendations are based on the Deloitte findings and the input provided by members of the BE BOLD III HC-SPG at its various collective and individual meetings. It includes identification of: 1) goals; 2) key considerations; 3) major challenges; 4) operating assumptions; and 5) recommendations. It also includes both sample quotes from the SPG session. Please note that quotes may not be verbatim.

1. Goals

- High quality professional health care for all who need it.
- Improved population ability to significantly enhance their own health care outcomes and reduce their need for chronic illness and/or catastrophic care.
- Reduction of the costs related to the incidence of chronic illness and catastrophic care.

- Better quality of life for all populations in Wisconsin.
- Greater workforce productivity.
- Measurable improvements in workforce retention and recruitment.
- Development of transitional funding models.

2. Key considerations

- Recognize the operating assumptions.
- Recognize and build on the research and the positive work already in place.
- Recognize the need to achieve systemic change that improves health quality outcomes on as large a geographic and a populations scale as possible, while achieving economies of scale and reductions in population treatment costs sufficient to help fund the required activities.
- Recognize the value of high-quality, affordable health care as a critical tool in Wisconsin's efforts to retain and attract the workforce it needs.

3. Major Challenges

Challenge No. 1: The decision to shift from a treatment volume-based reimbursement system to an outcomes-based reimbursement system for health care forces a recognition that environmental, economic, and lifestyle choices are contributing factors that determine the health of the patient seeking care and the care options available to his/her health care provider. A growing awareness that these factors represent a sort of “societal preexisting condition” is driving a major re-assessment of the factors affecting public health and what exactly constitutes “health care.”

Sample Comments

“We are changing from a hospital model to a health care system.”

“We are moving away from current cost model which is based on volume. Many of us have risk contracts based on the health of our population we serve. So it is to our benefit to improve population health and assess access to care, at the right facility, the right provider vs. the old model (the more the better.) It keeps our costs down.”

“Our problem is systemic. People are doing good work in pockets. And we are looking into systemizing the efforts, spreading them, making them accessible. People don't know what others are doing and our hope is to collaborate more and share information.”

“Health care industry is only going to affect 25 to 30 percent of the population health. Most of it is going to come from other social influences on health, communities and environ. And other entities are not stepping up to help us. The government and public are not supporting HC systems. WI ranks way below with support from government and public. They have to work from other side to influence change in population health at the same time we provide care.”

“For us, economic development intersects population health by cost. We need to offer quality health care at an affordable rate. ... We have to have a healthy work force to maintain cost. We need to help educate that employee base about disease prevention and provide them options to ensure a healthy workforce which controls cost, The other factor is people on the fringe that are having a huge impact on our socioeconomic status. No one two or three things are going to fix this. It is a system of complexities.”

“We are not good at this yet and not proficient yet. We are being asked to take on risks for populations we are not trained in dealing with. New physician reimbursement, new regulations from NACRA, our world is changing. So our risk factor has increased for population health. Telemedicine is huge opportunity for us and our regional folks. It helps us spread specialist care to areas that would never have access to it. But reaching to the fringe (not patients). Do we want to do that? Or should we focus on our current customers?”

“Health care organizations cannot do all the heavy lifting themselves. We cannot expect them to deal with school system problems, and poverty and quality of life issues alone.”

“We need critical mass. It’s a competition ... better schools, better business, better jobs, better health care. We have to quantify our numbers and share them. Share our successes to attract people. HC is continually coming up as top five decision maker to move here (and for business to develop). Site selectors use these numbers to locate in an area. But a lot don’t like our climate, or two seasons, etc. A lot of factors. All is connected.”

Challenge No. 2: Demographic realignments and economic pressures are exacerbating the challenges health care providers face and affecting their ability to adjust to the need to address community-wide health issues.

Sample Comments

“It is critical that our conversation keeps an urban and rural lens. We are going to have significant supply issues and when you overlay that over rural issues ... it may wipe rural communities off the map. It will have huge impact on population health in rural areas. More than we understand right now. Keep your workforce box and its impact as a significant factor in your recommendations. It has tremendous repercussions especially in rural areas.

“Broadband is critical. Health systems need better outreach. We have to get outside of our four walls and beyond our typical services.”

“While workforce issues are on the edge, they are critical to our needs. It is investment not just in our hospital system but investments in population health efforts. We need much more investment in other areas besides hospitals.”

“Who are we talking about? Are we talking about patients or various population health audiences? There are homeless, unhealthy poverty, insured, uninsured. Mental health ... There is not one answer. There are a lot of different avenues to care for different populations. So do we start with what gives the biggest return? That would not be about current patients, it is people outside of the health system.”

“Are we seeing same problems as 10 years ago ... is it a money issue, access issue, work force, staffing, type of illness issue, aging population.... What is the largest issue?”

“It’s not a single one of those. All of those issues in all communities, it fluctuates depending on communities.”

“At the end of the day we have to have metrics to show it is working. Period. We can attract businesses but we need the work force for them. Businesses are irritated when a new business starts because it’s competition for a work force. A lot of people were excited when Oscar Myer left because it meant workers were available. We are not losing as many people as we are failing to attract more.”

“Access points need to change. Care coordination is important and key to controlling costs. Better education on care needs matching entry points.”

“Data intensive. We need to look at what is going to look like in 10 years and invest properly now. We need a much more robust partnership with state government to get the best data for future resources and investments.”

“Investing in public health expertise. In rural areas that means nursing. Most public health officers are RNs. But our state health assessments are being hollowed out so we don’t know where to deploy them. “Someone” needs to deploy those experts into our communities. But we are no longer putting public dollars into that. We need a middle layer that effectively interfaces with population health and health care systems so that we are not wasting time and efforts chasing a diminishing return on health”

“They (HC providers) want to focus on collaborations, but they don’t have time to focus on it. They have to be so lean. Is there a way to reduce regulations? The investment in unnecessary regulations takes away ability to out dollars towards health upgrades.”

“In our rural system we don’t have the resources to go into the community and staff separately for community partnerships. We try to encourage people to come into our building for services, we don’t have separate programs or funds to go into community outside of our structure.”

Challenge No. 3: While recognizing that addressing the economic, social and behavioral phenomena that adversely affect community health is a critical step toward more comprehensive health care, it requires understanding that: a) doing so will have minimal, if any, impact on current patient outcomes for some time; b) that achieving economic, social and behavioral changes that positively affect community health outcomes will take time and money; and c) that the investments required to make progress on this front must either come from existing budgets, which may affect current patient outcomes, or from some new source of revenue.

Sample Comments

“Our problem is systemic. People are doing good work in pockets. And we are looking into systemizing the efforts, spreading them, making them accessible. People don’t know what others are doing and our hope is to collaborate more and share information.”

“Health care industry is only going to affect 25 to 30 percent of the population health. And other entities are not stepping up to help us. The government and public are not supporting HC systems. WI ranks way below with support from gov and public. They have to work from other side to influence change in population health at the same time we provide care.”

“Are we allowing advanced-practice technicians to deliver at the top of their training level?”

Regulatory issue: we need to look at what we allow our graduates to do right after school. Take a look at their licensing. We have to maximize our current workforce vs. growing the number.”

Changing people’s behaviors to allow them to live longer, healthier lives is incredibly complex.

What type of intersections are there between corporations, community as whole and health care system. When we look at corporations and partnering with them and hospitals, who are we putting at the table. Do we have the right people? Is it marketing people, is it workforce trainers, is it certification people ... Are we framing the issues correctly? Are we designing the programs and interactions correctly?

“We need to think of payback years. We are 10 years out on these strategies. It’s not going to happen immediately.”

“Risk. Who is going to take the risk. We have been asked to take on more risk. Why should we take on more risk?”

“We need to focus on that population health to keep costs in control. Systemic approach and sustainable. It is bigger than just health care. We need increased capacity. We need to improve access including transportation, reduce or influence demand of health care to control cost.”

“Data intensive. We need to look at what is going to look like in 10 years and invest properly now. We need a much more robust partnership with state government to get the best data for future resources and investments.”

“Shift the discussion to investment vs. expense. We are in a crisis. Don’t waste a good crisis.”

“HUD pathways initiative In Ohio... patient comes in, they may need housing and education as well as health care. They are then referred to community case worker. The case worker gets paid and reimbursed on results and the payers pay for this service. They are paid by their achievements. This is policy. This is the kind of model we may be looking at.”

“Institute of Health Initiatives and CDC grants - millions of federal dollars out there that will fund these type of programs We should look to see what is available for this type of work.”

4. Recommendations by Major Challenges

Challenge No. 1: The decision to shift from a treatment volume-based reimbursement system to an outcomes-based reimbursement system for health care forces a recognition that environmental, economic, and lifestyle choices are contributing factors that determine the health of the patient seeking care and the care options available to his/her health care provider. A growing awareness that these factors represent a sort of “societal preexisting condition” is driving a major re-assessment of the factors affecting public health and what exactly constitutes “health care.”

- **Operating Assumptions**

- There are likely to be changes made to the ACA, but the commitment to reimbursing for outcomes rather than services is unlikely to change.
- Similarly, the emphasis on quality and cost of outcomes will continue.
- A lower-cost, higher-quality outcomes reimbursement model is not sustainable either for what we now call the “health care” sector or for taxpayers or society as a whole unless it recognizes and is applied to the full spectrum of factors affecting individual and community health.
- These issues will be difficult to address unless the public and their policy makers understand that the cost and quality outcomes criteria being applied to health “care providers” must also be applied to the broader community of activities (e.g., early childhood development, education, addiction, etc.) that affect public health.
- It is possible to distinguish populations and activities that for one reason or another would yield greater reach/impact (e.g., workplace-based populations because they are more easily accessible; prenatal and infant populations because early engagement can have dramatic positive impact on long-term issues; etc.)
- There are partnerships and workplace-focused initiatives in Wisconsin dedicated to improving community/population health outcomes that suggest sustained concentrated, targeted activity can produce behavioral change. Ultimately there will be a need to scale up and systemize on a broader scale the best practices emerging from these efforts.
- Public awareness and understanding of the relationship and importance of community/population health factors to discussions about health care costs and outcomes is relatively limited.

- There is a need for more data.
- **Some of the approaches utilized to address the challenge thus far:**
 - Partnerships
 - Collaboration within health care profession.
 - Collaboration among specific health care professionals.
 - Collaboration among health care professionals and non-health care professionals.
 - Employers.
 - Educators.
 - Non-Medical providers of health-related services (e.g., transportation, home care, early childhood development, etc.).
 - Regulators.
 - Collaboration within population areas.
 - Collaboration within statutory (e.g., city, county, economic development region) or other type of region (e.g., rural).
 - Targeting by population.
 - Targeting by type of illness.
 - Research.
- **Recommendations**
 - Building on existing research (e.g., see the Deloitte BBIII Health Care Research Findings, Appendix A; and the Wisconsin State Health Plan – Healthiest Wisconsin available at <https://www.dhs.wisconsin.gov/hw2020/index.htm>), design and establish a system of “**Healthy Wisconsin!**” designations for communities, areas, and /or regions that have:
 - developed a “health impact map” that identifies and prioritizes populations, conditions affecting population health, and specific proven positive activities;
 - adopted a pro-active, cost-effective set of high-quality outcome strategies for addressing specifically identified community health needs;
 - created collaborative partnerships to support and sustain the execution of the strategies, including participation in a statewide collaboration dedicated to maximizing regional and systemic outcomes and efficiencies;
 - identified realistic projections of possible revenue streams to help fund the strategies; and,
 - agreed upon a set of cost and value-based metrics and reporting schedules dedicated to achieving continuous improvement.
 - Expedite the development and implementation of the **Healthy Wisconsin!** system by making available up to \$2 million in design and implementation grants for each of Wisconsin’s Regional Economic Districts.
 - The up to \$18 million required to fund this recommendation should be targeted as coming from the following sources:

- \$8 million from the State of Wisconsin (\$4 million a year for two years) available to match amounts up to \$1.38 per person in the population of each of the Regional Economic Districts.
 - \$1 million from the State of Wisconsin (\$500K a year for two years) to fund the statewide collaboration dedicated to maximizing regional and systemic outcomes and efficiencies.
 - \$6 million in matching funds raised within the Regional Economic Districts from individuals, philanthropic and not-for-profit organizations, businesses, local governments and institutions.
 - \$3 million in federal grants over two years.
- Develop and implement a major **Healthy Wisconsin!** marketing campaign in support of local, regional and statewide workforce retention and recruitment efforts.

Challenge No. 2: Demographic realignments and economic pressures are exacerbating the challenges health care providers face and affecting their ability to adjust to the need to address community wide health issues.

- **Operating Assumptions**

- Wisconsin's rural populations will continue to age with increasing percentages of the population being 65 and older.
- Wisconsin's younger population and its workforce population will continue to be a predominantly urban and suburban population.
- These demographic trends have created and will continue to create health outcome challenges and opportunities specific to geography, age, gender and income levels.

- **Some of the approaches utilized to address the challenge thus far:**

- Collaborations focused on sub-units of the general population (e.g., rural, workforce, family, etc.)
- Environmental and/or management interventions designed to improve health outcomes (e.g., investments in improving neighborhoods, establishment of chronic care coordinators).
- Suggesting the need to determine whether or not current regulations inhibit the ability of advanced practice technicians to deliver at the top of their training level.
- Advocacy for health care providers education and training, access to broadband, research.

- **Recommendations**

- Significantly expand the database Wisconsin needs to refine its understanding of and approaches to the challenges and opportunities related to its workforce, urban and rural, young and elderly populations.
 - Task the statewide collaboration dedicated to maximizing regional and systemic outcomes and efficiencies with creating and overseeing a clearinghouse for Wisconsin population research related, among other topics, to the populations identified above.

- Working with the Medical College of Wisconsin, the University of Wisconsin School of Medicine and Public Health, the Wisconsin Alumni Research Foundation and others, develop a comprehensive strategic research program designed to: a) provide needed information about the targeted populations; b) help test and refine specific approaches to and pathways for addressing critical issues; c) identify commercial opportunities to develop products and processes related to the addressing and managing the challenges and opportunities affecting the targeted populations; and d) developing an ongoing funding mechanism for this sort of research and the clearinghouse.
- Expedite the creation of this easily accessible, centralized database by providing \$2 million in two for one matching research grants.
 - The State of Wisconsin should provide \$1 million of the \$2 million of matching grant money.
 - A request should be made to the Medical College of Wisconsin and the University of Wisconsin School of Medicine and Public Health, and the Wisconsin Alumni Research Foundation to fund the other \$1 million.
- Utilize the research to inform the **Healthy Wisconsin!** initiative, with special attention to: 1) scaling up and systematizing existing best practices; 2) developing new approaches and strategies; 3) identifying systemic efficiencies; and 4) developing and marketing commercial products and applications related to addressing the challenges and opportunities of the target populations.

Challenge No. 3: While recognizing that addressing the economic, social and behavioral phenomena that adversely affect community health is a critical step toward more comprehensive health care, it requires understanding that: a) doing so will have minimal if any impact on current patient outcomes for some time; b) that achieving economic, social and behavioral changes that positively affect community health outcomes will take time and money; and c) that the investments required to make progress on this front must either come from existing budgets, which may affect current patient outcomes, or from some new source of revenue.

- **Operating Assumptions**

- The Operating Assumptions outlined under Challenges 1 and 2 are reasonable.
- The assertions outlined in Challenge No. 3 are reasonable.
- Wider application of best practices in wellness and preventive care can expedite the transition and generate savings now.
- A mix of funding sources, including new and innovative financing mechanisms, will be required to facilitate the transition.

- **Some of the approaches utilized to address the challenge thus far:**

- Well City initiatives.
- Partnerships with non-profits.
- Community investments.
- Policy-based efforts to improve health and livability.

- **Recommendations**

- Initiate a comprehensive statewide public information and education campaign targeted at employees and employers dedicated to promoting adoption of proven best practice wellness and prevention care insurance plans. The costs of the campaign should be financed with state funds and tax-deductible private-sector employer funds. The statewide education and information campaigns should be augmented with local and regional efforts.
- Adopt a statewide transitional funding plan.
 - convene a public-private sector collaboration tasked with identifying and recommending transitional financing options. The collaborative should:
 - include representatives from the banking and credit union communities, CPAs and actuaries, investors and insurers;
 - include as a first priority, options that offer a delayed, but complete payback on investment;
 - consider among other options, state and local funding, fees, tax-deductible contributions, investment opportunities and, if appropriate, the use of social impact bonds.

Research and Development Recommendations

The following recommendations are based on the Deloitte findings and the input provided by members of the BE BOLD III HC-SPG at its various collective and individual meetings. It includes identification of: 1) goals; 2) key considerations; 3) major challenges; 4) operating assumptions; and 5) recommendations. It also includes both sample quotes from the SPG session. Please note that quotes may not be verbatim.

Entrepreneurs know that opportunity lies at the intersection of need and vision and capacity. In recent years, it has become more and more apparent that health care, particularly that of the aging, is generating a major and growing need. Companies like Epic, Exact Sciences, Promega and dozens of others in Wisconsin developed scientific and technological capacity to create their own opportunities and now employ thousands of Wisconsin residents and taxpayers.

The emerging demands of the population health marketplace referenced above will potentially create a larger and equally important demand for goods and services and cures and miracles and for some way to access them on and/or deliver them to our mobile devices. The need is clearly there. Wisconsin has the necessary research and development skills. The question is whether or not we have the vision and whether or not we can attract capital to implement the vision and seize opportunity.

To address these issues, the HC-SPG recommends developing a health care management ecosystem (e.g., similar to that emerging in Wisconsin around water management) tasked with, among other things:

- creating a centrally located innovation hub that can provide opportunities for entrepreneurs to network and learn in the pre-start-up phase and supporting commercialization with public and private sector engagement;
- incentivizing collaboration between private and public organizations; and
- promoting specific investment opportunities and tax incentives that will increase investments in technology infrastructure and tools.

Robert M.

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Strategic Employment Growth in Wisconsin

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The La Follette School takes no stand on policy issues; opinions expressed in this paper reflect the views of individual researchers and authors.

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Executive Summary

This report, prepared for Competitive Wisconsin's BE BOLD 3 initiative, identifies 10 sectors that should have strong Wisconsin employment growth into 2020. These sectors, based on the North American Industry Classification System, represent 36% of Wisconsin's jobs. We judge these 10 economic sectors to be the greatest contributors to past and future employment growth for Wisconsin. The 10 sectors are:

- Insurance Carriers and Related Activities
- Professional, Scientific, and Technical Services
- Management of Companies and Enterprises
- Administrative and Support Services
- Ambulatory and Health Care Services
- Hospitals
- Nursing and Residential Care Facilities
- Social Assistance
- Amusement, Gambling, and Recreation Industries
- Food Services and Drinking Places

The sectors identified fall into three clusters: (1) management and professional services to business; (2) health care and social services; and (3) leisure and recreation services. The sectors we identify highlight one strong theme: All are service sectors. The list does not include manufacturing, dairy, or other food-related industries, which have been traditionally strong employment sectors in Wisconsin.

We are well aware these results may be somewhat controversial, but all 10 sectors had strong employment growth from 1997 to 2012, and the data show we can expect continued growth in these areas into 2020. The data and wide range of statistical methods on which we relied clearly and consistently pointed in this direction.

We recommend that Wisconsin policymakers acknowledge the shift of employment in our state economy toward service sectors.

To identify the industries and sectors that are doing well, we created six indices to identify what turned out to be a remarkably consistent set of 10 sectors based on the North American Industry Classification System. Our first index is an equally weighted average of annual job growth for 1997-2012 and projected average annual growth 2010-2020. The second method normalizes these variables, and it adds normalized 2012 average annual wages and the 2012 location quotient variable. We also computed other indices that served as robustness tests and used varying measures and weighting mechanisms.

The results of all of these measures and indices were remarkably similar, with the 10 sectors we identify rising to the top, or very near the top. The sectors and identified subsectors cover a wide range of occupations, many of which involve higher wage jobs. The type of job creation the state of Wisconsin will ultimately target is a policy decision; however, because of the potential outmigration of young and highly educated Wisconsin workers, we note the higher paying jobs that are most likely to retain these workers.

I. Introduction

This report, prepared for Competitive Wisconsin's BE BOLD 3 initiative, employs a range of methods to identify a set of economic sectors that we believe have provided and will continue to provide the greatest potential for employment growth for Wisconsin. Competitive Wisconsin identified the goals for this report in a series of power points and memoranda describing BE BOLD 3, the third in a series of Competitive Wisconsin initiatives to devise strategies that identify opportunities to strengthen Wisconsin's economy. Specifically, the University of Wisconsin tasks were: "Task: Identify industries/sectors that are doing well in Wisconsin. Task: Analyze data to identify 5 or 6 industries/sectors that are doing well and explain why they are doing well in Wisconsin." To do this, Competitive Wisconsin indicated the data to be used would include: "recent job growth; recent wealth creation; future growth potential; and related growth."¹

This report identifies the sectors as requested. We use six indices to identify what turn out to be a remarkably consistent set of 10 sectors based on the North American Industry Classification System (NAICS), the standard federal statistical agencies use to classify business establishments. Of the four sets of data Competitive Wisconsin suggested, we rely on the first three: (1) actual job growth from 1997 to 2012;² (2) projected job growth from 2010 to 2020 as prepared by the Wisconsin Department of Workforce Development (DWD); and (3) average sector wages and growth in wages. The actual and projected job growth data are the most recent available. Finally, we employ the location quotient that measures Wisconsin's competitiveness relative to other states; the location quotient is defined as the percentage of employment in a sector relative to the nation as a whole. This measure enables comparison of the proportion of workers in a certain sector in Wisconsin versus the proportion of workers in that same sector across the country. Any industry with a location quotient over 1 can be thought of as having a tendency to locate in Wisconsin, hence offering a competitive advantage for Wisconsin.³

Because of the emphasis on jobs in the BE BOLD 3 tasking statements, the first index we create is an equally weighted average of past annual job growth (1997–2012) and projected average annual growth (2010–2020). The second method normalizes these variables, and adds normalized 2012 average annual wages and the 2012 location quotient variable. For that index, each component is given an equal (25%) weight. Other combinations and varying measurements, such as unit and percent changes or rankings, are used in the robustness tests contained in Appendix A.

The results of all of these measures and indices are remarkably similar, with the 10 sectors we identify rising to the top, or very near the top, using each of the six methods.⁴ The sectors and identified subsectors cover a wide range of occupations, which we discuss with emphasis on higher wage jobs. Although the type of job creation the state will target is a policy decision,

¹ Competitive Wisconsin, *BE BOLD 3* slides 2 and 3.

² We first analyzed growth from 1997 to 2007 and then 2002 to 2012 to capture effects of the recession, but the results were almost identical, so we simplified the measurement to incorporate the entire 15-year period.

³ Rob Sentz, "Understanding Location Quotient," EMSI, October 14, 2011, <http://www.economicmodeling.com/2011/10/14/understanding-location-quotient-2/>

⁴ An additional sector, Support Activities to Transportation (NAICS No. 488) was also rated very high but was eliminated because it was very, very small in terms of current and future employment.

because of the potential outmigration of young and highly educated workers to other states, we note the higher paying jobs among these high employment growth sectors.⁵ Lopez and Scholz study net migration patterns of educated individuals (bachelor's or higher). They find that: (a) 22- to 30-year-olds leave for Chicago and Minneapolis, (b) Milwaukee does not have the same pull factor from Illinois and Minnesota, and (c) Wisconsin actually brings in a net in-migration of educated 30- to 49-year-olds. They state (p. 2): “Wisconsin was a net exporter of its educated 22- to 30-year-old population to Illinois and Minnesota, with an apparent trend of more people going to Minnesota and roughly constant for emigration {sic} to Illinois.”

The sectors identified fall into three clusters: (1) management and professional services to business; (2) health care and social services; and (3) leisure and recreation services. As is apparent, our recommended strategic sectors carry one strong theme—all are service sectors rather than Wisconsin’s traditional sectors of manufacturing, dairy, and other food-related industries. We are well aware these results may be somewhat controversial, but the data we rely on clearly and consistently point in this direction.

We also acknowledge that other methods can produce other justifiable results. For example, a 2013 report by MPI Group Inc.—sponsored by the Wisconsin Economic Development Corporation and others—relies more heavily on sectoral changes in productivity, which will usually be inversely related to job growth. Productivity for a particular sector is defined as output per employed worker. If productivity is increasing in a sector, output per worker is rising. It follows that a sector that experiences rapid increases in labor productivity is able to increase output with minimal expansion in employment.

As MPI writes: “For each 4-digit industry, a diverse set of 12 variables is used to characterize the individual industry. Each of the variables is an indicator of the past or present economic performance of the industry and represented in two groups: measures of competitiveness (including productivity) and measures of export orientation and regional centrality (including output location quotient).”⁶ The results of that analysis are understandably very different than those reported here; our emphasis is on jobs, wages, and geographic employment competitiveness. “All but one driver industry identified by the *Wisconsin Economic Future Study* is within manufacturing,” MPI notes.⁷ We see these and other methods as complementary to our analysis as tasked by BE BOLD 3. In combination, they provide a range of findings that should inform policymakers throughout Wisconsin.

This report proceeds as follows. Section II is the main analysis of sectors, describing data, methods, and results by industrial sector and clusters. We primarily use three-digit NAICS codes for the analysis, but also include a description of subsectors (four-digit codes) for the 10 sectors we identify. The codes group similar economic sectors. For example, codes 600–999 represent a set of service industries ranging from Educational Services to Hospitals to Social Assistance

⁵ See Yeri Lopez and John Karl Scholz, “Migration To and From Wisconsin” (La Follette School of Public Affairs Working Paper No. 2007-007, University of Wisconsin–Madison, 2007).

<http://www.lafollette.wisc.edu/images/publications/workingpapers/scholz2007-007.pdf>.

⁶ MPI Group Inc., *Wisconsin Economic Future Study: Statewide and Regional Analysis* (June 2013), 2. See <http://inwisconsin.com/economicfuturestudy/>.

⁷ *Ibid.*, 1.

Services. Section III discusses the main occupations associated with the sectors. Appendix A describes and presents results of different methods of identifying high-growth sectors for robustness purposes. Appendix B describes data and sources. Appendix C describes the methods that the DWD uses to make job projections. Appendix D provides detailed data and descriptions of the 10 sectors that should have strong employment growth into 2020. Appendix E describes DWD's long-term occupation projections methodology. Appendix F contains tables showing education breakdown of selected high-growth industries (Table F1), projected occupation employment change by cluster (Table F2), and projected employment change by occupation (Table F3).

II. Identifying High Employment Growth Sectors in the Wisconsin Economy

In this section, we describe our strategy for identifying those sectors in the Wisconsin economy that stand out as high potential employment growth sectors. Our strategy combines evidence on actual sector employment growth in recent years and on sector growth projections by the DWD (and the U.S. Department of Labor). Use of data on past performance presumes the structure of demands leading to rapid employment growth in the recent past will be operative in future years. Use of the projections directly addresses expected patterns of future growth. We also make use of data on the average wage and the Wisconsin location quotient, indicating how competitive the sector is in Wisconsin relative to the rest of the nation.

We first identify the 15 highest sectors in terms of potential growth (using the past actual and projected growth patterns), and then group closely related sectors among these 15 into clusters that appear to have high expected levels and rates of employment growth. For example, we identify hospitals, nursing, and ambulatory care as three high-growth sectors that compose a health-care cluster. We test the robustness of our high-growth cluster choice by estimating other methods for identifying these clusters. In this analysis, we also make use of the wealth generation characteristics of sectors (measured by the average annual wage) and of the propensity of sectors to locate in Wisconsin (measured by the location quotient).

A. Actual Sectoral Employment Growth Patterns (1997–2012)

As a first step, we assemble data from the U.S. Bureau of Labor Statistics on actual employment growth patterns for 1997–2012 for 98 sectors. Our procedures for compiling these data are described in Appendix B. For each sector, we calculate:

- (1) the change in the absolute number of actual employed workers,⁸
- (2) the percent change in total actual employment,⁹ and
- (3) the average annual percent rate of employment growth (decline).¹⁰

B. Projected Sectoral Employment Growth Patterns (2010–2020)

In a second step, we calculate analogous absolute change, percent change, and annual growth rate values describing DWD projected growth patterns over the 2010–2020 period. These statistics are calculated for the 54 sectors (out of the 98 sectors) for which we have 2010–2020

⁸ [(2012 actual employment – 1997 actual employment)_i]

⁹ {[(2012 actual employment – 1997 actual employment)_i] / 1997_i actual employment}

¹⁰ {[(2012 actual employment/1997 actual employment)_i]^{1/(15 years)} – 1}

projections. Our procedures for creating these data are described in Appendix C.¹¹ In particular, for each sector, we calculate:

- (1) the absolute change in projected employment growth,¹²
- (2) the percent change in total projected employment,¹³ and
- (3) the average annual percent rate of employment growth (decline).¹⁴

C. Average Annual Employment Growth Rate Index

For our first base case, we rely on the average annual employment growth rate measure for each sector (98 sectors in the 1997–2012 actual estimate; 54 sectors in the 2010–2020 projected estimate). We then use these annual employment growth rates—one set describing patterns of actual growth (1997–2012) and the other set describing patterns of projected growth (2010–2020)—to rank 54 sectors in terms of our Average Annual Employment Growth Index.

As a first step in identifying the 10 sectors with the highest employment annual growth rates, we first rank all of the 98 sectors by the value of their *actual* average annual employment growth rate for 1997–2012. We then rank the 54 sectors with available *projected* employment growth for 2010–2020 by the same growth indicator, the value of their *projected* average annual employment growth rate. We identify the top 10 sectors in each of the rankings—one for actual employment growth for 1997–2012 period and a second for projected employment growth for 2010–2020 period.

Table 1 identifies the actual employment growth and annual growth rates for actual and projected growth. The Average Annual Employment Growth Rate Index shown in the last column is a simple average of the actual and projected annual growth rates.¹⁵ The sectors are ordered from the highest index rating to the lowest. After eliminating the sector Support Activities for Transportation because it employed fewer than 5,500 workers in 2012, we retain the 10 yellow shaded sectors as those with the highest past and future growth rates. These top sectors are concentrated in the 400, 500, 600, and 700 NAICS sectors.

Among the 54 sectors, 22 have a negative growth rate index. Nineteen sectors have a growth index of zero to 1%. Each of our top 10 sectors has a growth rate index of greater than 1% per year. In terms of our Average Annual Employment Growth Index, the highest growth rate index among our 10 sectors is for the Management of Companies and Enterprises sector. With an average annual growth rate of 2.4%, this sector is expected to produce the most jobs through 2020. Two sectors have the lowest growth rate of 1% per year.

¹¹ As noted in Appendix C, the DWD procedure used to create these projections relies on a variety of statistical methods, including ordinary least squares regression and a shift-share model.

¹² $[(2020 \text{ projected employment} - 2010 \text{ actual employment})_i]$

¹³ $\{[(2020 \text{ projected employment} - 2010 \text{ actual employment})_i] / 2010 \text{ actual employment}\}$

¹⁴ $\{[(2020 \text{ actual employment} / 2010 \text{ actual employment})_i]^{1/(10 \text{ years})} - 1\}$

¹⁵ This single ranking is obtained by imposing the following criteria on the ranking of the sectors: $(0.5 \times \text{annual actual growth rate from 1997–2012}) + (0.5 \times \text{annual projected growth rate from 2010–2020})$.

Table 1: Average Annual Employment Growth Rate Index

Average Annual Employment Growth Rate Index (AAEGRI) = (0.5)(1997-2012 Average Annual Employment Growth Rate) + (0.5)(2010-2020 Average Projected Annual Employment Growth Rate). The yellow indicate the 10 sectors with the highest past and future growth rates

| NAICS Code | Code Description | 1997 Employment | 2012 Employment | 1997-2012 Average Annual Growth Rate | 2010 Employment | 2020 Projected Employment | 2010-20 Ave. Projected Annual Employment Growth Rate | 2012 Average Wage | AAEGRI |
|------------|---|-----------------|-----------------|--------------------------------------|-----------------|---------------------------|--|-------------------|--------|
| 551 | Management of Companies and Enterprises | 29,424 | 52,752 | 4.0% | 46,990 | 53,180 | 0.8% | \$86,642 | 2.4% |
| 488 | Support Activities for Transportation | 4,000 | 5,478 | 2.1% | 5,360 | 7,580 | 2.3% | \$43,212 | 2.2% |
| 624 | Social Assistance | 38,208 | 64,395 | 3.5% | 62,300 | 66,030 | 0.4% | \$28,061 | 2.0% |
| 622 | Hospitals | 90,294 | 123,749 | 2.1% | 118,870 | 144,140 | 1.3% | \$52,217 | 1.7% |
| 621 | Ambulatory Health-Care Services | 86,127 | 116,557 | 2.0% | 108,870 | 133,640 | 1.4% | \$51,910 | 1.7% |
| 561 | Administrative and Support Services | 110,528 | 134,291 | 1.3% | 123,740 | 156,550 | 1.6% | \$29,025 | 1.4% |
| 623 | Nursing and Residential Care Facilities | 69,087 | 84,674 | 1.4% | 76,850 | 96,070 | 1.5% | \$31,681 | 1.4% |
| 524 | Insurance Carriers and Related Activities | 49,028 | 63,538 | 1.7% | 69,600 | 81,470 | 1.1% | \$80,187 | 1.4% |
| 541 | Professional, Scientific, and Technical Services | 84,847 | 98,652 | 1.0% | 93,070 | 116,750 | 1.5% | \$61,359 | 1.3% |
| 722 | Food Services and Drinking Places | 163,321 | 190,177 | 1.0% | 186,280 | 229,510 | 1.4% | \$15,156 | 1.2% |
| 713 | Amusement, Gambling, and Recreation Industries | 27,179 | 33,900 | 1.5% | 25,360 | 27,600 | 0.6% | \$23,386 | 1.0% |
| 562 | Waste Management and Remediation Services | 5,079 | 5,663 | 0.7% | 5,290 | 6,180 | 1.0% | \$39,669 | 0.9% |
| 813 | Religious, Grant-making, Civic, Professional, and Similar Organizations | 25,621 | 29,246 | 0.9% | 91,100 | 102,240 | 0.8% | \$41,520 | 0.8% |
| 423 | Merchant Wholesalers, Durable Goods | 59,529 | 64,566 | 0.5% | 61,370 | 70,510 | 0.9% | \$39,128 | 0.7% |
| 452 | General Merchandise Stores | 57,308 | 62,212 | 0.5% | 61,050 | 68,250 | 0.7% | \$18,827 | 0.6% |
| 721 | Accommodation | 29,056 | 30,132 | 0.2% | 29,560 | 34,250 | 1.0% | \$19,919 | 0.6% |
| 522 | Credit Intermediation and Related Activities | 47,139 | 50,470 | 0.5% | 52,240 | 58,330 | 0.7% | \$57,311 | 0.6% |
| 712 | Museums, Historical Sites, and Similar Institutions | 2,011 | 2,072 | 0.2% | 1,750 | 2,020 | 1.0% | \$36,792 | 0.6% |
| 485 | Transit and Ground Passenger Transportation | 15,020 | 15,435 | 0.2% | 14,070 | 15,500 | 0.6% | \$26,770 | 0.4% |
| 448 | Clothing and Clothing Accessories Stores | 18,221 | 18,687 | 0.2% | 19,330 | 21,240 | 0.6% | \$16,335 | 0.4% |
| 238 | Specialty Trade Contractors | 69,926 | 59,348 | -1.1% | 59,880 | 79,060 | 1.9% | \$43,392 | 0.4% |
| 517 | Telecommunications | 11,714 | 12,002 | 0.2% | 13,010 | 14,130 | 0.6% | \$57,104 | 0.4% |
| 451 | Sporting Goods, Hobby, Musical Instrument, and Book Stores | 11,702 | 11,521 | -0.1% | 11,730 | 13,250 | 0.8% | \$16,915 | 0.4% |
| 812 | Personal and Laundry Services | 25,378 | 26,062 | 0.2% | 25,900 | 27,740 | 0.5% | \$37,701 | 0.3% |
| 332 | Fabricated Metal Product Manufacturing | 76,075 | 72,232 | -0.3% | 63,730 | 72,800 | 0.9% | \$48,378 | 0.3% |
| 446 | Health and Personal Care Stores | 15,109 | 15,896 | 0.3% | 15,890 | 16,350 | 0.2% | \$32,794 | 0.3% |
| 443 | Electronics and Appliance Stores | 8,052 | 8,249 | 0.2% | 9,310 | 9,680 | 0.3% | \$32,406 | 0.2% |
| 811 | Repair and Maintenance | 21,850 | 20,982 | -0.3% | 20,310 | 22,390 | 0.7% | \$44,347 | 0.2% |
| 444 | Building Material and Garden Equipment and Supplies Dealers | 26,538 | 24,727 | -0.5% | 24,750 | 28,020 | 0.8% | \$25,879 | 0.2% |
| 441 | Motor Vehicle and Parts Dealers | 36,515 | 35,403 | -0.2% | 32,920 | 35,370 | 0.5% | \$36,928 | 0.1% |
| 311 | Food Manufacturing | 62,202 | 62,239 | 0.0% | 59,930 | 61,910 | 0.2% | \$42,875 | 0.1% |
| 531 | Real Estate | 20,034 | 17,851 | -0.8% | 17,210 | 19,270 | 0.8% | \$33,023 | 0.0% |
| 326 | Plastics and Rubber Products Manufacturing | 32,603 | 29,298 | -0.7% | 27,920 | 30,900 | 0.7% | \$45,893 | 0.0% |
| 337 | Furniture and Related Product Manufacturing | 17,084 | 14,527 | -1.1% | 14,850 | 16,880 | 0.9% | \$41,396 | -0.1% |
| 327 | Nonmetallic Mineral Product Manufacturing | 10,512 | 8,370 | -1.5% | 8,500 | 10,060 | 1.1% | \$46,078 | -0.2% |
| 511 | Publishing Industries (except Internet) | 20,278 | 18,227 | -0.7% | 17,300 | 17,980 | 0.3% | \$61,804 | -0.2% |
| 312 | Beverage and Tobacco Product Manufacturing | 3,345 | 2,824 | -1.1% | 2,910 | 3,080 | 0.4% | \$39,937 | -0.4% |
| 532 | Rental and Leasing Services | 8,803 | 6,608 | -1.9% | 7,030 | 8,030 | 0.9% | \$32,693 | -0.5% |
| 331 | Primary Metal Manufacturing | 24,766 | 17,625 | -2.2% | 15,280 | 18,340 | 1.2% | \$53,404 | -0.5% |
| 447 | Gasoline Stations | 24,154 | 22,883 | -0.4% | 22,600 | 20,450 | -0.7% | \$16,862 | -0.5% |
| 711 | Performing Arts, Spectator Sports, and Related Industries | 10,402 | 7,463 | -2.2% | 7,350 | 8,720 | 1.1% | \$65,717 | -0.5% |
| 454 | Non-store Retailers | 24,212 | 19,538 | -1.4% | 20,470 | 21,610 | 0.4% | \$34,806 | -0.5% |
| 512 | Motion Picture and Sound Recording Industries | 3,763 | 3,342 | -0.8% | 3,690 | 3,440 | -0.5% | \$17,945 | -0.6% |
| 492 | Couriers and Messengers | 9,485 | 8,307 | -0.9% | 8,310 | 7,430 | -0.7% | \$37,869 | -0.8% |
| 333 | Machinery Manufacturing | 91,427 | 66,531 | -2.1% | 58,970 | 59,890 | 0.1% | \$60,235 | -1.0% |
| 336 | Transportation Equipment Manufacturing | 37,969 | 26,484 | -2.4% | 25,640 | 26,030 | 0.1% | \$60,071 | -1.1% |
| 323 | Printing and Related Support Activities | 36,985 | 28,968 | -1.6% | 28,490 | 25,590 | -0.7% | \$45,212 | -1.2% |
| 481 | Air Transportation | 3,574 | 2,237 | -3.1% | 2,490 | 2,510 | 0.1% | \$44,216 | -1.5% |
| 322 | Paper Manufacturing | 50,945 | 30,797 | -3.3% | 31,770 | 32,830 | 0.2% | \$60,320 | -1.5% |
| 339 | Miscellaneous Manufacturing | 20,114 | 13,765 | -2.5% | 13,460 | 12,140 | -0.7% | \$46,127 | -1.6% |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | 33,973 | 22,468 | -2.7% | 20,970 | 18,040 | -1.0% | \$65,353 | -1.9% |
| 314 | Textile Product Mills | 2,793 | 1,575 | -3.7% | 1,490 | 1,300 | -0.9% | \$29,487 | -2.3% |
| 315 | Apparel Manufacturing | 3,942 | 839 | -9.8% | 810 | 780 | -0.3% | \$29,977 | -5.0% |
| 316 | Leather and Allied Product Manufacturing | 5,281 | 1,172 | -9.5% | 1,100 | 840 | -1.8% | \$37,940 | -5.7% |

D. Competitive Growth Rate Index

For our second base case, we also rely on the average annual employment growth rate measures for each sector (98 sectors in the 1997–2012 actual estimate; 54 sectors in the 2010–2020 projected estimate). Following other studies seeking to identify sectors with high potential growth, we supplement these sector-specific employment growth rate estimates with sector-specific measures of “wealth creation” and “competitive advantage.”¹⁶ For wealth creation, we use the 2012 average annual wages in that sector. For competitive advantage, we use the 2012 location quotient, indicating the extent to which production in each sector is concentrated in Wisconsin relative to its concentration in the rest of the nation.

