



The clinical and economic benefits of better treatment of adult Medicaid beneficiaries with diabetes

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Introduction

Diabetes is one of the most prevalent and expensive medical conditions in the U.S. Today, nearly half of adults in the U.S. have diabetes or pre-diabetes.¹ According to the CDC, more than 29 million American adults have diabetes, more than five times higher compared to three decades ago. In addition, it is estimated that more than one-third of the remaining adults have prediabetes.² As a result of the current trend, the prevalence of diabetes in the US could be doubled by year 2030.³ Individuals with diabetes tend to develop serious comorbidities including cardiovascular diseases, blindness, kidney disease, amputations and depression. These complications lead to substantial treatment costs to patients and the health system. Diagnosed diabetes is estimated to cost \$244 billion in excess medical costs annually and care for people with diagnosed diabetes accounts for more than 1 in 5 health care dollars in the U.S.⁴

Previous studies have linked higher diabetes prevalence to low socio-economic status. The likelihood of developing type-2 diabetes can be doubled or even tripled for those living in poverty. This is due to multiple reasons, including high rates of obese and physical inactivity, insufficient nutrition, and stress related to financial adversity as well as lack of proper management of chronic disease.

Medicaid is the primary health insurer for low-income people in the U.S. By April 2017, nearly 69 million individuals were enrolled in Medicaid, of the adult enrollees more than 60% have at least one chronic condition, among them about 9% have diabetes and even higher share have cardiovascular disease (28%), respiratory disease (23%) and mental illness (35%). In addition, more than half of the enrollees with chronic conditions also have other comorbidities.⁵ Those individuals with chronic and comorbid conditions can incur substantial health costs. For example, it was estimated that about 5% of Medicaid enrollees account for half of all program spending, while Medicaid expenditures represent about 15% of total health expenditures in the U.S.⁶

Appropriate management of diabetes can improve patient health outcomes and reduce costs to the health care system. Research shows that better use of medicines to treat diabetes could generate \$8.3

¹ Menke A, Casagrande S, Geiss L, Cowie CC. Prevalence of and Trends in Diabetes Among Adults in the United States, 1988-2012. *JAMA*. 2015;314(10):1021-1029.

² News release: Diabetes: At A Glance 2016. CDC (<https://www.cdc.gov/chronicdisease/resources/publications/aag/diabetes.htm>)

³ Rowley WR, Bezold C, Arian Y et al. Diabetes 2030: Insights from Yesterday, Today, and Future Trends, *Popular Health Management*. 2017 Feb 1; 20(1): 6–12.

⁴ Dall TM, Yang W, Halder P et al. The Economic Burden of Elevated Blood Glucose Levels in 2012: Diagnosed and Undiagnosed Diabetes, Gestational Diabetes Mellitus, and Prediabetes, *Diabetes Care* 2014 Dec; 37(12): 3172-3179.

⁵ The Faces of Medicaid III: Refining the Portrait of People with Multiple Chronic Conditions. Kaiser Permanente, October 2009.

⁶ MEDICAID: A Small Share of Enrollees Consistently Accounted for a Large Share of Expenditures. United States Government Accountability Office, May 2015.

billion in savings annually and avoid over one million emergency department visits and hospitalizations each year.⁷ In the Medicaid population, effectively treating diabetes can potentially save \$430-\$660 per patient per year as a result of fewer complications.⁸ Another study with Medicare Part D beneficiaries also showed better diabetes drug adherence could save nearly \$5,000 in reduced medical spending over two years.⁹ Despite the known benefits of treatment, poor management of diabetes is common. About half of Medicaid beneficiaries with diabetes had their A1C, blood pressure and cholesterol level under control, respectively, with only 12% of the patients effectively controlling all three metrics.⁸

As an effort to quantify the impact of better diabetes management for Medicaid program, this study projected the economic and clinical benefits of improved treatment among Medicaid enrollees with diabetes over the next 10 years.

Methods

Population

The base population data sets were generated from multiple public data sources. To achieve the most accurate and complete clinical information for each individual, state level records from the American Community Survey (ACS, 2014) and Behavioral Risk Factor Surveillance System (BRFSS, 2013-2014) were merged to National Health and Nutrition Examination Survey (NHANES, 2005-2014) data through propensity match algorithm based on their age, gender, race, BMI, and insurance, diabetes, smoking, hypertension, and hyperlipidemia status. The combined data files provide metrics on blood pressure, cholesterol, and blood glucose level as well as other chronic illness conditions for each of US states and Washington DC. Records of adult Medicaid beneficiaries (age 20-64) with diagnosed or undiagnosed diabetes were extracted based on insurance status and expanded to generate state representative populations based on their sample weight.

