

A Report to the Governor's Health Care Transformation Task Force

November 19, 2007

Benefits of Comprehensive Health Promotion: The Case of Diabetes

Introduction

The factors impacting chronic disease are complex. The spectrum ranges from prevention of risk factors like physical inactivity, poor eating behaviors, smoking, and alcohol use, to preventing additional morbidity, mortality, and costs by providing high quality care to persons with a chronic condition. **Unhealthy days** due to either poor mental or physical health can be used as a *proxy for the direct (medical) and indirect (lost productivity) costs* associated with chronic conditions.

Diabetes is a leading cost driver for health care. The following case study uses diabetes and unhealthy days as a model for chronic disease. We will:

- Describe the populations that are part of the diabetes system in Minnesota.
- Detail key leverage points in the Minnesota diabetes system leading to diabetes-related unhealthy days.
- Highlight the relationship of the Steps to HealthierMN objectives and interventions to the diabetes system.
- Apply the *Task Force* recommendations for obesity reductions to the Minnesota diabetes system and examine the impact on diabetes-related unhealthy days through 2050.
- Apply additional scenarios that address improved care to Minnesotans with diabetes, akin to the Q-Care Initiative, and to Minnesotans with prediabetes and, examine their impact on diabetes unhealthy days.
- Summarize key findings.

Populations

In Minnesota, 224,000 (6%) adults are *diagnosed* with diabetes while 96,000 (2%) remain *undiagnosed*. Another 982,000 (26%) adult Minnesotan have *prediabetes*, a condition that results in high risk for developing diabetes as well as increased risk for cardiovascular and microvascular disease. There are 40,000 Minnesota kids with prediabetes. Minnesotans who are *obese* (24%) are at increased risk of developing prediabetes and diabetes. The direct and indirect costs of diabetes in Minnesota are \$2.3 billion per year.

The *yellow* boxes in **Figure 1** group Minnesotans into normal glucose, prediabetes, undiagnosed diabetes, and diagnosed diabetes. In the diabetes system, people move from normal to prediabetes to diabetes (undiagnosed and diagnosed). The one exception is that Minnesotans with prediabetes can move back to normal glucose levels. Minnesotans who are obese are found in all four groups.

The Leverage Points

The *red* text in **Figure 1** are the key leverage points that drive the diabetes system. These are reducing obesity, identifying Minnesotans with prediabetes and diabetes, appropriate management of Minnesotans with prediabetes, and high quality care management in Minnesotans with diabetes. We have clear evidence that:

- Physical activity and dietary behaviors and policies influence obesity
- In persons with prediabetes, structured lifestyle modification programs can increase physical activity, improve healthy eating, reduce weight and *delay the onset of diabetes by 58%*. These programs also improve lipid and blood pressure levels, reducing risk of heart disease and stroke. With cost sharing, insurers and employers can see a return on investment (ROI) within 3-years.
- In Minnesotans with diabetes, improved blood glucose, blood pressure, lipid control, and appropriate preventive care (e.g. immunizations, eye exams, foot exams, kidney function testing, smoking cessation, and use of aspirin) can reduce cardiovascular disease, visual impairment, amputations, and renal failure *by 40-60%*. These preventive care practices reduce health care costs.

Steps to a Healthier Minnesota: Core Performance Measures

In **Figure 1**, the *blue* text highlights the core performance measures for Steps to a Healthier Minnesota. These are similar to the *Comprehensive Statewide Health Promotion Plan*. The core performance measures either directly impact the leverage points or result from interventions to improve the leverage points, including our ultimate goal of reducing unhealthy days. Decreased hospitalizations in Minnesotans with diabetes is a Steps to a Healthier Minnesota core performance measure. Hospitalizations accounts for 2/3 of direct diabetes health care costs in Minnesota.

Steps to a Healthier Minnesota: Activity Examples

In **Figure 1**, the text in *green* represents several interventions being implemented in the Steps to a Healthier Minnesota communities. These demonstrate how the evidence-based, full spectrum, locally determined approach of Steps can impact all aspects of Minnesota’s diabetes system and its key leverage points. Our current state efforts to reduce the burden and costs of diabetes focus on care delivery and shifting costs of care delivery and improvement. Little is being done to address prediabetes or obesity prevention. Furthermore, the sheer scope of the latter two, each occurring in over 1 million Minnesotans, suggests that efforts to address these populations are urgently needed and should expand well beyond the health care system.

Modeling the Minnesota Diabetes System

What combination of strategies promises to deliver the greatest impact on the burden of diabetes in the short- and long-term future? For the past 2 years, the Minnesota Diabetes Program at MDH has been working with CDC’s Division of Diabetes Translation and national experts in Systems Dynamic Modeling to develop a tool to better understand and address the above question. The tool’s primary purposes are to help decision-makers *better understand what happens* as a result of different actions or policies, but also, and even more importantly, *why it happens*.