We then identify the 10 top ranked sectors using this method, and compare these sectors with the 10 sectors that we have identified in our first base case estimate.

In calculating this Competitive Growth Rate Index, we assign equal weight to: (1) the average wage (relative to the overall average wage) in 2012, (2) the location quotient in 2012, (3) the *actual* annual employment growth rate from 1997–2012, and (4) the *projected* annual growth rate from 2010–2020. Because of different metrics for these variables, each of the four variables is normalized around its mean and the normalized values are then given equal weight. This formula is applied to each detailed sector, and then the sectors are ranked.¹⁷ We present the critical variables and this ranking in Table 2.

The Competitive Growth Rate Index across all 54 of the sectors ranges from +3.17 to -4.29. The 10 sectors that we identified in our first base case estimate are in the top 14 in this four-variable growth rate index. These sectors are highlighted in Table 2. The other four sectors that are included in the top 14 are Support Activities for Transportation (488), Fabricated Metal Product Manufacturing (332), Merchant Wholesalers-Durable Goods (423), and Credit Intermediation and Related Activities (522). Because of its small size, we eliminate Support Activities for Transportation. In the ranking for our first base case estimate shown in Table 1, which is based on the Average Annual Employment Growth Rate Index, the three sectors not included in our list of 10 sectors rank 25, 14, and 17, respectively.

We interpret this ranking as supportive of the first base estimate. Hence, in Table 2 we shade in the top 10 sectors as ranked by the first base estimate.

¹⁶ For example, the EMSI report for Oklahoma used three criteria—wealth generation, growth potential (past trends and projections), and competitive advantage—to identify the high potential sectors for Oklahoma on which it concentrated. (See Joshua Wright, “Oklahoma Establishes Statewide Economic Development Strategy after In-Depth Data Analysis,” EMSI, March 14, 2013, <http://www.economicmodeling.com/2013/03/14/oklahoma-establishes-statewide-economic-development-strategy-after-in-depth-data-analysis/>.) Oklahoma Department of Commerce analysts used the EMSI database to perform the analysis, which they started by analyzing 72 variables across 669 industries, reflecting the use of the five-digit NAICS level sector identifiers. The analysts then identified five clusters of industries, namely aerospace and defense; energy; agriculture and bioscience; information and financial services; and transportation and distribution. The analysts then “balanced three factors: 1. Wealth generation (sales revenue, export share, and wages); 2. Growth potential (new markets, industry trends, and number of establishments); and 3. Competitive advantage (location quotient, physical assets, workforce)” in identifying their clusters of sectors.

¹⁷ The ranking based on the Competitive Growth Rate Index is obtained by imposing the following criterion: $\text{Index} = 0.25 \times \text{normalized average annual employment growth rate for 1997–2012} + 0.25 \times \text{normalized projected annual employment growth rate for 2010–2020} + 0.25 \times \text{normalized location quotient in 2012} + 0.25 \times \text{normalized weighted average wage (relative to the average weighted average wage) in 2012}$. This index is calculated for each sector of the 54 sectors for which we have employment projections.

Table 2: Competitive Growth Rate Index

Competitive Growth Rate Index (CGRI) = (0.25)(1997–2012 normalized Average Annual Employment Growth Rate) + (0.25)(2010–2020 normalized Projected Annual Employment Growth Rate) + (0.25)(2012 normalized Average Wage) + (0.25)(2012 normalized Location Quotient)

| NAICS Code | Code Description | 1997-2012 Average Annual Employment Growth Rate | 2010-2020 Projected Annual Employment Growth Rate | 2012 Average Wage | 2012 Location Quotient | CGRI |
|------------|---|---|---|-------------------|------------------------|-------|
| 551 | Management of Companies and Enterprises | 4.0% | 1.2% | \$86,642 | 1.29 | 3.17 |
| 622 | Hospitals | 2.1% | 1.9% | \$52,217 | 1.00 | 2.88 |
| 621 | Ambulatory Health Care Services | 2.0% | 2.1% | \$51,910 | 0.89 | 2.78 |
| 524 | Insurance Carriers and Related Activities | 1.7% | 1.6% | \$80,187 | 1.50 | 2.49 |
| 541 | Professional, Scientific, and Technical Services | 1.0% | 2.3% | \$61,359 | 0.60 | 2.35 |
| 624 | Social Assistance | 3.5% | 0.6% | \$28,061 | 1.12 | 2.25 |
| 561 | Administrative and Support Services | 1.3% | 2.4% | \$29,025 | 0.86 | 2.18 |
| 488 | Support Activities for Transportation | 2.1% | 3.5% | \$43,212 | 0.41 | 2.10 |
| 623 | Nursing and Residential Care Facilities | 1.4% | 2.3% | \$31,681 | 1.22 | 2.04 |
| 722 | Food Services and Drinking Places | 1.0% | 2.1% | \$15,156 | 0.93 | 1.81 |
| 332 | Fabricated Metal Product Manufacturing | -0.3% | 1.3% | \$48,378 | 2.51 | 1.51 |
| 423 | Merchant Wholesalers, Durable Goods | 0.5% | 1.4% | \$39,128 | 1.12 | 1.38 |
| 522 | Credit Intermediation and Related Activities | 0.5% | 1.1% | \$57,311 | 0.95 | 1.28 |
| 713 | Amusement, Gambling, and Recreation Industries | 1.5% | 0.9% | \$23,386 | 0.96 | 1.26 |
| 813 | Religious, Grant-making, Civic, Professional, and Similar Organizations | 0.9% | 1.2% | \$41,520 | 1.06 | 1.20 |
| 311 | Food Manufacturing | 0.0% | 0.3% | \$42,875 | 2.08 | 1.10 |
| 238 | Specialty Trade Contractors | -1.1% | 2.8% | \$43,392 | 0.83 | 1.07 |
| 452 | General Merchandise Stores | 0.5% | 1.1% | \$18,827 | 0.97 | 1.02 |
| 562 | Waste Management and Remediation Services | 0.7% | 1.6% | \$39,669 | 0.68 | 0.99 |
| 721 | Accommodation | 0.2% | 1.5% | \$19,919 | 0.78 | 0.85 |
| 326 | Plastics and Rubber Products Manufacturing | -0.7% | 1.0% | \$45,893 | 2.22 | 0.81 |
| 485 | Transit and Ground Passenger Transportation | 0.2% | 1.0% | \$26,770 | 1.11 | 0.72 |
| 812 | Personal and Laundry Services | 0.2% | 0.7% | \$37,701 | 0.97 | 0.70 |
| 712 | Museums, Historical Sites, and Similar Institutions | 0.2% | 1.4% | \$36,792 | 0.45 | 0.65 |
| 333 | Machinery Manufacturing | -2.1% | 0.2% | \$60,235 | 2.96 | 0.63 |
| 441 | Motor Vehicle and Parts Dealers | -0.2% | 0.7% | \$36,928 | 1.00 | 0.62 |
| 517 | Telecommunications | 0.2% | 0.8% | \$57,104 | 0.69 | 0.61 |
| 451 | Sporting Goods, Hobby, Musical Instrument, and Book Stores | -0.1% | 1.2% | \$16,915 | 0.96 | 0.61 |
| 448 | Clothing and Clothing Accessories Stores | 0.2% | 0.9% | \$16,335 | 0.66 | 0.58 |
| 811 | Repair and Maintenance | -0.3% | 1.0% | \$44,347 | 0.86 | 0.56 |
| 444 | Building Material and Garden Equipment and Supplies Dealers | -0.5% | 1.2% | \$25,879 | 1.04 | 0.56 |
| 337 | Furniture and Related Product Manufacturing | -1.1% | 1.3% | \$41,396 | 2.02 | 0.56 |
| 446 | Health and Personal Care Stores | 0.3% | 0.3% | \$32,794 | 0.78 | 0.52 |
| 443 | Electronics and Appliance Stores | 0.2% | 0.4% | \$32,406 | 0.79 | 0.43 |
| 331 | Primary Metal Manufacturing | -2.2% | 1.8% | \$53,404 | 2.15 | 0.33 |
| 511 | Publishing Industries (except Internet) | -0.7% | 0.4% | \$61,804 | 1.21 | 0.33 |
| 531 | Real Estate | -0.8% | 1.1% | \$33,023 | 0.60 | 0.28 |
| 327 | Nonmetallic Mineral Product Manufacturing | -1.5% | 1.7% | \$46,078 | 1.12 | 0.24 |
| 454 | Nonstore Retailers | -1.4% | 0.5% | \$34,806 | 2.16 | 0.23 |
| 322 | Paper Manufacturing | -3.3% | 0.3% | \$60,320 | 3.97 | 0.05 |
| 323 | Printing and Related Support Activities | -1.6% | -1.1% | \$45,212 | 3.06 | 0.00 |
| 447 | Gasoline Stations | -0.4% | -1.0% | \$16,862 | 1.33 | -0.05 |
| 711 | Performing Arts, Spectator Sports, and Related Industries | -2.2% | 1.7% | \$65,717 | 0.87 | -0.08 |
| 312 | Beverage and Tobacco Product Manufacturing | -1.1% | 0.6% | \$39,937 | 0.72 | -0.09 |
| 532 | Rental and Leasing Services | -1.9% | 1.3% | \$32,693 | 0.64 | -0.18 |
| 512 | Motion Picture and Sound Recording Industries | -0.8% | -0.7% | \$17,945 | 0.44 | -0.42 |
| 336 | Transportation Equipment Manufacturing | -2.4% | 0.2% | \$60,071 | 0.86 | -0.44 |
| 492 | Couriers and Messengers | -0.9% | -1.1% | \$37,869 | 0.77 | -0.46 |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | -2.7% | -1.5% | \$65,353 | 2.95 | -0.59 |
| 339 | Miscellaneous Manufacturing | -2.5% | -1.0% | \$46,127 | 1.16 | -0.95 |
| 481 | Air Transportation | -3.1% | 0.1% | \$44,216 | 0.24 | -1.18 |
| 314 | Textile Product Mills | -3.7% | -1.4% | \$29,487 | 0.67 | -1.80 |
| 315 | Apparel Manufacturing | -9.8% | -0.4% | \$29,977 | 0.28 | -4.12 |
| 316 | Leather and Allied Product Manufacturing | -9.5% | -2.7% | \$37,940 | 1.95 | -4.29 |

E. Identifying “Clusters” of High-Growth Potential Sectors

We identify three clusters of high potential growth sectors among these 10 high-growth sectors. Each cluster consists of the set of similar sectors identified by their sector groups and codes.

These four 500-level sectors form a natural group that we have named the **Management and Professional Support Services to Business** cluster:

Administrative and Support Systems (561); Professional, Scientific, and Technical Services (541), Management of Companies and Enterprises (551); and Insurance Carriers and Related Activities (524) are in the top 10 sectors as ranked by first base case estimate, the Average Annual Employment Growth Rate Index. They are also included in the top 10 sectors as ranked by the four-variable index used in the second base case estimate, the Competitive Growth Rate Index.

These four 600-level sectors also form a cluster that we call **Health-Care and Social Services**:

Ambulatory Health-Care Services (621); Hospitals (622); Nursing and Residential Care Facilities (623); and Social Assistance (624) are in our top 10 sectors as ranked by the Average Annual Employment Growth Rate Index. They are also included in the top 10 sectors as ranked by the four-variable index used in the Competitive Growth Rate Index.

These two 700-level sectors make up our **Leisure and Recreation Services** cluster:

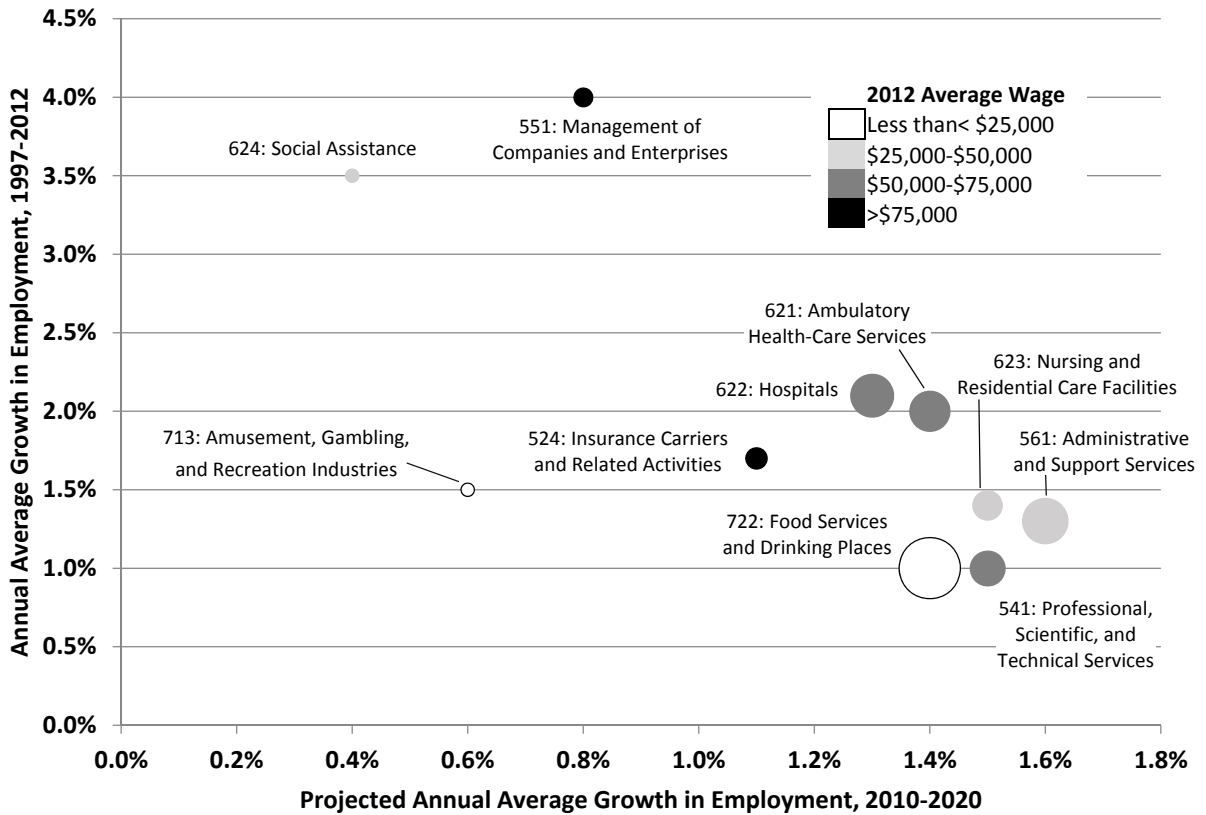
Amusement, Gambling, and Recreation Industries (713), and Food Services and Drinking Places (722) are in the top 10 sectors as ranked by the Average Annual Employment Growth Rate Index. They rank 10th and 14th in the four-variable Competitive Growth Rate Index.

A detailed description of each sector and important statistics are in Appendix D. Table F5 provides information on education and wages for each of the 10 sectors.

Figure 1 illustrates important aspects of the 10 high employment growth sectors we identified. The circles indicate combined actual annual growth of the 10 sectors from 1997 to 2012 (vertical axis) and their projected growth (horizontal axis). The size of each circle represents the size of the sector in terms of 2012 employment. And the shade of each circle represents the 2012 average wage level for jobs in that sector.

Several features are worth noting. First, all 10 sectors have positive actual annual growth rates and positive projected annual growth rates. Second, for four of the largest sectors—Professional, Scientific and Technical Services (541), Administrative and Support Services (561), Nursing and Residential Care Services (623), and Food Services and Drinking Places (722)—the projected growth rate exceeds the past growth rate. These four sectors account for 53% total employment among the 10 sectors in 2012. The two highest wage sectors of the 54 total sectors—Insurance Carriers and Related Activities (524), and Management of Companies and Enterprises (551)—are included in our list of 10 sectors.

Figure 1: Industry Sector Employment Growth by NAICS Code



F. Alternative Methods for Identifying High Employment Growth Sectors

Our procedure for identifying high employment growth sectors in Wisconsin is but one of several that could be used. We used alternative methods to establish the robustness of our procedure and our selection of the 10 sectors and three clusters of potential growth sectors. In Appendix A, we summarize the results of these alternative analyses.

G. Subsector Analysis

To this point, our analysis has utilized three-digit sectors. Next we break those 10 sectors, down by the NAICS four-digit subsectors, as Table 3 shows.

Table 3: Breakdown of Selected High-Growth Industries

| Industry | Description | 1997 Employment | Percentage of 1997 Employment | 1997 Annual Salary (2012 Dollars) | 2012 Employment | Percentage of 2012 Employment | 2012 Annual Salary | 1997-2012 Change in Employment | 1997-2012 Percent Change in Employment | 1997-2012 Average Annual Percent Change in Employment | 1997-2012 Change in Salary (Real Dollars) |
|------------|--|--------------------|-------------------------------------|--|--------------------|-------------------------------------|--------------------------|--------------------------------------|---|--|--|
| 524 | Insurance Carriers and Related Activities | 49,028 | | \$65,408 | 63,538 | | \$80,187 | 14,510 | 30% | 1.7% | \$14,778 |
| 5241 | Insurance Carriers | 32,881 | 67% | \$66,678 | 44,097 | 69% | \$82,199 | 11,216 | 34% | 2.0% | \$15,521 |
| 5242 | Agencies, Brokerages, and Other Insurance Related Activities | 16,147 | 33% | \$43,527 | 19,441 | 31% | \$55,192 | 3,294 | 20% | 1.2% | \$11,665 |
| 541 | Professional, Scientific, and Technical Services | 84,847 | | \$58,338 | 98,652 | | \$61,359 | 13,805 | 16% | 1.0% | \$3,021 |
| 5413 | Architectural, Engineering, and Related Services | 16,804 | 20% | \$55,489 | 18,722 | 19% | \$65,534 | 1,918 | 11% | 0.7% | \$10,045 |
| 5415 | Computer Systems Design and Related Services | 14,960 | 18% | \$68,344 | 17,149 | 17% | \$72,509 | 2,189 | 15% | 0.9% | \$4,164 |
| 5411 | Legal Services | 14,527 | 17% | \$59,723 | 14,729 | 15% | \$75,178 | 202 | 1% | 0.1% | \$15,455 |
| 5412 | Accounting, Tax Preparation, Bookkeeping, and Payroll Services | 12,878 | 15% | \$42,776 | 12,273 | 12% | \$51,508 | (605) | -5% | -0.3% | \$8,732 |
| 5416 | Management, Scientific, and Technical Consulting Services | 5,350 | 6% | \$59,456 | 11,168 | 11% | \$56,133 | 5,818 | 109% | 5.0% | -\$3,323 |
| 5419 | Other Professional, Scientific, and Technical Services | 8,569 | 10% | \$53,719 | 10,994 | 11% | \$55,158 | 2,425 | 28% | 1.7% | \$1,439 |
| 5418 | Advertising and Related Services | 8,157 | 10% | \$41,272 | 6,247 | 6% | \$48,705 | (1,910) | -23% | -1.8% | \$7,433 |
| 5417 | Scientific Research and Development Services | 2,323 | 3% | \$59,827 | 5,611 | 6% | \$74,706 | 3,288 | 142% | 6.1% | \$14,879 |
| 5414 | Specialized Design Services | 1,228 | 1% | \$46,124 | 1,576 | 2% | \$52,676 | 348 | 28% | 1.7% | \$6,552 |
| 551 | Management of Companies and Enterprises | 29,424 | | \$70,104 | 52,752 | | \$86,642 | 23,328 | 79% | 4.0% | \$16,538 |
| 5511 | Management of Companies and Enterprises | 29,424 | 100% | \$70,104 | 52,752 | 100% | \$86,642 | 23,328 | 79% | 4.0% | \$16,538 |
| 561 | Administrative and Support Services | 110,528 | | \$27,228 | 134,291 | | \$29,025 | 23,763 | 21% | 1.3% | \$1,797 |
| 5613 | Employment Services | 53,052 | 48% | \$19,757 | 61,124 | 46% | \$23,084 | 8,072 | 15% | 0.9% | \$3,327 |
| 5617 | Services to Buildings and Dwellings | 26,302 | 24% | \$30,929 | 32,995 | 25% | \$27,359 | 6,693 | 25% | 1.5% | -\$3,571 |
| 5614 | Business Support Services | 9,495 | 9% | \$25,102 | 15,959 | 12% | \$28,055 | 6,464 | 68% | 3.5% | \$2,953 |
| 5619 | Other Support Services | 6,761 | 6% | \$30,837 | 8,602 | 6% | \$27,800 | 1,841 | 27% | 1.6% | -\$3,037 |
| 5616 | Investigation and Security Services | 7,528 | 7% | \$19,698 | 7,367 | 5% | \$23,138 | (161) | -2% | -0.1% | \$3,440 |
| 5611 | Office Administrative Services | 1,523 | 1% | \$60,508 | 4,662 | 3% | \$60,306 | 3,139 | 206% | 7.7% | -\$202 |
| 5615 | Travel Arrangement and Reservation Services | 5,194 | 5% | \$28,665 | 2,586 | 2% | \$42,284 | (2,608) | -50% | -4.5% | \$13,619 |
| 5612 | Facilities Support Services | 520 | 0% | \$69,865 | 645 | 0% | \$50,031 | 125 | 24% | 1.4% | -\$19,834 |
| 621 | Ambulatory Health-Care Services | 86,127 | | \$54,722 | 116,557 | | \$51,910 | 30,430 | 35% | 2.0% | -\$2,812 |
| 6211 | Offices of Physicians | 27,314 | 32% | \$84,340 | 47,069 | 40% | \$82,377 | 19,755 | 72% | 3.7% | -\$1,963 |
| 6212 | Offices of Dentists | 14,409 | 17% | \$38,864 | 16,999 | 15% | \$50,979 | 2,590 | 18% | 1.1% | \$12,115 |
| 6214 | Outpatient Care Centers | 18,007 | 21% | \$56,256 | 15,626 | 13% | \$47,768 | (2,381) | -13% | -0.9% | -\$8,488 |
| 6213 | Offices of Other Health Practitioners | 10,923 | 13% | \$37,933 | 14,282 | 12% | \$34,018 | 3,359 | 31% | 1.8% | -\$3,915 |
| 6216 | Home Health Care Services | 8,921 | 10% | \$23,031 | 13,643 | 12% | \$24,802 | 4,722 | 53% | 2.9% | \$1,771 |
| 6219 | Other Ambulatory Health-Care Services | 4,927 | 6% | \$15,214 | 5,943 | 5% | \$21,003 | 1,016 | 21% | 1.3% | \$5,789 |
| 6215 | Medical and Diagnostic Laboratories | 2,414 | 3% | \$46,117 | 2,602 | 2% | \$50,019 | 188 | 8% | 0.5% | \$3,902 |
| 622 | Hospitals | 90,294 | | \$43,501 | 123,749 | | \$52,217 | 33,455 | 37% | 2.1% | \$8,716 |
| 6221 | General Medical and Surgical Hospitals | 82,256 | 91% | \$45,905 | 110,042 | 89% | \$57,073 | 27,786 | 34% | 2.0% | \$11,167 |
| 6222 | Psychiatric and Substance Abuse Hospitals | 840 | 1% | \$42,916 | 2,480 | 2% | \$52,897 | 1,640 | 195% | 7.5% | \$9,981 |
| 6223 | Specialty (except Psychiatric and Substance Abuse) Hospitals | | 0% | \$0 | 1,575 | 1% | \$42,582 | 1,575 | N/A | N/A | \$42,582 |
| 623 | Nursing and Residential Care Facilities | 69,087 | | \$25,815 | 84,674 | | \$31,681 | 15,587 | 23% | 1.4% | \$5,866 |
| 6231 | Nursing Care Facilities | 45,318 | 66% | \$25,926 | 39,256 | 46% | \$28,000 | (6,062) | -13% | -1.0% | \$2,074 |
| 6233 | Community Care Facilities for the Elderly | 12,381 | 18% | \$22,369 | 26,126 | 31% | \$20,343 | 13,745 | 111% | 5.1% | -\$2,026 |
| 6232 | Residential Mental Retardation, Mental Health and Substance Abuse Facilities | 9,198 | 13% | \$23,804 | 13,453 | 16% | \$21,759 | 4,255 | 46% | 2.6% | -\$2,045 |
| 6239 | Other Residential Care Facilities | 1,742 | 3% | \$24,503 | 2,283 | 3% | \$22,566 | 541 | 31% | 1.8% | -\$1,937 |
| 624 | Social Assistance | 38,208 | | \$27,910 | 64,395 | | \$28,061 | 26,187 | 69% | 3.5% | \$151 |

| Industry | Description | 1997 Employment | Percentage of 1997 Employment | 1997 Annual Salary (2012 Dollars) | 2012 Employment | Percentage of 2012 Employment | 2012 Annual Salary | 1997-2012 Change in Employment | 1997-2012 Percent Change in Employment | 1997-2012 Average Annual Percent Change in Employment | 1997-2012 Change in Salary (Real Dollars) |
|------------|---|--------------------|-------------------------------------|--|--------------------|-------------------------------------|--------------------------|--------------------------------------|---|--|--|
| 6241 | Individual and Family Services | 13,686 | 36% | \$29,007 | 36,033 | 56% | \$28,162 | 22,347 | 163% | 6.7% | -\$845 |
| 6244 | Child Day Care Services | 13,224 | 35% | \$15,954 | 17,565 | 27% | \$23,437 | 4,341 | 33% | 1.9% | \$7,483 |
| 6243 | Vocational Rehabilitation Services | 9,529 | 25% | \$30,007 | 8,689 | 13% | \$29,115 | (840) | -9% | -0.6% | -\$893 |
| 6242 | Community Food and Housing, and Emergency and Other Relief Services | 1,762 | 5% | \$21,831 | 2,109 | 3% | \$21,953 | 347 | 20% | 1.2% | \$121 |
| 713 | Amusement, Gambling, and Recreation Industries | 27,179 | | \$16,753 | 33,900 | | \$23,386 | 6,721 | 25% | 1.5% | \$6,633 |
| 7139 | Other Amusement and Recreation Industries | 22,237 | 82% | \$16,025 | 27,083 | 80% | \$20,601 | 4,846 | 22% | 1.3% | \$4,576 |
| 7132 | Gambling Industries | 4,312 | 16% | \$26,770 | 5,950 | 18% | \$30,660 | 1,638 | 38% | 2.2% | \$3,890 |
| 7131 | Amusement Parks and Arcades | 623 | 2% | \$21,837 | 867 | 3% | \$15,380 | 244 | 39% | 2.2% | -\$6,457 |
| 722 | Food Services and Drinking Places | 163,321 | | \$13,377 | 190,177 | | \$15,156 | 26,856 | 16% | 1.0% | \$1,779 |
| 7225* | Restaurants and Other Eating Places | 136,447 | 84% | \$12,262 | 160,746 | 85% | \$15,129 | 24,299 | 18% | 1.1% | \$2,867 |
| 7224 | Drinking Places (Alcoholic Beverages) | 20,009 | 12% | \$9,955 | 19,084 | 10% | \$10,517 | (925) | -5% | -0.3% | \$562 |
| 7223 | Special Food Services | 6,866 | 4% | \$14,738 | 10,348 | 5% | \$16,356 | 3,482 | 51% | 2.8% | \$1,618 |

* NAICS Industry 7225-Restaurants and Other Eating Places was created in 2007 to combine previous NAICS codes 7221-Full-Service Restaurants and 7222-Limited-Service Eating Places into one NAICS category

H. Sector Overview

The 10 top *industry* sectors that we identify in this report are primarily service sectors, with the *jobs* created being primarily service sector jobs. These 10 sectors represent 36% of the current level of employment in Wisconsin. Arrayed in three clusters, all 10 showed strong employment growth from 1997 to 2012 and strong projected employment growth from 2010 to 2020. Also common is that almost all employment in these sectors is private. Only two sectors, as noted in Appendix D, have more than 10% of jobs in the public sector. Finally, many of the sectors we identify have high wages relative to their sector comparisons.

However, the sectors vary on a number of dimensions. For example, insurance, professional services, management, and ambulatory care are high-paying service sectors, well above the state average wage of \$45,912. But the remaining sectors in our list are considerably below the state average wage. The sectors vary widely in the education and training levels that they require. This variation is a strength because it indicates that the Wisconsin economy will grow across a range of incomes, occupations, and educational levels. However, attracting and retaining workers in the higher paying sectors and occupations within sectors should be emphasized. We do so in our discussion of occupations below and in Appendix D where we provide details on each of the 10 sectors.

Missing from our list of top sectors are manufacturing, dairy, and food-related industries—all traditionally strong sectors in Wisconsin. But these sectors have been in decline in terms of jobs since 1997 and are projected to decline into the future. There are clearly areas in these sectors that may blossom, either in terms of jobs or in terms of state image. For example, while not employing many workers, fish farms and specialty cheese and brewing companies are increasing in the state and garnering national and sometimes international attention. Farms, as well, employ relatively few workers.

Manufacturing is different. In the past it drove Wisconsin employment and paid high wages. Many would argue that the American economy and middle class were built around these jobs in our major industries—automobiles, steel, machines and tools, etc. But data indicate these jobs have been reduced in the nation and the state, as have the wages paid in the manufacturing sectors. The Dallas Federal Reserve Bank came to exactly the same conclusion in a 2014 newsletter: “Expanding US industrial employment would require an increase in world demand for American manufactured goods, which can be achieved only by reductions in US wages and living standards. Instead, policymakers should acknowledge the importance of a growing service sector and consider focusing resources on compensating displaced manufacturing workers and incentivizing them to acquire skill to engage in higher value added activities.”¹⁸ We recommend that policymakers acknowledge the shift of employment in our state economy toward service sectors.¹⁹

¹⁸ Michael Sposi and Valerie Grossman, “Deindustrialization Redeploys Workers to Growing Service Sector,” Federal Reserve Bank of Dallas *Economic Letter*, September 2014.

¹⁹ One comparison is between Wisconsin and Minnesota. A 2007 report by University of Wisconsin–Madison economist Donald Nichols concluded: “In the early 1980’s, Wisconsin’s income fell 5 percent below the national average, and it has never fully recovered. In recent years this gap has averaged 3 percent. Minnesota, in contrast, has fared well in recent years. Minnesota has a concentration of industries—more heavily into electronics than

Finally, a number of the service sectors we highlight affect the more traditional sectors of Wisconsin's economy. For example, dairy, broadly defined, has in part declined in terms of jobs because scientific technology has dramatically increased productivity in that sector. Thus promotion of professional, scientific, and technical services will continue to aid dairy farming, production, and product development. Similarly, a number of our sectors will directly and indirectly aid and modernize manufacturing in the state.

III. Occupational Employment Growth

We have identified 10 rapid employment growth sectors in the Wisconsin economy. While each sector has a unique structure of occupational requirements, jobs in any occupational category exist at some level in other sectors. For example, "office and administrative support" occupations are present in most sectors and in all three of our clusters. By using the DWD occupation by industry matrix,²⁰ we are able to translate the aggregate employment growth patterns for each of the 10 sectors that make up the three high employment growth clusters into occupation-specific employment growth estimates. We can then aggregate these sector-specific occupational demand estimates over our 10 sectors (three clusters) to obtain the breakdown of the actual and projected employment demands by 770 detailed four-digit occupations. Finally, we aggregate these detailed occupational employment demands into 21 broad occupational groups.

This pattern of employment demand is shown in Table 4, with occupations ordered from the highest to the lowest wage level. Overall, the 10 high employment growth sectors that we have identified account for an additional 168,260 jobs in the Wisconsin economy. This number is equal to nearly one-half of the total growth in Wisconsin employment over this period.

machinery—and it has Minneapolis/St. Paul, which has emerged as an important financial sector at a time when finance has become increasingly important as a source of high-income jobs. Minnesota's per-capita personal income has pulled well ahead of the national average while Wisconsin has remained a bit behind." And, "Minneapolis/St. Paul employs more people in highly paid business-type occupations than Milwaukee and the history of Minnesota as being home to technology firms long before the boom of the late twentieth century are two of the forces that have worked in Minnesota's favor in the past twenty-five years. ... Minnesota's employment has been much greater in a rapidly growing sector, namely a sector that employs highly paid professionals in mathematical and computer occupations." Donald Nichols, "The Gap in Employment of High-Income Professionals in Wisconsin" (La Follette School Working Paper No. 2007-010, University of Wisconsin–Madison, 2007).

<http://www.lafollette.wisc.edu/images/publications/workingpapers/nichols2007-010.pdf>

²⁰ DWD's employment by industry and occupation matrix shows the occupational breakdown of employment for approximately 90 industries by NAICS classification and 770 occupations. The 770 occupations in the matrix represent detailed occupations at the four-digit level of the Standard Occupational Classification system. This matrix is described and access to it is available at

http://worknet.wisconsin.gov/worknet/progdesc_long.aspx?menuselection=da#PROJ

Table 4: Projected Employment Change 2010-2020 by Occupation Class

Occupation classes in bold have average annual wages above the Wisconsin average of \$45,912.

| Occupation Class | Projected Employment Change in High-Growth Clusters | Projected Employment Change in All Wisconsin Sectors | Percentage of Projected Total Growth in High-Growth Clusters | 2012 Mean Annual Wage |
|--|---|--|--|-----------------------|
| Management Occupations | 4,730 | 10,550 | 44.8% | \$96,500 |
| Legal Occupations | 670 | 1,340 | 50.0% | \$79,770 |
| Health-care Practitioners and Technical Occupations | 27,090 | 31,480 | 86.1% | \$73,260 |
| Computer and Mathematical Occupations | 8,130 | 13,100 | 62.1% | \$68,220 |
| Architecture and Engineering Occupations | 3,440 | 4,170 | 82.5% | \$65,770 |
| Business and Financial Operations Occupations | 9,440 | 22,020 | 42.9% | \$59,680 |
| Life, Physical, and Social Science Occupations | 1,110 | 2,890 | 38.4% | \$56,990 |
| Education, Training, and Library Occupations | 110 | 11,950 | 0.9% | \$49,420 |
| Construction and Extraction Occupations | 390 | 18,820 | 2.1% | \$48,060 |
| Arts, Design, Entertainment, Sports, and Media Occupations | 1,570 | 5,570 | 28.2% | \$44,230 |
| Installation, Maintenance, and Repair Occupations | 1,060 | 12,060 | 8.8% | \$43,590 |
| Community and Social Service Occupations | 2,130 | 4,060 | 52.5% | \$43,490 |
| Protective Service Occupations | 2,210 | 3,660 | 60.4% | \$39,380 |
| Sales and Related Occupations | 4,380 | 23,500 | 18.6% | \$36,240 |
| Production Occupations | 5,290 | 21,490 | 24.6% | \$34,910 |
| Office and Administrative Support Occupations | 22,030 | 36,890 | 59.7% | \$33,030 |
| Transportation and Material Moving Occupations | 3,070 | 25,670 | 12.0% | \$32,150 |
| Health-care Support Occupations | 12,220 | 19,190 | 63.7% | \$27,750 |
| Building and Grounds Cleaning and Maintenance Occupations | 5,300 | 13,020 | 40.7% | \$25,540 |
| Personal Care and Service Occupations | 11,420 | 20,350 | 56.1% | \$23,110 |
| Food Preparation and Serving Related Occupations | 42,470 | 44,750 | 94.9% | \$20,060 |
| Total | 168,260 | 346,680 | 48.5% | \$41,920 |

The group with the largest projected growth is the Food Preparation and Serving Related Occupations, up 42,000 jobs from 2010 to 2020, 25% of the total growth projected and 12% of total projected employment growth in Wisconsin in this period for our 10 sectors. Health-care Practitioners and Technical Occupations accounts for another 27,000 jobs and the Office and Administrative Support Occupations accounts for 22,000 more. These three occupations are projected to account for 57% of the total employment growth projected for this period for our 10 high-growth sectors and 28% of total growth in the Wisconsin economy.

In terms of wages, the highest paying general occupations across sectors are managerial (\$96,500), legal (\$79,770), and health-care practitioners and technical workers (\$73,260). Other occupations with wages considerably above the state average of \$45,912 are computer and mathematical (\$68,220), architecture and engineering (\$65,770), and business and financial occupations (\$59,680).