Simulation model

We used a Markov-based microsimulation approach to quantify the impact of diabetes treatment on individuals' health status and medical expenditures over the next 10 years. Changes in HbA1c, blood pressure, cholesterol levels, and body weight combined with demographics, smoking status, and presence of chronic conditions are used to predict onset, severity, and mortality of over 40 conditions (diabetes, hypertension, congestive heart failure, ischemic heart disease, retinopathy, end-stage renal disease, history of myocardial infarction, stroke, and various cancers). Simulated annual medical expenditures reflect patient demographics, biometrics, and overall health profiles. All reported costs are in 2016 dollar amount.

Scenario analysis

⁷ Jha A, Aubert R, Yao J, Teagarden JR, Epstein R. "Greater Adherence to Diabetes Drugs is Linked to Less Hospital Use and Could Save Nearly \$5 Billion Annually." *Health Affairs*, August 2012.

⁸ The cost and quality gap in diabetes care: an actuarial analysis. Milliman Client Report. Jan 2012

⁹ Stuart, B. C., Dai, M., Xu, J et al. Does good medication adherence really save payers money?. *Medical care*, 2015, 53(6), 517-523.

We simulated outcomes of diabetes treatment under the following two scenarios:

- Status quo scenario: The aging process and other characteristic changes of diabetes enrollees with controlled (HbA1c <6.5%) or uncontrolled blood glucose level (HbA1c ≥6.5%) follow national average trends for comparable individuals.
- Intervention scenario: We modeled the impact of better control of HbA1c (reduce by 1 percentage point), blood pressure (reduce by 20mm/Hg for those with SBP >140 mm Hg or DBP >90 mm Hg) and high cholesterol (reduce by 35mg/dL for those with total cholesterol > 240mg/dL). In addition, those diabetes patients who are overweight or obese would lose 5% of their initial weight.

Results

Clinical benefit

Outcomes from our simulation showed better diabetes management significantly reduced the onset of its complications as the result of well controlled HbA1C, blood pressure and total cholesterol level. Over the next 10 years, the national average onset of hypertension, Ischemic heart disease, heart attack and stroke are expected to reduce by 13 to 28% among all adult enrollees with diabetes, and by 18% to 34% among those with uncontrolled diabetes. (Figure 1). At the state level, the effects on diabetes complications vary. For example, Arkansas, Alaska, Maryland, Massachusetts, and Montana are estimated to cut the rates of heart attacks or ischemic heart disease among beneficiaries with uncontrolled diabetes in half (Appendix Table 1).

Economic saving

We projected the following three types of annual medical expense savings as a result of the improved diabetes management scenario:

- Per capita saving among all diabetes enrollees who receives better treatment
- Per capita saving among subset of patients with uncontrolled A1C level
- Calculated annual saving based on the total enrollees of Medicaid population from each state.

As shown in Figure 2, on average Medicaid could save \$308 to \$1490 per year in medical expenses for each treated diabetes patient, with the state of Alaska, South Dakota and Massachusetts expected to benefit the most with annual saving of \$1,490, \$1,241, and \$1,130, respectively.

Among the subset of patients with uncontrolled glucose level, per capita savings range from \$361 to \$1,698 across the states (Appendix Table 1). Taking into consideration the entire Medicaid population of the state, on average each adult beneficiary from South Dakota, Alaska and Alabama could save over \$200 per year as the result of diabetes interventions, while those from Wyoming, Oregon and Minnesota could only reduce annual medical cost by less than \$50 per person (Figure 3).

At the national level, we estimated better diabetes management in Medicaid program will save on average \$845 for each beneficiary with diabetes and \$985 for those with uncontrolled A1c level, which translate to about \$112 per adult program enrollee or over \$4 billion in total savings based on Medicaid health care spending of 2016.

Conclusion

Our analysis projected sizable clinical and economic benefits to Medicaid beneficiaries as a result of more effective diabetes treatments. Even though the quantitative findings vary widely across different states, it is well recognized that well-controlled HbA1C, blood pressure and cholesterol level are essential for the management of diabetes.

