

# CLINICAL AND ECONOMIC OUTCOMES OF CONTINUOUS GLUCOSE MONITORING AMONG SWEDISH RESIDENTS WITH POORLY CONTROLLED TYPE 1 DIABETES

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## INTRODUCTION

Despite intensive diabetes therapy (IDT), a substantial proportion of people with type 1 diabetes (T1DM) remain poorly controlled. Such individuals are at increased risk for developing acute and long-term diabetes complications. Continuous glucose monitoring (CGM) is indicated for detecting glucose trends and tracking patterns in people with diabetes. Although growing evidence demonstrates the clinical effectiveness of CGM, its cost benefits have not yet been firmly established.

## METHODS

A decision-tree model was developed to compare anticipated rates and costs of diabetes complications among Swedish residents with poorly controlled T1DM who received CGM with IDT versus those who received IDT alone. Population estimates of T1DM were obtained from the Swedish National Board of Health and Welfare.<sup>1</sup> Rates of poorly controlled T1DM (defined as A1c ≥9%) were derived from the Swedish National Diabetes Register.<sup>2</sup> The effectiveness of CGM with IDT was based on a 3-month randomized, controlled trial among individuals with T1DM.<sup>3</sup> Rates and costs of diabetes complications were derived from published sources (Swedish data were used where available). Costs reported in currencies other than USD were converted to USD and inflated to 2010 values using the medical care component of the United States Consumer Price Index.

### Definitions

#### Cardiovascular Disease (CVD):

Nonfatal and fatal myocardial infarction (MI), unstable angina, percutaneous coronary intervention, coronary artery bypass graft, cerebral hemorrhage, cerebral infarction, or unspecified stroke.<sup>9</sup> Annual Swedish medical costs for MI and stroke were averaged for the first 2 years of care.<sup>11</sup>

#### Continuous Glucose Monitoring (CGM):

DexCom™ SEVEN® CGM stand-alone system annual per patient cost of \$3,600.<sup>13</sup>

#### Intensive Diabetes Therapy (IDT):

≥3 injections insulin/day or insulin pump therapy, ≥4x/day self-monitoring of blood glucose, diet education, monthly visits.<sup>7</sup>

**Nephropathy:** Albumin excretion rate ≥200 µg/min.<sup>4</sup> Annual medical costs for U.S. patients with diabetes and chronic kidney disease (glomerular filtration rate <60 mL/min/1.73 m<sup>2</sup> or stages 3-5).<sup>9</sup>

**Neuropathy:** Patient report of neuropathy symptoms, including paresthesia, dulled sensation, and pain in legs and feet. Annual medical costs for patients with diabetic neuropathy (averaged across all stages, ranging from asymptomatic sensory-motor neuropathy to lower extremity amputation) in Germany.<sup>10</sup>