Table F2 shows the detailed pattern of occupational growth demands for our three clusters of 10 sectors by Standard Occupational Classification codes. Table F3 shows the occupational growth patterns for 94 more detailed occupations in each of our three clusters. As seen there, the Health-Care and Social Services Cluster is projected to account for 64,000 new jobs from 2010 to 2020. Table F3, which is ordered by wages, provides more detailed higher income occupations. Notable both for high wages and a large number of jobs are: managerial and supervisory occupations, health-care practitioners, engineers and computer occupations, financial specialists, and sales and business operations.

IV. Summary

This report has identified 10 service sectors that have and will continue to produce a large number of jobs with relatively high wages in many occupations. These sectors are in three clusters: management and business services, health care and social services, and leisure and recreation. Six statistical methods consistently identified these sectors based on past and future job growth, wages, and location quotient.

Although these sectors do not include traditional sectors of economic strength in Wisconsin, namely dairy and food processing and manufacturing, we anticipate that the growth of service sectors will have spillover effects for those traditional sectors. However, we do not dispute that if policymakers act in part on the conclusions of this report, their decisions will indicate a new direction for economic growth in the state.

Appendix A: Alternative Methods for Identifying High-Growth Sectors

Section II of this paper identifies 10 potential high employment growth sectors using two growth indices. The Average Annual Employment Growth Rate Index gave equal weight to both the past (1997–2012) and projected (2010–2020) average annual percent growth rate. The Competitive Growth Rate Index also considered past and projected annual average annual percent growth rates, and gave weight to each sector’s 2012 average wage and 2012 location quotient. From these indices, we identified 10 sectors that were substantial in size and could be described as potential high employment-growth sectors.

Our procedure for identifying these sectors in Wisconsin was one of many techniques that could be used. We used alternative procedures to establish the robustness of our procedure and the robustness of our identification of the 10 sectors and three clusters. In this appendix, we show four of these alternative methods and their results. The 10 sectors are:

NAICS

| Code | Sector |
|------|--|
| 524 | Insurance Carriers and Related Activities |
| 541 | Professional, Scientific, and Technical Services |
| 551 | Management of Companies and Enterprises |
| 561 | Administrative and Support Services |
| 621 | Ambulatory and Health Care Services |
| 622 | Hospitals |
| 623 | Nursing and Residential Care Facilities |
| 624 | Social Assistance |
| 713 | Amusement, Gambling, and Recreation Industries |
| 722 | Food Services and Drinking Places |

1. Equal Weighting of the Unit Change Index and Percent Change Index

Instead of the average annual percent growth rate used in section II, this alternative uses the absolute unit change of past (1997–2012) and projected (2010–2020) growth to create a “unit index,” and the percent change of past and projected employment growth during these same time periods to create a “percent index.” We then create a ranking system from these indices that gives equal weight to the unit and percent indices. (See Table A1.) The equation for this method is:

$$\text{Unit and Percent Change Index} = 0.5(\text{Unit Index}^{21}) + 0.5(\text{Percent Index}^{22})$$

The results of this method are summarized in the table below. *Of the 54 sectors included in this ranking, the sectors we identified in Section II as high potential growth sectors make up 10 of the top 11 ranked sectors.* The range of the index score from the 54 sectors included in this ranking is -6.33 to 9.16 (26 positive and 28 negative) with an average of 0.50 and median of -0.02. The average index score of our 10 selected sectors is 6.78. From these results, we conclude that this

²¹ {[0.5(2012 Employment-1997 Employment)_i] + [0.5(2020 Projected Employment-2010 Employment)_i]}

²² {[0.5((2012 Employment-1997 Employment)/(1997 Employment))_i] + [0.5((2020 Projected Employment-2010 Employment)/(2010 Employment))_i]}

alternative method supports our selection of 10 sectors and three clusters as having high potential growth.

Table A1: Unit and Percent Change Index

| Unit and Percent Change Index (UPCI) = 0.5(Unit Index) + 0.5(Percent Index) | | | | | | | | |
|--|--|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|---------------|------------------|-------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| NAICS Code | Code Description | 1997-2012 Employment Change | 1997-2012 % Employment Change | 2010-2020 Employment Change | 2010-2020 % Employment Change | Unit Index | Percent Index | UPCI |
| 551 | Management of Companies and Enterprises | 23,328 | 79.3% | 6,190 | 13.2% | 7.25 | 11.08 | 9.16 |
| 622 | Hospitals | 33,455 | 37.1% | 25,270 | 21.3% | 11.92 | 6.00 | 8.96 |
| 624 | Social Assistance | 26,187 | 68.5% | 3,730 | 6.0% | 7.83 | 9.28 | 8.56 |
| 621 | Ambulatory Health Care Services | 30,430 | 35.3% | 24,770 | 22.8% | 11.01 | 5.86 | 8.44 |
| 722 | Food Services and Drinking Places | 26,856 | 16.4% | 43,230 | 23.2% | 11.72 | 3.42 | 7.57 |
| 561 | Administrative and Support Services | 23,763 | 21.5% | 32,810 | 26.5% | 9.86 | 4.26 | 7.06 |
| 623 | Nursing and Residential Care Facilities | 15,587 | 22.6% | 19,220 | 25.0% | 6.25 | 4.31 | 5.28 |
| 524 | Insurance Carriers and Related Activities | 14,510 | 29.6% | 11,870 | 17.1% | 5.26 | 4.80 | 5.03 |
| 541 | Professional, Scientific, and Technical Services | 13,805 | 16.3% | 23,680 | 25.4% | 6.16 | 3.52 | 4.84 |
| 488 | Support Activities for Transportation | 1,478 | 37.0% | 2,220 | 41.4% | 0.63 | 7.09 | 3.86 |
| 713 | Amusement, Gambling, and Recreation Industries | 6,721 | 24.7% | 2,240 | 8.8% | 2.13 | 3.71 | 2.92 |
| 813 | Religious, Grantmaking, Civic, Professional, and Similar Organizations | 3,625 | 14.1% | 11,140 | 12.2% | 2.08 | 2.52 | 2.30 |
| 423 | Merchant Wholesalers, Durable Goods | 5,037 | 8.5% | 9,140 | 14.9% | 2.29 | 1.92 | 2.11 |
| 452 | General Merchandise Stores | 4,904 | 8.6% | 7,200 | 11.8% | 2.07 | 1.76 | 1.92 |
| 522 | Credit Intermediation and Related Activities | 3,331 | 7.1% | 6,090 | 11.7% | 1.52 | 1.56 | 1.54 |
| 562 | Waste Management and Remediation Services | 584 | 11.5% | 890 | 16.8% | 0.25 | 2.42 | 1.34 |
| 721 | Accommodation | 1,076 | 3.7% | 4,690 | 15.9% | 0.75 | 1.35 | 1.05 |
| 712 | Museums, Historical Sites, and Similar Institutions | 61 | 3.0% | 270 | 15.4% | 0.04 | 1.24 | 0.64 |
| 448 | Clothing and Clothing Accessories Stores | 466 | 2.6% | 1,910 | 9.9% | 0.31 | 0.87 | 0.59 |
| 485 | Transit and Ground Passenger Transportation | 415 | 2.8% | 1,430 | 10.2% | 0.25 | 0.92 | 0.58 |
| 812 | Personal and Laundry Services | 684 | 2.7% | 1,840 | 7.1% | 0.37 | 0.74 | 0.55 |
| 446 | Health and Personal Care Stores | 787 | 5.2% | 460 | 2.9% | 0.27 | 0.84 | 0.55 |
| 517 | Telecommunications | 288 | 2.5% | 1,120 | 8.6% | 0.19 | 0.79 | 0.49 |
| 443 | Electronics and Appliance Stores | 197 | 2.4% | 370 | 4.0% | 0.09 | 0.54 | 0.31 |
| 451 | Sporting Goods, Hobby, Musical Instrument, and Book Stores | (181) | -1.5% | 1,520 | 13.0% | 0.09 | 0.51 | 0.30 |
| 311 | Food Manufacturing | 37 | 0.1% | 1,980 | 3.3% | 0.20 | 0.19 | 0.19 |
| 811 | Repair and Maintenance | (868) | -4.0% | 2,080 | 10.2% | -0.05 | 0.04 | -0.01 |
| 441 | Motor Vehicle and Parts Dealers | (1,112) | -3.0% | 2,450 | 7.4% | -0.09 | 0.01 | -0.04 |
| 332 | Fabricated Metal Product Manufacturing | (3,843) | -5.1% | 9,070 | 14.2% | -0.25 | 0.12 | -0.07 |
| 444 | Building Material and Garden Equipment and Supplies Dealers | (1,811) | -6.8% | 3,270 | 13.2% | -0.21 | -0.17 | -0.19 |
| 531 | Real Estate | (2,183) | -10.9% | 2,060 | 12.0% | -0.43 | -0.77 | -0.60 |
| 326 | Plastics and Rubber Products Manufacturing | (3,305) | -10.1% | 2,980 | 10.7% | -0.67 | -0.74 | -0.70 |
| 238 | Specialty Trade Contractors | (10,578) | -15.1% | 19,180 | 32.0% | -1.23 | -0.23 | -0.73 |
| 511 | Publishing Industries (except Internet) | (2,051) | -10.1% | 680 | 3.9% | -0.52 | -1.11 | -0.81 |
| 337 | Furniture and Related Product Manufacturing | (2,557) | -15.0% | 2,030 | 13.7% | -0.54 | -1.21 | -0.88 |
| 447 | Gasoline Stations | (1,271) | -5.3% | (2,150) | -9.5% | -0.56 | -1.21 | -0.89 |
| 312 | Beverage and Tobacco Product Manufacturing | (521) | -15.6% | 170 | 5.8% | -0.13 | -1.72 | -0.92 |
| 512 | Motion Picture and Sound Recording Industries | (421) | -11.2% | (250) | -6.8% | -0.14 | -1.83 | -0.99 |
| 327 | Nonmetallic Mineral Product Manufacturing | (2,142) | -20.4% | 1,560 | 18.4% | -0.47 | -1.66 | -1.06 |
| 492 | Couriers and Messengers | (1,178) | -12.4% | (880) | -10.6% | -0.42 | -2.20 | -1.31 |
| 532 | Rental and Leasing Services | (2,195) | -24.9% | 1,000 | 14.2% | -0.53 | -2.48 | -1.51 |
| 711 | Performing Arts, Spectator Sports, and Related Industries | (2,939) | -28.3% | 1,370 | 18.6% | -0.71 | -2.67 | -1.69 |
| 454 | Nonstore Retailers | (4,674) | -19.3% | 1,140 | 5.6% | -1.23 | -2.22 | -1.72 |
| 331 | Primary Metal Manufacturing | (7,141) | -28.8% | 3,060 | 20.0% | -1.75 | -2.67 | -2.21 |
| 481 | Air Transportation | (1,337) | -37.4% | 20 | 0.8% | -0.38 | -4.85 | -2.61 |
| 323 | Printing and Related Support Activities | (8,017) | -21.7% | (2,900) | -10.2% | -2.56 | -3.39 | -2.98 |
| 339 | Miscellaneous Manufacturing | (6,349) | -31.6% | (1,320) | -9.8% | -1.94 | -4.66 | -3.30 |
| 314 | Textile Product Mills | (1,218) | -43.6% | (190) | -12.8% | -0.37 | -6.40 | -3.38 |
| 336 | Transportation Equipment Manufacturing | (11,485) | -30.2% | 390 | 1.5% | -3.25 | -3.87 | -3.56 |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | (11,505) | -33.9% | (2,930) | -14.0% | -3.56 | -5.19 | -4.38 |
| 333 | Machinery Manufacturing | (24,896) | -27.2% | 920 | 1.6% | -7.03 | -3.47 | -5.25 |
| 322 | Paper Manufacturing | (20,148) | -39.5% | 1,060 | 3.3% | -5.66 | -4.99 | -5.32 |
| 315 | Apparel Manufacturing | (3,103) | -78.7% | (30) | -3.7% | -0.89 | -10.49 | -5.69 |
| 316 | Leather and Allied Product Manufacturing | (4,109) | -77.8% | (260) | -23.6% | -1.20 | -11.46 | -6.33 |

2. Equal Weighting of the Unit Change Index, Percent Change Index, 2012 Industry Average Wage, and 2012 Location Quotient

The method used in Section IIC, Average Annual Employment Growth Rate Index, includes the actual average annual and projected average growth rates, and each sector's average annual wage and 2012 location quotient.²³ This second alternative method uses a similar approach, but replaces the actual and projected annual average percent growth rates with the unit index and percent index (the same unit and percent indices used in the first alternative method, equal weighting of the unit change index and the percent change index. This second method then gives equal weight to the unit index, percent index, 2012 average annual wages, and 2012 location quotient. (See Table A2.) The equation for this method is:

$$\text{Competitive Unit and Percent Change Index} = 0.25(\text{Unit Index}^{24}) + 0.25(\text{Percent Index}^{25}) + 0.25(\text{2012 Weighted Average Annual Wage Index}^{26}) + 0.25(\text{2012 Location Quotient}^{27})$$

The results of this method are summarized in the table below. *Of the 54 sectors included in this ranking, the sectors we identified in the body of the paper again are among the 10 of the top 11 ranked sectors.* The range of this index score is -2.77 to 5.88 (35 positive and 19 negative) with an average of 0.82 and median of 0.43. The average of our 10 selected sectors is 4.37. From these results, we again conclude that this alternative method supports our 10 selected sectors and three clusters as having characteristics of high potential jobs growth.

²³ We note in Section IIC, Average Annual Employment Growth Rate Index, that the 2012 average annual wage provides an indicator for the wealth generation associated with a sector and that the 2012 location quotient serves as an indicator for any sort of competitive advantage Wisconsin may have in that sector when compared to the rest of the United States.

²⁴ $\{ [0.5(2012 \text{ Employment} - 1997 \text{ Employment})_i] + [0.5(2020 \text{ Projected Employment} - 2010 \text{ Employment})_i] \}$

²⁵ $\{ [0.5((2012 \text{ Employment} - 1997 \text{ Employment}) / (1997 \text{ Employment}))_i] + [0.5((2020 \text{ Projected Employment} - 2010 \text{ Employment}) / (2010 \text{ Employment}))_i] \}$

²⁶ $\{ 2012 \text{ Weighted Wage} = [(2012 \text{ Average Annual Wage}) * (2012 \text{ Employment})_i] * (1 / (2012 \text{ Average of all Wisconsin Sector Employment})) \} / \{ \text{Average of all Wisconsin 2012 Weighted Wage} \}$

²⁷ $(\text{Percentage of Wisconsin's Total Workforce in Sector } i) / (\text{Percentage of United States' Total Workforce in Sector } i)$

Table A2: Competitive Unit and Percent Change Index

Competitive Unit and Percent Change Index (CUGI)=

0.25(Unit Index) + 0.25(% Index) + 0.25(2012 Average Wage) + 0.25(Location Quotient)

| NAICS Code | Code Description | Unit Index | Percent Index | 2012 Average Wages | 2012 Location Quotient | CUGI |
|------------|---|------------|---------------|--------------------|------------------------|-------|
| 622 | Hospitals | 11.92 | 6.00 | \$52,217 | 1.00 | 5.88 |
| 551 | Management of Companies and Enterprises | 7.25 | 11.08 | \$86,642 | 1.29 | 5.72 |
| 621 | Ambulatory Health Care Services | 11.01 | 5.86 | \$51,910 | 0.89 | 5.52 |
| 624 | Social Assistance | 7.83 | 9.28 | \$28,061 | 1.12 | 4.88 |
| 722 | Food Services and Drinking Places | 11.72 | 3.42 | \$15,156 | 0.93 | 4.53 |
| 561 | Administrative and Support Services | 9.86 | 4.26 | \$29,025 | 0.86 | 4.44 |
| 524 | Insurance Carriers and Related Activities | 5.26 | 4.80 | \$80,187 | 1.50 | 3.79 |
| 541 | Professional, Scientific, and Technical Services | 6.16 | 3.52 | \$61,359 | 0.60 | 3.65 |
| 623 | Nursing and Residential Care Facilities | 6.25 | 4.31 | \$31,681 | 1.22 | 3.42 |
| 488 | Support Activities for Transportation | 0.63 | 7.09 | \$43,212 | 0.41 | 2.07 |
| 713 | Amusement, Gambling, and Recreation Industries | 2.13 | 3.71 | \$23,386 | 0.96 | 1.84 |
| 423 | Merchant Wholesalers, Durable Goods | 2.29 | 1.92 | \$39,128 | 1.12 | 1.78 |
| 813 | Religious, Grant-making, Civic, Professional, and Similar Organizations | 2.08 | 2.52 | \$41,520 | 1.06 | 1.63 |
| 522 | Credit Intermediation and Related Activities | 1.52 | 1.56 | \$57,311 | 0.95 | 1.52 |
| 452 | General Merchandise Stores | 2.07 | 1.76 | \$18,827 | 0.97 | 1.41 |
| 332 | Fabricated Metal Product Manufacturing | -0.25 | 0.12 | \$48,378 | 2.51 | 1.21 |
| 311 | Food Manufacturing | 0.20 | 0.19 | \$42,875 | 2.08 | 1.09 |
| 562 | Waste Management and Remediation Services | 0.25 | 2.42 | \$39,669 | 0.68 | 0.88 |
| 721 | Accommodation | 0.75 | 1.35 | \$19,919 | 0.78 | 0.83 |
| 812 | Personal and Laundry Services | 0.37 | 0.74 | \$37,701 | 0.97 | 0.69 |
| 485 | Transit and Ground Passenger Transportation | 0.25 | 0.92 | \$26,770 | 1.11 | 0.64 |
| 446 | Health and Personal Care Stores | 0.27 | 0.84 | \$32,794 | 0.78 | 0.56 |
| 517 | Telecommunications | 0.19 | 0.79 | \$57,104 | 0.69 | 0.54 |
| 448 | Clothing and Clothing Accessories Stores | 0.31 | 0.87 | \$16,335 | 0.66 | 0.51 |
| 441 | Motor Vehicle and Parts Dealers | -0.09 | 0.01 | \$36,928 | 1.00 | 0.46 |
| 712 | Museums, Historical Sites, and Similar Institutions | 0.04 | 1.24 | \$36,792 | 0.45 | 0.45 |
| 326 | Plastics and Rubber Products Manufacturing | -0.67 | -0.74 | \$45,893 | 2.22 | 0.44 |
| 451 | Sporting Goods, Hobby, Musical Instrument, and Book Stores | 0.09 | 0.51 | \$16,915 | 0.96 | 0.42 |
| 443 | Electronics and Appliance Stores | 0.09 | 0.54 | \$32,406 | 0.79 | 0.40 |
| 811 | Repair and Maintenance | -0.05 | 0.04 | \$44,347 | 0.86 | 0.38 |
| 238 | Specialty Trade Contractors | -1.23 | -0.23 | \$43,392 | 0.83 | 0.30 |
| 444 | Building Material and Garden Equipment and Supplies Dealers | -0.21 | -0.17 | \$25,879 | 1.04 | 0.28 |
| 337 | Furniture and Related Product Manufacturing | -0.54 | -1.21 | \$41,396 | 2.02 | 0.18 |
| 511 | Publishing Industries (except Internet) | -0.52 | -1.11 | \$61,804 | 1.21 | 0.10 |
| 447 | Gasoline Stations | -0.56 | -1.21 | \$16,862 | 1.33 | -0.04 |
| 531 | Real Estate | -0.43 | -0.77 | \$33,023 | 0.60 | -0.05 |
| 327 | Nonmetallic Mineral Product Manufacturing | -0.47 | -1.66 | \$46,078 | 1.12 | -0.18 |
| 454 | Non-store Retailers | -1.23 | -2.22 | \$34,806 | 2.16 | -0.20 |
| 312 | Beverage and Tobacco Product Manufacturing | -0.13 | -1.72 | \$39,937 | 0.72 | -0.26 |
| 512 | Motion Picture and Sound Recording Industries | -0.14 | -1.83 | \$17,945 | 0.44 | -0.37 |
| 331 | Primary Metal Manufacturing | -1.75 | -2.67 | \$53,404 | 2.15 | -0.40 |
| 492 | Couriers and Messengers | -0.42 | -2.20 | \$37,869 | 0.77 | -0.41 |
| 323 | Printing and Related Support Activities | -2.56 | -3.39 | \$45,212 | 3.06 | -0.49 |
| 711 | Performing Arts, Spectator Sports, and Related Industries | -0.71 | -2.67 | \$65,717 | 0.87 | -0.54 |
| 532 | Rental and Leasing Services | -0.53 | -2.48 | \$32,693 | 0.64 | -0.56 |
| 333 | Machinery Manufacturing | -7.03 | -3.47 | \$60,235 | 2.96 | -1.17 |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | -3.56 | -5.19 | \$65,353 | 2.95 | -1.19 |
| 481 | Air Transportation | -0.38 | -4.85 | \$44,216 | 0.24 | -1.23 |
| 339 | Miscellaneous Manufacturing | -1.94 | -4.66 | \$46,127 | 1.16 | -1.25 |
| 336 | Transportation Equipment Manufacturing | -3.25 | -3.87 | \$60,071 | 0.86 | -1.28 |
| 322 | Paper Manufacturing | -5.66 | -4.99 | \$60,320 | 3.97 | -1.34 |
| 314 | Textile Product Mills | -0.37 | -6.40 | \$29,487 | 0.67 | -1.52 |
| 316 | Leather and Allied Product Manufacturing | -1.20 | -11.46 | \$37,940 | 1.95 | -2.67 |
| 315 | Apparel Manufacturing | -0.89 | -10.49 | \$29,977 | 0.28 | -2.77 |

3. Average Annual Growth Rate Index (Past Growth Only)

The methods used for identifying high potential growth sectors in Section II in both cases give weight to past and projected employment growth in each sector. This third alternative methodology omits consideration of the DWD’s projected employment numbers and only considers the *past average annual percent growth rate* from 1997 to 2012 (50% weighting), the 2012 average annual wage in each sector (25% weighting), and the 2012 location quotient (25% weighting). (See Table A3.) The equation for this method is:

$$\text{Competitive Past Growth Rate Index} = 0.5(\text{1997–2012 Average Annual Employment Growth Rate}^{28}) + 0.25(\text{2012 Weighted Average Annual Wage Index}^{29}) + 0.25(\text{2012 Location Quotient}^{30})$$

Table A3: Competitive Past Growth Rate Index

Competitive Past Growth Rate Index (CPGRI) = (0.5)(1997-2012 Average Annual Growth Rate) + (0.25)(2012 Location Quotient) + (0.25)(2012 Average Wage)

| NAICS Code | Code Description | 1997-2012 Average Annual Growth Rate | 2012 Average Wages | 2012 Location Quotient | CPGRI |
|------------|---|--------------------------------------|--------------------|------------------------|-------|
| 551 | Management of Companies and Enterprises | 4.0% | \$86,642 | 1.29 | 4.44 |
| 624 | Social Assistance | 3.5% | \$28,061 | 1.12 | 3.55 |
| 622 | Hospitals | 2.1% | \$52,217 | 1.00 | 3.17 |
| 621 | Ambulatory Health Care Services | 2.0% | \$51,910 | 0.89 | 3.00 |
| 524 | Insurance Carriers and Related Activities | 1.7% | \$80,187 | 1.50 | 2.73 |
| 541 | Professional, Scientific, and Technical Services | 1.0% | \$61,359 | 0.60 | 2.07 |
| 561 | Administrative and Support Services | 1.3% | \$29,025 | 0.86 | 2.00 |
| 623 | Nursing and Residential Care Facilities | 1.4% | \$31,681 | 1.22 | 1.92 |
| 488 | Support Activities for Transportation | 2.1% | \$43,212 | 0.41 | 1.91 |
| 713 | Amusement, Gambling, and Recreation Industries | 1.5% | \$23,386 | 0.96 | 1.62 |
| 722 | Food Services and Drinking Places | 1.0% | \$15,156 | 0.93 | 1.60 |
| 813 | Religious, Grant-making, Civic, Professional, and Similar Organizations | 0.9% | \$41,520 | 1.06 | 1.22 |
| 423 | Merchant Wholesalers, Durable Goods | 0.5% | \$39,128 | 1.12 | 1.18 |
| 522 | Credit Intermediation and Related Activities | 0.5% | \$57,311 | 0.95 | 1.13 |
| 311 | Food Manufacturing | 0.0% | \$42,875 | 2.08 | 1.00 |
| 332 | Fabricated Metal Product Manufacturing | -0.3% | \$48,378 | 2.51 | 0.96 |
| 452 | General Merchandise Stores | 0.5% | \$18,827 | 0.97 | 0.91 |
| 562 | Waste Management and Remediation Services | 0.7% | \$39,669 | 0.68 | 0.82 |
| 446 | Health and Personal Care Stores | 0.3% | \$32,794 | 0.78 | 0.57 |
| 812 | Personal and Laundry Services | 0.2% | \$37,701 | 0.97 | 0.56 |
| 721 | Accommodation | 0.2% | \$19,919 | 0.78 | 0.50 |
| 485 | Transit and Ground Passenger Transportation | 0.2% | \$26,770 | 1.11 | 0.50 |
| 517 | Telecommunications | 0.2% | \$57,104 | 0.69 | 0.43 |
| 443 | Electronics and Appliance Stores | 0.2% | \$32,406 | 0.79 | 0.38 |
| 448 | Clothing and Clothing Accessories Stores | 0.2% | \$16,335 | 0.66 | 0.36 |
| 441 | Motor Vehicle and Parts Dealers | -0.2% | \$36,928 | 1.00 | 0.31 |
| 712 | Museums, Historical Sites, and Similar Institutions | 0.2% | \$36,792 | 0.45 | 0.29 |
| 326 | Plastics and Rubber Products Manufacturing | -0.7% | \$45,893 | 2.22 | 0.20 |
| 451 | Sporting Goods, Hobby, Musical Instrument, and Book Stores | -0.1% | \$16,915 | 0.96 | 0.19 |
| 811 | Repair and Maintenance | -0.3% | \$44,347 | 0.86 | 0.15 |

²⁸ { [(2012 actual employment/1997 actual employment)_i]^{1/(15 years)} - 1 }

²⁹ { 2012 Weighted Wage=[(2012 Average Annual Wage)_i*(2012 Employment)_i*(1/(2012 Average of all Wisconsin Sector Employment)))] / { Average of all Wisconsin 2012 Weighted Wage }

³⁰ (Percentage of Wisconsin’s Total Workforce in Sector i) / (Percentage of United States’ Total Workforce in Sector i)

| NAICS Code | Code Description | 1997-2012 Average Annual Growth Rate | 2012 Average Wages | 2012 Location Quotient | CPGRI |
|------------|--|--------------------------------------|--------------------|------------------------|-------|
| 447 | Gasoline Stations | -0.4% | \$16,862 | 1.33 | 0.10 |
| 444 | Building Material and Garden Equipment and Supplies Dealers | -0.5% | \$25,879 | 1.04 | -0.02 |
| 511 | Publishing Industries (except Internet) | -0.7% | \$61,804 | 1.21 | -0.09 |
| 238 | Specialty Trade Contractors | -1.1% | \$43,392 | 0.83 | -0.24 |
| 337 | Furniture and Related Product Manufacturing | -1.1% | \$41,396 | 2.02 | -0.28 |
| 333 | Machinery Manufacturing | -2.1% | \$60,235 | 2.96 | -0.29 |
| 323 | Printing and Related Support Activities | -1.6% | \$45,212 | 3.06 | -0.35 |
| 531 | Real Estate | -0.8% | \$33,023 | 0.60 | -0.38 |
| 492 | Couriers and Messengers | -0.9% | \$37,869 | 0.77 | -0.48 |
| 454 | Nonstore Retailers | -1.4% | \$34,806 | 2.16 | -0.52 |
| 512 | Motion Picture and Sound Recording Industries | -0.8% | \$17,945 | 0.44 | -0.54 |
| 312 | Beverage and Tobacco Product Manufacturing | -1.1% | \$39,937 | 0.72 | -0.73 |
| 327 | Nonmetallic Mineral Product Manufacturing | -1.5% | \$46,078 | 1.12 | -0.91 |
| 331 | Primary Metal Manufacturing | -2.2% | \$53,404 | 2.15 | -1.16 |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | -2.7% | \$65,353 | 2.95 | -1.27 |
| 532 | Rental and Leasing Services | -1.9% | \$32,693 | 0.64 | -1.38 |
| 322 | Paper Manufacturing | -3.3% | \$60,320 | 3.97 | -1.43 |
| 336 | Transportation Equipment Manufacturing | -2.4% | \$60,071 | 0.86 | -1.48 |
| 711 | Performing Arts, Spectator Sports, and Related Industries | -2.2% | \$65,717 | 0.87 | -1.52 |
| 339 | Miscellaneous Manufacturing | -2.5% | \$46,127 | 1.16 | -1.68 |
| 481 | Air Transportation | -3.1% | \$44,216 | 0.24 | -2.49 |
| 314 | Textile Product Mills | -3.7% | \$29,487 | 0.67 | -2.95 |
| 316 | Leather and Allied Product Manufacturing | -9.5% | \$37,940 | 1.95 | -7.46 |
| 315 | Apparel Manufacturing | -9.8% | \$29,977 | 0.28 | -8.09 |

The ranking methodology yielding the patterns shown in the table again reveals *our selected sectors comprising 10 of the top 11 sectors (out of 54)*. The range of this third ranking index is - 8.09 to 4.44 (31 positive, 23 negative) with an average of 0.07 and median of 0.20. The average of our 10 selected sectors shown in the table below is 2.61. These results again support our selection of 10 sectors and three clusters as having characteristics of high potential growth.

4. Average Annual Growth Rate Index (Projected Growth Only)

Parallel to alternative method three, we omit past growth and only consider DWD’s *projected annual average percent growth rate* of employment from 2010–2020 (50% weighting), the 2012 average annual wage in each sector (25% weighting) and the 2012 location quotient (25% weighting). (See Table A4.) The equation for this method is:

$$\text{Competitive Projected Growth Rate Index} = 0.5(\text{2010–2020 Projected Average Annual Employment Growth Rate}^{31}) + 0.25(\text{2012 Weighted Average Annual Wage Index}^{32}) + 0.25(\text{2012 Location Quotient}^{33})$$

³¹ $\{[(2020 \text{ actual employment}/2010 \text{ actual employment})_i]^{1/(10 \text{ years})} - 1\}$

³² $\{2012 \text{ Weighted Wage}=[(2012 \text{ Average Annual Wage})_i*(2012 \text{ Employment})_i]*(1/(2012 \text{ Average of all Wisconsin Sector Employment}))\} / \{\text{Average of all Wisconsin 2012 Weighted Wage}\}$

³³ $(\text{Percent of Wisconsin’s Total Workforce in Sector } i) / (\text{Percent of United States’ Total Workforce in Sector } i)$

Table A4: Competitive Projected Growth Rate Index

| Competitive Projected Growth Rate Index = (0.5)(2010-2020 Average Annual Growth Rate) + (0.25)(2012 Location Quotient) + (0.25)(2012 Average Wage) | | | | | |
|---|--|--------------------------------------|-------------------|------------------------|-------|
| (1) | (2) | (3) | (4) | (5) | (6) |
| NAICS Code | Code Description | 2010-2020 Average Annual Growth Rate | 2012 Average Wage | 2012 Location Quotient | CPGRI |
| 541 | Professional, Scientific, and Technical Services | 2.3% | \$61,359 | 0.60 | 2.62 |
| 622 | Hospitals | 1.9% | \$52,217 | 1.00 | 2.58 |
| 621 | Ambulatory Health Care Services | 2.1% | \$51,910 | 0.89 | 2.56 |
| 238 | Specialty Trade Contractors | 2.8% | \$43,392 | 0.83 | 2.38 |
| 561 | Administrative and Support Services | 2.4% | \$29,025 | 0.86 | 2.36 |
| 488 | Support Activities for Transportation | 3.5% | \$43,212 | 0.41 | 2.29 |
| 524 | Insurance Carriers and Related Activities | 1.6% | \$80,187 | 1.50 | 2.25 |
| 623 | Nursing and Residential Care Facilities | 2.3% | \$31,681 | 1.22 | 2.15 |
| 332 | Fabricated Metal Product Manufacturing | 1.3% | \$48,378 | 2.51 | 2.06 |
| 722 | Food Services and Drinking Places | 2.1% | \$15,156 | 0.93 | 2.03 |
| 551 | Management of Companies and Enterprises | 1.2% | \$86,642 | 1.29 | 1.89 |
| 331 | Primary Metal Manufacturing | 1.8% | \$53,404 | 2.15 | 1.83 |
| 423 | Merchant Wholesalers, Durable Goods | 1.4% | \$39,128 | 1.12 | 1.58 |
| 333 | Machinery Manufacturing | 0.2% | \$60,235 | 2.96 | 1.55 |
| 322 | Paper Manufacturing | 0.3% | \$60,320 | 3.97 | 1.52 |
| 522 | Credit Intermediation and Related Activities | 1.1% | \$57,311 | 0.95 | 1.43 |
| 326 | Plastics and Rubber Products Manufacturing | 1.0% | \$45,893 | 2.22 | 1.41 |
| 337 | Furniture and Related Product Manufacturing | 1.3% | \$41,396 | 2.02 | 1.40 |
| 327 | Nonmetallic Mineral Product Manufacturing | 1.7% | \$46,078 | 1.12 | 1.38 |
| 711 | Performing Arts, Spectator Sports, and Related Industries | 1.7% | \$65,717 | 0.87 | 1.35 |
| 721 | Accommodation | 1.5% | \$19,919 | 0.78 | 1.21 |
| 311 | Food Manufacturing | 0.3% | \$42,875 | 2.08 | 1.19 |
| 813 | Religious, Grantmaking, Civic, Professional, and Similar Organizations | 1.2% | \$41,520 | 1.06 | 1.19 |
| 562 | Waste Management and Remediation Services | 1.6% | \$39,669 | 0.68 | 1.16 |
| 444 | Building Material and Garden Equipment and Supplies Dealers | 1.2% | \$25,879 | 1.04 | 1.13 |
| 452 | General Merchandise Stores | 1.1% | \$18,827 | 0.97 | 1.13 |
| 451 | Sporting Goods, Hobby, Musical Instrument, and Book Stores | 1.2% | \$16,915 | 0.96 | 1.02 |
| 532 | Rental and Leasing Services | 1.3% | \$32,693 | 0.64 | 1.01 |
| 712 | Museums, Historical Sites, and Similar Institutions | 1.4% | \$36,792 | 0.45 | 1.01 |
| 454 | Nonstore Retailers | 0.5% | \$34,806 | 2.16 | 0.99 |
| 811 | Repair and Maintenance | 1.0% | \$44,347 | 0.86 | 0.98 |
| 624 | Social Assistance | 0.6% | \$28,061 | 1.12 | 0.96 |
| 531 | Real Estate | 1.1% | \$33,023 | 0.60 | 0.95 |
| 485 | Transit and Ground Passenger Transportation | 1.0% | \$26,770 | 1.11 | 0.94 |
| 441 | Motor Vehicle and Parts Dealers | 0.7% | \$36,928 | 1.00 | 0.92 |
| 713 | Amusement, Gambling, and Recreation Industries | 0.9% | \$23,386 | 0.96 | 0.90 |
| 812 | Personal and Laundry Services | 0.7% | \$37,701 | 0.97 | 0.84 |
| 517 | Telecommunications | 0.8% | \$57,104 | 0.69 | 0.80 |
| 448 | Clothing and Clothing Accessories Stores | 0.9% | \$16,335 | 0.66 | 0.79 |
| 511 | Publishing Industries (except Internet) | 0.4% | \$61,804 | 1.21 | 0.74 |
| 336 | Transportation Equipment Manufacturing | 0.2% | \$60,071 | 0.86 | 0.59 |
| 312 | Beverage and Tobacco Product Manufacturing | 0.6% | \$39,937 | 0.72 | 0.55 |
| 443 | Electronics and Appliance Stores | 0.4% | \$32,406 | 0.79 | 0.48 |
| 446 | Health and Personal Care Stores | 0.3% | \$32,794 | 0.78 | 0.46 |
| 323 | Printing and Related Support Activities | -1.1% | \$45,212 | 3.06 | 0.35 |
| 481 | Air Transportation | 0.1% | \$44,216 | 0.24 | 0.13 |
| 335 | Electrical Equipment, Appliance, and Component Manufacturing | -1.5% | \$65,353 | 2.95 | 0.09 |
| 315 | Apparel Manufacturing | -0.4% | \$29,977 | 0.28 | -0.16 |
| 447 | Gasoline Stations | -1.0% | \$16,862 | 1.33 | -0.20 |
| 339 | Miscellaneous Manufacturing | -1.0% | \$46,127 | 1.16 | -0.22 |
| 512 | Motion Picture and Sound Recording Industries | -0.7% | \$17,945 | 0.44 | -0.30 |
| 492 | Couriers and Messengers | -1.1% | \$37,869 | 0.77 | -0.43 |
| 314 | Textile Product Mills | -1.4% | \$29,487 | 0.67 | -0.65 |
| 316 | Leather and Allied Product Manufacturing | -2.7% | \$37,940 | 1.95 | -1.12 |

The ranking shown in the table yields results that are similar to, but not completely consistent with, the results of the other methodologies. Our 10 sectors include eight of the top 11 with the two other sectors—Social Assistance (624) and Amusement, Gambling, and Recreation Industries (713)—ranking 32 and 36 respectively out of 54 sectors. While this methodology yields slightly different results, they are generally supportive of the 10-sector choice based on results from the two primary methods.³⁴ The range of this index ranking is -1.12 to 2.62 (47 positive and seven negative) with an average of 1.07 and 1.02. The average of our 10 selected sectors remains well above the mean and median at 2.03.

³⁴ The DWD develops its industry employment projections based on a compilation of statistical methodologies and expert input. DWD then uses the average of these results as its projection. While we place confidence in DWD's labor projection methodology, these are best-guess estimates for a range of potential economic outcomes (for a more detailed description of DWD's labor projection methodology, see Appendix C). Given that slight changes in these projection numbers could have significant impacts on the overall rankings output in this fourth alternative methodology, we do not feel placing significant weight on these outcomes is appropriate. Two of our 10 selected sectors do fall below average in this ranking methodology, but these sectors place near the top in all other ranking methodologies. Furthermore, the range of index scores in this method is significantly smaller than all other index ranges, which suggests small changes in the projection numbers would cause sectors to make large jumps up and down the rankings. For both of these reasons, we feel this fourth and final robustness test generally still supports our 10 selected sectors and three clusters as having high potential growth.