Figure 1 provides a top-level view of the framework underlying the tool. Application of this framework is based on:

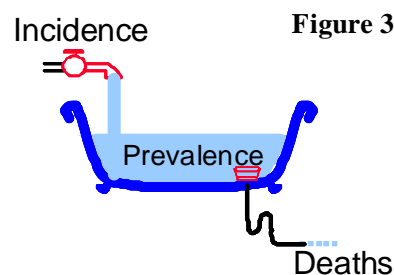
- A computer-based simulation model.
- Inclusion of the best national data and evidence currently available.
- Tailoring to reflect Minnesota’s demographic and population health profile.

As described earlier, key strategies (or leverage points) to reduce the burden of diabetes and diabetes unhealthy days are obesity reduction, prediabetes and diabetes detection, care management for Minnesotans with prediabetes, and diabetes care management. We have used this tool to explore the cumulative effects on diabetes unhealthy days through 2050 using these strategies in Minnesota. These are compared to a baseline scenario where we do not change anything we are currently doing as of today. The **three scenarios** we present are:

1. **Obesity Reduction:** As defined by the *Task Force*, no increase in obesity in 2008-9 followed by a 1% annual decrease through 2013 and a 0.5% annual reduction thereafter until we reach a level of 15% (2039), the 1980 obesity rate.
2. **Obesity Reduction & Improved Diabetes Management:** The obesity reduction scenario above plus continued improvements the delivery of high quality diabetes care.
3. **Comprehensive (Obesity reduction, improved diabetes management, & improved prediabetes detection and management):** The addition of increased prediabetes detection and management. This scenario represents the coordinated, locally-based, full spectrum approach to diabetes prevention, exemplified by the Comprehensive Statewide Health Promotion Plan.

Figure 2 illustrates the relative benefits of the three different scenarios described above (1) obesity reduction (red line); 2) obesity reduction plus improvements in diabetes management (green line); and 3) a comprehensive approach (purple line), relative to our baseline (blue line) of not changing anything we are currently doing.

By 2050, **obesity reduction will avert 69 million diabetes unhealthy days** compared to baseline, or a 7% reduction. However, because of the momentum of the diabetes system, it will take time to see these benefits. Using a bathtub analogy (Figure 3), it will take almost three decades to reduce obesity enough so that fewer new diabetes cases will enter the bathtub compared to the number of Minnesotans leaving the bathtub through death.



Right now the ratio is 2 to 1. There are few appreciable benefits by 2013.

Compared to baseline, **obesity reduction plus improvements in diabetes care will avert 137 million diabetes unhealthy days (13%)** by 2050. We will avert 2.7 million unhealthy days by 2013. Improving diabetes care will have an immediate and sustained effect on diabetes unhealthy days. This care improvement complements the long-term obesity reduction effect that prevents new diabetes cases. The momentum of the diabetes system will still result in a rise in unhealthy days, but a much slower rise.

Using the **Comprehensive approach (i.e. adding prediabetes care) will avert 186 million diabetes unhealthy days (18%)** by 2050 compared to the baseline scenario. This is because improvements in glucose screening and prediabetes management complement both obesity reduction and improved diabetes care. The addition of prediabetes detection and management will more quickly prevent or delay new cases of diabetes while leading to earlier detection and better management of Minnesotans who develop diabetes. Minnesotans with managed prediabetes will also have better managed blood pressure and blood lipids thus preventing

additional heart disease and stroke. We will avert 3.4 million diabetes unhealthy days by 2013. This is the **ONLY** scenario where diabetes unhealthy days decline below today's levels.

Summary

A successful comprehensive approach to diabetes has the potential to steadily improve the burden of diabetes in Minnesota for the next four decades and beyond. Such an approach will not only help contain health care costs but will prevent premature death, improve quality of life and increase productivity for thousands of Minnesotans—both now and into the future. Our model of the diabetes system suggests that the *Comprehensive Statewide Health Promotion Plan* provides an excellent vision for reducing the burden of diabetes (Figures 1 and 2).

Key points:

1. Although not pictured, ***no matter what we do the number of Minnesotans with diabetes will continue to increase through 2050***. Diabetes is like an ocean liner with aging and obesity as the engine. Even after you cut the engine, the ship continues to move forward and you cannot reverse aging. This is also seen with diabetes unhealthy days in the obesity reduction scenario where a decrease in unhealthy is does not occur until nearly 2040.
2. As a proxy of costs, ***the number of unhealthy days experienced by the growing diabetes population can be substantially reduced***. This is seen in all three scenarios when compared to the baseline scenario. But only the Comprehensive approach improves the diabetes unhealthy days relative to the current rate. The benefits of a comprehensive approach accumulate over time leading to nearly a 3-fold difference in impact by 2050.
3. Using diabetes as a model suggests ***efforts to most effectively reduce chronic disease costs must simultaneously address*** a) reducing risk behaviors and risk factors in the general Minnesota population, b) targeting high risk populations like Minnesotans with high glucose (prediabetes), high blood pressure, and high cholesterol for additional care management, and c) improving the access and quality of care delivered to Minnesotans with chronic conditions.

The *Comprehensive Statewide Health Promotion Plan* is the scenario that will most improve the health and costs associated with diabetes in Minnesota. This scenario would simultaneously address obesity reduction, improved diagnoses and care of Minnesotans with prediabetes, and provision of high quality care to Minnesotans with diabetes. This is the only scenario where the quality of life among Minnesotans with diabetes will get better than it currently is today.

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