



WHITE PAPER

Return on investment of the Livongo for Diabetes Program



A proven approach to cost savings



2.6x to 4.1x ROI

DIABETES SOLUTION

Our Livongo programs empower people with chronic conditions to live better and healthier lives. Our Diabetes program supports improved hemoglobin Alc (HbAlc) and other metabolic markers, which have been shown in large clinical trials to reduce diabetes complications^{1,2} and decrease out-of-range blood glucose values, leading to reduced utilization of healthcare resources. These health outcomes, in turn, drive financial savings for clients by helping people with diabetes bring and keep their blood glucose in the target range.

Several groups have published analyses that demonstrate medical cost savings over a three-year period when HbAlc reductions occurred in commercially insured populations.³⁻⁷ We calculate return on investment for the Livongo for Diabetes program by combining the cost savings described in a Fitch et al. study⁶ of the clinical results in the Livongo population.

THE FITCH STUDY

Modeling cost impact of improved diabetes control

While many studies have quantified the impact of HbAlc control on medical claim costs, this model provides broader information on the impact of better control of HbAlc, blood pressure and lipid levels. Fitch and colleagues used National Health and Nutrition Examination Survey (NHANES) data to estimate control rates of diabetes-related clinical metrics in a hypothetical cohort of people with type 2 diabetes. They



found that only 57% of people have well-controlled HbAlc (< 7%), 45% have well-controlled blood pressure (BP) (<130/80 mmHg) and 47% have controlled lipids (LDL<100 mg/dL). Altogether, only 12% of people with type 2 diabetes have all three metrics well-controlled, indicating there is an opportunity for clinical improvement and cost savings for most people with diabetes, even in those with a well-controlled HbAlc.

There were 466 participants selected. Using projected incidence⁸ of seven diabetes complications (myocardial infarction, ischemic heart disease, stroke, congestive heart failure, amputation, blindness and renal failure) at current HbAlc values for each person's specific risk factors (high blood pressure, low-density lipoprotein [LDL] and high-density lipoprotein [HDL]), Fitch and colleagues developed three scenarios of improvements in clinical metrics (Table 1), which led to decreased complications from diabetes and to cost savings (Table 2).



Clinical improvement scenarios

Table 1:

Three sets of assumptions or scenarios for clinical metric improvement

	ADA/AHA clinical targets	Scenario 1	Scenario 2	Scenario 3
HbA1c reduction	HbAlc < 7%	1%	1.25%	1.5%
Systolic blood pressure reduction	< 130/80 mmHg	10 mmHg	20 mmHg	30 mmHg
Increase in HDL	> 40 (M), > 50 (F)	20%	30%	50%
Decrease in total cholesterol	< 200 mg/dL	20%	35%	50%

\$77 to \$184

COST SAVINGS PER PATIENT PER MONTH Direct cost savings varied between \$77 and \$184 per participant, per month (PPPM) in 2018 USD. These estimates are conservative because they do not include costs related to other diabetes-related comorbidities, such as depression, neuropathy, hypoglycemia or gastropathy nor indirect costs such as lost work time, lower productivity or disability.

Cost savings for clinical I improvement scenarios

Table 2:

Commercial population	Scenario 1	Scenario 2	Scenario 3		
Target: all diabetes patients with any uncontrolled metric*					
Reduction in complication rate	43%	55%	67%		
Savings PPPM	\$77.31	\$99.86	\$122.41		
Savings per target patient over 3 years	\$2,783	\$3,595	\$4,407		
Target: diabetes patients with any uncontrolled metric					
Reduction in complication rate	43%	55%	68%		
Savings PPPM	\$115.97	\$148.18	\$183.62		
Savings per target patient over 3 years	\$4,175	\$5,335	\$6,610		

*Uncontrolled HbAlc, blood pressure or lipids.

From Fitch 2013, Table 5. Author's modeling used NHANES 2005-2008, MarketScan 2006-2009, Medicare 5% sample 2008 and Milliman Health Cost Guidelines 2011. Costs adjusted to 2017 USD per medical pricing index from the Bureau of Labor Statistics. NHANES = National Health and Nutrition Examination Survey; PPPM = per participant, per month.



Modeling clinical metrics and cost savings

We have reported sustained glycemic improvements in multiple cohorts^{9,10} and have followed over 65,000 members on the Livongo for Diabetes program for more than one year. Of those members, 27,808 reported their HbA1c at program registration. When we compare these HbA1c values at registration with those estimated from blood glucose (BG) values¹¹ after one year in the program, these members have experienced a mean HbA1c reduction from 7.7% to 6.9%.