Appendix B: Description of Employment Data and Sources

This report contains data from the BLS Quarterly Census of Employment and Wages. This census gathers employment information on a quarterly basis from 97% of employers in the United States, Puerto Rico, and the U.S. Virgin Islands. Every employment establishment reports the number of positions it has filled for each quarter. BLS defines an establishment as a single economic unit, such as a farm, a mine, a factory, or a store, that produces goods or services. A company or firm can have multiple establishments within and across many different states.³⁵

Establishments are counted by state, which means that for statewide totals, only establishments located within the state are counted toward employment, even if the firm is headquartered in another state. For temporary positions, defined as lasting less than 12 months or that are worked at physically dispersed locations on a routine basis, employment is counted in the state where the main branch office is located that is directly responsible for supervision.³⁶

This analysis uses the Quarterly Census of Employment and Wages employment and wage data from 1997 through 2012. Data are separated by NAICS three-digit sub-sector identification codes. There are 98 sub-sectors in total. Data from 1997 are classified under the NAICS 2002 coding system, and data from 2012 are classified under the 2012 system. The differences between the two systems are relatively small.³⁷ Data are also separated by federal, state, local, or private ownership.

Employment is defined as the average number of positions filled in the sub-sector over the four quarters of the year. Average wages include the average salary, bonuses, stock options, severance pay, profit distributions, cash value of meals and lodging, and tips and other gratuities for an employee working in each subsector. Wages are adjusted for inflation to 2012 dollars using BLS's All Urban Consumer Price Index for a Midwest urban city. The index used for 1997 is 139.8%.

³⁵ Bureau of Labor Statistics, "Quarterly Census of Employment and Wages: Frequently Asked Questions (FAQs)," January 12, 2015, <http://www.bls.gov/cew/cewfaq.htm#Q14>.

³⁶ Bureau of Labor Statistics, "Quarterly Census of Employment and Wages: The Multiple Worksite Report FAQs," January 12, 2015, <http://www.bls.gov/cew/cewmwr01.htm>.

³⁷ U.S. Census Bureau, "North American Industry Classification System: Concordances," January 12, 2015, <https://www.census.gov/eos/www/naics/concordances/concordances.html>

Appendix C: Methodology of DWD's Industry Labor Projections

The DWD completes Wisconsin industry employment projections through a four-step process.

The first step involves collecting and examining historical employment levels collected by the BLS's Quarterly Census of Employment and Wages.³⁸

The second step is creating a set of preliminary short-term (two years) and long-term (10 years) projections using a variety of statistical methods. The long-term projections are based upon ordinary least squares regression and a shift-share model. DWD forms the short-term projections based upon several complementary methods—trend line, ordinary least squares, autoregressive moving-average, vector autoregressive, and Bayesian vector autoregressive models.

Third, DWD disburses the historical data and preliminary projections to business and government analysts and academics for review. They adjust the projections based upon their economic, social, and technological expertise. The analysts' projections are then averaged and used as the final industrial employment projections.

Finally, DWD calculates employment projections at the level of the three- and four-digit of NAICS codes based on the BLS's projected ratios. These projections assume Wisconsin will grow at the same rate as the nation. The BLS completes its industry employment projections by projecting industry demand and then imputing the number of hours of work needed to meet that demand.³⁹

³⁸ Wisconsin's Worknet, "Program Descriptions," May 2013, http://worknet.wisconsin.gov/worknet/progdesc_long.aspx?menuselection=da#PROJ.

³⁹ Bureau of Labor Statistics, "Employment Projections: Projections Methodology," January 2, 2015, http://www.bls.gov/emp/ep_projections_methods.htm#Industry_employment.

Appendix D. Detailed Sector Descriptions

Appendix D summarizes the 10 sectors that should have strong employment growth into 2020. Data for these 10 sectors are in Tables 1, 2, and 4, and Table F1.

Insurance Carriers and Related Activities (524)

2012 Jobs: 63,538
2012 Average Wages: \$80,187
2012 Education (Percentage with Some College and Degrees): 70.0%
2012 Location Quotient: 1.50
1997–2012 Job Increase: 14,510
1997–2012 Average Annual Percent Job Increase: 1.7%
1997–2012 Real Wage Increase: \$14,778
2010–2020 *Projected* Average Annual Percent Job Increase: 1.6%

BLS Sector Description: Industries in this sector are primarily engaged in one of the following activities: (1) underwriting (assuming the risk, assigning premiums, and so forth) annuities and insurance policies or (2) facilitating such underwriting by selling insurance policies, and by providing other insurance and employee-benefit related services.

Insurance has been a premier business in Wisconsin since the first half of the 20th century. As indicated by location quotient (1.5), Wisconsin is home to, on average, 50% more insurance-related businesses than the rest of the country. The industry has also had large employment growth in the past and has a projected growth through 2020 of 1.6% per year. Insurance Carriers and Related Activities is a high-wage sector with an average wage in 2012 of \$80,187 or 175% of the state average wage of \$45,912. High wage jobs, as indicated in Table F7, include management positions, sales executives, computer occupations, and financial specialists. The sector also has the highest level of education of our 10 sectors with 70% of employees having some college, an associate degree, or a four-year college or post-graduate degree. The primary subsectors in Table 3 are Insurance Carriers, and Agencies and Brokerages, and Other Insurance Related Activities. Office and administrative support (42%) and business and financial operations (24%) are the most prevalent occupations in the sector.

Professional, Scientific, and Technical Services (541)

2012 Jobs: 98,652

2012 Average Wages: \$61,359

2012 Location Quotient: 0.60

2012 Education (Percentage with Some College and Degrees): 63.1%

1997–2012 Job Increase: 13,805

1997–2012 Average Annual Percent Job Increase: 1.0%

1997–2012 Real Wage Increase: \$3,021

2010–2020 *Projected* Average Annual Percent Job Increase: 2.3%

BLS Sector Description: This sector comprises establishments that specialize in performing professional, scientific, and technical activity for others. Requiring a high degree of expertise and training, these activities include: legal advice and representation; accounting, bookkeeping, and payroll services; architectural, engineering, and specialized design services; computer sciences; consulting services; research services; advertising services; photographic services; translation, and interpretation services; veterinary services; and other professional, scientific, and technical services.

This relatively high wage and education sector comprised almost 100,000 jobs in 2012 and is slated to grow at annual rate of 1% per year through 2020. High wage jobs, as indicated in Table F7, include management positions, engineers, mathematical science and computer occupations, architects, drafters, and engineering technicians. At the present, Wisconsin is not as competitive as other states in these activities as indicated by a location quotient of 0.60. However, given the appropriate education infrastructure, the state can become more competitive, and retain and grow these jobs.

Management of Companies and Enterprises (551)

2012 Jobs: 52,752
2012 Average Wages: \$86,642
2012 Location Quotient: 1.29
2012 Education (Percentage with Some College and Degrees): 58.5%
1997–2012 Job Increase: 23,328
1997–2012 Average Annual Percent Job Increase: 4.0%
1997–2012 Real Wage Increase: \$16,538
2010–2020 *Projected* Average Annual Percent Job Increase: 1.3%

BLS Sector Description: This sector comprises (1) establishments that hold securities of (or other equity interests in) companies and enterprises for the purpose of owning a controlling interest or influencing management decisions or (2) establishments (except government establishments) that administer, oversee, and manage establishments of the company or enterprise and that normally undertake the strategic or organizational planning and decision-making role of the company or enterprise.

Management of companies and enterprises was the fastest growing sector in Wisconsin from 1997–2012, at a 4% annual rate, from 29,424 jobs in 1997 to 52,752 jobs in 2012. In addition, the sector has the highest average wages of our 10 top sectors (\$86,642). High wage jobs, as indicated in Table F3, include management positions, sales executives, computer occupations, business operations, and financial specialists. Although the education level of 58.5% with some college or more is high, it is not as high as several other sectors, indicating that jobs in this area may not require college or advance degrees as much as other technical or health-related sectors. Prevalent occupations in this sector include office managers and administrators, sales managers, as well as those working in banks, for venture capitalists, and at other financial companies. The fact that the location quotient is 1.29 means that Wisconsin has some competitive advantage in this very important sector.

Administrative and Support Services (561)

2012 Jobs: 134,291

2012 Average Wages: \$29,025

2012 Location Quotient: 0.86

2012 Education (Percentage with Some College and Degrees): 39.1%

1997–2012 Job Increase: 23,763

1997–2012 Average Annual Percent Job Increase: 1.3%

1997–2012 Real Wage Increase: \$1,797

2010–2020 *Projected* Average Annual Percent Job Increase: 2.4%

BLS Sector Description: Industries in this sector are engaged in activities that support the day-to-day operations of other organizations. The processes employed (e.g., general management personnel administration, clerical activities, cleaning) are often integral parts of activities of establishments found in all sectors of the economy. The establishments classified in this subsector have specialized in one or more of these activities and can, therefore, provide services to clients in a variety of industries and, in some cases, households. Many of the activities performed in this subsector are ongoing routine support functions that all businesses and organizations must do and have traditionally done for themselves. Recent trends, however, are to contract or purchase such services from businesses that specialize in such activities and can, therefore, provide such services more efficiently.

Contracted administrative support services employ many people in Wisconsin at relatively low wages. Those wages have increased by 6.6% from 1997 to 2012. The jobs do not usually require a high degree of training or education (39.1% some college or more), but do provide entry-level jobs. Management and supervisory positions in this sector are above the state average in wages. The sector is projected to grow at a very high rate of 2.4% per year, increasing by an estimated 32,810 jobs from 2010 to 2020. Other states are somewhat more competitive in this sector, undoubtedly due to the larger employment base in those states.

Ambulatory Health-Care Services (621)

2012 Jobs: 116,557

2012 Average Wages: \$51,910

2012 Location Quotient: 0.89

2012 Education (Percentage with Some College and Degrees): 62.8%

1997–2012 Job Increase: 30,430

1997–2012 Average Annual Percent Job Increase: 2.0%

1997–2012 Real Wage Increase: -\$2,812

2010–2020 *Projected* Average Annual Percent Job Increase: 2.1%

BLS Sector Description: Industries in this sector provide health-care services directly or indirectly to ambulatory patients and do not usually provide inpatient services. Health practitioners in this subsector provide outpatient services, with facilities and equipment usually being the most significant part of the production process.

Although job growth in this area is about 2% per year from 1997 to 2020, and the sector has above state average wages, it is the only sector in our list that lost wages (-\$2,812) from 1997 to 2012. The education level of employees in this sector are relatively high (62.8% have some college or more). The reason for the loss is unclear, but the sector is heavily supported by private or public medical insurance, and forced reduction in reimbursement rates may have carried over to wages. Higher paying jobs in addition to management and supervisory jobs include health diagnosing and treatment practitioners, and computer occupations.

Hospitals (622)

2012 Jobs: 123,749

2012 Average Wages: \$52,217

2012 Location Quotient: 1.00

2012 Education (Percentage with Some College and Degrees): 64.0%

1997–2012 Job Increase: 33,455

1997–2012 Average Annual Percent Job Increase: 2.1%

1997–2012 Real Wage Increase: \$8,716

2010–2020 *Projected* Average Annual Percent Job Increase: 2.0%

BLS Sector Description: Industries in the Hospitals NAICS subsector provide medical, diagnostic, and treatment services that include physician, nursing, and other health services to inpatients and the specialized accommodation services required by inpatients. Hospitals may also provide outpatient services as a secondary activity. Establishments in the Hospitals subsector provide inpatient health services, many of which can only be provided using the specialized facilities and equipment that form a significant and integral part of the production process.

Hospitals are a higher-than-average wage sector that has grown and will continue to grow at about 2% per year. Subsectors include primarily general medical and surgical hospitals (89%), but also psychiatric and specialty hospitals. Hospitals are one of the two sectors that have substantial employment in the public sector at 13%. Those public employees make approximately 25% more money than private hospital workers. Major occupations include health-care practitioners and technical occupations (53%), office and administrative support (14%), and health-care support (13%). In addition to managers and supervisors, health-care practitioners and technical occupations are among the higher wage jobs in this sector.

Nursing and Residential Care Facilities (623)

2012 Jobs: 84,674

2012 Average Wages: \$31,681

2012 Location Quotient: 1.22

2012 Education (Percentage with Some College and Degrees): 45.4%

1997–2012 Job Increase: 15,587

1997–2012 Average Annual Percent Job Increase: 1.4%

1997–2012 Real Wage Increase: \$5,866

2010–2020 *Projected* Average Annual Percent Job Increase: 2.3%

BLS Sector Description: Industries in the Nursing and Residential Care Facilities sector provide residential care combined with nursing, supervisory, or other types of care as residents require. In this subsector, the facilities are a significant part of the production process, and the care is a mix of health and social services with the health services being largely some level of nursing services.

Nursing and residential care facilities provide increasing employment in a relatively low-wage sector. That wage level reflects the relatively low level of education of many workers in this sector. Wages increased 22.7% from 1997 to 2012. The number of jobs is anticipated to increase 2.3% through 2020. The majority of services are provided in nursing care facilities (66% of employees), with the rest in community elder care or mental health facilities. Unlike other health-care sectors in our list, nursing homes are relatively competitive with other states with a location quotient of 1.22. Health-care support and personal care and service occupations outnumber (56%) the higher paying health-care practitioners and technical occupations (15%). The latter includes nurses.

Social Assistance (624)

2012 Jobs: 64,395

2012 Average Wages: \$28,061

2012 Location Quotient: 1.12

2012 Education (Percentage with Some College and Degrees): 46.5%

1997–2012 Job Increase: 26,187

1997–2012 Average Annual Percent Job Increase: 3.5%

1997–2012 Real Wage Increase: \$151

2010–2020 *Projected* Average Annual Percent Job Increase: 0.6%

BLS Sector Description: Industries in the Social Assistance NAICS subsector provide a wide variety of social assistance services directly to their clients. These services do not include residential or accommodation services, except on a short-stay basis.

The social assistance sector had remarkable growth in employment averaging 3.5% from 1997 to 2012. However, that growth is predicted to be considerably lower in the decade beginning in 2010. In addition, since 1997, there has been essentially no wage increase in an already relatively low-wage sector. That wage level reflects the modest level of education of many employees. Social scientists and related workers are an exception to the low wages paid in general in this sector.

Amusement, Gambling, and Recreation Industries (713)

2012 Jobs: 33,900
2012 Average Wages: \$28,386
2012 Location Quotient: 0.96
2012 Education (Percentage with Some College and Degrees): 35.0%
1997–2012 Job Increase: 6,721
1997–2012 Average Annual Percent Job Increase: 1.5%
1997–2012 Real Wage Increase: \$6,633
2010–2020 *Projected* Average Annual Percent Job Increase: .6%

BLS Sector Description: Industries in this sector operate facilities where patrons can primarily engage in sports, recreation, amusement, or gambling activities and/or provide other amusement and recreation services, such as supplying and servicing amusement devices in places of business operated by others; operating sports teams, clubs, or leagues engaged in playing games for recreational purposes; and guiding tours without using transportation equipment. The industry groups in this subsector highlight particular types of activities: amusement parks and arcades, gambling industries, and other amusement and recreation industries.

This sector is part of Wisconsin's important tourism industry. It has experienced above average growth in the last 15 years but slower growth is projected in the next decade. Real-wage increases have been respectable but the average annual wage still is considerably below the state average of \$45,931. That in part is reflected in the part-time nature of a number of jobs and probably of higher than average employment of young workers on amusement parks and arcades. It also is affected by the lower levels of education in the industry (35% have some college or more). This sector also has by far the most public employees with 22.1% of employees as local government workers. Those workers averaged \$26,012 in annual wages compared to \$14,601 for the 77.2% of the workforce in the private sector. Other than managers and supervisors, there are few distinctive high paying jobs in this sector.

Food Services and Drinking Places (722)

2012 Jobs: 190,177

2012 Average Wages: \$15,156

2012 Location Quotient: 0.93

2012 Education (Percentage with Some College and Degrees): 23.7%

1997–2012 Job Increase: 26,856

1997–2012 Average Annual Percent Job Increase: 1.0%

1997–2012 Real Wage Increase: \$1,779

2010–2020 *Projected* Average Annual Percent Job Increase: 2.0%

BLS Sector Description: Industries in the Food Services and Drinking Places subsector prepare meals, snacks, and beverages to customer order for immediate on- and off-premises consumption. There is a wide range of establishments in these industries. Some provide food and drink only; while others provide various combinations of seating space, waiter/waitress services and incidental amenities, such as limited entertainment.

The largest of our 10 top, this sector is expected to grow about 10% from 2010 to 2020. It is also the lowest paying sector, but that may well be partly due to the under-reporting of tip income and the part-time nature of much of the work in full- and limited-service restaurants that make up, respectively, 47% and 37% of the sector employment. The sector also has by far the lowest level of education with 23.1% of workers having some college or more. However, that share reflects the number of young workers, perhaps with entry-level job experiences, who have not ended their education. In Table F1 that trend is indicated by the 48.8% “educational attainment not available” category for 2012. Other than managers and supervisors, there are few distinctive high paying jobs in this sector. However, this sector is an important part of the tourism industry, which remains important in the state.

Appendix E: Methodology of DWD’s Occupation Employment Projections

This report uses DWD’s long-term occupational employment projections. DWD’s occupational employment projections are based on BLS’s national occupation employment projections, the Occupational Employment Statistics survey, and Wisconsin’s actual industry employment at the four-digit NAICS code level. The projections process involves three main steps⁴⁰:

First, DWD uses the Occupational Employment Statistics survey to estimate current (base year) Wisconsin employment by occupation.

Second, DWD receives a job “replacement rate” from BLS, which estimates the expected rate at which jobs will become available due to workers permanently leaving their positions over the projection period.⁴¹ BLS also provides a set of “change factors” that attempts to estimate how the number of job openings in each occupation will expand or contract over the projection period.⁴²

Finally, DWD creates a matrix comprised of base-year industry (NAICS code) employment on one axis and Standard Occupational Classification employment estimates on the other axis, also known as the industry-occupation matrix. DWD then factors in its long-term industry employment projections,⁴³ BLS “replacement rates,” and BLS “change factors” to create a set of long-term occupation projections.

⁴⁰ Wisconsin’s Worknet, “Program Descriptions,” May 2013,

http://worknet.wisconsin.gov/worknet/progdesc_long.aspx?menuselection=da#PROJ

⁴¹ Bureau of Labor Statistics, “Employment Projections: Estimating Occupational Replacement Needs,” January 2, 2015, http://www.bls.gov/emp/ep_replacements.htm

⁴² Bureau of Labor Statistics, “Employment Projections: Projections Methodology,” January 2, 2015, http://www.bls.gov/emp/ep_projections_methods.htm#occfactors

⁴³ DWD’s industry employment projections methodology is described in Appendix C.

Appendix F: Tables

Table F1: Education Breakdown of Selected High-Growth Industries

| Industry | Description | Percentage of 1997 Employment | 1997 Salary in 2012 Dollars | Percentage of 2012 Employment | 2012 Salary | Average Annual Growth Rate | 1997-2012 Salary Change |
|------------|--|-------------------------------|-----------------------------|-------------------------------|-------------|----------------------------|-------------------------|
| 524 | Insurance Carriers and Related Activities | | | | | | |
| E1 | Less than high school | 2.3% | \$31,493 | 4.0% | \$43,392 | 5.1% | \$11,899 |
| E2 | High school or equivalent, no college | 21.1% | \$35,922 | 21.7% | \$47,448 | 1.6% | \$11,526 |
| E3 | Some college or Associate degree | 29.2% | \$42,754 | 31.8% | \$55,539 | 2.1% | \$12,785 |
| E4 | Bachelor's degree or advanced degree | 38.3% | \$65,858 | 38.2% | \$86,193 | 1.4% | \$20,335 |
| E5 | Educational attainment not available (workers 24 or younger) | 9.0% | \$23,285 | 4.3% | \$28,524 | -3.5% | \$5,239 |
| 541 | Professional, Scientific, and Technical Services | | | | | | |
| E1 | Less than high school | 3.3% | \$31,057 | 5.7% | \$44,007 | 4.7% | \$12,950 |
| E2 | High school or equivalent, no college | 18.2% | \$36,945 | 20.9% | \$47,424 | 1.9% | \$10,479 |
| E3 | Some college or Associate degree | 25.5% | \$47,371 | 28.0% | \$56,367 | 1.6% | \$8,996 |
| E4 | Bachelor's degree or advanced degree | 39.0% | \$76,981 | 35.1% | \$87,885 | 0.2% | \$10,904 |
| E5 | Educational attainment not available (workers 24 or younger) | 13.9% | \$23,654 | 10.4% | \$25,197 | -1.0% | \$1,543 |
| 551 | Management of Companies and Enterprises | | | | | | |
| E1 | Less than high school | 5.6% | \$38,518 | 6.2% | \$49,902 | 4.3% | \$11,384 |
| E2 | High school or equivalent, no college | 25.5% | \$44,775 | 24.3% | \$57,741 | 3.3% | \$12,966 |
| E3 | Some college or Associate degree | 26.6% | \$54,337 | 30.5% | \$69,945 | 4.6% | \$15,608 |
| E4 | Bachelor's degree or advanced degree | 27.1% | \$91,798 | 28.0% | \$119,430 | 3.9% | \$27,632 |
| E5 | Educational attainment not available (workers 24 or younger) | 15.2% | \$19,292 | 10.9% | \$25,149 | 1.4% | \$5,857 |
| 561 | Administrative and Support Services | | | | | | |
| E1 | Less than high school | 11.4% | \$18,366 | 12.4% | \$21,624 | 0.8% | \$3,258 |
| E2 | High school or equivalent, no college | 24.9% | \$23,239 | 26.0% | \$25,719 | 0.5% | \$2,480 |
| E3 | Some college or Associate degree | 22.2% | \$27,731 | 25.0% | \$29,958 | 1.0% | \$2,227 |
| E4 | Bachelor's degree or advanced degree | 11.2% | \$44,284 | 14.1% | \$44,805 | 1.7% | \$521 |
| E5 | Educational attainment not available (workers 24 or younger) | 30.2% | \$15,195 | 22.5% | \$16,209 | -1.8% | \$1,014 |
| 621 | Ambulatory Health Care Services | | | | | | |
| E1 | Less than high school | 4.0% | \$24,908 | 5.8% | \$35,496 | 4.3% | \$10,588 |
| E2 | High school or equivalent, no college | 21.9% | \$30,121 | 23.1% | \$37,449 | 2.1% | \$7,328 |
| E3 | Some college or Associate degree | 35.3% | \$39,537 | 35.0% | \$48,003 | 1.7% | \$8,466 |
| E4 | Bachelor's degree or advanced degree | 28.4% | \$101,063 | 27.8% | \$116,226 | 1.6% | \$15,163 |
| E5 | Educational attainment not available (workers 24 or younger) | 10.4% | \$17,732 | 8.2% | \$17,484 | 0.2% | -\$248 |
| 622 | Hospitals | | | | | | |
| E1 | Less than high school | 3.7% | \$26,884 | 5.2% | \$36,759 | 4.1% | \$9,875 |
| E2 | High school or equivalent, no college | 21.2% | \$30,985 | 23.0% | \$39,114 | 2.2% | \$8,129 |
| E3 | Some college or Associate degree | 37.1% | \$37,251 | 36.9% | \$46,635 | 1.6% | \$9,384 |
| E4 | Bachelor's degree or advanced degree | 29.4% | \$53,788 | 27.1% | \$68,400 | 1.1% | \$14,612 |
| E5 | Educational attainment not available (workers 24 or younger) | 8.6% | \$20,706 | 7.7% | \$24,360 | 0.9% | \$3,654 |
| 623 | Nursing and Residential Care Facilities | | | | | | |
| E1 | Less than high school | 7.0% | \$20,513 | 7.9% | \$22,680 | 1.8% | \$2,167 |
| E2 | High school or equivalent, no college | 25.7% | \$23,440 | 25.5% | \$25,011 | 1.0% | \$1,571 |
| E3 | Some college or Associate degree | 30.9% | \$27,676 | 30.1% | \$29,031 | 0.9% | \$1,355 |
| E4 | Bachelor's degree or advanced degree | 16.3% | \$37,251 | 15.3% | \$37,545 | 0.6% | \$294 |
| E5 | Educational attainment not available (workers 24 or younger) | 20.0% | \$14,637 | 21.2% | \$14,433 | 1.4% | -\$204 |
| 624 | Social Assistance | | | | | | |
| E1 | Less than high school | 7.8% | \$16,776 | 10.2% | \$18,066 | 5.1% | \$1,290 |
| E2 | High school or equivalent, no college | 24.4% | \$19,582 | 26.0% | \$20,286 | 3.7% | \$704 |
| E3 | Some college or Associate degree | 28.2% | \$23,134 | 29.7% | \$23,412 | 3.7% | \$278 |
| E4 | Bachelor's degree or advanced degree | 17.4% | \$30,826 | 16.8% | \$29,712 | 3.0% | -\$1,114 |
| E5 | Educational attainment not available (workers 24 or younger) | 22.1% | \$13,022 | 17.3% | \$12,402 | 1.6% | -\$620 |
| 713 | Amusement, Gambling, and Recreation Industries | | | | | | |
| E1 | Less than high school | 6.8% | \$19,846 | 7.4% | \$21,186 | 1.6% | \$1,340 |
| E2 | High school or equivalent, no college | 22.1% | \$21,951 | 21.9% | \$22,245 | 1.0% | \$294 |
| E3 | Some college or Associate degree | 19.8% | \$24,728 | 21.8% | \$23,817 | 1.7% | -\$911 |
| E4 | Bachelor's degree or advanced degree | 11.2% | \$29,924 | 13.2% | \$25,311 | 2.2% | -\$4,613 |
| E5 | Educational attainment not available (workers 24 or younger) | 40.1% | \$10,036 | 35.8% | \$9,204 | 0.3% | -\$832 |
| 722 | Food Services and Drinking Places | | | | | | |
| E1 | Less than high school | 7.1% | \$14,553 | 8.4% | \$15,759 | 1.6% | \$1,206 |
| E2 | High school or equivalent, no college | 18.8% | \$15,920 | 19.1% | \$16,287 | 0.6% | \$367 |
| E3 | Some college or Associate degree | 14.1% | \$17,309 | 16.1% | \$17,055 | 1.4% | -\$254 |
| E4 | Bachelor's degree or advanced degree | 5.9% | \$19,963 | 7.6% | \$18,192 | 2.2% | -\$1,771 |
| E5 | Educational attainment not available (workers 24 or younger) | 54.1% | \$8,065 | 48.8% | \$8,760 | -0.2% | \$695 |

Table F2: Projected Occupation Employment Change 2010–2020 by High-Growth Cluster

Note: SOC is Standard Occupational Classification.

| Management and Professional Support Services to Business Cluster | | | |
|--|--|----------------------------|---------------------------|
| SOC | Occupation Class | 2010-2020 Projected Growth | Percent of Cluster Growth |
| 43 | Office and Administrative Support Occupations | 13,530 | 22.2% |
| 13 | Business and Financial Operations Occupations | 8,700 | 14.3% |
| 15 | Computer and Mathematical Occupations | 7,400 | 12.2% |
| 51 | Production Occupations | 5,130 | 8.4% |
| 41 | Sales and Related Occupations | 4,270 | 7.0% |
| 37 | Building and Grounds Cleaning and Maintenance Occupations | 3,580 | 5.9% |
| 17 | Architecture and Engineering Occupations | 3,440 | 5.7% |
| 11 | Management Occupations | 3,430 | 5.6% |
| 53 | Transportation and Material Moving Occupations | 2,510 | 4.1% |
| 33 | Protective Service Occupations | 1,910 | 3.1% |
| 29 | Healthcare Practitioners and Technical Occupations | 1,810 | 3.0% |
| 27 | Arts, Design, Entertainment, Sports, and Media Occupations | 1,240 | 2.0% |
| 19 | Life, Physical, and Social Science Occupations | 850 | 1.4% |
| 49 | Installation, Maintenance, and Repair Occupations | 710 | 1.2% |
| 23 | Legal Occupations | 670 | 1.1% |
| 31 | Healthcare Support Occupations | 510 | 0.8% |
| 39 | Personal Care and Service Occupations | 470 | 0.8% |
| 47 | Construction and Extraction Occupations | 390 | 0.6% |
| 25 | Education, Training, and Library Occupations | 130 | 0.2% |
| 21 | Community and Social Service Occupations | 90 | 0.1% |
| 35 | Food Preparation and Serving Related Occupations | 80 | 0.1% |
| Total Projected Cluster Growth 2010-2020: | | 60,850 | 100% |

| Health-Care and Social Services Cluster | | | |
|--|--|----------------------------|---------------------------|
| SOC | Occupation Class | 2010-2020 Projected Growth | Percent of Cluster Growth |
| 29 | Healthcare Practitioners and Technical Occupations | 25,280 | 39.3% |
| 31 | Healthcare Support Occupations | 11,700 | 18.2% |
| 39 | Personal Care and Service Occupations | 10,230 | 15.9% |
| 43 | Office and Administrative Support Occupations | 8,320 | 12.9% |
| 21 | Community and Social Service Occupations | 2,040 | 3.2% |
| 35 | Food Preparation and Serving Related Occupations | 2,030 | 3.2% |
| 11 | Management Occupations | 1,300 | 2.0% |
| 37 | Building and Grounds Cleaning and Maintenance Occupations | 1,150 | 1.8% |
| 15 | Computer and Mathematical Occupations | 730 | 1.1% |
| 13 | Business and Financial Operations Occupations | 690 | 1.1% |
| 19 | Life, Physical, and Social Science Occupations | 260 | 0.4% |
| 49 | Installation, Maintenance, and Repair Occupations | 240 | 0.4% |
| 27 | Arts, Design, Entertainment, Sports, and Media Occupations | 140 | 0.2% |
| 51 | Production Occupations | 110 | 0.2% |
| 33 | Protective Service Occupations | 80 | 0.1% |
| 53 | Transportation and Material Moving Occupations | 60 | 0.1% |
| 41 | Sales and Related Occupations | 50 | 0.1% |
| 25 | Education, Training, and Library Occupations | (20) | 0.0% |
| Total Projected Cluster Growth 2010-2020: | | 64,390 | 100% |

| Leisure and Recreation Services Cluster | | | |
|--|--|----------------------------|---------------------------|
| (1) | (2) | (3) | (4) |
| SOC | Occupation Class | 2010-2020 Projected Growth | Percent of Cluster Growth |
| 35 | Food Preparation and Serving Related Occupations | 40,360 | 93.8% |
| 39 | Personal Care and Service Occupations | 720 | 1.7% |
| 37 | Building and Grounds Cleaning and Maintenance Occupations | 570 | 1.3% |
| 53 | Transportation and Material Moving Occupations | 500 | 1.2% |
| 33 | Protective Service Occupations | 220 | 0.5% |
| 27 | Arts, Design, Entertainment, Sports, and Media Occupations | 190 | 0.4% |
| 43 | Office and Administrative Support Occupations | 180 | 0.4% |
| 49 | Installation, Maintenance, and Repair Occupations | 110 | 0.3% |
| 41 | Sales and Related Occupations | 60 | 0.1% |
| 13 | Business and Financial Operations Occupations | 50 | 0.1% |
| 51 | Production Occupations | 50 | 0.1% |
| 31 | Healthcare Support Occupations | 10 | 0.0% |
| Total Projected Cluster Growth 2010-2020: | | 43,020 | 100% |

Table F3: Projected Employment Change 2010-2020 by Occupation

SOC is Standard Occupational Classification. The occupations in bold are those with average annual wages above Wisconsin’s average of \$45,912.

| SOC | Occupation | Projected Employment Change in High-Growth Clusters | Projected Employment Growth in All Wisconsin Sectors | Percentage of Total Projected Growth in High-Growth Clusters | 2012 Average Annual Wage |
|-----|---|---|--|--|--------------------------|
| 111 | Top Executives | 680 | 1,180 | 57.63% | \$108,087 |
| 112 | Advertising, Marketing, Promotions, Public Relations, and Sales Managers | 520 | 2,780 | 18.71% | \$106,372 |
| 231 | Lawyers, Judges, and Related Workers | 280 | 1,400 | 20.00% | \$103,330 |
| 113 | Operations Specialties Managers | 1,950 | 8,130 | 23.99% | \$94,652 |
| 291 | Health Diagnosing and Treating Practitioners | 19,070 | 42,300 | 45.08% | \$91,078 |
| 119 | Other Management Occupations | 1,580 | 9,040 | 17.48% | \$81,941 |
| 532 | Air Transportation Workers | - | 270 | 0.00% | \$80,138 |
| 152 | Mathematical Science Occupations | 120 | 910 | 13.19% | \$79,219 |
| 172 | Engineers | 2,140 | 5,200 | 41.15% | \$72,986 |
| 192 | Physical Scientists | 340 | 1,300 | 26.15% | \$69,533 |
| 414 | Sales Representatives, Wholesale and Manufacturing | 310 | 7,440 | 4.17% | \$68,426 |
| 151 | Computer Occupations | 8,010 | 25,280 | 31.69% | \$67,828 |
| 193 | Social Scientists and Related Workers | 230 | 1,230 | 18.70% | \$66,641 |
| 132 | Financial Specialists | 2,750 | 15,420 | 17.83% | \$64,377 |
| 171 | Architects, Surveyors, and Cartographers | 530 | 1,330 | 39.85% | \$64,181 |
| 471 | Supervisors of Construction and Extraction Workers | 20 | 2,460 | 0.81% | \$63,640 |
| 491 | Supervisors of Installation, Maintenance, and Repair Workers | 80 | 1,380 | 5.80% | \$61,600 |
| 191 | Life Scientists | 250 | 2,200 | 11.36% | \$61,519 |
| 331 | Supervisors of Protective Service Workers | - | 70 | 0.00% | \$60,538 |
| 413 | Sales Representatives, Services | 3,290 | 11,130 | 29.56% | \$58,617 |
| 131 | Business Operations Specialists | 6,690 | 28,620 | 23.38% | \$57,356 |
| 299 | Other Healthcare Practitioners and Technical Occupations | 340 | 930 | 36.56% | \$56,094 |
| 511 | Supervisors of Production Workers | 80 | 1,800 | 4.44% | \$55,780 |
| 252 | Preschool, Primary, Secondary, and Special Education School Teachers | - | 10,330 | 0.00% | \$53,589 |
| 518 | Plant and System Operators | 10 | 650 | 1.54% | \$51,859 |
| 531 | Supervisors of Transportation and Material Moving Workers | 30 | 2,520 | 1.19% | \$50,771 |
| 173 | Drafters, Engineering Technicians, and Mapping Technicians | 770 | 1,800 | 42.78% | \$49,774 |
| 431 | Supervisors of Office and Administrative Support Workers | 1,130 | 4,980 | 22.69% | \$49,580 |
| 273 | Media and Communication Workers | 790 | 4,010 | 19.70% | \$48,857 |
| 212 | Religious Workers | 20 | 250 | 8.00% | \$48,551 |
| 472 | Construction Trades Workers | 220 | 31,870 | 0.69% | \$48,329 |
| 411 | Supervisors of Sales Workers | 100 | 2,500 | 4.00% | \$46,439 |
| 492 | Electrical and Electronic Equipment Mechanics, Installers, and Repairers | 200 | 1,760 | 11.36% | \$44,164 |
| 312 | Occupational Therapy and Physical Therapist Assistants and Aides | 730 | 1,710 | 42.69% | \$43,714 |
| 211 | Counselors, Social Workers, and Other Community and Social Service Specialists | 2,110 | 7,550 | 27.95% | \$43,665 |
| 499 | Other Installation, Maintenance, and Repair Occupations | 740 | 14,710 | 5.03% | \$43,308 |
| 292 | Health Technologists and Technicians | 7,680 | 19,700 | 38.98% | \$43,009 |
| 271 | Art and Design Workers | 530 | 2,430 | 21.81% | \$42,833 |
| 232 | Legal Support Workers | 390 | 1,270 | 30.71% | \$42,657 |
| 254 | Librarians, Curators, and Archivists | 10 | 230 | 4.35% | \$40,378 |
| 474 | Other Construction and Related Workers | 150 | 1,640 | 9.15% | \$40,328 |
| 371 | Supervisors of Building and Grounds Cleaning and Maintenance Workers | 270 | 830 | 32.53% | \$40,075 |
| 194 | Life, Physical, and Social Science Technicians | 290 | 860 | 33.72% | \$39,785 |
| 493 | Vehicle and Mobile Equipment Mechanics, Installers, and Repairers | 40 | 6,160 | 0.65% | \$39,120 |
| 274 | Media and Communication Equipment Workers | 50 | 790 | 6.33% | \$38,891 |
| 391 | Supervisors of Personal Care and Service Workers | 150 | 570 | 26.32% | \$37,793 |
| 514 | Metal Workers and Plastic Workers | 1,060 | 16,780 | 6.32% | \$37,440 |
| 515 | Printing Workers | 70 | (1,870) | -3.74% | \$37,112 |
| 272 | Entertainers and Performers, Sports and Related Workers | 200 | 3,860 | 5.18% | \$36,513 |
| 436 | Secretaries and Administrative Assistants | 4,740 | 10,090 | 46.98% | \$35,546 |
| 419 | Other Sales and Related Workers | 460 | 3,650 | 12.60% | \$35,102 |
| 533 | Motor Vehicle Operators | 860 | 26,810 | 3.21% | \$34,818 |
| 253 | Other Teachers and Instructors | 50 | 4,220 | 1.18% | \$34,594 |
| 332 | Fire Fighting and Prevention Workers | 110 | 430 | 25.58% | \$33,335 |
| 433 | Financial Clerks | 2,530 | 14,420 | 17.55% | \$32,542 |
| 519 | Other Production Occupations | 1,530 | 13,550 | 11.29% | \$32,434 |
| 435 | Material Recording, Scheduling, Dispatching, and Distributing Workers | 490 | (2,560) | -19.14% | \$32,359 |
| 319 | Other Healthcare Support Occupations | 3,220 | 7,850 | 41.02% | \$32,035 |
| 351 | Supervisors of Food Preparation and Serving Workers | 2,460 | 5,540 | 44.40% | \$31,498 |



COMPETITIVE WISCONSIN
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Deloitte.

**BE BOLD III: Health Care
Assessment**

Competitive Wisconsin, Inc.