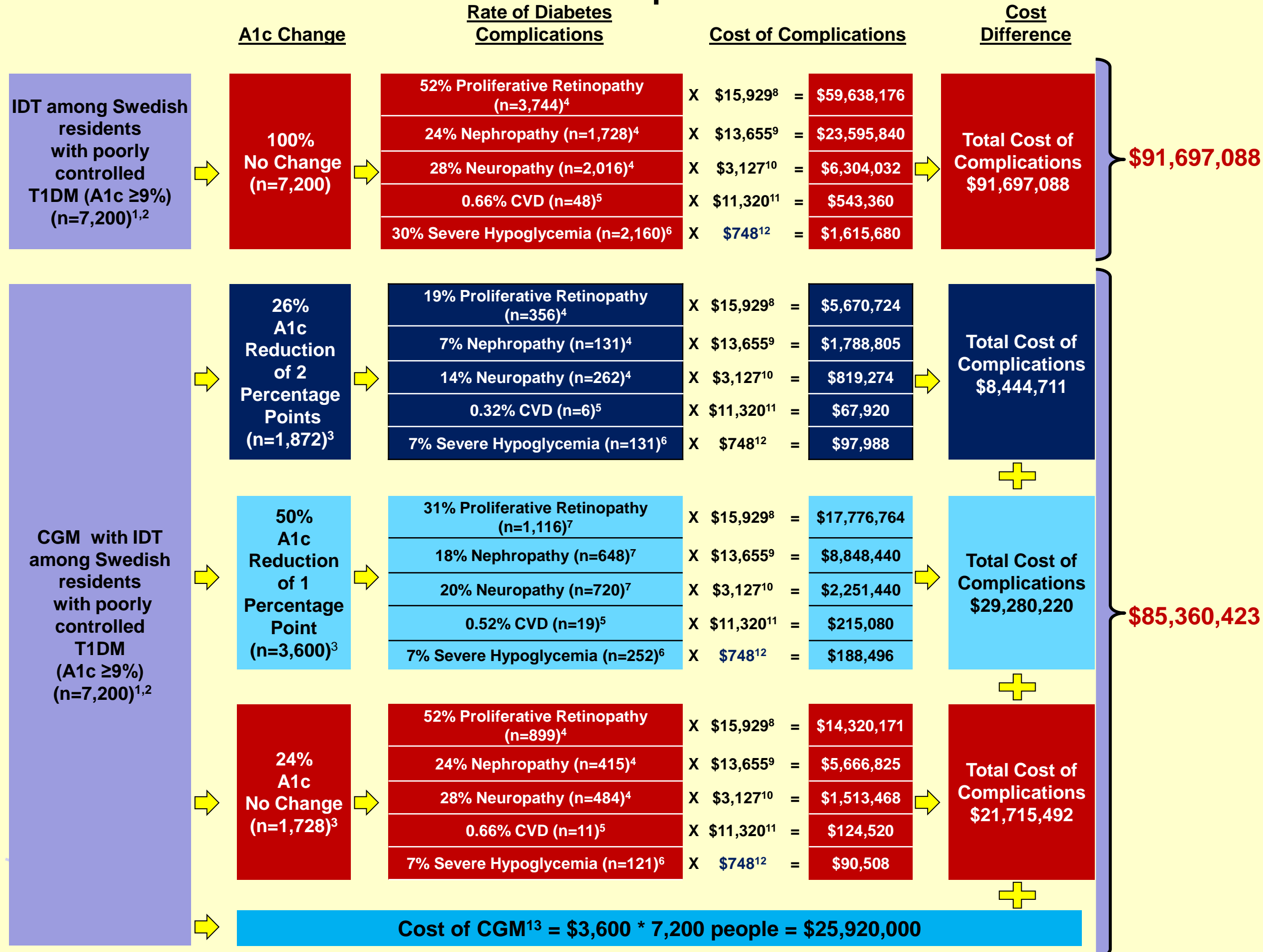
**Poorly Controlled T1DM:** A1c ≥9%

**Proliferative Retinopathy (PR):** PR or retinopathy requiring photocoagulation.<sup>4</sup> Annual Medicare expenditures for patients with PR.<sup>8</sup>

**Severe Hypoglycemia:** An event requiring assistance from another to administer resuscitative actions.<sup>6</sup> Annual medical costs for a hypoglycemia event (weighted average of events requiring assistance from family/friends, medical assistance, and hospitalization) in insulin-dependent Swedish residents with type 2 diabetes.<sup>12</sup>

## RESULTS

### Rates and Cost of Diabetes Complications



**Annual cost benefit associated with CGM: \$91,697,088 - \$85,360,423 = \$6,336,665**

## CONCLUSIONS

This model illustrates that people with T1DM and poorly controlled glucose regulation who receive CGM may experience a substantial reduction in diabetes complications and costs. Although cost savings may not be immediately realized, and may vary by duration of T1DM, CGM appears to be an effective means of improving outcomes and reducing costs among those with T1DM and poorly controlled glucose regulation.

## REFERENCES

- www.socialstyrelsen.se/publicerat. Accessed 9/4/10.
- Eeg-Olofsson K. *Diabetes Care* 2007;30:496-502.
- Deiss D. *Diabetes Care* 2006;29:2730-2.
- Reichard P. *N Engl J Med* 1993;329:304-9.
- Eeg-Olofsson K. *Diabetes Care* 2010;33:1640-6.
- JDRF CGM Study Group. *Diabetes Care* 2009;32:2047-9.
- The DCCT Research Group. *N Engl J Med* 1993;329:977-86.
- Schmier JK. *Retina* 2009;29:199-206.
- Laliberte F. *J Manag Care Pharm* 2009;15:312-22.
- Happich M. *Diabetes Res Clin Pract* 2008;81:223-30.
- Levy E. *Pharmacoeconomics* 2003;21:651-9.
- Jonsson L. *Value Health* 2006;9:193-8.
- Huang ES. *Diabetes Care* 2010;33:1269-74.

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