The improvement in glycemic control occurred without an increased frequency of hypoglycemia. In fact, these Livongo members experienced, on average, a 9.5% decrease in the likelihood of having a day with a blood glucose value <70 mg/dL while on the Livongo for Diabetes program.¹⁰

Our data suggest that Livongo members experience mean HbAlc improvements from 0.8% to 1.6%, covering the range of the Fitch study scenarios. For our ROI model, the assumption is that 80% of Livongo members will achieve the assumed HbAlc reduction.



HbA1c reduction over a year



In addition to demonstrating improvements in HbAlc labs and estimated HbAlc, data suggest that Livongo members also experience improvements in cholesterol levels. An analysis of lipid panel data provided by one large self-insured employer client (n=1,961) compared pre-Livongo members and non-members who have similar mean total cholesterol levels of 191 mg/dL to start. At the end of the one-year intervention period, Livongo members showed a 3.72% (p=0.04) reduction. (Oral presentation, American Diabetes Association Scientific Sessions, June 2017.)

The three important clinical metrics of diabetes management include HbA1c, blood pressure and cholesterol, and we have demonstrated improvements in all three.





\$2,828 to \$4,477

THREE-YEAR SAVINGS

The Livongo for Diabetes program demonstrates ROI

By applying the impact of the Livongo program on clinical metrics and combining cost-savings estimates from Fitch with the Livongo population, pricing and diabetes supply cost replacement inputs, we project a three-year cost savings of \$2,828 to \$4,477 or a 2.6x to 4.1x ROI.

When do we expect to see cost savings?

The Fitch analysis does not give insight into how the savings might be distributed over the three-year observation period. Other studies suggest medical plan cost savings appear within two to three years of better glycemic control due to decreased hospital admissions and office visits⁵ and that earlier effects of better glycemic control can be seen after one year due to reduced symptom burden and greater functionality.¹² Given that the literature mainly reflects a longer time horizon (three years), our ROI model is three years.

Assumptions based on Livongo population

Commercial insurance (adults 18-64)	Scenario 1
HbA1c at registration 7%	39%
HbA1c at registration >7%	61%
Population with improved metrics	80%
Cost of Livongo (PPPM)	\$70
Cost of diabetes supplies (PPPM)	\$40
Incremental cost of Livongo (PPPM)	\$30

Inputs from Fitch 2013 (converted to 2018 USD)

	Scenario 1	Scenario 2	Scenario 3
HbAlc at registration 7%	\$2,783	\$3,595	\$4,407
HbA1c at registration > 7%	\$4,175	\$5,335	\$6,610
Projected cost savings with Livongo	\$2,828	\$3,624	\$4,477
Projected ROI	2.6	3.4	4.1

91% with one metric (HbAlc, blood pressure or lipids) uncontrolled.

¹The Diabetes Control and Complications Trial Research Group. 1993. "The Effect of Intensive Treatment of Diabetes on the Development and Progression of Long-Term Complications in Insulin-Dependent Diabetes Mellitus." New England Journal of Medicine 329:977-986. https://doi.org/10.1056/NEJM199309303291401

²Stratton, Irene M., Arnanda I. Adler, H. Andrew W. Neil, et al. 2000. "Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study." The BMJ August 12, 2000; 321. https://doi.org/10.1136/bmj.321.7258.405

³Aagren, Mark, and Wenli Luo. 2011. "Association between glycemic control and short-term healthcare costs among commercially insured diabetes patients in the United States." Journal of Medical Economics 108-114. https://doi.org/10.3111/13696998.2010.548432

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PDowning, J., J. Bollyky, and J. Schneider. 2016. "Coaching Coupled With Real Time Data Improves Blood Glucose." American Diabetes Association Scientific Sessions. June 2016.

¹⁰Downing, J., J. Bollyky, J. Schneider. 2016. "HbA1c Reduction and Fewer Days with High and Low Blood Glucose Readings with Cellular-Enabled Glucose Meter." American Diabetes Association Scientific Sessions. June 2016.

¹Nathan, David M., Judith Kuenen, Rikke Borg, et al. 2008. "Translating the A1C Assay Into Estimated Average Glucose Values." *Diabetes Care* 2008 Aug; 31(8): 1473-1478. https://doi.org/10.2337/dc08-0545 ¹²Testa, M. A., and D.C. Simonson. 1998. "Health economic benefits and quality of life during improved glycemic control in patients with type 2 diabetes mellitus: a randomized, controlled, double-blind trial." *Journal of the American Medical Association* 280(17), 1490-1496. https://doi.org/10.1001/jama.280.17.1490 280(17).1490-1496.

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