August 2016



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Purpose – *Call to Action*

- The goal of Competitive Wisconsin, Inc. (CWI) to improve Wisconsin’s economic landscape has led to several initiatives
 - BE BOLD I and II were commissioned to revitalize Wisconsin’s economic development efforts and enhance competitiveness of the State’s talent pool
 - As a continuation of the previous studies, BE BOLD III looks at what drives or inhibits the ability of companies to grow and expand within high performing sectors in Wisconsin
 - Based on research performed by researchers at the University of Wisconsin System and the Wisconsin Economic Development Corporation, CWI and the BE BOLD Council identified the high performing sectors for BE BOLD III as food processing, business services, and healthcare
- CWI engaged Deloitte Consulting, LLP to complete the BE BOLD III Food Processing Assessment in 2015
- CWI has now retained Deloitte to conduct an assessment on how successful the intersection or “touch points” and potential for opportunities between government (state and local) and the private sector are in stimulating growth in the healthcare sector
 - Based on Deloitte’s understanding of CWI’s needs, BE BOLD III Healthcare Assessment will focus more specifically on:
 - Population Health: Identifying the options for achieving better community and employee health which impacts employer and employee retention efforts
 - Research, Development, and Investment: Understanding the potential to encourage healthcare technology and R&D efforts that impact where and how companies choose to incubate and grow

Executive Summary (1/4)

- The BE BOLD III Health Care Assessment included the following activities:
 - Conducting stakeholder engagement workshops to evaluate intersections between government and health care
 - Analyzing workshop findings to determine the current state of the initiatives, identify opportunities for improvement, and understand any future opportunities
 - Developing key recommendations based on findings to improve the intersections between government and health care
- To derive insights into the most impactful health care factors, Deloitte identified where healthcare providers commonly interface with government across seven key intersections, as it relates to Population Health and Research, Development, and Investment
- Wisconsin is ranked in the top tier for health care quality and access, and implementing many innovative and collaborative programs to ensure current and future health care needs are met. Based on research findings, Wisconsin is leading in many health care areas and stakeholders will need to foster engagement across all industries and sectors to continue to adequately address opportunities for improvement
- With the identification of Wisconsin's current programs, Deloitte identified other top tier, or leading practice programs that Wisconsin could leverage from other states to further stimulate the industry:
 - States include: California, Colorado, Indiana, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Minnesota, Nebraska, North Carolina, Ohio, Oregon, Rhode Island, Tennessee and Washington
 - Each state program or initiative is aligned to a prospective recommendation to address the identified gaps or areas of opportunity in Wisconsin within Population Health, Research and Development, and Investment
- Based on the assessment findings and analysis of Wisconsin's key intersections, Deloitte identified areas of opportunity related to Population Health (Prevention Control, Access to Care, and Talent Availability), Research and Development, and Investment, and leveraged those findings to develop:
 - 15 recommendations likely to influence Population Health
 - 4 recommendations related to Research and Development, and
 - 5 recommendations to help promote further Investment in the health care sector

Executive Summary (2/4)

- The following Population Health recommendations focus on ways to support programs that will foster greater community health which positively impacts the health care industry within Wisconsin:

Within Prevention Control

- **Incentivize collaboration between private and public organizations.** Massachusetts's Prevention and Wellness Trust Fund and Prevention Access to Care and Treatment program are examples that support full integration services in public health
- **Invest in recruitment, training, and funding for patient care coordinators.** Oregon has an example of a program that provides patients with more comprehensive health care needs to reduce health care costs and better manage their chronic conditions
- **Establish Guidelines for Children Nutrition and Physical Health.** California and North Carolina provide examples where establishing guidelines support an environment of preventative health

Within Access to Care

- **Expand workforce certifications to allow for greater scope of care.** Indiana and Iowa provide examples where expanding certifications allows for broader capabilities and helps address the shortage of health care resources
- **Enact legislation to expand high-speed internet coverage.** Iowa is an example of where legislation expanded internal access to deliver care via remote technologies
- **Establish Nurse-Family Partnership.** Massachusetts is an example of a program created to support new mothers in low income areas
- **Develop and enable health care opportunities for low-access communities.** Massachusetts and Minnesota provide examples of opportunities for communities with limited access to health care

Within Talent Availability

- **Re-evaluate policies to support team-based care model.** Minnesota is an example of providing additional resources to address a limited supply of health care resources
- **Fund financial incentives to attract and retain nurses and physicians for in-demand areas.** Massachusetts and Minnesota are examples of states that sponsor programs to ensure underserved areas receive necessary resources
- **Fund internships to retain medical students post-graduation.** Minnesota and Nebraska provide examples of how Wisconsin can make the state more attractive to business and address the forecasted shortage of health care professionals

Executive Summary (3/4)

- The following Population Health recommendations focus on ways to support programs that will foster greater community health which positively impacts the health care industry within Wisconsin:

Within Talent Availability

- **Increase residencies and provide support to attract and retain medical school students.** Minnesota has an example of a program that could address the forecasted shortage of health care professionals in Wisconsin
- **Fund clinical training for high priority health professions.** Minnesota is an example of how Wisconsin can address a shortage of health care educators
- **Promote the availability of health care and access to high quality of life.** Colorado and Washington provide examples of how Wisconsin could promote a healthier community to attract and retain workforce
- **Train and expand the use of Community Health Workers.** Massachusetts and Minnesota provide examples of where Wisconsin could provide additional health care resources to the local community
- **Collaborate in key sectors.** Washington DC provides an example of how to foster engagement in key sectors to address development initiatives

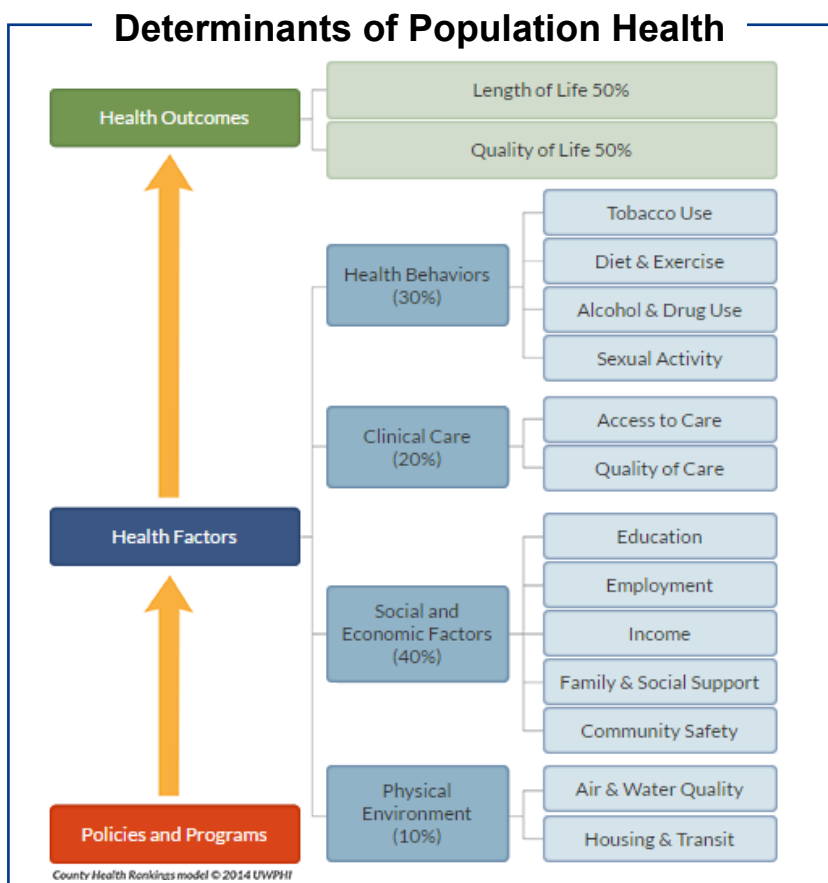
Executive Summary (4/4)

- The following Research and Development recommendations focus on additional areas where Wisconsin can support technology innovation and advancement within health care:
 - **Build an Learning and Innovation Ecosystem.** Minnesota and Ohio have examples of programs that could lead to technology advancements in health care
 - **Create entrepreneurship and incubation hub.** Rhode Island has an example of a program to encourage knowledge economy innovations which could create jobs and advance sustainable innovations
 - **Host an Innovation conference.** Kentucky is an example where Wisconsin could sponsor a conference to identify top technology trends to guide future health care strategies
 - **Survey entrepreneurs to understand and reduce barriers.** Colorado provides an example that Wisconsin could leverage to identify and mitigate potential barriers to success throughout the innovation process
- The following Investment recommendations focus on areas where Wisconsin can invest to address health care opportunities for improvement and align with future trends:
 - **Promote specific investment opportunities and tax incentives.** Maryland provides an example of how Wisconsin could provide awareness of investments which could result in a more attractive business environment to employers
 - **Enact policies to support crowdsourcing.** Kansas has an example of a program that encourages entrepreneurs within the local communities
 - **Adopt private sector investment strategy to maximize existing funds.** Maryland provides an example of how Wisconsin could sponsor additional funding opportunities for local business owners
 - **Survey private sector investors on needs.** Tennessee provides an example of how Wisconsin could better understand the local environment and plan future strategies for health care innovation
 - **Increase investments in technology infrastructure and tools.** Massachusetts Health Quality Partners is an example of a collaborative initiative to measure local healthcare data and physician performance

Assessment Background

The Importance of Population Health

Population Health focuses on how health factors, policies and programs impact health outcomes based on a pattern of determinants, which can translate into a healthier community



- Benefits of Population Health**
- Population Health looks at a variety of health factors that relate to health outcomes
 - Population Health represents a paradigm shift where the focus is on preventative care, healthier behaviors, and social and economic factors that impact overall health
 - A healthier community is more attractive to businesses as improved overall health translates to reduced health care costs for employees and employers
 - Improved Population Health can influence both individual and business decisions

The BE BOLD III Assessment focuses on identifying the drivers or inhibitors to expansion within health care, more specifically Population Health, in Wisconsin

The Importance of Research, Development and Investment

Research, Development and Investment focuses on ways to leverage technology trends to address health care challenges and expand

Health Care Technology Challenges

- Lack of high-speed broadband infrastructure and availability to support telemedicine and remote / online education courses
- Restrictive Regulations
 - Existing regulations limit telemedicine to approved areas
 - Medicare regulations do not allow providers to give tools to patients for at-home follow-up care, making it difficult for patients to comply with homecare instructions
- Lack of experience integrating smartphone real-time imaging apps
- High cost of technology required to comply with regulations is prohibitive for small/individual health care practices (e.g., e-medical records)
- Older population that requires more health care services tends to lag in technology adoption and requires more education in tool usage and monitoring

Healthcare Technology Trends

Telemedicine

- Increasing prevalence of telemedicine to deliver care to rural and underserved populations who otherwise have difficulty accessing care

EMRs

- Mandatory adoption of electronic medical records by the Affordable Care Act (ACA) is driving technology upgrades and implementations in legacy systems

Online tools and apps

- Increasing use/adoption of digital and online in health care research, scheduling, and payment

Personalized Medicine

- Personalized medicine and mass customization

VC Funding

- VC dollars are pouring into IT for health care, and less investment in med devices/pharma

Online Education

- Online education courses are growing in popularity with technical colleges

The BE BOLD III Assessment focuses on understanding how to address health care challenges and expand using technology research, development, and investments

Key Intersections for the Health Care Sector

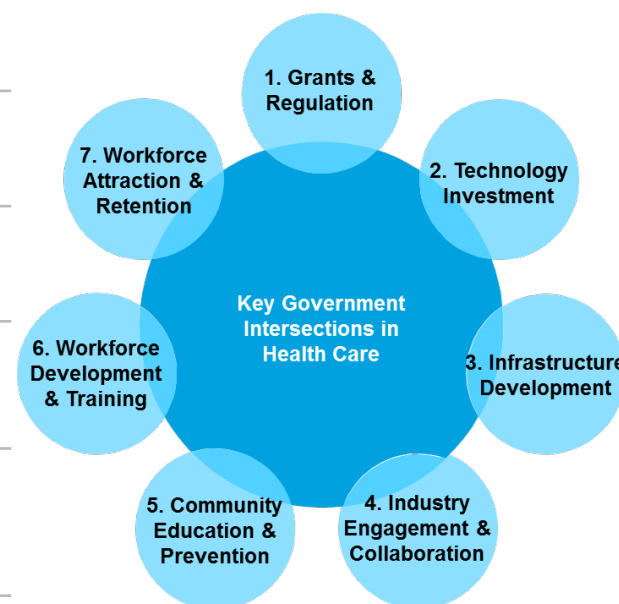
Seven key “touch points” or intersections will drive this assessment to understand the most impactful factors, in the common interfaces between government and health care, as it relates to Population Health, Research, Development and Investment



Breakdown of Key Intersections for the Health Care Sector

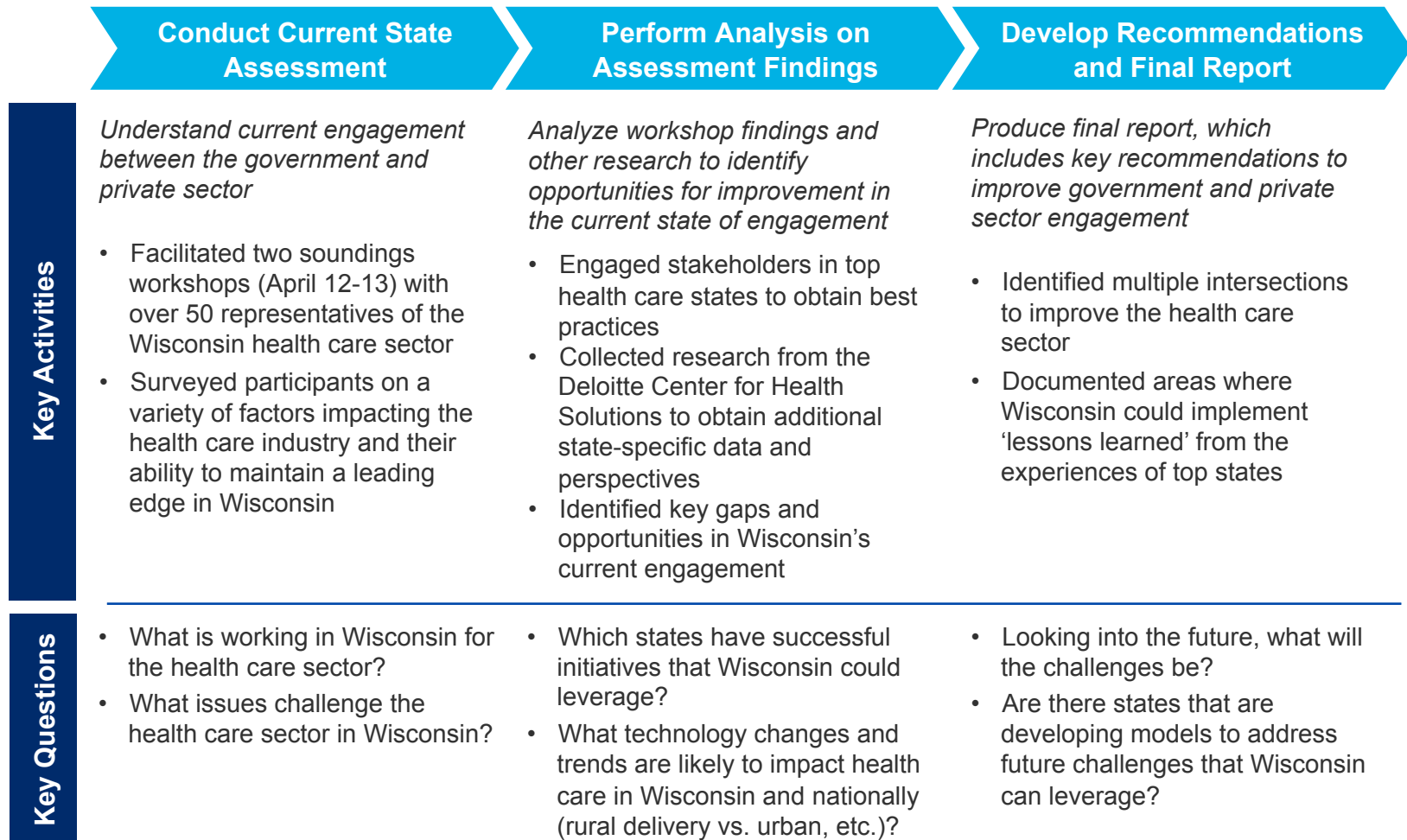
Each of the seven key intersections is a distinct driver in how government and health care integrate to stimulate or inhibit growth

| Key Intersection | Impact |
|-------------------------------------|---|
| Grants & Regulation | <ul style="list-style-type: none"> Government grants act as a catalyst for companies interested in expanding which in turn provides more services for the local community Government regulation can support or inhibit the ease of how companies operate in the local community |
| Technology Investment | <ul style="list-style-type: none"> Local government technology investments provides health care companies with better access to the local community through online tools (e.g., telemedicine in rural or underprivileged communities) |
| Infrastructure Development | <ul style="list-style-type: none"> Local government infrastructure development provides health care companies with better engagement with the local community (e.g., broadband infrastructure in rural areas) |
| Industry Engagement & Collaboration | <ul style="list-style-type: none"> Strong engagement and collaboration with local government allows health care companies to reach a larger base of community |
| Community Education & Prevention | <ul style="list-style-type: none"> Local government investment in community education and prevention supports population health to promote a healthier community which aligns with current health care trends for preventative care |
| Workforce Development & Training | <ul style="list-style-type: none"> Local government investment in workforce development and training provides the local community with better employment opportunities and creates a more attractive workforce for the business community |
| Workforce Attraction & Retention | <ul style="list-style-type: none"> Government investment creates more opportunities within the local community to attract and retain workforce which has a direct impact on the supply and demand of local resources |



Deloitte's Assessment Approach

Deloitte's approach provides an overview of the process to understand Wisconsin's key intersections and opportunities for improvements in health care



Current State Assessment

Key Takeaways from Current State Assessment

Sounding workshop feedback provided insight into Wisconsin's successful intersections between the government and health care and highlighted opportunities for improvement



Successful Intersections

1

Health System Quality & Access

- Second best overall health care quality measure score among all 50 states based on health care quality in type of care, setting of care, and care by clinical area¹
- High rankings in Access to Care and with Medicare patients
- One of the lowest uninsured rates in the country
- Consistently placed at or near the top of AHRQ's ranking since 2005¹

2

Innovative Practices

- Wisconsin has invested in the continued adoption of new technologies to expand telemedicine capabilities
- Public/private institutions are investing in innovative initiatives to increase the health care professional pipeline

3

Advanced Collaboration

- Public/private partnerships have been established to increase the pipeline of health care professionals in Wisconsin
- Wisconsin Legislature made investments in medical education to ensure there is an adequate supply of physicians and specialists in key shortage professions



Opportunities for Improvement

1

Prevention Control

- Existing health programs may need to shift focus to preventative care to address current and future population health issues
- Current partnerships with the local community, businesses and state may not adequately address population health

2

Access to Care

- Existing and future regulation may impede telemedicine advancements
- Changes or decreases in regulation may adversely impact quality and access to care
- Limited broadband capabilities in rural areas make it difficult to access care
- Limited number of physicians and nurses can impact access to care in rural communities

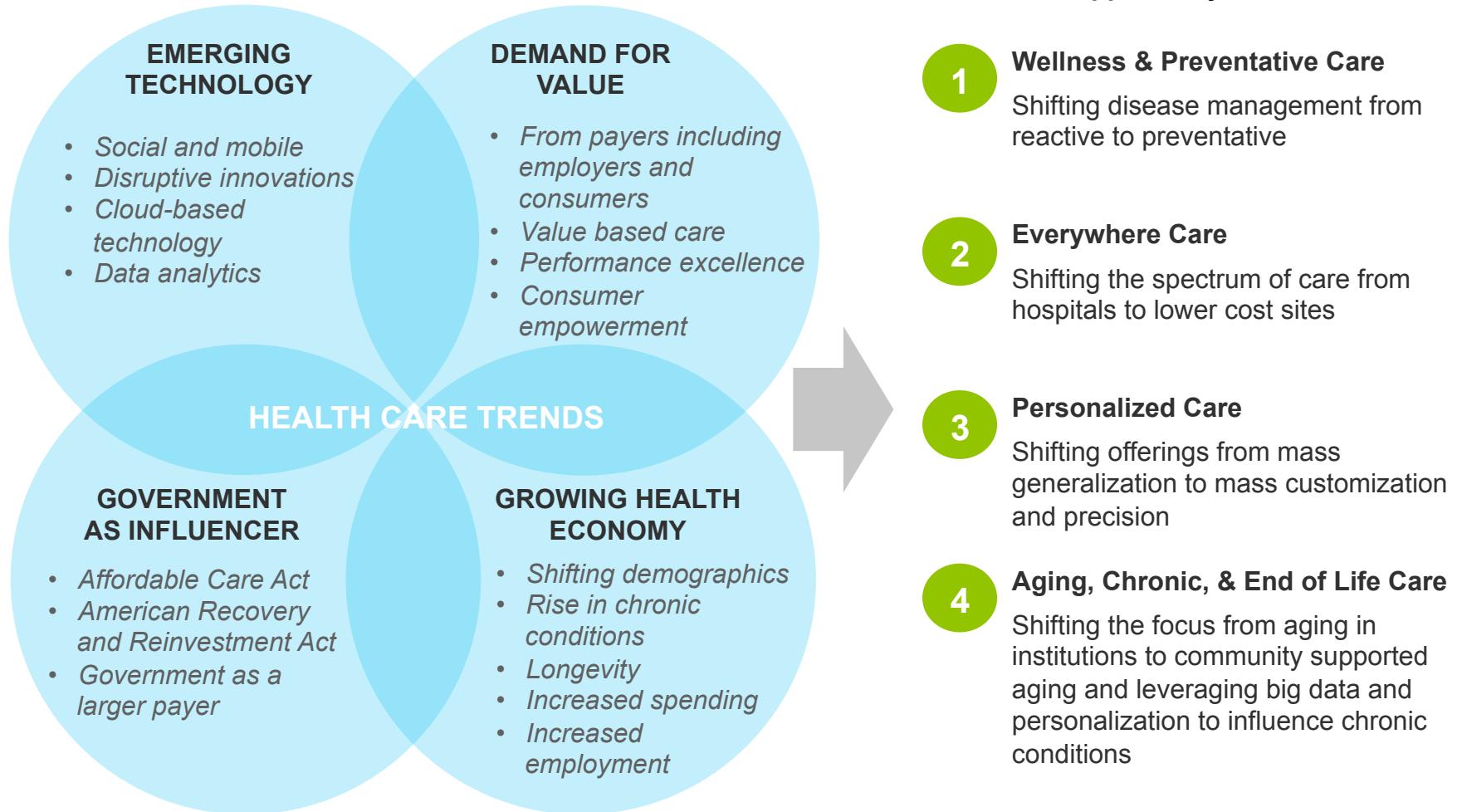
3

Talent Availability

- The current pipeline of labor is insufficient to meet anticipated population growth, which includes attraction and retention of physicians and nurses
- There is a shortage of educators to train nurses and physicians and sustainable support for graduate medical education

The Convergence of Trends in Health Care

Four of the identified, overarching trends challenge the traditional health care market and create new opportunities for innovation within Population Health



Opportunities for Improvement Align to Health Care Trends

The clear alignment of Wisconsin's opportunities for improvement and health care trends allow Wisconsin to improve current and develop new programs to address population needs



Opportunities for Improvement

1 Prevention Control

2 Access to Care

3 Talent Availability



Resulting Opportunities

1 Wellness & Preventative Care

Shifting disease management from reactive to preventative

Preventive care and slowing disease progression becomes a new frontier in the midst of government incentives and more powerful big data methods that drive precise identification of personal risk factors and self-directed services emerge as low cost tools for changing health behaviors

2 Everywhere Care

Shifting the spectrum of care from hospitals to lower cost sites

Cost pressures, consumer preferences, changing staffing models, and technology create a business case for care anytime, anywhere

3 Personalized Care

Shifting offerings from mass generalization to mass customization and precision

New scientific advances provide the most value when targeted to particular consumers. Widespread adoption of "personalized/precision care" will be made possible through offerings that integrate drugs and devices with low cost diagnostics, disease management programs, and clinical decision support

4 Aging, Chronic, & End of Life Care

Shifting the focus from aging in institutions to community supported aging and leveraging big data and personalization to influence chronic conditions

A wealthy, aging demographic is willing to pay for new services, while others struggle to pay for unexpected bills. Caregiver involvement increases as the "sandwich generation" looks for better solutions for their parents. This results in a need for new services and care models

Opportunity Area Examples

There are examples of successful health care companies in each of the opportunity areas

1 Wellness & Preventative Care



Mobile platform delivering info and analytics capabilities to maximize outcomes and improve efficiencies

2 Everywhere Care



Telehealth provider offering software and mobile to connect physicians with patients

3 Personalized Care



Platform allowing physicians and consumers to select genetic tests based on hereditary conditions

4 Aging, Chronic, & End of Life Care



Technology allowing elderly to age in place and avoid preventable hospital admissions



Health app collecting patient data in real-time to assess patient conditions



Clinics offering a range of efficient, outpatient services



Personalized analytics platform tracking vital signs and detecting changes based on the individual



Provider of sensors to analyze and report daily activities such as medication adherence



Pediatric asthma technology platform to improve medication adherence



Wellness company using tech to create online private networks between patients, doctors, and the wellness team



Startup producing functional human tissues using 3D printing




Online end-of-life planning platform educating users on how to prepare

Summary Findings – Population Health

Successful Intersections of Wisconsin's Health Care (1/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has several top tier rankings that align to the key intersections

| Finding | Details | Intersection |
|-----------------------|---|---|
| Health System Quality | <ul style="list-style-type: none"> • According to the Federal Agency for Healthcare Research and Quality (AHRQ), Wisconsin had the second best overall health care quality measure score, based on types of care, settings of care, and care by clinical area¹ • Based on a new Centers for Medicare & Medicaid Services (CMS) hospital rating system, Wisconsin had at least two hospitals that received the highest rankings (4 and 5 stars)² • Wisconsin is ranked the sixth best state based on health care access³ • Ranked in the top 10 for insurance coverage due to a low uninsured rate (5.6% in 2015 according to the Gallup Well-Being Poll) and strong health insurance industry performance • Wisconsin maintains low hospital readmission rates and serves as a national model for reducing infections by the CDC • Wisconsin Hospital Association (WHA) has been active in advancing policies that leverage and encourage integrated, coordinated care models <ul style="list-style-type: none"> – “HIPAA Harmonization” legislation removed barriers to the communication of mental health information between a patient’s behavioral health and physical health providers which was a catalyst for a WHA championed bill that will begin to test (on a pilot basis) new payment models for integrated and coordinated behavioral health care, and new payment models to promote access through psychiatric consultations with primary care |  |



Successful Intersections of Wisconsin's Health Care (2/13)


Workshop feedback revealed that Wisconsin's health care ecosystem is adopting innovative practices that align to the key intersections

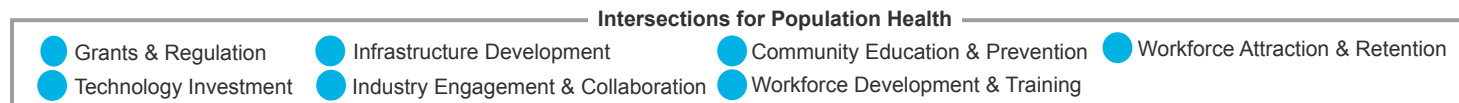
| Finding | Details | Intersection |
|----------------------|--|---|
| Innovative Practices | <ul style="list-style-type: none"> • Continued focus on quality and price of care, over fee for service model <ul style="list-style-type: none"> – Managed Medicaid system was in place prior to the ACA – Integrated, statewide delivery networks that utilize HMO focusing on quality and price • Continued adoption of new technologies to expand telemedicine capabilities <ul style="list-style-type: none"> – Operated by WHA Information Center, Wisconsin's Inpatient Mental Health 'Bed Tracker' is a real-time online tool that decreases the time from the Emergency Room to inpatient care for psychiatric patients <ul style="list-style-type: none"> ▪ The system was signed into law February 27, 2016 ▪ Statewide training has been completed • Madison has consistently appealed to and attracted millennials – model for other WI cities • The Physician Licensure Interstate Compact expands access to primary and specialty care through a voluntary expedited licensing option for physicians within compact states that would like to practice in other compact states • Bellin Health in Green Bay and Access Community Health Centers in Madison conduct integrated screenings for behavioral and physical health • Medical malpractice policies and patient compensation funds create favorable liability environment for physicians and patients |  |



Successful Intersections of Wisconsin's Health Care (3/13)


Workshop feedback revealed that Wisconsin's health care ecosystem is adopting innovative practices that align to the key intersections

| Finding | Details | Intersection |
|----------------------|---|---|
| Innovative Practices | <ul style="list-style-type: none"> • Wisconsin Association of Independent Colleges and Universities (WAICU) accounts for 24% of all Wisconsin's bachelors degrees and 37% of all Wisconsin's advanced degrees (masters, doctoral, or professional) • Wisconsin Primary Care and Psychiatry Shortage Grant Program awards twelve grants annually to primary care physicians and psychiatrists, graduating from a Wisconsin residency program, to incentivize the graduates to stay in Wisconsin • WAICU created impactful programs to increase the pipeline of health care professionals at the following institutions: <ul style="list-style-type: none"> – Alverno College opened clinical simulation labs to provide a wide range of experiences to nursing students – Bellin College completed expansion of the Health Sciences Resource Center which enhances the student training and clinical simulation experience – Carroll University recently received accreditation for its two-year, post-baccalaureate program for Occupational Therapy – Carthage College added a Bachelor of Science in Nursing program – Columbia College of Nursing trains nurses, at the graduate level, for complex care management roles which will ultimately prepare them for roles to improve healthcare delivery models, improve patient outcomes, reduce hospital readmissions and decrease healthcare expenditures – Milwaukee School of Engineering's School of Nursing began offering an Accelerated Second Degree Bachelor of Science in Nursing designed specifically for working professionals with a Bachelor of Science or Bachelor of Arts degree and looking to transition careers |  |



Successful Intersections of Wisconsin's Health Care (4/13)

Workshop feedback revealed that Wisconsin's health care ecosystem is adopting innovative practices that align to the key intersections


| Finding | Details | Intersection |
|----------------------|--|---|
| Innovative Practices | <ul style="list-style-type: none"> • WAICU created impactful programs to increase the pipeline of health care professionals at the following institutions (continued): <ul style="list-style-type: none"> – Concordia University Wisconsin offers an accelerated track for students working toward a Bachelor of Science in Rehabilitation Science (BSRS) and built a new pharmacy school in response to the statewide shortage of pharmacists – Edgewood College received accreditation for its five-year Doctor of Nursing Practice (DNP) program which will prepare individuals for advanced nursing leadership positions – Marian University launched an online Nursing and Radiology programs, new undergraduate majors in Community Health and Human Services, and Exercise and Sport Science, along with a Family Nurse Practitioner master's degree program to allow working healthcare professionals to accelerate their careers in a more flexible format – Medical College of Wisconsin (MCW) is working with partners in various regions of the state to expand its medical education program <ul style="list-style-type: none"> ▪ With partners in Green Bay (Bellin College and St. Norbert College) and Central Wisconsin, MCW is developing an innovative community-based program designed to educate and train more physicians who will remain in Wisconsin to practice. MCW will also open a school of pharmacy in Milwaukee to address the estimated demand shortage for pharmacists to work in underserved communities ▪ MCW will create a 28-month Master of Science in Anesthesia-Anesthesiologist Assistant Program through its medical school which is expected to be the first program in the state (11th nationwide) to train anesthesiologist assistants to work under the direction of leading physician anesthesiologists after graduation – Mount Mary University is expanding its Master of Science Counseling Program to include a Clinical Rehabilitation Counseling Concentration, including a concentration in Clinical Mental Health and School Counseling |  |

Intersections for Population Health

-  Grants & Regulation
-  Infrastructure Development
-  Community Education & Prevention
-  Workforce Attraction & Retention
-  Technology Investment
-  Industry Engagement & Collaboration
-  Workforce Development & Training

Successful Intersections of Wisconsin's Health Care (5/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|---|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • State/University partnerships have effectively advanced funding and community partnerships • Policies which expanded scope of care for pharmacists, physical therapists, and advance practice nurses remove barriers to team-based model of care to address workforce shortages and demographic changes <ul style="list-style-type: none"> – A new state law, backed by WHA, allows non-physicians to be on hospital medical staff and order care consistent with their scope of work – Advanced Practice Nurse Prescriber (APNP) scope of practice rule updates detail the treatments and services APNP's can provide and foster a flexible and more collaborative relationship with physicians • WHA partnered with WisconsinEye to discuss the quality of rural health care, potential partnerships with employees and the community impact when rural care improves • Wisconsin Collaborative for Healthcare Quality (WCHQ) provides transparency and accountability through performance measurement, to improve the quality and affordability of healthcare • Nurses for Wisconsin, an initiative with funding from the University of Wisconsin system, was established in hopes of encouraging nurses to further their education and eventually become Nurse Educators |  |



Successful Intersections of Wisconsin's Health Care (6/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|--|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • The Network Adequacy Council engages representatives across WHA membership to discuss national proposals on network adequacy, and develop and prioritize policy responses <ul style="list-style-type: none"> – The council was created by WHA and will work with state insurance regulators to discuss issues and create a better complaint submission process • Wisconsin enacted legislative funding for Graduate Medical Education (GME) and health care provider partnerships to increase medical residencies, emphasizing key physician areas (primary care, psychiatry and general surgery) • Based on feedback from the Competitive Wisconsin/health care sector meetings, Wisconsin Legislature made investments to ensure an adequate supply of physicians and specialists in key shortage professions, enabling high-quality, high-value care in all areas <ul style="list-style-type: none"> – Investments in the number of medical residencies, with emphasis on training for physicians in primary care, psychiatry and general surgery, have enabled Wisconsin to create 39 new residency positions for primary care, 9 in general surgery, 31 new residencies are expected to be created for psychiatry – New grant funding has resulting in expansion for new and existing residency programs in Family Medicine <ul style="list-style-type: none"> ▪ Gundersen Medical Foundation (new and existing) ▪ Hudson Hospital/Health Partners ▪ Mayo Clinic Health System ▪ Monroe Clinic ▪ University of Wisconsin Fox Valley Family Medicine Program (existing) |  |



Successful Intersections of Wisconsin's Health Care (7/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|--|---|
| Advanced Collaboration | <ul style="list-style-type: none"> - New grant funding has resulting in expansion for new and existing residency programs in General Surgery <ul style="list-style-type: none"> ▪ Gundersen Medical Foundation (new and existing) ▪ University of Wisconsin Hospital and Clinics (new and existing) - New grant funding has resulting in expansion for new and existing residency programs in Psychiatry <ul style="list-style-type: none"> ▪ Clement J. Zablocki VA Medical Center ▪ North Central Health Care ▪ University of Wisconsin Hospital and Clinics (new and existing) • WAICU developed partnerships to create impactful programs to increase the pipeline of health care professionals at the following institutions: <ul style="list-style-type: none"> - Carroll University has developed multiple programs: <ul style="list-style-type: none"> ▪ The Graduate Physical Therapy program works with Curative Care Network to provide exercise and customized therapeutic activities with guidance from faculty and staff ▪ Carroll University partnered with Bruce Guadalupe Middle School to offer students hands-on health care experience with current college students and professionals ▪ Carroll University received a three-year Workforce Diversity Grant from the U.S. Department of Health and Human Services' Health Resources and Service Administration (HRSA) to create the Carroll University Academic Success Program in Nursing (ASPIN). The program promotes health education for K-12 students from medically underserved areas, creates an early entry career pipeline and provides scholarship and academic support services to underrepresented students enrolled in Carroll's nursing program |  |



Successful Intersections of Wisconsin's Health Care (8/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

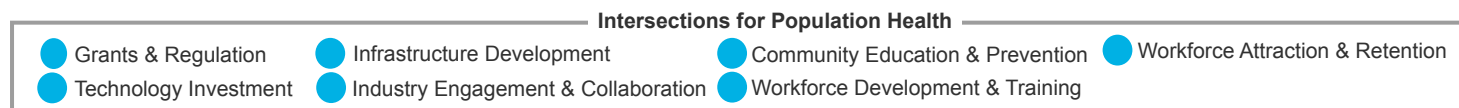
| Finding | Details | Intersection |
|------------------------|--|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • WAICU developed partnerships to create impactful programs to increase the pipeline of health care professionals at the following institutions (continued): <ul style="list-style-type: none"> – Lakeland College pre-nursing students who complete two years of liberal arts core classes can transfer to Columbia College of Nursing to complete the final two years of clinically intensive nursing curriculum and have guaranteed placement within the Columbia St. Mary's network of hospitals and clinics – Funded through a five-year grant from National Institutes of Health, Marquette University, Medical College of Wisconsin, and Milwaukee School of Engineering, together with Children's Hospital of Wisconsin, University of Wisconsin-Milwaukee, the Blood Center of Wisconsin, Froedtert Hospital, and the Zablocki VA Medical Center are collaborating to improve patient care and education through biomedical research, with a larger demographic of patients – Medical College of Wisconsin and Milwaukee School of Engineering (MSOE) have several joint ventures: <ul style="list-style-type: none"> ▪ Joint venture to promote lean healthcare management techniques ▪ Joint master's degree in medical informatics which combines the strength of the Medical College of Wisconsin, a leading provider of medical education and research, and the expertise of MSOE in the disciplines of business and information technology ▪ Partnership to train pre-residency medical doctors and nurses to work together through a variety of simulations – In a joint venture with Milwaukee Institute of Art & Design and GE Healthcare, "The Compassion Project: Navigating the significant issues of cancer awareness, prevention, and discovery..." engages students to broaden their understanding of how their talents can influence or impact health care |  |



Successful Intersections of Wisconsin's Health Care (9/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

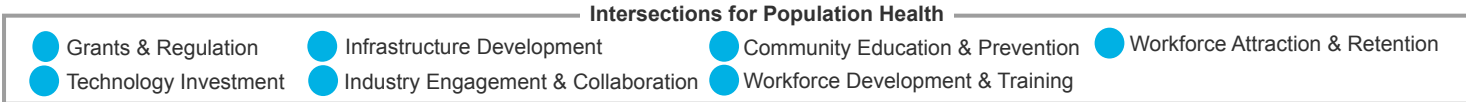
| Finding | Details | Intersection |
|------------------------|--|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • WAICU developed partnerships to create impactful programs to increase the pipeline of health care professionals at the following institutions (continued): <ul style="list-style-type: none"> – Ripon College is working with Eli Lilly in the Open Innovation Drug Discovery Program to virtually screen molecules for potential pharmaceutical use – St. Norbert College opened the Gehl-Mulva Science Center and launched a new MBA program with a track for health care and medical professionals that combines extensive medical knowledge with crucial business acumen – St. Norbert College also partners with Green Bay's Bellin College where students can earn a Bachelor of Science degree in Nursing with a liberal arts foundation and then transition into Bellin College's specialty nursing program – Silver Lake College signed an agreement with the Wisconsin Technical College System to guarantee admission, to all technical college students who earned an Associate Degree in Nursing, in Silver Lake College's Bachelor of Science in Nursing program – Viterbo University received accreditation from the Council for Accreditation of Counseling and Related Educational Programs (CACREP) for its Master of Science in Mental Health Counseling degree <ul style="list-style-type: none"> ▪ CACREP is widely considered the gold standard of counseling accreditation agencies and is the preferred designation for employment at the Veterans Administration and other federal government agencies – Viterbo recently added a Health Care Management emphasis to its evening MBA program and a new undergraduate degree in Health Care and Wellness Management – Viterbo will also allow students to enter the professional nursing sequence two times per year utilizing the increased capacity in the state-of-the-art nursing facility |  |