Figure 1. Percentage of disease onset reduction over the next 10 years

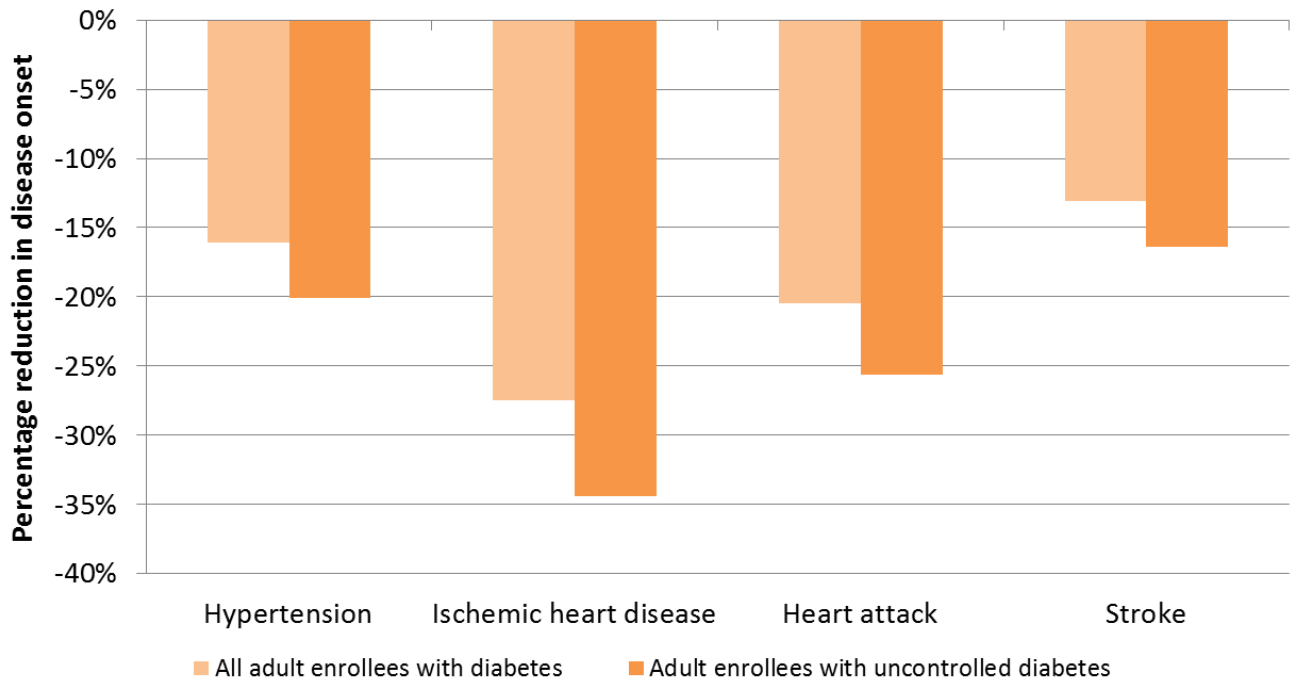


Figure 2. Projected Medicaid saving per capita per intervention participant

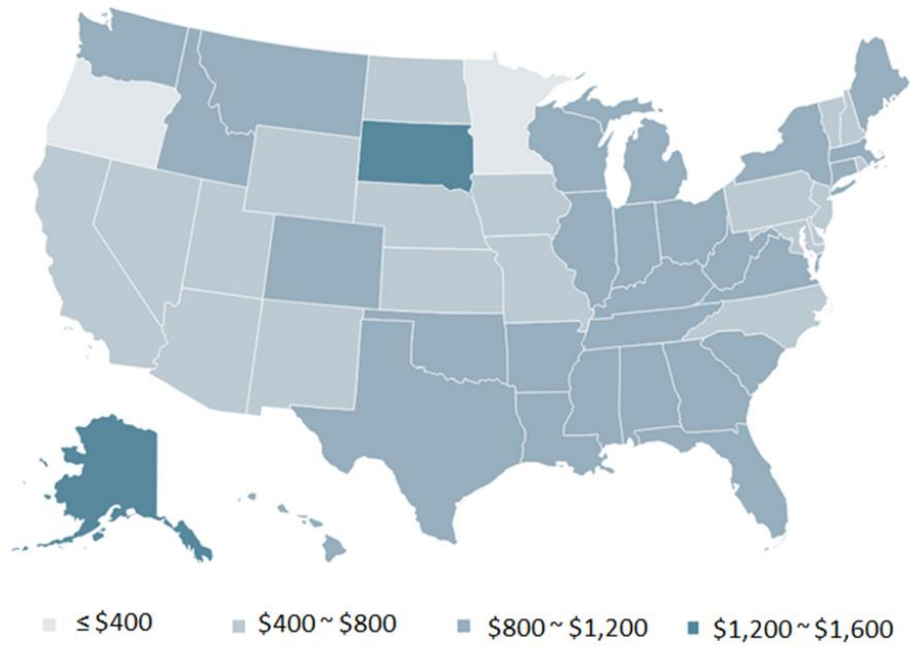


Figure 3. Projected Medicaid saving per capita