Successful Intersections of Wisconsin's Health Care (10/13)

Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|--|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • WHA highlighted several programs created to address population health issues in Wisconsin: <ul style="list-style-type: none"> – The following programs provide financial assistance to patients in need: <ul style="list-style-type: none"> ▪ Aspirus Medford Hospital & Clinics ▪ Aurora Helping Hand Financial Assistance Program (patients within the Aurora Medical Centers) ▪ Beloit Health System ▪ Froedtert Financial Assistance Program ▪ Holy Family Memorial Community Care Program ▪ HSHS Hospitals Community Care Program ▪ Mayo Clinic Health System ▪ Meriter-Unity Point Health ▪ Mike Bluff Medical Center Community Care Program ▪ St. Mary's Hospital & Charity Care ▪ Upland Hills Health ▪ UW Hospitals and Clinics Uncompensated Care Program ▪ Wheaton Franciscan Health care Community Care Program – The following programs established free clinics to address community health care needs: <ul style="list-style-type: none"> ▪ Aurora Medical Centers – Living Healthy Community Clinic, Lake Area Free Clinic, Lakeshore Community Health Care, Greater Milwaukee Free Clinic, Bread of Healing Clinic, Sixteenth Street Community Health Centers ▪ Columbia St. Mary's community-based chronic disease clinics |  |



Successful Intersections of Wisconsin's Health Care (11/13)


Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|--|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • WHA highlighted several programs created to address population health issues in Wisconsin (continued): <ul style="list-style-type: none"> – The following programs established free clinics to address community health care needs: <ul style="list-style-type: none"> ▪ Agnesian HealthCare – Mission of Mercy ▪ Columbia-St. Mary's – John and the St. Elizabeth Ann Seton Dental Clinic ▪ Froedtert & the Medical College of Wisconsin/Aurora Medical Centers – Albrecht Free Clinic, Community Outreach Health Clinic ▪ HSHS – Community Smiles for Dental Care Initiatives, Lakeshore Community Dental Clinic ▪ Ministry Saint Joseph's Hospital – Saint Vincent De Paul Free Clinic ▪ Ministry Door County Medical Center Dental Clinic – The following programs were created to sponsor community health initiatives: <ul style="list-style-type: none"> ▪ American Family Children's Hospital – Safe Sleep ▪ Aspirus Wausau Hospital – Community Health Needs Assessment, Life of an Athlete, Just Girls ▪ Aurora Health Centers – Better Together Fund ▪ Berlin Memorial Hospital – Community Health Needs Assessment, Behavioral Health Center ▪ Black River Memorial Hospital – Community Health Needs Assessment ▪ Children's Hospital of Wisconsin – Community Health Navigator Program ▪ Cumberland Healthcare – Know Your Numbers Screenings ▪ Edgerton Hospital and Health Services – Getting Fit |  |



Successful Intersections of Wisconsin's Health Care (12/13)

Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|---|---|
| Advanced Collaboration | <ul style="list-style-type: none"> • WHA highlighted several programs created to address population health issues in Wisconsin (continued): <ul style="list-style-type: none"> – The following programs were created to sponsor community health initiatives: <ul style="list-style-type: none"> ▪ Essentia Health St. Mary's Hospital – Community Health Needs Assessment ▪ Flambeau Hospital – Price County/Mental Health Coalition ▪ Gundersen Health System – Community Needs Assessment ▪ Holy Family Memorial – Reach Out and Read Program ▪ HSHS – Double Your Bucks program for proper nutrition, Teen Mental Health, Community Benefit, Ok2Ask, Oconto Falls Area Trail System Committee, Community Pharmaceutical Take-Back and Medical Equipment Drive, Community Safety Fair ▪ Mayo Clinic Health System – Community Needs Assessment, Health Grant Program ▪ Memorial Medical Center – Community Health Needs Assessment ▪ Mercy Health Systems - Casualty Care in the Classroom, Honoring end of life decisions ▪ Meriter-UnityPoint Health – Dane County Community Health Needs Assessment ▪ Milwaukee Health Care Partnership – Community Health Needs Assessment, Improving Access to Oral Health Services, Milwaukee Enrollment Network, Emergency Department Care Coordination initiative ▪ Ministry Good Samaritan Health Center – Lincoln County Nutrition Coalition, Merrill Community Agencies, DC Everest Rolling Readers Program ▪ Ministry Saint Clare's Hospital - Marathon County's Start Right program |  |



Successful Intersections of Wisconsin's Health Care (13/13)

Workshop feedback revealed that Wisconsin's health care ecosystem has adopting collaborative processes that align to the key intersections

| Finding | Details | Intersection |
|------------------------|--|--------------|
| Advanced Collaboration | <ul style="list-style-type: none"> • WHA highlighted several programs created to address population health issues in Wisconsin (continued): <ul style="list-style-type: none"> – The following programs were created to sponsor community health initiatives: <ul style="list-style-type: none"> ▪ Reedsburg Area Medical Center – Health 4U ▪ Ripon Medical Center – healthYouth Summer Active Camp ▪ Rogers Memorial Hospital – Community Health Needs Assessment ▪ St. Mary's Hospital - Reducing Type 2 Diabetes, Hospital-Supported Initiatives ▪ ThedaCare – Weight of the Fox Valley, Alcohol and Drug Abuse Awareness, Latino Teen Pregnancy Prevention, Community Health Action Teams, Waupaca Providing Mentors, End of Life Initiative ▪ Upland Hills Health – Community Health Needs Assessment ▪ Wheaton Franciscan – Community Needs Assessment | |

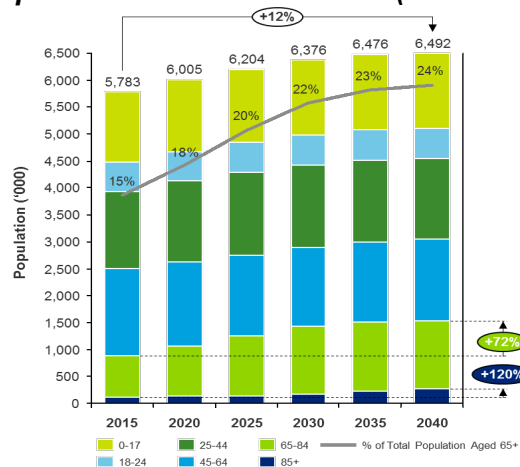


Challenges with Wisconsin's Health Care Supply

Workshop feedback and studies reveal gaps in supply based on forecasted demand and population trends

Increased Demand for Health Care

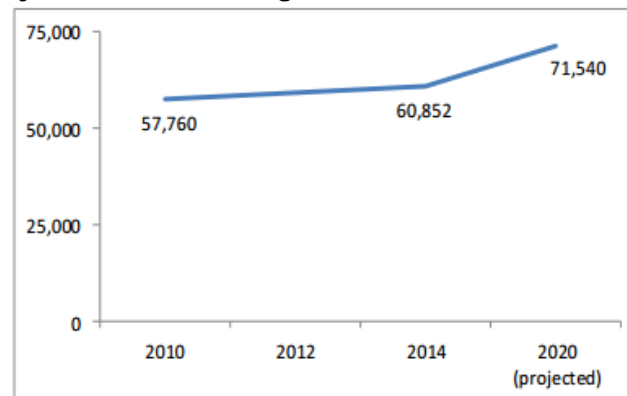
Population Growth Estimates (2015-2040)



Source: Wisconsin Department of Administration

Decreased Supply of Health Care Providers

Projected need for Registered Nurses in WI in 2020

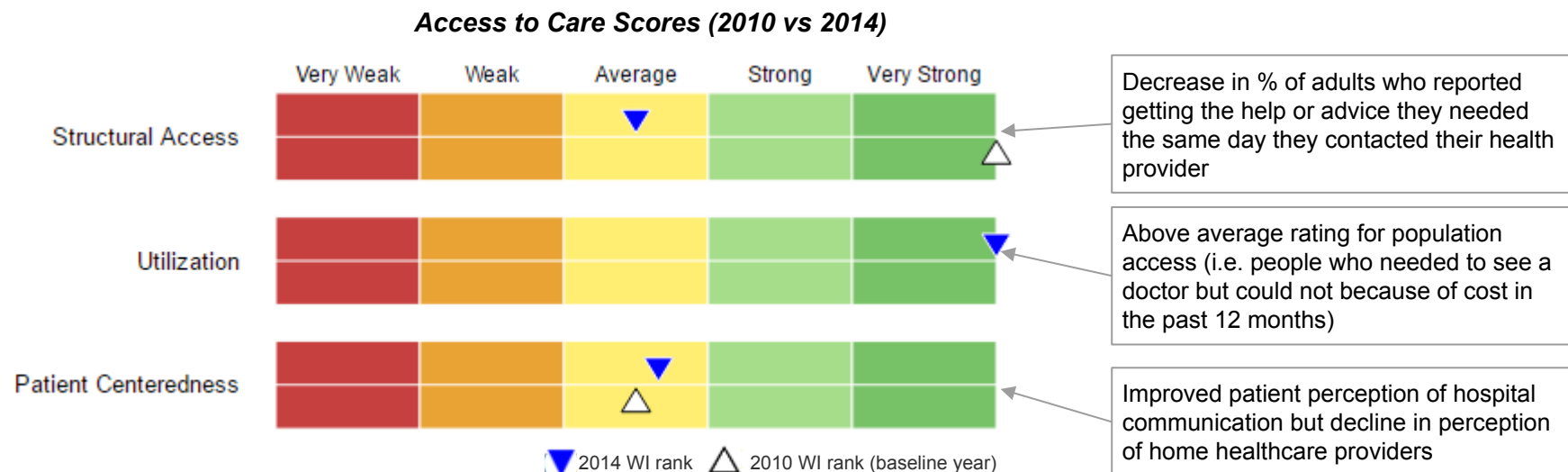


Source: Wisconsin Department of Workforce Development

- An increasingly aging population indicates increased healthcare demand and potential labor shortages
 - 6.5M total forecasted population in Wisconsin by 2040
 - Anticipated 1.5M people aged 65+ in 2040, which will constitute 24% of the total population (72% increase from 2015)
 - 120% increase in the number of people aged 85+ from 2015-2040
- Wisconsin is heading toward a nursing and nursing faculty workforce shortage
 - 34% of nursing workforce is 55 years or older and many will retire in the next 10 years
 - Only 33% of faculty positions are being filled due to lack of qualified applicants and funding
 - Wisconsin nurse practitioner and educator salaries are below the national average, and the number of nursing students graduating is not sufficient to meet demand

Challenges with Wisconsin's Access to Health Care

Workshop feedback and studies reveal gaps in access to care, particularly within the healthcare provider space



- Relative to national average, Wisconsin has experienced a drop in Structural Access to health care
- Structural access limitations may become exacerbated if supply of healthcare professionals fails to meet increasing demand
- While scoring above average among state hospital care, Wisconsin scored average to below average in patient perception and access to Hospice and End-of-Life Care

Opportunities for Improvement in Health Care Intersections (1/2)


Based on workshop feedback, Deloitte was able to identify three distinct opportunities for improvement in Wisconsin's key intersections between government and health care sector

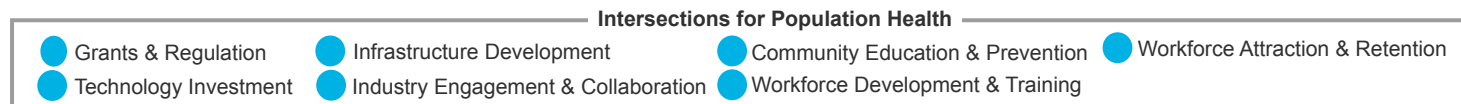
| Identified Gap | Details | Intersection |
|---------------------|--|--------------|
| Prevention Control | <ul style="list-style-type: none"> There is a need to increase and augment partnerships with the community, state, and businesses which improve population health (e.g., YMCA) Additionally, Wisconsin may need to shift from reactive to preventative care programs (e.g., sponsor chronic disease prevention programs) to align with health care trends | |
| Access to Care | <ul style="list-style-type: none"> Wisconsin has experienced a drop in structural access to health care with patients that reported getting the help or advice they needed the same day they contacted their health provider Perceived over-regulation related to telemedicine usage could impede advancements which have been instrumental in expanding and increasing efficiency of care delivery Reimbursement funding of 101% is integral for Critical Access Hospitals where any change in reimbursement policy may adversely impact quality and access to care for patients in rural communities Challenges to Access to care in rural communities include: <ul style="list-style-type: none"> Lack of infrastructure (e.g., broadband) and transportation difficulties make it hard to access care Difficulty attracting physicians and nurses to rural health care communities | |
| Talent Availability | <ul style="list-style-type: none"> Wisconsin ranked 24th state in national community population health in 2015² in overall health There is a lack of understanding and visibility into current cost structure <ul style="list-style-type: none"> Difficulty quantifying actual cost of health care at a granular level Lack of standardized methodology to quantify costs aside from cost of care | |



Opportunities for Improvement in Health Care Intersections (2/2)





Based on workshop feedback, Deloitte was able to identify three distinct opportunities for improvement in key intersections between the government and health care sector

| Identified Gap | Details | Intersection |
|---------------------|--|---|
| Talent Availability | <ul style="list-style-type: none"> • The pipeline of labor for nurses, primary care physicians, and psychiatrists does not currently meet expected demand based on population growth <ul style="list-style-type: none"> – Projections estimate a 20,000 shortage of nurses by 2035 – Salary for nurse practitioners is estimated to be 20% lower than competitor states – Large supply of registered nurses (RN) are expected to retire in the next 10 years, as the current average age is 47 with roughly one third age 50 or older – Overall demand for health care is expected to continue to increase due to more people with access to health care (e.g., Affordable Care Act provisions) and the aging population • There is difficulty attracting and retaining top faculty which has resulted in a shortage of faculty to educate nurses and physicians due to difficulty attracting and retaining top faculty <ul style="list-style-type: none"> – Wisconsin will “be about 3,000 short of MDs by 2025” – Additional programs are needed to meet the shortage, similar to Nurses for Wisconsin – Top faculty with NIH funding are leaving the state and taking research dollars with them – States (i.e. Maryland and Pennsylvania) are increasing grants to nursing institutions to support faculty funding and increasing facility capacity through shared resources – Legislators in Michigan are working with universities to develop 15-month accelerated BSN programs to improve student pipeline • Siloed organizations limit the sharing of best practices which has implications on health care innovation and R&D <ul style="list-style-type: none"> – Need for increased partnerships within the health care sector |  |



Opportunities for Improvement – Prevention Control

Prevention Control is one of the opportunity for improvement areas in which Wisconsin could leverage programs utilized in other states





| Opportunity | Case Example | Intersection |
|---|--|---|
| Nutrition and Physical Activity Self- Assessment for Child Care Program | <ul style="list-style-type: none"> The Nutrition and Physical Activity Self- Assessment for Child Care Program (NAP SACC) aims to improve children’s nutrition and physical health by offering competitive local community grants. To date, the NAP SACC grant program has reached nearly 3,500 children between the ages of two and five years and 67 centers in nine counties across North Carolina. |  |
| Smoking Cessation | <ul style="list-style-type: none"> Medicaid covers all FDA approved tobacco cessation medications and behavioral counseling for the Massachusetts Medicaid (MassHealth) population, resulting in 26% decrease in smoking, which leads to reduced hospitalization and cardiovascular disease. Overall, this program demonstrated a return on investment (ROI) of \$2.12 for each dollar invested.¹ |  |
| Health Improvement Fund | <ul style="list-style-type: none"> The Massachusetts Prevention and Wellness Trust Fund was established by legislation to reduce the rate of common preventable health conditions, increase healthy habits, increase the adoption of effective health management and workplace wellness programs, address health disparities and/or build evidence on effective prevention programming. Allocating an ample and protected budget for public health strategies and measuring their value, is an important vehicle for addressing population and community health issues.¹ |  |
| Community Engagement | <ul style="list-style-type: none"> In Massachusetts, the Prevention, Access to Care and Treatment (PACT) Program engages community members (many of whom have similar diseases and challenges as their patients) to visit patients, observe adherence to medication, and provide support as needed. This model has been successful in disease management, both for non-communicable diseases, such as diabetes, and infectious diseases such as HIV/AIDS.² |  |

Intersections for Population Health



Opportunities for Improvement – Access to Care

Based on assessment findings, Access to Care is a current gap where Wisconsin could leverage successful initiatives utilized in other states to improve key intersections




| Opportunity | Case Example | Intersection |
|---|---|--|
| Increase internet access | <ul style="list-style-type: none"> Iowa governor recently signed a law to expand high-speed Internet access across the state after a study determined that almost a third of Iowa businesses and farms did not have access to high-speed Internet |  |
| Expand workforce certifications | <ul style="list-style-type: none"> States such as Indiana are evaluating occupational licensing requirements to make them less restrictive through alternatives such as certification or registration. State recognition of foreign degrees and credentials may help foreign entrepreneurs and other professionals to start new businesses |  |
| Establish Nurse-Family Partnership | <ul style="list-style-type: none"> Massachusetts's Nurse-Family Partnership (NFP) program provides nurse home-visits to first-time pregnant women, most of whom are low-income, unmarried, and teenagers. The nurses visit their clients approximately one time per month during pregnancy and during the first two years of their children's lives. During these visits the nurses teach positive health-related behaviors, positive child-care practices, and maternal personal development such as family planning, educational achievement, and participation in the workforce |  |
| Increase health care coverage through legislation | <ul style="list-style-type: none"> Massachusetts has policies in place that mandates either businesses must help cover health insurance or pay a penalty fee per employee. States provides 15% rebate for small businesses that adopt a wellness program. Individuals must carry health insurance or pay a penalty each month they don't have insurance (amount is based off of income level) |  |

Intersections for Population Health



Opportunities for Improvement – Talent Availability (1/3)

Talent Availability is the third opportunity for improvement identified where Wisconsin could leverage successful initiatives in other states

| Opportunity | Case Example | Intersection |
|--|---|--|
| Incentivize workforce to work in underserved locations | <ul style="list-style-type: none"> Health reforms encourage students to practice in Minnesota's underserved communities by increasing student loans through the National Health Service Corps and residencies for medical students entering primary care. Training for nurse practitioners and physician assistants is also increased.¹ The Academic Health Center Office of Education in Minnesota offers \$300 per student per year reimbursement for rural rotations that meet the specified guidelines and eligibility requirements. The reimbursement is intended to help offset food, housing and travel expenses related to the rural rotation² |  |
| Incentivize workforce for treatment of low-income patients | <ul style="list-style-type: none"> Minnesota increases payments to primary care providers when they serve Medicaid and Medicare patients. Minnesota has created options to help extend the role of traditional primary care providers by authorizing and developing new professions like community health workers, community paramedics, dental therapists and advanced dental therapists. Emergency Medical Services personnel are now helping them manage their chronic diseases, adhere to medication plans, enroll in insurance coverage, or access social services in addition to their traditional roles³ |  |
| Incentivize workforce for needed services | <ul style="list-style-type: none"> Minnesota passed legislation that authorized the state's Medicaid program to reimburse certified CPs for specific services. Although the law applies only to public coverage, policymakers and state officials believe that private insurers will follow suit |  |

Intersections for Population Health






Sources: National Governors Association

<http://mn.gov/health-reform/topics/workforce/training-health-professionals/index.jsp>

<http://www.ahceducation.umn.edu/1health-setting-new-standard-interprofessional-education/ahc-1health-support-student-rural-rotations>

Opportunities for Improvement – Talent Availability (2/3)

Talent Availability is the third opportunity for improvement identified where Wisconsin could leverage successful initiatives in other states



| Opportunity | Case Example | Intersection |
|---|---|---|
| Create workforce recruitment through loan repayment | <ul style="list-style-type: none"> To address the shortage of primary care physicians, Massachusetts launched loan repayment programs and increased the use of community health workers for outreach, navigation, and coordination |  |
| Collaborate in key sectors | <ul style="list-style-type: none"> In Washington, the economic development, workforce, and educational systems align through sector-specific strategies. The state's Workforce Training and Education Coordinating Board surveys employers about the pace of hiring, positions in high demand, skill gaps, and other challenges. Simultaneously, the Department of Commerce strategically focuses on key sectors to develop targeted worker training programs. The workforce board partners with the state's K-12 education system, community colleges, career and technical education programs, and four university centers of excellence |  |
| Create internships to encourage workforce retention post-graduation | <ul style="list-style-type: none"> Nebraska launched InternNE, which connects college students with paid internships in the state. The program aims to provide interns with real-world business experience and encourage more students to stay in the state after graduation. The program provides a 40% match, up to \$3,500 per internship, for eligible businesses hiring eligible interns. The program was launched in 2011 and has placed 130 interns, 44 (34%) in companies located in rural areas |  |

Intersections for Population Health



Opportunities for Improvement – Talent Availability (3/3)

Talent Availability is the third opportunity for improvement identified where Wisconsin could leverage successful initiatives in other states

| Opportunity | Case Example | Intersection |
|-------------------------------------|---|---|
| Expand scope of care for paramedics | <ul style="list-style-type: none"> Minnesota passed legislation in 2011 that formally recognized community paramedics as a distinct provider, and clarified their educational and training requirements. The legislation established training and clinical requirements for certification, including completion of a community paramedic training program from an approved college or university, and authorized community paramedics to provide services as directed by the primary care physician. The law enables community paramedics to provide specific health services, as well as prevention, emergency care, evaluation, disease management and referrals¹ |  |
| Fund clinical training | <ul style="list-style-type: none"> The Medical Education and Research Costs (MERC) Grant, administered by the Minnesota Department of Health (MDH), distributes grants annually to providers of clinical medical education. Funds for MERC come from several sources, such as cigarette tax revenue, federal Medicaid matching funds and a carveout of medical education funds from the Prepaid Medical Assistance Program (PMAP). The purpose of MERC is to fund a portion of the cost for clinical training of 15 clinical health professions in Minnesota² |  |

Intersections for Population Health

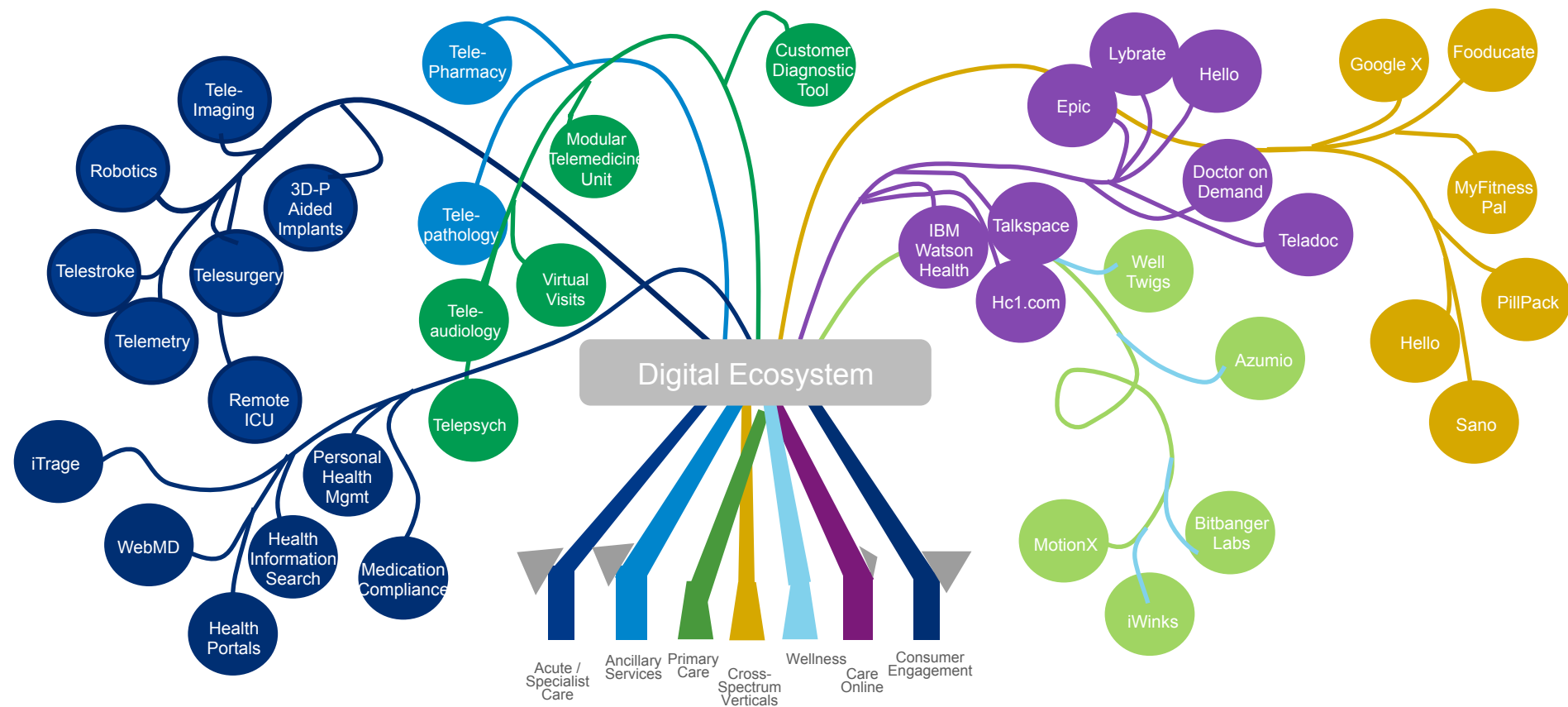


41 Sources: National Governors Association
<http://www.ncsl.org/research/health/expanding-the-primary-care-role-of-first-responder.aspx>
<http://www.health.state.mn.us/divs/hpsc/hep/merc/index.html>

Summary Findings – Research, Development and Investment




The Vast Digital Health Ecosystem

Assessment findings revealed a robust, vast, and interconnected digital health ecosystem that offers targeted solutions for healthcare challenges and issues



Opportunities – Promoting Research & Development (1/2)



Wisconsin could leverage policies and incentive programs used by other states as inspiration to develop research and development opportunities that address key intersections

| Opportunity | Case Example | Intersection |
|--|---|--|
| <p>Create opportunities for entrepreneurs to network and learn in the pre-start-up phase</p> | <ul style="list-style-type: none"> Some states have engaged Startup Weekend and 1 Million Cups, national programs designed to educate and connect entrepreneurs to increase learning. Micro-funding programs are also being used to inspire entrepreneurs to connect with each other. For example, state programs can support the granting of small sums to a dozen or more start-ups at a time, creating a cohort of entrepreneurs that can be brought together with local support groups. Examples are Launch Kansas City and Arch Grants in St. Louis—both of which are partnered with the Missouri Technology Corporation |  |
| <p>Create a centrally located innovation hub</p> | <ul style="list-style-type: none"> Rhode Island launched a life sciences innovation hub in 2011 to bring science, talent, and capital together to accelerate innovation within the Rhode Island life sciences community. The hub is housed in the Rhode Island Center for Innovation and Entrepreneurship, close to hospitals, research universities and entrepreneurs |  |
| <p>Support commercialization with public and private sector engagement</p> | <ul style="list-style-type: none"> The Massachusetts Technology Transfer Center (MTTC) is developing a pipeline of new companies by serving as a resource for the technology transfer offices in public and private institutions in Massachusetts, focusing outside of the Boston metropolitan area. The center, which is financially supported by the state, MassVentures, helps inventor commercialize technologies along with strong private-sector input. MTTC is connecting, coaching, and coordinating entrepreneurs through proof-of-concept awards, showcases, education, and pre-incubation services. The coaches, mentors, and expert reviewers, are drawn from the local investor community, industry partners, professional service providers, experienced technology entrepreneurs, and other MTTC partners |  |



Opportunities – Promoting Research & Development (2/2)




Wisconsin could leverage policies and incentive programs used by other states as inspiration to develop research and development opportunities that address key intersections

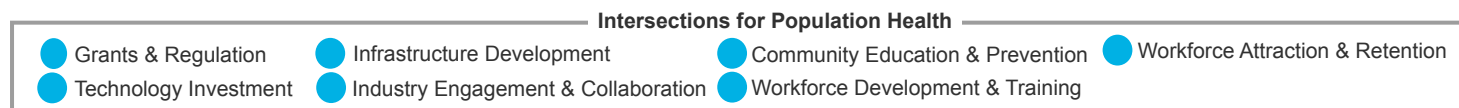
| Opportunity | Case Example | Intersection |
|---|---|---|
| <p>Create incubator facilities</p> | <ul style="list-style-type: none"> Maryland Department of Business and Economic Development collaborated with the University of Maryland to create the Maryland International Incubator (MI2). The incubator offers state-of-the-art facilities, world-class resources from overseas economic development offices and venture funds, and on-site services connecting Maryland companies with joint ventures in China, Russia, Kazakhstan, India, Bangladesh, and other countries |  |
| <p>Engage entrepreneur community to identify and reduce barriers to success</p> | <ul style="list-style-type: none"> States are surveying entrepreneurs to identify state-level barriers to success, enhancing digital connectivity for entrepreneurs, and building networks and resources to support them. Economists in the Colorado Office of State Planning and Budgeting developed a model for measuring progress on whether communities in the state are attractive to entrepreneurs. The state surveyed how Colorado entrepreneurs perceive their start-up ecosystem and whether they would promote the community as a great place for other entrepreneurs. The analysis demonstrated 1) a close relationship between entrepreneur satisfaction and community growth 2) that individual and organizational connections to other entrepreneurs and investors are important factors to satisfaction |  |



Opportunities – Funding Investment in Health Care (1/2)




Using other states as a guide, Wisconsin could allocate funds for increased development and collaboration in health care technology

| Opportunity | Case Example | Intersection |
|---|--|--|
| Provide funds for university research and collaboration | <ul style="list-style-type: none"> Virginia created the Commonwealth Research Fund in 2011 to encourage partnerships between universities and industry. Awards made through the fund must align with goals set forth in the commonwealth's research and technology strategic roadmap and with key industry sectors identified by the commonwealth. Washington recently created the W Fund—a combination of state, university, and philanthropic funding—to provide early-stage venture funds to promising companies started at the state's research institutions |  |
| Provide funds for collaborative startups | <ul style="list-style-type: none"> In fiscal year 2013, Michigan invested \$12 million in entrepreneurship support services. The funding supports both business accelerators (organizations that help new, typically venture-backed companies grow and enter national and international markets) and other organizations that enhance the entrepreneurial ecosystem or promote the availability and quality of entrepreneurial talent in Michigan. To apply for funding from the business accelerator services fund, an organization must demonstrate that it is partnering with at least five SmartZones (regional networks) or local economic development organizations. Michigan lawmakers recently approved a \$3.5 million increase to the Michigan Economic Development Corporation's innovation and entrepreneurship programs for fiscal year 2014 |  |
| Provide funds for priority sectors | <ul style="list-style-type: none"> Colorado's Advanced Industries Accelerator Program is a 10-year \$200 million program that provides seed funding to businesses in the state's seven advanced industry sectors, which account for nearly 30 percent of the state's wage earnings and sales revenues. Colorado's OEDIT offers companies early-stage capital grants of \$250,000 for technology development and \$500,000 for applied R&D, technology acceleration, and production |  |



Opportunities – Funding Investment in Health Care (2/2)






Using other states as a guide, Wisconsin could allocate funds for increased development and collaboration in health care technology

| Opportunity | Case Example | Intersection |
|--|---|--|
| Increase state fund allocation | <ul style="list-style-type: none"> Tennessee’s state-supported nonprofit innovation committee sought advice from angel and venture capital communities, entrepreneurs, and other private sector representatives located in the state on how to provide timely, accurate information to policymakers. That effort helped the state better understand the economic needs of its business community and focus state programs on small-business financing requirements that weren’t being served by private investors |  |
| Invest in improved technology infrastructure | <ul style="list-style-type: none"> Massachusetts Health Quality Partners (MHQP) compiles healthcare data to measure and report on physician performance creating reports on performance at the physician network, medical group, practice site, and individual physician level, for both doctors and consumers. This investment is successful in influencing investments in information systems to support quality and incentives for individual physicians and the challenges of engaging consumers |  |
| Create a Fund of Funds | <ul style="list-style-type: none"> An increasingly common model for state-sponsored venture capital programs involve establishing a “fund of funds,” where public funds are committed to private fund managers for investment in promising companies alongside private capital. Fund-of-fund programs are often administered by a private, quasi-governmental intermediary with the ability to hold an equity interest in a private company. With investment decisions made by contracted investment managers and not public sector employees, states avoid the appearance of picking winners and losers. In Maryland, for example, the InvestMaryland Program is an approximately \$84 million state venture capital program—now administered by an independent quasi-public organization, the Maryland Technology Development Corporation—which was financed by a strategy that defers the fiscal effect of the investment program over several years to align fiscal effect with anticipated economic development effect at an acceptable cost of capital |  |



Expansion of Large Health Tech Companies


In recent years, there are several examples where states' investments in technology and research and development resulted in successful health care technology companies

| Company | State | Reach | Economics |
|---|---------------|--|---|
|  <p>Web-based physician finder which integrates peer reviews and insurance information (in/out of network) to locate and make doctor appointments, typically within 24 hours.</p> | New York | <ul style="list-style-type: none"> Services is available to 60% of the US population and includes physicians in over 50 specialties¹ | <ul style="list-style-type: none"> Recent round of funding in 2015 raised \$130M with a total of \$230M in equity financing¹ Valued at \$1.8B 600 employees |
|  <p>Image-based diagnostics decision support tool</p> | New York | <ul style="list-style-type: none"> Used by 1,500+ hospitals and large clinics Used in 50%+ of U.S. medical schools, ranked top app at Harvard Medical and University of Pennsylvania | <ul style="list-style-type: none"> N/A |
|  <p>Telehealth platform connecting physicians with patients through desktop, desktop, and tablet</p> | Massachusetts | <ul style="list-style-type: none"> Recently announced partnership with CVS Health to deliver care in Ohio | <ul style="list-style-type: none"> Recently raised \$80M series C funding |
|  <p>Self-assessment app to quickly identify symptoms. Stores health records and connects users to treatment centers</p> | Colorado | <ul style="list-style-type: none"> App has been downloaded 12+ million times | <ul style="list-style-type: none"> Acquired by Aetna for an undisclosed sum in 2011 |
|  <p>Telehealth platform delivering on-demand healthcare</p> | Texas | <ul style="list-style-type: none"> Q1 2016 figures: 15.1M members, 239,942 visits 575,000 telehealth visits in 2015 | <ul style="list-style-type: none"> \$26.9M in revenue for Q1 2016 \$77M in revenue in 2015 |

Recommendations

Population Health Recommendations – Prevention Control (1/2)

Based on assessment findings, Deloitte has developed impactful recommendations to address the identified opportunities for improvement in key intersections for population health

| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|---|--|---|---|
| Incentivize collaboration between private and public organizations | <ul style="list-style-type: none"> Create a forum that provides enough value to for-profit companies that they are willing to share their experiences with other health organizations, even at the risk of a potential competitive disadvantage Develop sustainable funding streams, complementary processes and common outcomes to support full integration services in public health, social support, education, employment, and community development Engage community members to visit patients and help with disease management Establish partnership with colleges and universities (state and private) to provide investment funds to increase the number of nurse faculty positions and provide incentives for graduate degrees | <ul style="list-style-type: none"> Massachusetts established the Prevention and Wellness Trust Fund to reduce preventable health conditions, increase healthy habits, address health disparities, and improve prevention programming The Massachusetts Prevention Access to Care and Treatment program has been successful in disease management | <ul style="list-style-type: none"> Wisconsin Primary Care and Psychiatry Shortage Grant Program Nurses for Wisconsin WAICU collaborations ThedaCare as an Accountable Care Organization |  |



Intersections for Population Health



Population Health Recommendations – Prevention Control

(2/2)

Based on assessment findings, Deloitte has developed impactful recommendations to address the identified opportunities for improvement in key intersections for population health




| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|---|---|--|--|
| Invest in recruitment, training, and funding for patient care coordinators | <ul style="list-style-type: none"> Hire patient care coordinators to address the comprehensive needs of Super Utilizers' care needs. Creating a single point of responsibility for high risk patients through time to identify holistic clinical and non-clinical needs can avoid expensive emergency care and in-patient services by better managing their chronic conditions. Patient care coordinators can be recruited from all backgrounds given appropriate training and resources | <ul style="list-style-type: none"> Oregon uses patient care coordinators to address patients' holistic well-being needs. Patient care coordinators can spend their budget on non-medical related expenses that contribute to improved health such as air conditioning units in poor housing conditions | <ul style="list-style-type: none"> Part of Care Coordination activities |  |
| Establish Guidelines for Children Nutrition and Physical Health | <ul style="list-style-type: none"> Establish guidelines on school food nutrition, physical activity requirements, and screen time in public child care programs Require compliance certifications annually and tie school funding with compliance | <ul style="list-style-type: none"> California schools are prohibited from offering fried foods or food containing artificial trans fats North Carolina established community grants to improve child physical and nutrition health | |  |

Intersections for Population Health



Population Health Recommendations – Access to Care (1/2)

Based on assessment findings, Deloitte has developed impactful recommendations that will address the identified opportunities for improvement in key intersections for population health


| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|---|--|--|---|
| Expand workforce certifications to allow for greater scope of care | <ul style="list-style-type: none"> Expand professional licensure/ scope of practice for nurses, health care workers, and physicians to allow practitioners to provide additional support Increase recognition of foreign degrees and credentials to allow qualified care providers to practice in the state | <ul style="list-style-type: none"> Indiana is evaluating occupational licensing requirements to make them less restrictive and is considering recognizing foreign degrees and credentials | <ul style="list-style-type: none"> Physician Licensure Interstate Compact APNP practice rule updates New WHA-backed state law |  |
| Enact legislation to expand high-speed internet coverage | <ul style="list-style-type: none"> With the prevalence and growth of telemedicine, broadband internet access is critical to delivering care through remote technologies | <ul style="list-style-type: none"> Iowa governor recently signed a law to expand high-speed internet access across the states | <ul style="list-style-type: none"> Rural Initiative supported by WHA state budget Broadband Initiatives |  |
| Establish Nurse-Family Partnership | <ul style="list-style-type: none"> Increase the number of programs to assist new mothers in low income areas | <ul style="list-style-type: none"> Massachusetts's NFP program provides nurse home-visits to first-time pregnant women, most of whom are low-income, unmarried, and teenagers, to teach positive health-related behaviors, positive child-care practices, and maternal personal development | <ul style="list-style-type: none"> Milwaukee health system support |  |

Intersections for Population Health



Population Health Recommendations – Access to Care (2/2)

Based on assessment findings, Deloitte has developed impactful recommendations that will address the identified opportunities for improvement in key intersections for population health



| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|--|---|---|---|
| <p>Develop and enable health care opportunities for low-access communities</p> | <ul style="list-style-type: none"> • Mobile health clinics bring services to communities with limited health care access (e.g., rural communities, low-income populations) • Mobile clinics and telemedicine allow physicians to diagnose and recommend treatments remotely. Care can be delivered by clinic health care providers • Alternatively, transportation services brings low-mobility patients to care facilities and providers | <ul style="list-style-type: none"> • Massachusetts Nurse-Family Partnership provides nurse home visits to first-time pregnant women once a month to educate on positive health behaviors, child development and care, family planning, and importance of education • Minnesota's Emergency Medical Services personnel check up on high-risk patients to manage chronic diseases, medication, and care • Remote Area Mobile brings general medical, dental, vision, and preventative care to rural communities through mobile clinics • ClickMedix enables telemedicine by connecting remote doctors with patients to diagnose and deliver care through local health workers or nurses | <ul style="list-style-type: none"> • ThedaCare • Clinics in smaller communities (e.g., Lafarge) |  |

Intersections for Population Health



Population Health Recommendations – Talent Availability (1/3)

Based on assessment findings, Deloitte has developed impactful recommendations that will address the opportunities for improvement in key intersections for population health

| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|---|--|---|---|--|
| Re-evaluate policies to support team-based care model | <ul style="list-style-type: none"> Team-based care model may require reexamination of regulations and policy regarding payment and organizational regulations (such as federal hospital regulations) | <ul style="list-style-type: none"> Minnesota passed legislation that authorized Medicaid to reimburse certified community paramedics for needed services A \$250,000 grant from the Department of Labor will train 100 more community medics over the next three years, and a CMS Innovation grant to the State Department of Human Services may also help expand their use | <ul style="list-style-type: none"> Advanced Practice Nurse Prescriber Practice Rules New WHA-backed state law Leg Package 2017 |  |
| Fund financial incentives to attract and retain nurses and physicians for in-demand areas | <ul style="list-style-type: none"> Incentivize workforce to practice in needed care specialties and locations (e.g., primary care, behavioral health, rural) through loan reduction and forgiveness, cost subsidies, training/internship programs, and other financial incentives (e.g., increase salaries, offer bonuses) Provide financial incentives for health care professionals to work in Health Professional Shortage Areas (HPSA) | <ul style="list-style-type: none"> Massachusetts developed loan forgiveness program to attract primary care physicians Minnesota reimburses \$300 per student for rural rotations Minnesota increases primary care providers' payments for Medicaid and Medicare patients | <ul style="list-style-type: none"> WAICU collaborations Mental Health Loan Repayment Resources for HPSA |  |

Intersections for Population Health



Population Health Recommendations – Talent Availability (2/3)

Based on assessment findings, Deloitte has developed impactful recommendations that will address the opportunities for improvement in key intersections for population health




| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|--|--|--|--------------|
| Increase residencies and provide support to attract and retain medical school students | <ul style="list-style-type: none"> Developing the pipeline of high quality medical professionals includes education, residency/ internship opportunities, and full time jobs. Studies have shown that students who study and complete their residencies in the same state, are much more likely to stay in the state full-time. Increase number of residencies to improve student retention | <ul style="list-style-type: none"> Minnesota has appropriated funding to support residencies (\$2.5M for primary care, \$370k to assist immigrant international med grads and foreign trained health care professionals) | <ul style="list-style-type: none"> WAICU collaborations GME WHA-supported programs | |
| Fund clinical training for high priority health professions | <ul style="list-style-type: none"> Develop high priority skills and knowledge by funding training facilities and educators | <ul style="list-style-type: none"> Minnesota distributes grants to providers of clinical medical education, funded by sources such as cigarette tax, federal Medicaid matching, and state medical education funds. Minnesota forgives student loans up to \$36,000 for allied health educators | <ul style="list-style-type: none"> WAICU collaborations | |
| Promote the availability of health care and access to high quality of life | <ul style="list-style-type: none"> Attract workers to the state and retain workers by promoting high quality of life as evidenced by the high quality health care system | <ul style="list-style-type: none"> Colorado and Washington have used their standing as top population health states to attract millennials to live and work | <ul style="list-style-type: none"> WAICU collaborations WHA Value Campaign | |

Intersections for Population Health



Population Health Recommendations – Talent Availability (3/3)

Based on assessment findings, Deloitte has developed impactful recommendations that will address the opportunities for improvement in key intersections for population health



| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|---|---|---|--|---|
| Fund internships to retain medical students post-graduation | <ul style="list-style-type: none"> Provide funding to support and encourage internships which translates to higher retention post-graduation | <ul style="list-style-type: none"> Nebraska launched InternNE to connect college students with paid internships and provides matching funds (up to \$3,500 per intern) Minnesota has dedicated almost \$300k to fund summer health care internship programs for secondary and post-secondary students | |  |
| Train and expand the use of Community Health Workers | <ul style="list-style-type: none"> Supplement care providers with community health workers where a shortage exists by providing health guidance, navigating the system, and providing follow-up care | <ul style="list-style-type: none"> Massachusetts increased the use of community health workers for outreach, navigation, and coordination Minnesota is developing community health workers, community paramedics, dental therapists, and advanced dental therapists to supplement PCP | |  |
| Collaborate in key sectors | <ul style="list-style-type: none"> Engage key sectors to address development initiatives | <ul style="list-style-type: none"> In Washington DC, the economic development, workforce, and educational systems align through sector-specific strategies. Workforce Training and Education Coordinating Board surveys employers about the pace of hiring, positions in high demand, skill gaps, and other challenges. Department of Commerce focuses on key sectors to develop targeted worker training programs | <ul style="list-style-type: none"> Governor's Council on Workforce Investment DWD Sector-specific strategies WDBSCW Quality Improvement projects |  |

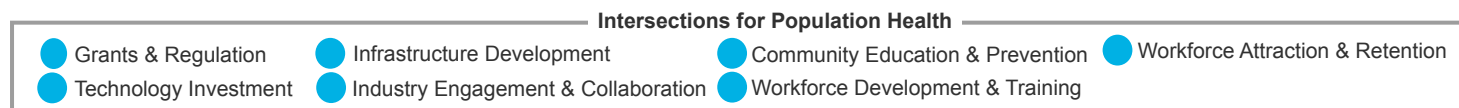
Intersections for Population Health



Research and Development Recommendations (1/2)



Wisconsin could use research and development policies and programs from other states that successfully leverage key intersections to stimulate growth

| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|--|---|--|--|
| Build an Learning and Innovation Ecosystem | <ul style="list-style-type: none"> Encourage collaboration between key institutions (e.g., universities, community colleges, research institutions, investment funds, industry associations) Create national information exchange forums to demonstrate leadership in health technology | <ul style="list-style-type: none"> Global Center for Health Innovation in Cuyahoga County, Ohio is a forum for learning, collaboration and discovery that powers healthcare transformation Destination Medical Center project in Rochester, Minnesota is a economic development initiative to position Rochester, Minnesota as the world's premier destination for health and wellness - with more than \$5 billion in projected private investments over the next 20 years | <ul style="list-style-type: none"> WAICU collaborations |  |
| Create entrepreneurship and incubation hub | <ul style="list-style-type: none"> Develop centrally located incubation hubs where entrepreneurs have access to the physical and knowledge resources required in each phase of the innovation process Host idea exchange and meet and greets between entrepreneurs, educators, investors, and health care industry professionals | <ul style="list-style-type: none"> Rhode Island Center for Innovation and Entrepreneurship is located close to hospitals, research universities and entrepreneurs in downtown Networks at RI-CIE help entrepreneurs find the right market and business model to succeed using an idea-to-lab-to-market approach to capitalize on Rhode Island's knowledge economy innovations to create jobs and advance sustainable building options | |  |



Research and Development Recommendations (2/2)



Wisconsin could use research and development policies and programs from other states that successfully leverage key intersections to stimulate growth

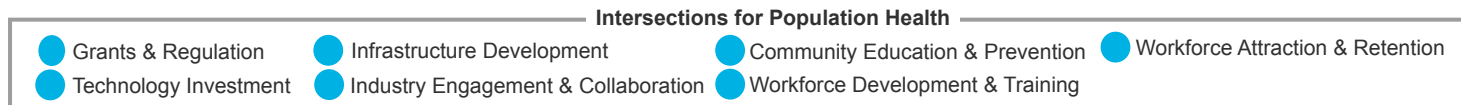
| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|--|---|---|-------------------------|--|
| <p>Host an Innovation conference</p> | <ul style="list-style-type: none"> Host an innovation conference to identify top technology trends and needs. This type of investment brings together stakeholders and investors across the country to collaborate and identify opportunities with the greatest market potential Conference can be used to promote existing research such as the Precision Medicine Initiative between Marshfield Clinic, UW and Medical College of Wisconsin | <ul style="list-style-type: none"> Kentucky hosted a health care innovation conference to bring together 500+ entrepreneurs, educators, and investors Conference includes panel discussions with prominent guests, as well as an Innovation Competition and Innovation Spotlights from health tech startups from around the world | |  |
| <p>Survey entrepreneurs to understand and reduce barriers to success</p> | <ul style="list-style-type: none"> Directly engage with local entrepreneurs to identify barriers to success in each stage of the innovation process Reform policies and funding to support innovation | <ul style="list-style-type: none"> Colorado Office of State Planning conducted survey to understand entrepreneur needs, which asked entrepreneurs to rate their perception of a few broad categories that influence startup ecosystem. The goal is to use the data to drive legislative change at a community level | |  |



Investment Recommendations (1/2)




Wisconsin could use investment policies and programs from other states that successfully leverage key intersections between government and health care to stimulate growth

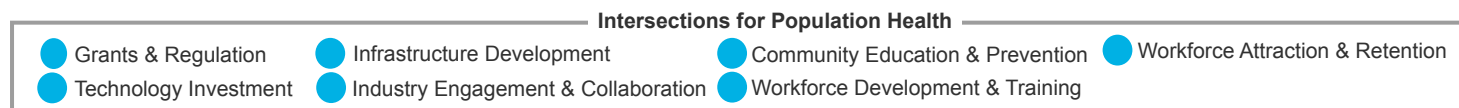
| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|---|---|---|-------------------------|--|
| <p>Promote specific investment opportunities and tax incentives</p> | <ul style="list-style-type: none"> Governors can help build awareness of opportunities within the state among private investors, ranging from prominent businesspersons and high-wealth individuals to less wealthy individuals who might be attracted by so-called crowdfunding opportunities. In both cases, individuals might not be aware of the possibilities of angel or venture investment opportunities in their home state. Governors also can make the angel community aware of tax credit programs that encourage angel investing | <ul style="list-style-type: none"> Maryland's state funded International Incubator (MI2) connects entrepreneurs with international economic development offices and venture funds in 15+ countries to promote awareness of investment opportunities | |  |
| <p>Enact policies to support crowdsourcing</p> | <ul style="list-style-type: none"> Promote access to capital for entrepreneurs and early-stage companies by decreasing regulation that may prohibit crowd sourced funding Crowd sourcing can also encourage collaboration between small investors and entrepreneurs | <ul style="list-style-type: none"> Launch Kansas and Arch Grants in St. Louis provide small funding to several start-ups to create cohort of entrepreneurs Arch Grants has funded 55 companies that have generated \$6.5 million in revenue, attracted \$17.7 million in additional capital, and created 192 net new jobs for St. Louis | |  |



Investment Recommendations (2/2)

Wisconsin could use investment policies and programs from other states that successfully leverage key intersections between government and health care to stimulate growth

| Recommendation | Recommendation Details | Case Example | Currently Exists in WI? | Intersection |
|---|--|---|-------------------------|--|
| Adopt private sector investment strategy to maximize existing funds | <ul style="list-style-type: none"> State-sponsored venture capital programs have increasingly established a fund of funds managed by private fund managers | <ul style="list-style-type: none"> \$84M state venture capital program, InvestMaryland was financed by an online auction in which 24 insurance companies bid up the price of tax credits they wanted to receive in the future. Insurance companies that do business in Maryland bought the tax credits to offset future tax liabilities, from 2015 to 2019 | |  |
| Increase investments in technology infrastructure and tools | <ul style="list-style-type: none"> Technology investments in data analytics can be used to support new models of health care delivery and improve patient care (e.g., workforce data collection and workforce planning, etc.) | <ul style="list-style-type: none"> Massachusetts Health Quality Partners (MHQP) compiles healthcare data to measure and report on physician performance creating reports on performance at the physician network, medical group, practice site, and individual physician level, for both doctors and consumers | |  |
| Survey private sector investors on needs | <ul style="list-style-type: none"> To better understand angel and venture capital economic and business needs, engage with the private sector to align on policy changes that encourages innovation | <ul style="list-style-type: none"> Tennessee worked with angel investors, venture capital, and entrepreneurs to identify gap in small-business financing needs The SBDCs assisted more than 9,500 entrepreneurs to start new businesses. Provided counseling services to more than 91,000 emerging entrepreneurs and 75,000 existing businesses, and training services to approximately 214,000 clients | |  |



Case Studies

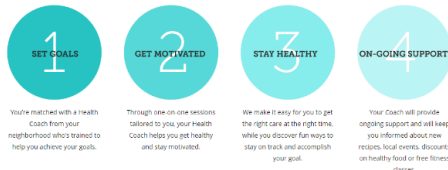
Case Studies Executive Summary

- The following case studies highlight domestic and global programs that are successfully providing health care services to their local populations. Wisconsin can derive insight from these studies to address overall population health care needs and leverage underserved population and/or global models to address access to care gaps in rural areas
- From an overall population health perspective:
 - The City Health Works program provides health coaches in local neighborhood clinics to promote healthier lifestyles
 - The Joslin Diabetes Center streamlines diabetes care where patients can meet with a team of health care professionals to address their specific needs from a holistic perspective
- From an underserved population and/or global model perspective:
 - The Remote Area Mobile operates mobile clinics to bring services to rural communities
 - International Partnership for Innovative Health Care Delivery increases access to affordable care through sponsorship of innovators to scale to high demand networks
 - ClickMedix provides telehealth services to rural communities to enable patients access to highly-trained physicians
 - CommCare provides a mobile platform where health care professionals can collect medical field data on a mobile device

City Health Works provides individuals with Health Coaches to support healthy lifestyles

| Population | Program Summary | Funding Model | Impact and Reach |
|---|---|--|--|
| Urban United States | Provides Health Coaches to support population long-term health in local neighborhoods | Non-profit: <i>Donation-based</i> | Programs currently focused on six coaches in Harlem |
| <p>Countries: United States (Harlem, NY)</p> <p>Population: Targets individuals in urban areas who are at risk of or suffer from chronic illnesses such as diabetes, asthma, and hypertension</p> | <p>Overview: City Health Works integrates teams of local Health Coaches and social service providers into clinics to support population health management in local neighborhoods</p> <p>Services:</p> <ul style="list-style-type: none"> Provides individuals with a Health Coach to discuss personal health goals and develop a personal health plan to address clinical, emotional, and social needs Over the course of a year, Health Coaches communicate in-person with both the individual and also his or her primary care doctors to secure appointments and give status updates After the in-person sessions are completed in the first year, Health Coaches remain a resource to provide continual support <p>Partners:</p> <ul style="list-style-type: none"> Health Systems & Health Plans and Social Service Providers | <p>Funding Model: Currently funded by private donations only. The organization is working to establish and co-develop payment models with partners (e.g. Health Insurers, Health Plans and Health Providers) to ensure the financial stability of the organization</p> <p>Scalability: Currently the organization may have trouble scaling because of the reliance on donor funding. However, the use of “paraskilled” Health Coaches is highly scalable once finances are secured</p> | <p>Reach:</p> <ul style="list-style-type: none"> Since their founding in 2012, the organization has employed 6+ professionally trained, bi-lingual Health Coaches in East Harlem <p>Impact:</p> <ul style="list-style-type: none"> No publicly available information on the intervention’s health outcomes |

We Make it Simple to Get (& Stay) Healthy



Key Takeaways:

- Working closely with patients helps make lifestyle changes sustainable:** According to a Robert Wood Johnson study, only 20% of one’s health is determined by clinical care. By employing a mentor to work one-on-one with patients, City Health Works is able to better understand and address challenges in patients lives that occur outside of the health system. With that information, the organization can be thoughtful about how to make healthy lifestyle more habitual and sustainable for their clients

Joslin Diabetes Center aggregates diabetes care into a single location to streamline management

| Population | Program Summary | Funding Model | Impact and Reach |
|--|---|---|---|
| U.S. diabetes patients | Aggregated diabetes care into one location to improve management | Non-profit: Reimbursements from insurance and Medicare, as well as funding from government and NPOs for research | Decreases late-stage blindness from 60% to 1% and lowers annual monetary impact on health care |
| <p>Countries: Developed – United States</p> <p>Population: Diabetic patients</p> | <p>Overview: Joslin reorganized diabetes care interventions so that patients meet in single appointments with teams of medical specialists to help them better treat and manage their conditions</p> <p>Services:</p> <ul style="list-style-type: none"> • Diabetes management classes and check-ups • Inpatient services, such as special testing and surgeries, provided through partnerships with local providers (e.g., Harvard Medical and Beth Israel Medical Center) <p>Partners: Harvard Medical and Beth Israel Deaconess Medical Center research services (services), National Institute of Diabetes and the NIH (funding)</p> | <p>Funding Model: The Center is reimbursed in fixed amounts by insurance and Medicare for providing care and also receives funding from governmental agencies and non-profits for research</p> <ul style="list-style-type: none"> • Joslin ran at a \$1M net loss in 2012 due to low payments from insurance. It relies on investment income and contributions to fund remaining costs <p>Scalability: This expensive model, requiring access to an array of specialists and their own facilities, is difficult to scale</p> | <p>Reach:</p> <ul style="list-style-type: none"> • Joslin currently has 26 centers across the US, spanning 14 states <p>Impact:</p> <ul style="list-style-type: none"> • Joslin's early intervention program decreases late-stage blindness from 60% to ~1% • Joslin has an average annual reduced monetary impact on health care system of \$430 per new patient with multiple visits in the first year |



Key Takeaways:

- **Aggregating care services can increase convenience and drive innovation:** Bringing together care services into one location for diabetes patients improves coordination and convenience for patients
- **Receiving insurance coverage as an innovative model is challenging:** Innovative care methods are often expensive and not fully covered by US insurance payments: as of 2008, only 61% of the cost of care were covered by current reimbursements

Remote Area Medical (RAM) operates mobile clinics to bring health services to rural populations

| Population | Program Summary | Funding Model | Impact and Reach |
|---|--|---|--|
| <p><i>Rural U.S. underserved populations</i></p> | <p><i>Mobile medical care clinics providing general care to isolated and impoverished communities</i></p> | <p>Non-profit: <i>Partnerships with local health organizations and external donations</i></p> | <p><i>Provided over \$12M worth of care across 52,000 patient encounters</i></p> |
| <p>Countries: Developed – United States</p> <p>Population: Underserved, rural populations</p> | <p>Overview: RAM provides health services through mobile clinics in underserved, isolated, or impoverished communities. RAM established the first mobile clinics in the USA.</p> <p>Services:</p> <ul style="list-style-type: none"> • Mobile clinics with general medical, dental, vision, and preventative care • Health education programs • Veterinarian services <p>Partners: Partners with permanent clinics in Kentucky, California, Oklahoma, Virginia, and Guyana</p> | <p>Funding Model: Clinics are all supported by donations, as no fee is charged to individuals seeking services</p> <ul style="list-style-type: none"> • To fund and staff clinics, RAM establishes partnerships with local health organizations to leverage existing community services and capabilities <p>Scalability: The RAM model runs entirely on donations, and is therefore not a financially sustainable model. However, they have operated successfully for 15 years on donations, driven by both effective spending and local partner support</p> | <p>Reach:</p> <ul style="list-style-type: none"> • RAM holds 18 free mobile health clinics around the U.S. every year in order to provide free medical treatment to thousands of underserved Americans • In 2013, RAM served 32,000 patients through 52,000 patient encounter <p>Impact:</p> <ul style="list-style-type: none"> • No publicly available information on the intervention's health outcomes • However, in 2013, RAM provided \$12M worth of medical care |



Key Takeaways:

- **Bringing care to underserved populations can be achieved through mobile clinics:** RAM served over 30,000 patients through mobile clinics in 2013 alone
- **Establishing short term partnerships with health service providers is possible:** Through RAM only makes short visits to rural communities, their partnerships in each location helps improve service delivery and allow for a sustainable model without charging patients for services

International Partnership for Innovative Health Care Delivery helps successful innovators scale to increase access to quality health care

| Population | Program Summary | Funding Model | Impact and Reach |
|--|---|---|--|
| <i>Non- Profits and For-Profits in health care</i> | <i>Partners with health care organizations and businesses to help replicate existing inventions and scale up these proven models</i> | Not-for-profit organization: <i>Funded by donors and hosted by Duke University</i> | <i>IPIHD network includes over forty award-winning innovators</i> |
| <p>Country: Developing or developed – country varies by innovator</p> <p>Population: Innovators increasingly focus activity among low- and middle income countries in both urban and rural areas</p> | <p>Overview: IPIHD aims to increase access to affordable care by allowing successful innovators to scale to high demand networks by providing funding, consulting support, and a community of comparable peer organizations</p> <p>Services:</p> <ul style="list-style-type: none"> • Connects innovators to industry partnerships (e.g., Aetna, Pfizer, Glaxo Smith Kline, Robert Wood Johnson Foundation) • Enables mentoring support, equivalent to \$10,000 of services per year • Provides a networking forum with potential investors and policy makers alike via peer learning groups and the IPIHD Annual Forum <p>Partners: Duke Medicine, WEF, McKinsey, etc.</p> | <p>Funding Model: Receives financial and in-kind resources from corporations and foundations</p> <ul style="list-style-type: none"> • Founded by Duke Medicine, the World Economic Forum and McKinsey & Company • Key partner of the Social Entrepreneurship Accelerator at Duke University, a USAID-funded program <p>Scalability: The model has some limitations to sustainability because it is entirely funded by donors. However, the model is scalable, as it can quickly add new models to the network</p> | <p>Reach:</p> <ul style="list-style-type: none"> • Since 2011, IPIHD has grown from supporting five innovators to almost forty innovators • Innovators operate in over 48 countries around the world • Funding partners increased by 60% in the past year and the community member network increased by 54% <p>Impact:</p> <ul style="list-style-type: none"> • IPIHD has used its network, funders and partner to help channel more than \$1.5 million in funding to innovators |



Key Takeaways

- **Non-profits and for-profits can effectively come together into learning networks if the incentives for participation exist:** IPIHD has created a forum that provides enough value to for-profit companies that they are willing to share their experiences with other health organizations, even at the risk of a potential competitive disadvantage
- **Private, public, and donor organizations are interested in tapping into and establishing partnerships with health innovator networks:** Partnerships allow for organizations to tailor programming and funding to existing health innovation best practices rather than dedicate resources to less mature solutions

ClickMedix connects patients across the world with highly-trained providers

| Population | Program Summary | Funding Model | Impact and Reach |
|--|---|--|--|
| <p><i>Underserved Patients Across the World</i></p> | <p><i>Smart-phone-enabled telehealth platform that connects remote patients to medical providers</i></p> | <p><i>For-profit: Patients pay membership fees</i></p> | <p><i>Pilot programs have been deployed in 16 countries, allowing doctors to increase patient volumes 4-10x</i></p> |
| <p>Countries: Developing and Developed - Bangladesh, Chile, China, Ghana, Peru, Guatemala, India, Mexico, Philippines, Taiwan, Trinidad & Tobago, Egypt, Uganda, Haiti, Botswana, USA</p> <p>Population: Underserved</p> | <p>Overview: ClickMedix provides telehealth services to rural communities. Health workers or nurses serve as the liaison between remote doctors and patients, enabling patients access to highly-trained physicians they would not otherwise have contact</p> <p>Services:</p> <ul style="list-style-type: none"> • Remote consults and medical advice • Direct medical treatment through in-person health workers <p>Partners: NGOs, Medical Schools and Hospitals, and Government Agencies</p> | <p>Funding Model: ClickMedix has a membership payment model that is tailored based on the customized needs and uses of the product. Select programs for specific health needs have been funded by private stakeholders or governments and/or philanthropists</p> <p>Scalability: The technology component of ClickMedix can be easily scaled. However, the necessity of physicians in the model may create barriers to scale</p> | <p>Reach: Programs have been piloted in 61 clinics and hospitals, by 3 governments, 10 research institutions and medical schools, 4 NGOs, and 4 multi-national corporations</p> <ul style="list-style-type: none"> • Over five years, the program has reached a population of over 700,000 individuals <p>Impact:</p> <ul style="list-style-type: none"> • No publicly available information on the intervention's health outcomes • However, through ClickMedix, doctors are able to increase their patient volume 4-10x because of the assistance of health workers |



Key Takeaways:

- **Interventions can be integrated into the existing health system:** The product is used as a tool to improve and facilitate care where there is already an infrastructure in place. The program enables specialists to have a farther reach and increase the volume of patients they can treat
- **Expanding telehealth solutions may be challenging:** Though the ClickMedix telehealth software is easily scalable, the necessity of physician interaction with each patient requires that physician staff increase along with patient demand, potentially slowing scale
- **Establishing flexible and customizable solutions can increase uptake:** The program can be used to address various health issues, depending on what is most pressing in that region

CommCare is a mobile platform that allows the collection of field data collection on mobile devices

| Population | Program Summary | Funding Model | Impact and Reach |
|---|--|--|---|
| <p><i>Mobile workforces</i></p> <p><i>Countries:</i> Developing and developed- A number of projects are focused in India, US, Tanzania, and Zambia</p> <p><i>Population:</i> Information platform intended to service mobile workforces</p> | <p><i>Platform to collect field data on mobile devices</i></p> <p><i>Overview:</i> CommCare is a mobile tool used to collect, track, and visualize health data in real time</p> <ul style="list-style-type: none"> All data collected with CommCare Mobile is sent over a cellular data network to a HIPAA-compliant server, CommCareHQ In the case that data is not available, information is saved on the worker's phone <p><i>Example Project:</i> Tanzania – The CommCare module brought CHWs through key points of identifying and responding to signs of neonatal distress. It also provided guidelines and educational aids that promote simple hygiene and preventive care to reduce infections such as infected cord stumps, pneumonia, and tetanus</p> <p><i>Partners:</i> BMGF, UN Foundation, USAID, Microsoft Research, HP, Vodafone Foundation, and IDRC</p> | <p><i>For-profit: Fee-based system for software and services</i></p> <p><i>Funding Model:</i> Organizations obtain the CommCare software and services through a fee-based system. For select projects, CommCare will receive funding from foundations or other donors</p> <p><i>Scalability:</i> CommCare and CommCareHQ are digital technology platforms that can be quickly catered to different client needs, making them highly scalable</p> | <p><i>175 active projects across 30 countries</i></p> <p><i>Reach:</i></p> <ul style="list-style-type: none"> Currently operating in 30 countries across 4 continents with 175 active projects <p><i>Impact:</i> Select project -</p> <ul style="list-style-type: none"> The computer science department of the University of Washington conducted a trial study on the use of SMS reminders to health workers to encourage them to visit their clients on schedule. The reminder system improved timeliness of visits by 85% |



Key Takeaways:

- Ensuring data compliance is critical:** To operate as a patient medical record database, systems must be compliant with local regulations (e.g., CommCare is HIPAA-compliant)
- Catering technology to developing markets is imperative:** To be effective, technology must still function outside of mobile cell service areas to account for limited connectivity that can be commonplace in developing markets
- Opportunity to leverage existing technology solutions:** Products such as CommCare exist that can be purchased and used by CommCare partners, including RF or other organizations

Appendix

Appendix Executive Summary

- The Appendix includes additional research findings and studies regarding health care in Wisconsin, other states, and the landscape of other health care programs and factors to provide a broader perspective on the industry
- The Additional Studies & Findings section provides additional data points and research on general health care in Wisconsin
- The State-Specific Findings section provides top statistics and rankings for Colorado, Massachusetts, Minnesota, North Carolina, and Washington and detailed information regarding some health care offerings in Kentucky, Michigan, Minnesota, Oregon, and Washington for a general understanding of the health care sponsored programs in other states
- The Additional Health Care Research section includes supplemental research on Telehealth factors and programs, the digital technology landscape, wellness programs, and technology solution models demonstrating their integration within the health care industry

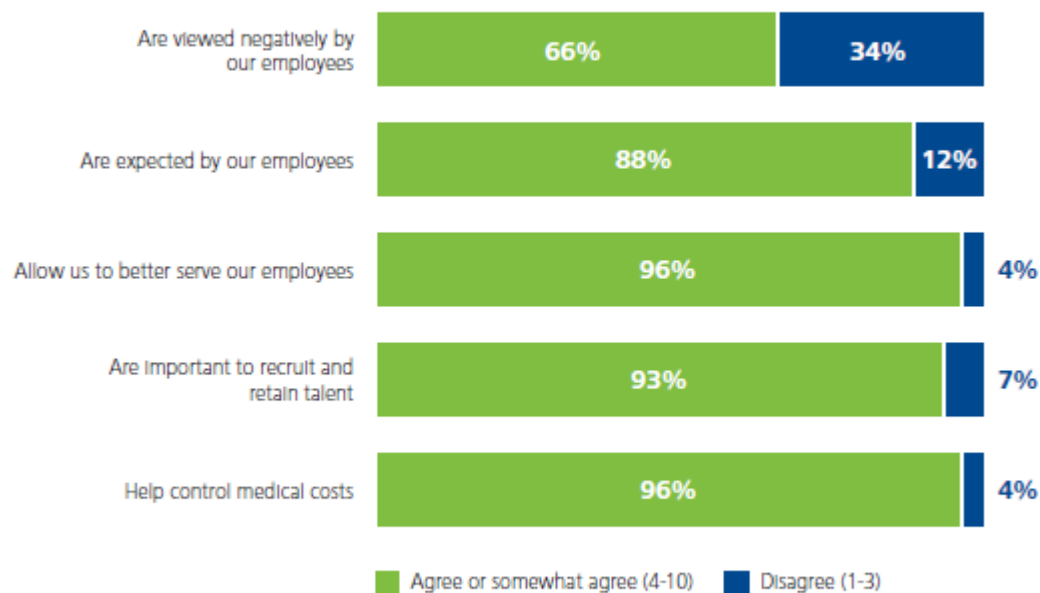
Additional Studies & Findings

Benefits of Population Health for Employers

Studies have shown that improved population health translates to reduced costs for employers, making a healthy community more attractive to businesses

Employees Perception of Employer Wellness Programs

Please indicate your level of agreement with the following statements. Employer health offerings, such as wellness and disease management programs...



Responses based on a scale of 1 to 10 where 1 is "totally disagree" and 10 is "totally agree."
Source: Deloitte Center for Health Solutions: 2015 Survey of US Employers

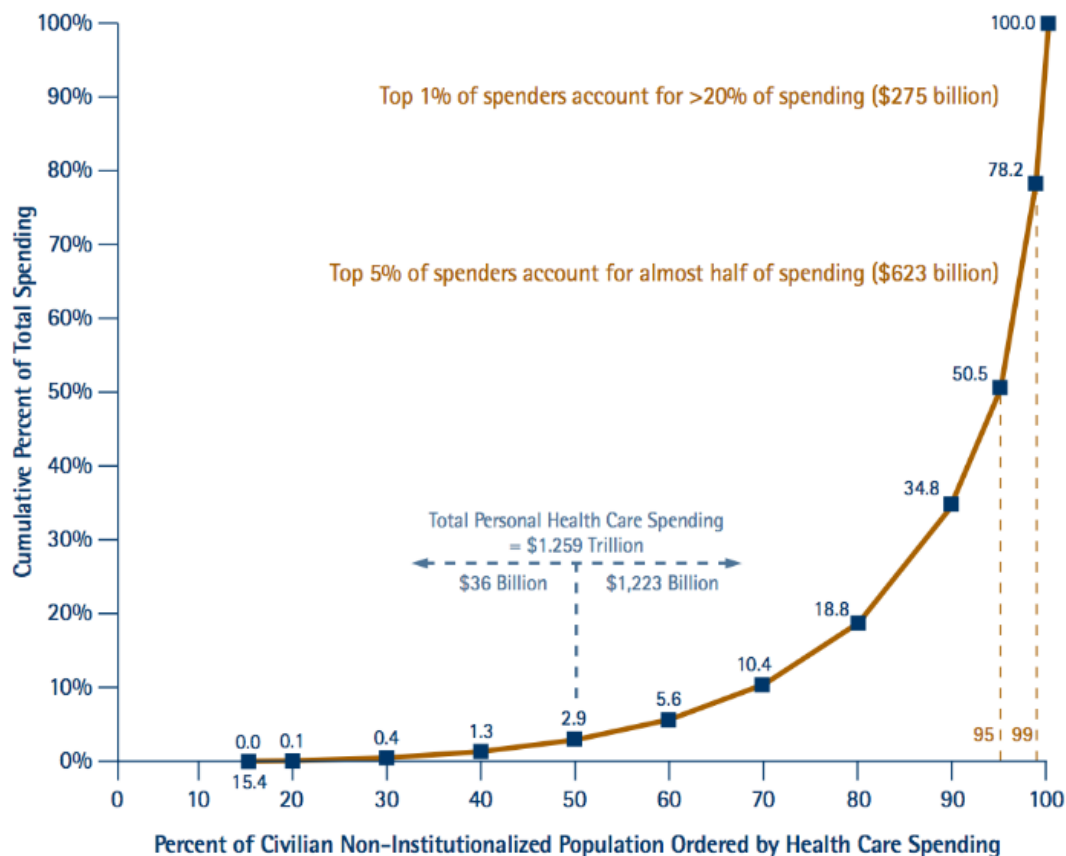
Findings

- Almost all surveyed employers (96%) agree or somewhat agree that wellness programs help to control medical costs
- One study examining absenteeism and presenteeism (performance of workers) among 50,000 workers at 10 companies shows that lost productivity costs are 2.3 times higher than medical and pharmacy costs
- Employees with multiple chronic health conditions have been shown to be particularly vulnerable to productivity loss
- Medical costs fall about \$3.27 for every dollar spent on wellness programs, and absentee day costs fall by about \$2.73 for every dollar spent.¹

Health Spending

Focusing on improving the health of the top 5% of spenders would address almost half of the health care spend

Health Care Spending Distribution



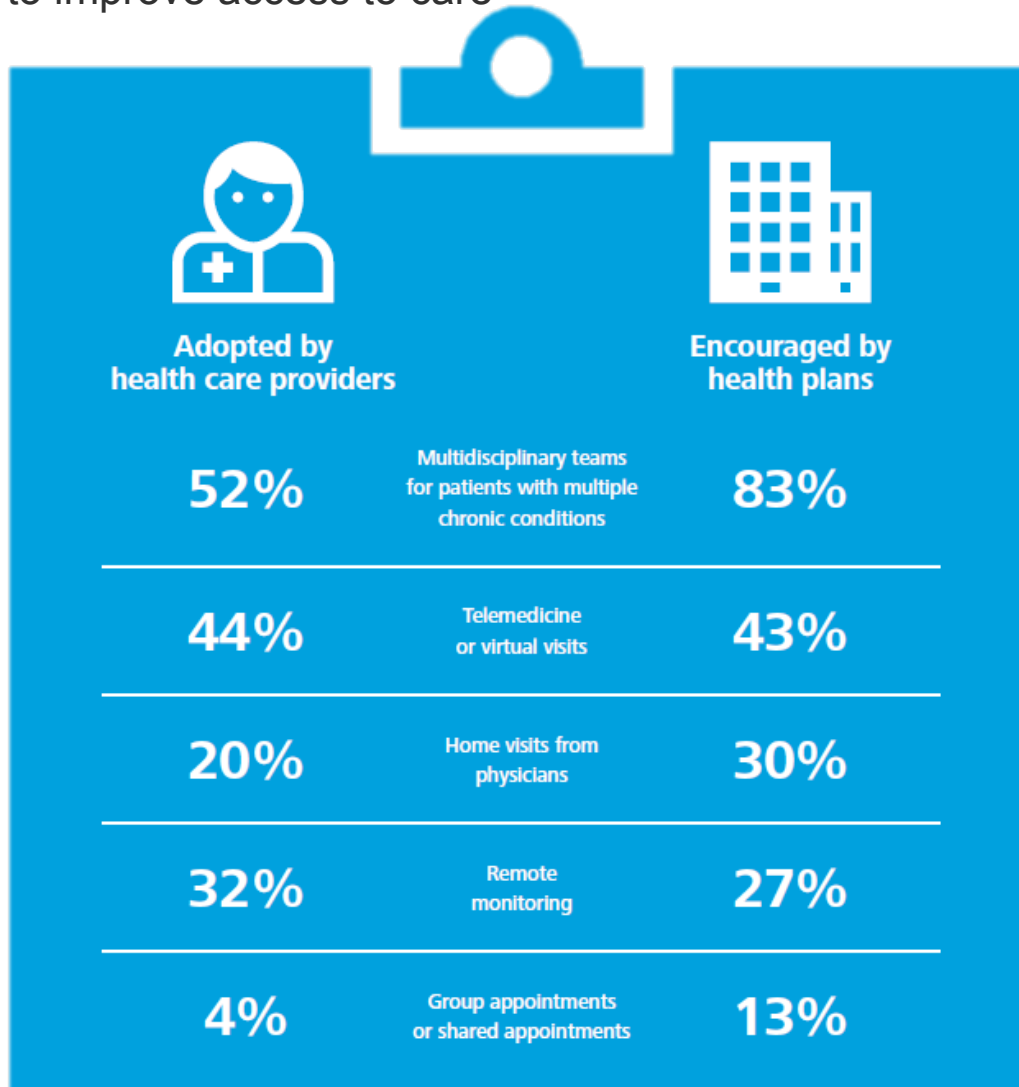
Observations

- Estimated half of health spending in 2009 (\$623 billion) went towards 5% of the population who use \$40,000 of health care annually (known as “Super utilizers”) compared with \$236/ person for the lower-spending half¹
- “Super-utilizers” may exhibit the following characteristics:
 - Have complex care needs
 - Take multiple prescription drugs
 - Visit the hospital multiple times per year
 - Have non-clinical complications due to various factors (e.g., unstable housing, employment, food and transportation and interaction with the criminal justice system)
 - Visit emergency departments and inpatient services which could have been prevented with proper home and community-based interventions

“The vast majority of factors that contribute to health and well-being are socioeconomic and behavioral in nature.” – National Governors Association

Access to Care – Innovative Care Delivery

A recent Deloitte study showed opportunities to increase adoption of innovative care delivery to improve access to care

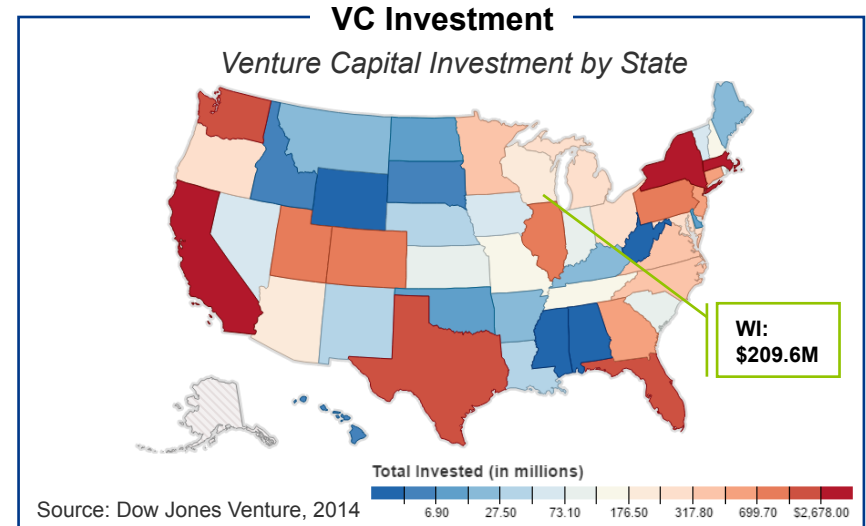
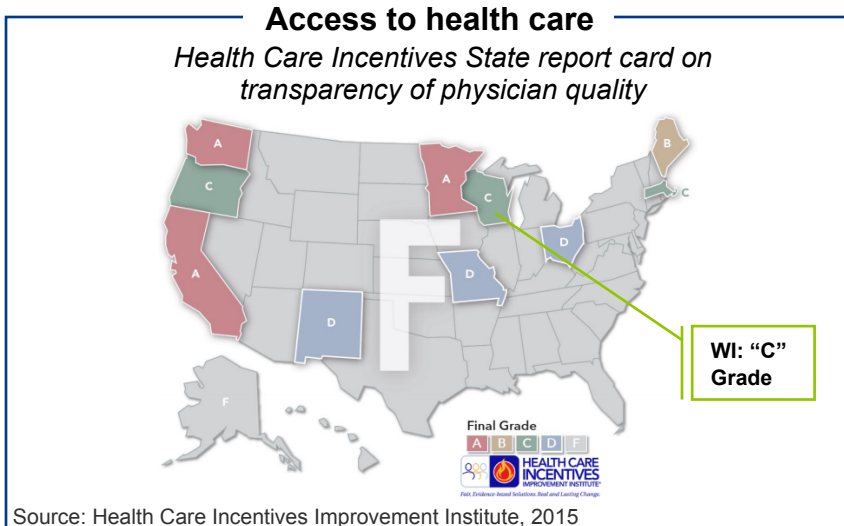
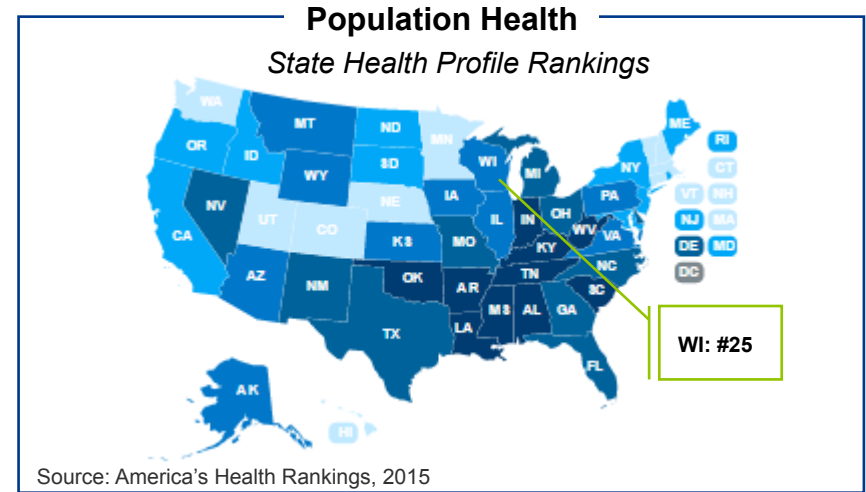
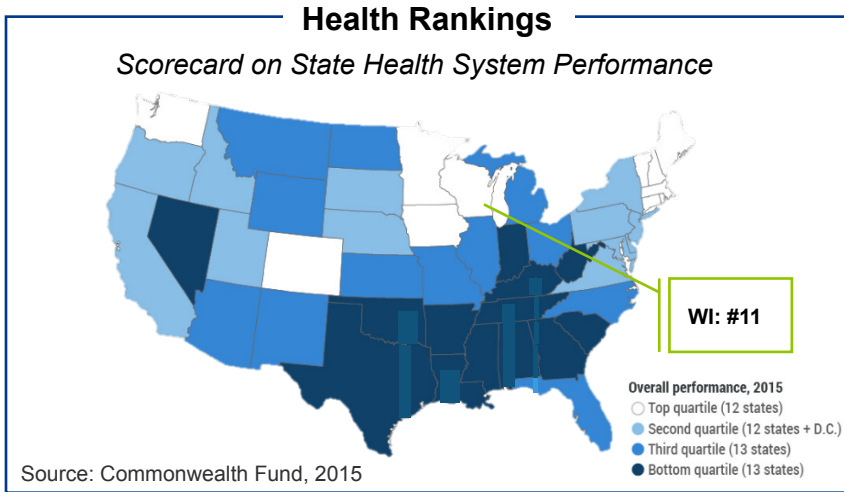


Survey Findings

- While many health plan respondents (77 percent) think that Value Based Care creates opportunities for clinical innovation that improves access to care at the right time and the right place, provider respondents are less likely to think so (40 percent), and our study found little evidence of provider-based innovation thus far.
- In-depth conversations with health plan executives point to several clinical areas where plans have invested or plan to invest: care in the home, medication therapy management (MTM), end-of-life care, and behavioral health.
- Because health plans' efforts are in the early stages of planning or implementation (except for MTM, which is more common), we did not observe widespread adoption of clinical innovation.
 - Most health plan respondents (83 percent) are actively encouraging providers to take a multidisciplinary approach to care but half of providers (52 percent) indicate they have adopted this.
 - 43% of health plans encourage and 44% of providers use telemedicine or virtual visits
 - Other forms of innovation, such as home visits, remote monitoring, and group appointments, are less common
 - Reimbursement methodologies may not be keeping pace with new types of clinical activities, slowing their adoption

State Comparisons

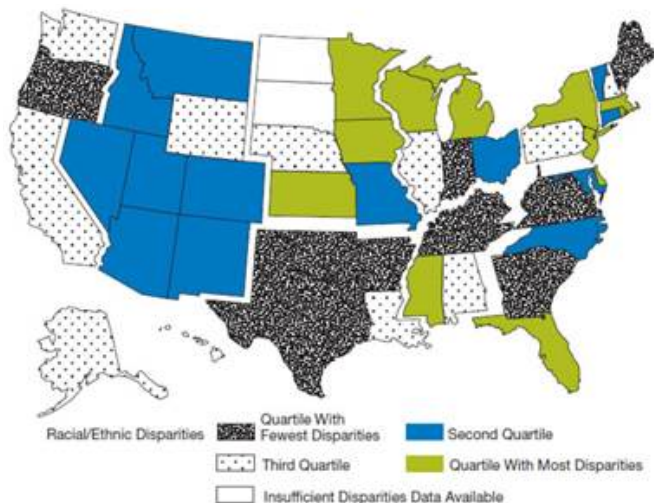
Wisconsin scores well in national health system rankings but can improve on population health and investment



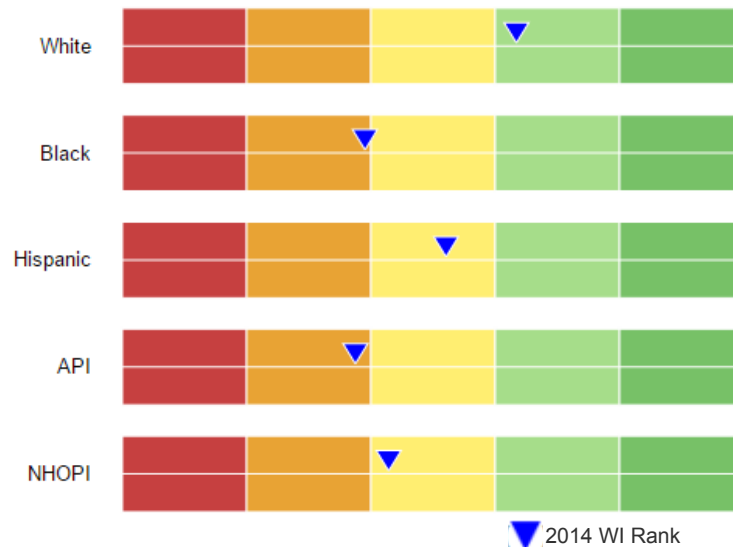
Minority Access to Healthcare

Workshop feedback and studies revealed disparities in certain demographics

Minority Healthcare Disparity



WI Healthcare Access Rank by Race



- Despite high ranking in overall quality of health, Wisconsin ranks in the bottom quartile in **disparity** of health between racial/ ethnic minorities¹
 - Lack of diversity in the provider community to mirror the patient base

- Wisconsin ranks below the national average in terms of minority access to care, particularly for Black and Asian and Pacific Islander populations
 - Particularly related to adequacy of access to prenatal, cardiac, and preventable disease care

State Agencies Influencing the Health Care Sector

Several agencies are key contacts for Wisconsin to drive change in the health care sector

| State Agency | Authority | Relevant Intersections |
|--|--|---|
| Department of Public Instruction | <ul style="list-style-type: none"> Administers state education programs from pre-kindergarten to postsecondary | 2. Technology Investment 4. Industry Engagement & Collaboration 6. Workforce Development & Training 7. Workforce Attraction & Retention |
| Department of Health Services | <ul style="list-style-type: none"> Administers Medicaid and the State Children's Health Insurance Program, including BadgerCare Plus, SeniorCare, and Family Care Manages direct payment, prior authorization, utilization management for health care providers and indirectly through contracts with managed care plans Oversees state mental health institutions, public health, and behavioral health programs | All intersections |
| Housing and Economic Development Authority | <ul style="list-style-type: none"> Administers zoning regulations Administers community design regulations, such as school siting and green space | 3. Infrastructure Development 5. Community Education & Prevention 7. Workforce Attraction & Retention |
| Department of Administration | <ul style="list-style-type: none"> Administers state benefit packages, including Workers' Compensation | 5. Community Education & Prevention |
| Department of Public Safety | <ul style="list-style-type: none"> Administers law enforcement practices and programs Grants licenses to health care providers to practice in Wisconsin | 4. Industry Engagement & Collaboration 5. Community Education & Prevention 6. Workforce Development & Training 7. Workforce Attraction & Retention |
| Department of Children and Families | <ul style="list-style-type: none"> Administers Supplemental Nutrition Assistance Programs (formerly called Food Stamps); Women, Infants, and Children (WIC); and other food programs Administers and monitors child care programs Administers income support and children's services | 5. Community Education & Prevention |
| Department of Transportation | <ul style="list-style-type: none"> Provides transit system and roadway infrastructure to access rural communities | 3. Infrastructure Development 6. Workforce Development & Training 7. Workforce Attraction & Retention |
| Department of Workforce Development | <ul style="list-style-type: none"> Responsible for Vocational Rehabilitation that funds efforts to move individuals with injuries and disabilities into employment | 6. Workforce Development & Training 7. Workforce Attraction & Retention |
| Department of Employee Trust Funds | <ul style="list-style-type: none"> Contracts with health plans (that pay health care providers) for the health care services provided to state and local employees and retirees | 4. Industry Engagement & Collaboration |

State-Specific Findings

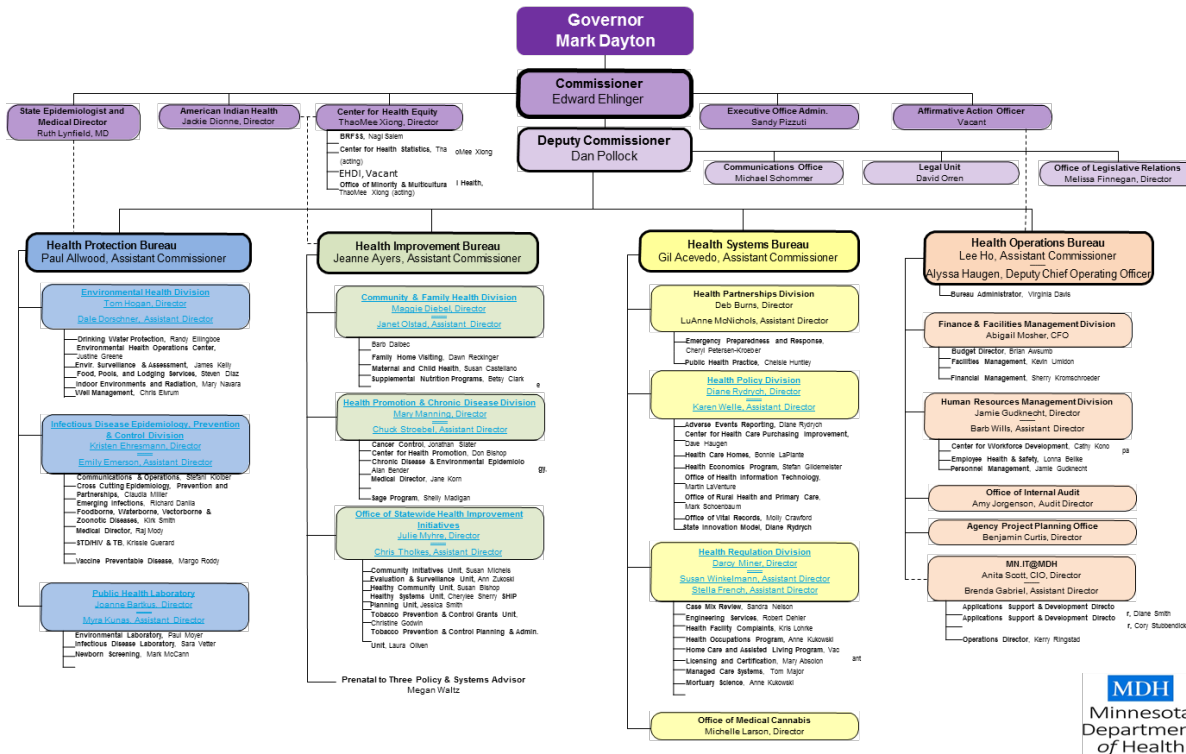
Health Care Rankings in Other States

Some states have experienced significant improvement in national rankings and can be leveraged for best practices

| State | 2015 Health Care Rankings |
|----------------|---|
| Minnesota | <ul style="list-style-type: none"> ▪ #4 in America's Health Rankings of State Community Health ▪ #1 in Commonwealth Fund of State Health Systems ▪ #5 in National health care Quality and Disparities Report ▪ \$434.9M capital raised for health-tech in MN in 2015¹ ▪ #4 for VC funding for digital health investment in 2015² |
| Massachusetts | <ul style="list-style-type: none"> ▪ #3 in America's Health Rankings of State Community Health ▪ Top funded state by the Innovation Center of the Centers for Medicare & Medicaid Services ▪ #2 largest funding from NIH in 2015 (\$1.0B) ▪ \$4.1B in VC funding for digital health in 2014³ ▪ #4 in Commonwealth Fund of State Health Systems ▪ #4 in National health care Quality and Disparities Report |
| North Carolina | <ul style="list-style-type: none"> ▪ Improved from #37 in 2014 to #31 in 2015 on the America's Health Rankings, the biggest improvement seen in 2015 ▪ Top funded state by the Innovation Center of the Centers for Medicare & Medicaid Services ▪ #4 largest funding from NIH in 2015 (\$412M) |
| Washington | <ul style="list-style-type: none"> ▪ Improved from #13 in 2014 to #9 in 2015 on the America's Health Rankings ▪ Moved to the top quartile in Commonwealth State Health Systems Ranking in 2015 ▪ #8 largest funding from NIH in 2015 (\$365M) ▪ #5 largest VC funding in 2014 (\$1.3B) |
| Colorado | <ul style="list-style-type: none"> ▪ #8 in America's Health Rankings of State Community Health ▪ #4 in 2015 for start up activity by the Kauffman Index⁴ |

Minnesota Healthcare Innovation

Minnesota has several dedicated bureaus and staff focused on improving health care



- In February 2013, the Center for Medicare and Medicaid Innovation (CMMI) awarded Minnesota a State Innovation Model (SIM) testing grant of over \$45 million to use across a three-year period ending October 2016
- As a joint effort between the Department of Health (MDH) and the Department of Human Services (DHS) with support from Governor Mark Dayton's office, Minnesota will use the grant money to test new ways of delivering and paying for health care using the Minnesota Accountable Health Model framework
- The goal of this model is to improve health in communities, provide better care, and lower health care costs

Washington Population Health Prevention Framework

The Prevention Framework is used as the foundation for the Washington plan to improve population health

| |
|--|
| VISION: The people of Washington embrace and sustain a culture of health. |
| GOAL: The people of Washington will be healthier at every stage of life. |
| PRINCIPLES: Alignment Balance Collective Action Health Health Equity Participation Quality |
| OBJECTIVES: <ul style="list-style-type: none">• By 2019, Washington State will increase the proportion of the population who receive evidence-based clinical and community preventative services that lead to a reduction in preventable health conditions.• By 2019, Washington State will increase the proportion of the population with better physical and behavioral health outcomes by engaging individuals, families, and communities in a responsive system that supports social and health needs.• By 2019, Washington State will increase the number of communities with improved social and physical environments that encourage healthy behaviors, promote health and health equity.• By 2019, Washington State will increase the number of integrated efforts between public health, the health care delivery system and systems that influence social determinants of health to lower costs, improve health, improve the experience of care and contribute to the evidence-base. |
| PRIORITY: <p>Prevention & management of chronic disease and behavioral health issues.</p> <p><i>Initial areas</i></p> <ul style="list-style-type: none">• Cardiovascular disease and diabetes• Healthy eating, active living, tobacco-free, and obesity prevention• Mental illness, substance abuse/use• Trauma-informed practices |
| STRATEGY: <ol style="list-style-type: none">1. Engage and influence health and other systems to improve health, reduce cost and improve experiences for those who use and provide services that support health.2. Align funding and resources to incentivize prevention and health improvement.3. Engage and activate people, communities and systems to create and foster health promoting environments. |

Oregon Health Care Improvement Strategy

Oregon's health care collaboration identified goals needed to achieve Triple Aim which integrates population health, experience of care and cost

Goals for Achieving Triple Aim

1

Provide a better future for today's kids by investing in the health of future generations

2

Ensure access to high quality care

3

Promote integration and holistic care

4

Reduce costs and make health care sustainable



Michigan National Quality Strategy

Michigan engaged various stakeholders to align their quality strategy with the National Quality Strategy (NQS) as outlined by the Department for Health and Human Services (HHS)



Sample Project:

Michigan Keystone Intensive Care Unit Project

Problem:

Nearly one in every 20 hospitalized patients in the United States each year acquires a healthcare-associated infection while receiving medical care. Central intravenous line associated blood-stream infections are one of the most deadly types, with a mortality rate of 12 to 25 percent

Solution:

In this AHRQ-funded project, a research team at Johns Hopkins University partnered with the Michigan Health and Hospital Association to implement CDC recommendations to reduce central line blood stream infections in 100 intensive care units throughout the State

Successes:

The initiative, known as the “Keystone Project,” reduced the rate of these central line bloodstream infections by two thirds within 3 months. Over 18 months, the program saved more than 1,500 lives and nearly \$200 million. These dramatic improvements have been sustained for 5 years and the approach used is now being spread to all 50 States and the District of Columbia

Kentucky Technology Innovation Summit

Kentucky hosted a technology innovation conference to evaluate the best innovative strategies for development of the State Health System Innovation Plan

Conference Goals

1

Identify current challenges to health system innovation in Kentucky

What has impeded Kentucky from using innovative technologies to improve health care delivery within the current system?

2

Develop an inventory of existing innovations linked to population health and increasing access to care

What technologies are currently available for different types of stakeholders (e.g., providers, consumers, payers, etc.) that can help to drive improvements in health outcomes?

3

Determine methods for improving population health, improving care, and decreasing costs using innovative technologies

What types of new technologies, such as mobile and technology that supports consumer engagement, can support the Commonwealth in its effort to transform health care delivery?

4

Create opportunities for synergy and collaboration with other innovators in Kentucky

How can businesses, providers, consumers, and other stakeholders work together to accelerate the advancement of health care innovation in Kentucky?

Attendees

- Consumers
- Advocacy Groups
- Providers
- Payers
- Governmental agencies
- Academic Institutions
- Venture capital
- Private equity
- Foundations and institutions
- Technology companies
- Care management organizations

Results

- The innovation conference hosted 500+ entrepreneurs, educators, and investors
- The conference included panel discussions with prominent guests, as well as an Innovation Competition and Innovation Spotlights from health tech startups from around the world
- Additionally, the conference included a start-up pitch event that supported collaboration between providers, innovators, and investors

Additional Health Care Research

Telehealth and Diagnostics: Success Factors and Potential Challenges

Research identified critical success factors and challenges for telehealth management

Key Success Factors

Appropriate broadband access and coverage

- All geographies require reliable broadband coverage to ensure access to telehealth and other technology/ web-based services

Establishing training programs that teach local doctors to provide medical care over the phone

- Medical schools both in developing countries and in the West, do not teach telephone-based medicine. Physicians will need to be trained in how phone-based health delivery varies from in-person service
- There's an opportunity to demonstrate the effectiveness of telehealth programs to influence local medical schools to incorporate lessons on telehealth into the curriculum

Utilizing telehealth and diagnostic technologies that providers and local workers are comfortable with

- The BuddyWorks Community Partnership provided remote telehealth sites with workstations and broadband internet to refer challenging cases to a centralized facility; however, the program was not well adopted because the doctors were not familiar with the technology
- When the workflow was revised to allow doctors to respond via SMS, which they were more familiar with, uptake increased to over 300 referrals from 44 doctors over 6 months

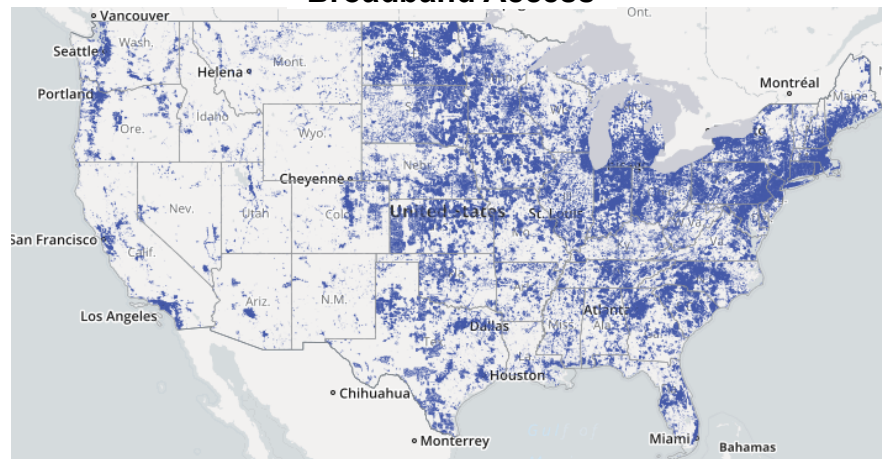
Leveraging diagnostic solutions that can be used by semi-trained workers

- A number of diagnostics exist that do not require significant training to perform (e.g., blood pressure monitoring); identifying innovative diagnostic methods that require minimal training to perform can keep down resource costs while improving access to prevention services

Articulating a clear value proposition for providers

- Telehealth and remote diagnostics can have a strong economic impact on hospital systems, as reduced unnecessary ED utilization and admissions can improve the hospital's bottom line

Broadband Access



Potential Challenges

Maintaining privacy of transmitted health and diagnostic information

- Transmitting patient files via the Internet threatens patient privacy, requiring many telehealth solutions have developed their own regulation-compliant systems
- Non-profits such as the Center for Connected Health are working toward solutions like making Skype compliant with medical codes so that doctors can communicate over the Internet without the liability of breaching doctor-patient confidentiality

Limiting the number of diagnostic screenings and / or patient visits that can be completed due to connectivity issues

- The Opportune Breast Cancer Screening and Diagnosis Program (OBCSDP), a pilot program initiated in rural Mexico to send mammograms to radiologists in cities via the Internet, recognized equipment breakdowns and impossibly slow Internet connections as major impediments. OBCSDP is working to acquire more reliable technologies, and, in the interim, has had to place the image scans on CDs and use ground transportation to deliver them to physicians

Telehealth and Diagnostics: Analogs



Summary

World Health Partners (WHP) uses an integrated intervention process to tackle location-specific challenges (e.g., improving TB diagnosis and treatment in India). *Non-profit, donor-funded*

Swasthya Slate is a device that allows Android tablets and phones to conduct 33 diagnostic tests on the mobile tablet with 99% accuracy in 45 minutes by a semi-trained worker. *For-profit model.*

Medicall Home is a health care company that provides hotline-based services. Users call the hotline to receive telehealth services and can receive at-home doctor visits. *For-profit model.*

Key Insights

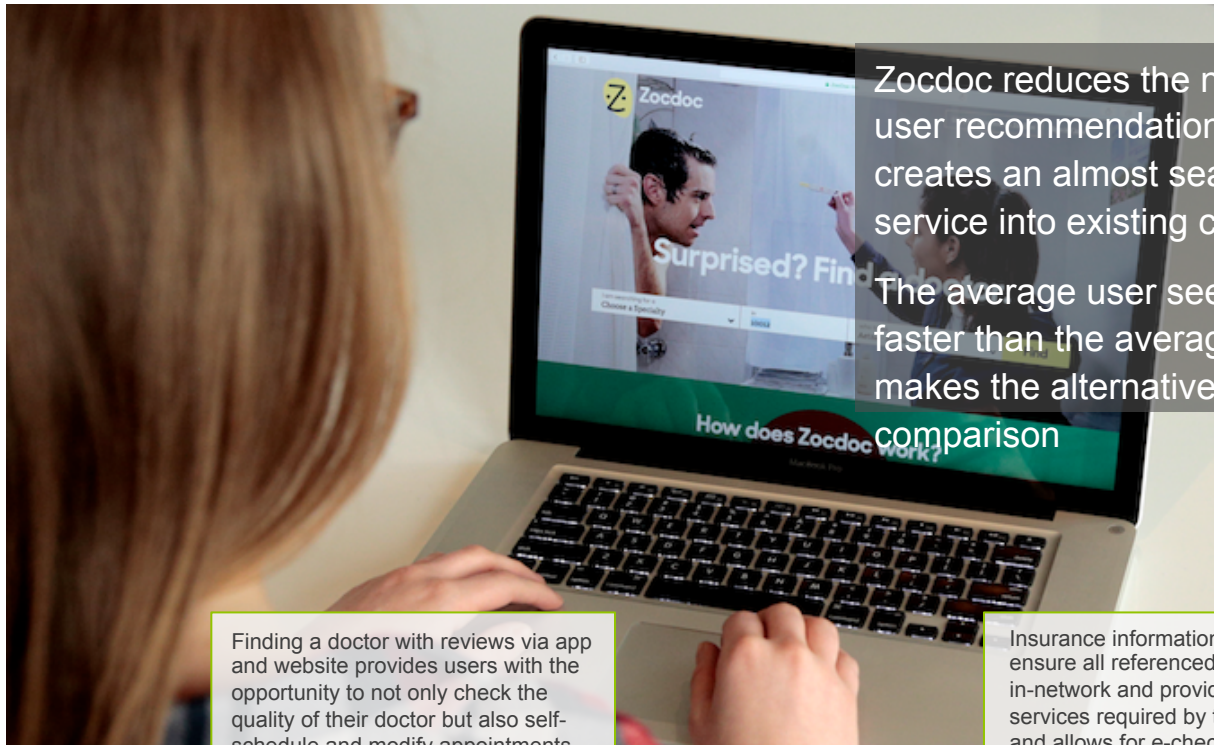
- While WHP has seen success in rural franchises, there appears to be an open opportunity to leverage similar solutions in urban environments in high-traffic areas
- WHP has successfully developed a model in which the first telehealth visit is free and subsequent visits cost a nominal fee, therefore improving sustainability of the model and making these visits “aspirational”

- Swasthya Slate’s geotagged EMR system is verified and sent to local government leaders to influence health policy decisions that address the identified challenges
- The Slate is still in the process of testing across the globe, but its ability to run 33 diagnostic test through a mobile tablet makes it an attractive potential partner for the organization

- Working with mobile phone carriers allowed Medicall Home to gather the \$5 service fee directly from patient’s mobile bills, resulting in improved uptake of services
- By centralizing health product purchasing across 233 cities, Medicall Home is able to negotiate a discount from 5-50%

Digital Disruption of the Provider Landscape

Companies like Zocdoc are driving new business models, enabling technologies, and customer demands that require providers to become swift and agile, but also strategic and methodical in order to keep up with the disruption



Zocdoc reduces the need for decision-making using user recommendations and physician “awards” which creates an almost seamlessly embedding of their service into existing consumer behaviors

The average user sees a doctor with 24 hours – 18x faster than the average traditional appointment and makes the alternative feel clumsy and unreliable by comparison

Finding a doctor with reviews via app and website provides users with the opportunity to not only check the quality of their doctor but also self-schedule and modify appointments hassle-free

Insurance information on file ensure all referenced providers are in-network and provide the services required by the customer and allows for e-check-in and registration

Electronic schedule and physician review reminders and preemptive wellness notifications keep the Zocdoc experience at the top of mind for the customer



Zocdoc

ATTRACT

enter

ENGAGE

exit

EXTEND

Best practices for wellness programs implementation

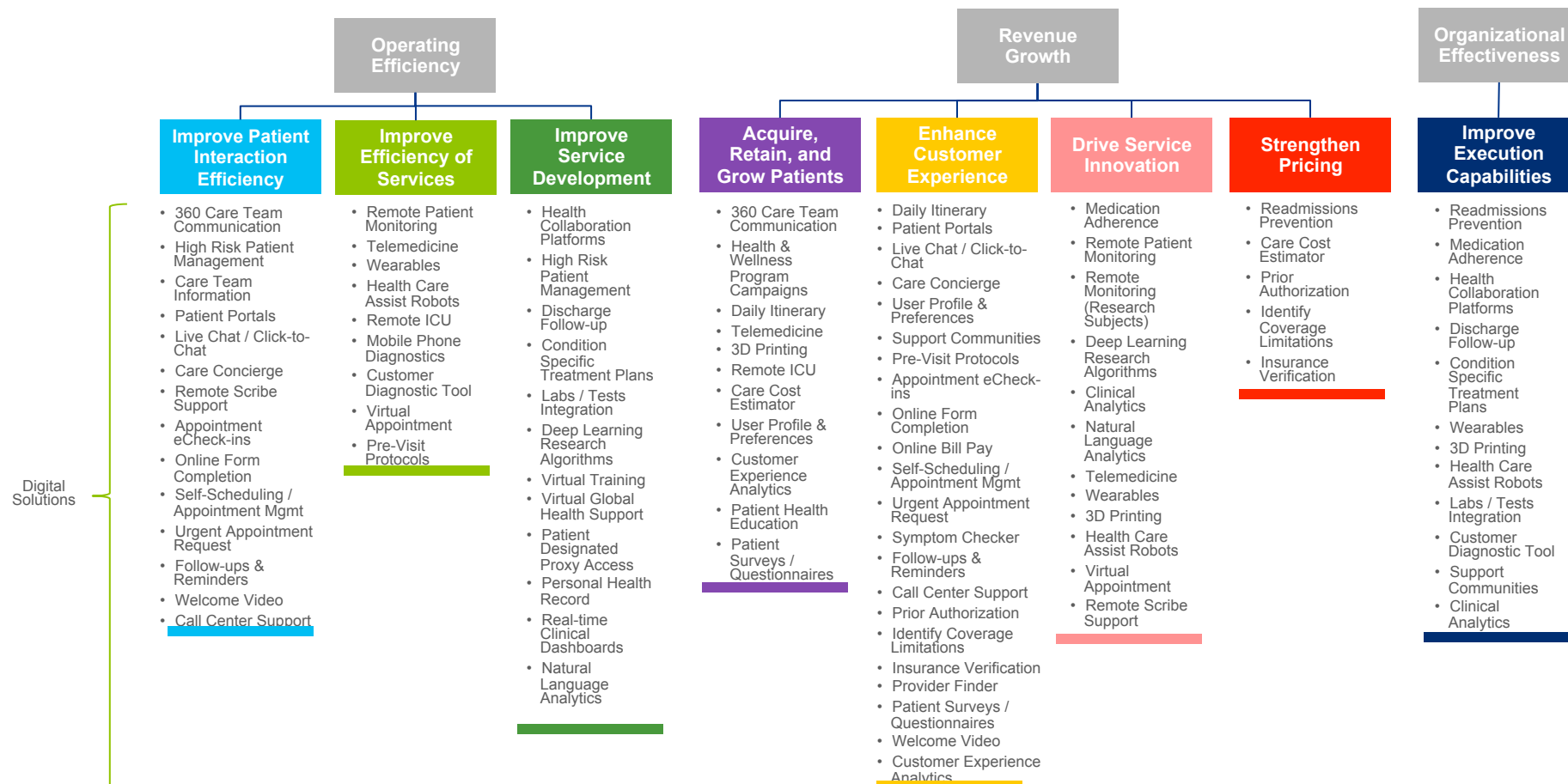
Study conducted by CMS on ongoing wellness program operations and costs to identify best practices and challenges in implementing six wellness programs in ACA priority areas¹

What are the best practices for program implementation and operations and what lessons can be learned from the various programs?

- Large, multi-site implementation coordinators have centralized aspects of workforce management, marketing, fidelity monitoring, and data reporting to create operational efficiencies.
- Small and single-site implementation coordinators maintain smaller staff, with staff members performing multiple implementation tasks and roles.
- Organizations leveraged partnerships with local health systems and universities to recruit leaders and guest experts.
- Health care providers and staff at wellness program workshop locations (e.g., assisted living facilities, senior centers) may effectively identify and refer individuals who may benefit most from wellness programs based on their knowledge of an individual's health status.
- In-person and word of mouth marketing strategies are most effective.
- Organizations are seeking to build strategic partnerships with health care providers to reinforce the legitimacy of the wellness programs and develop possible paths to reimbursement or additional funding streams.
- Organizations use additional services, such as transportation services or translators, to engage harder to reach rural or immigrant populations.
- Spanish language programs were more successful in locations where they were supported by a large Hispanic community, but implementers experienced challenges when the local Hispanic community was small or reluctant to engage with government related programs.
- Participant retention strategies included accurately marketing the programs so that participants are aware of the required commitment, creating a sense of community among workshop participants, minimizing paperwork, and for programs that involve guest experts, marketing the experts as a special event.
- The majority of organizations conduct simple data analyses to support funding requirements and grant applications; however, a few organizations maintain robust data collection and reporting systems.

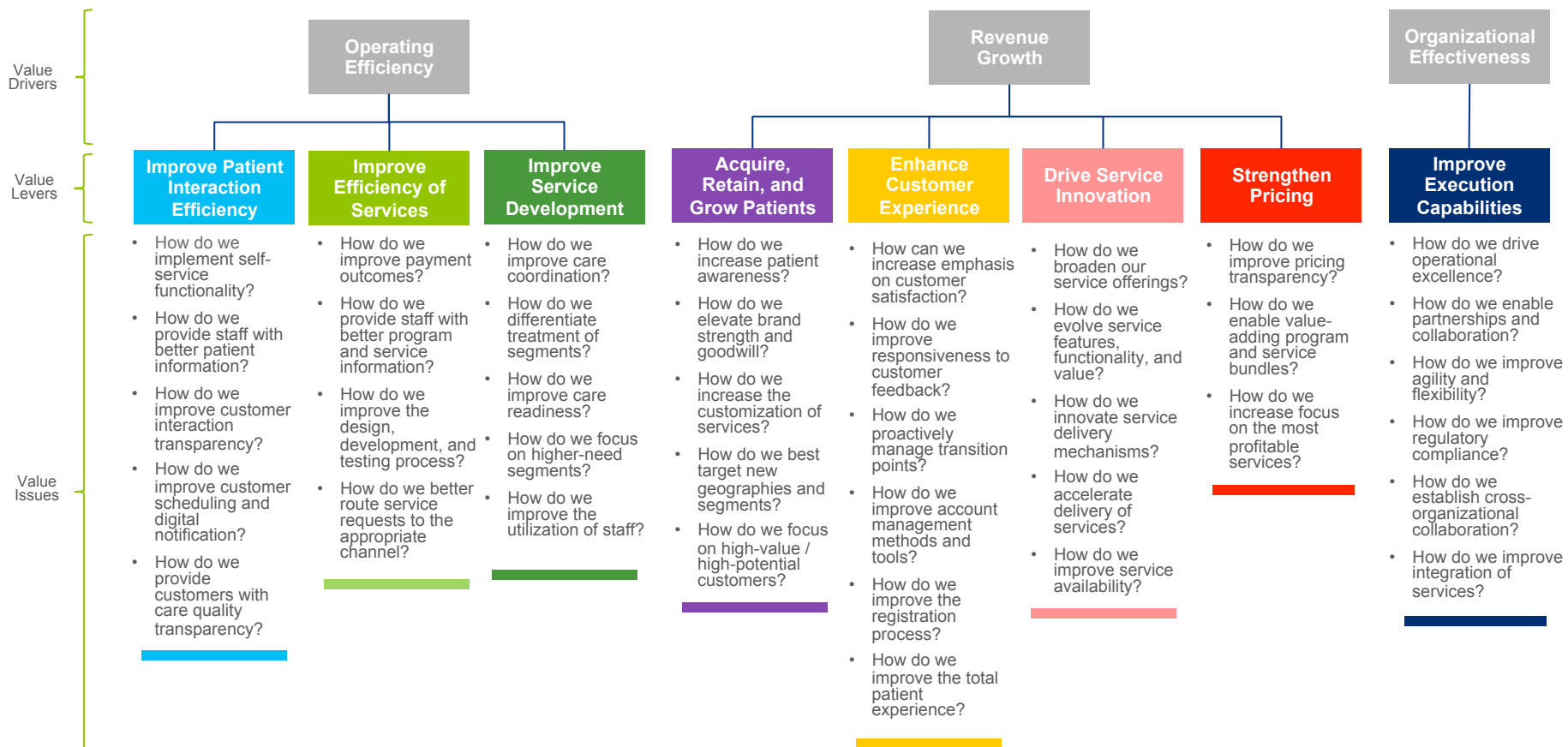
Solutions to Provider Challenges

Technology solutions can be utilized as a component in addressing the issues providers are facing when comprised of a portfolio which aligns properly with the organization and processes in place



Digital Health Issue Architecture

Digital solutions can address a number of values drivers in the health care system, and it is critical to identify and invest efforts in high-value white space opportunities



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