

A Budget Impact Analysis of Substituting Sitagliptin with Liraglutide in Type 2 Diabetes from A Private Health Insurance Perspective in Egypt

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Abstract

Introduction

Type 2 diabetes mellitus (T2DM) causes a sizable burden globally both from health and economic points of view. This study aimed to assess the budget impact of substituting sitagliptin with liraglutide versus other glucose lowering drugs from the private health insurance perspective in Egypt over a 3-year time horizon.

Methods

Two budget impact models were compared: the standard of care (metformin, pioglitazone, gliclazide, insulin glargine, repaglinide, and empagliflozin) administered in addition to liraglutide or sitagliptin versus the standard of care with placebo. A gradual market introduction of liraglutide or sitagliptin was assumed, and the existing market shares for the other glucose lowering drugs were provided and validated by Expert Panel. The event rates were extracted from the LEADER and TECOS trials. Direct and mortality costs were measured. Sensitivity analyses were performed.

Results

The estimated target population of 120,574 T2DM adult patients were associated with CV risk. The budget impact per patient per month (PPPM) for liraglutide is EGP29 (\$6.7), EGP39 (\$9), and EGP49 (\$11.3) in the first, second, and third year, respectively. The budget impact PPPM for sitagliptin is EGP11 (\$2.5), EGP14 (\$3.2), and EGP18 (\$4.1) in the first, second, and third year, respectively. Furthermore, adoption of liraglutide resulted in 203 fewer deaths and 550 avoided hospitalizations, while sitagliptin resulted in 43 increased deaths and 14 avoided hospitalizations. The treatment costs of liraglutide use are mostly offset by substantial savings due to fewer CV-related events, avoided mortality and avoided hospitalizations over 3-years.

Conclusion

Adding liraglutide resulted in a modest budget impact, suggesting that the upfront drug costs were offset by budget savings due to fewer CV-related complications and deaths avoided compared to the standard of care. While sitagliptin resulted in a small budget impact but associated with deaths increased and less hospitalizations avoided.

Key Points

The upfront drug costs of adding liraglutide were offset by its budget savings due to fewer CV-related complications and deaths avoided compared to the standard of care (modest budget impact). While sitagliptin resulted in a small budget impact but associated with deaths increased and less hospitalizations avoided. This study will help to guide the reimbursement decisions in Egypt.

Introduction

Diabetes mellitus is a chronic disease characterized by high levels of plasma glucose and deficiency in insulin production or utilization. Diabetes causes a sizable burden globally both from health and economic points of view. In 2017, they estimated that the number of people suffering from diabetes worldwide is 425 million, a number that is expected to increase to 629 million by 2045 [1]. Of the current diabetic population, 79% are from low- and middle-income countries, and the highest prevalence is among people aged 40 and 59 [1]. Diabetes costs public health systems around the world about 727 billion USD and caused 4 million deaths in 2017 [1].

The International Diabetes Federation (IDF) ranked Egypt as ninth highest country in the number of type 2 diabetes mellitus (T2DM) patients [2]. The number of T2DM patients is increased threefold over 20 years ago with a current prevalence of 15.6% among age group 20 to 79 [2]. T2DM is a metabolic disease associated with microvascular and macrovascular complications. The control of plasma glucose levels is associated with reduced risk of microvascular complications (retinopathy, nephropathy, and neuropathy), and benefits for macrovascular complications (reduced rates of heart attacks, strokes and improved blood flow to legs) [3].

Liraglutide (approved in Egypt for treating T2DM) is a human glucagon like peptide 1 (GLP-1) with an established plasma glucose lowering effect, thus reducing the risk of microvascular complications [3]. The effects of glycemic control on macrovascular complications were evaluated in the LEADER clinical trial [3]. The double-blind randomized trial, included 9,340 participants at randomization to investigate the cardiovascular safety of liraglutide versus the standard of care (metformin, thiazolidinedione, sulfonylureas, insulin, meglitinides and FGABG (SGLT2i)) in T2DM patients with high risk for cardiovascular (CV) events. The trial concluded that the rate of cardiovascular complications (nonfatal myocardial infarction (MI), nonfatal stroke) and all cause death were lower in the liraglutide group compared to the standard of care [3]. The TECOS trial is a randomized, double-blind study, assigned 14,671 patients to add either sitagliptin or placebo to their existing therapy [4]. The median follow-up was 3 years to assess the cardiovascular implication to adding sitagliptin to the standard of care for T2DM patients. The primary composite outcome for this non-inferiority trial was CV death, nonfatal stroke, nonfatal MI and hospitalization for unstable angina. Sitagliptin was found noninferior to placebo [4].

This study assessed the budget impact of substituting sitagliptin with liraglutide versus other glucose lowering drugs (metformin, pioglitazone, gliclazide, insulin glargine, repaglinide, and empagliflozin) from the private health insurance perspective in Egypt over a 3-year time horizon.

Methodology

2.1 Population and treatment mix

Two budget impact models were constructed. The first one assessed the budget impact of the use of liraglutide versus other glucose lowering drugs while the second model assessed the budget impact of

the use of sitagliptin versus other glucose lowering drugs. The target population of T2DM patients was estimated with the current Egyptian adult population and the prevalence of T2DM in Egypt [2, 5]. The estimated target population was then narrowed to a group of diagnosed and treated patients at risk of cardiovascular events as demonstrated in Fig. 1 [6]. This study focused exclusively on the proportion of this patient group covered by private health insurance companies [7]. The number of targeted patients was estimated to be 120,574. A gradual market introduction of liraglutide or sitagliptin was assumed, and the existing market shares for the other glucose lowering drugs were provided and validated by Expert Panel.

2.2 Clinical Parameters

The event rates for cardiovascular complications were extracted from the LEADER trial [3]. The events considered in this study included mortality, myocardial infarction, stroke, heart failure [HF], coronary revascularization, and microvascular complications (retinopathy, and nephropathy). The event rate difference per complication (liraglutide vs. standard of care) was multiplied by the number of patients on liraglutide to determine the number of cardiovascular events avoided. Similarly, sitagliptin inputs were extracted from the TECOS trial and all clinical parameters were included in the model (Table 1).

Table 1
The Model inputs parameters

Parameter	Base Value	Low Value	High Value	Source
Population data				
Total Adult Population	50,364,992	40,291,994	60,437,990	[5]
T2DM prevalence	13.7%	10.9%	16.4%	[2]
Proportion of patients with Type 2 Diabetes diagnosed & treated (with CV morbidity)	35%	28%	42%	[6]
Proportion of patients covered by private insurance companies in Egypt	5%	4%	6%	[7]
GLP-1RA Adoption year 1	3%	2.4%	3.6%	IMS data
GLP-1RA Adoption year 2	4%	3.2%	4.8%	IMS data
GLP-1RA Adoption year 3	5%	4%	6%	IMS data
Clinical parameters from the LEADER Trial.				
MI*	-0.80%	-0.00640	-0.00960	[3]
Ischemic Stroke*	-0.40%	-0.00320	-0.00480	[3]
HF (hospitalization)*	-0.60%	-0.00480	-0.00720	[3]
Coronary Revascularization*	-0.70%	-0.00560	-0.00840	[3]
Retinopathy*	0.30%	0.00240	0.00360	[3]
Nephropathy*	-1.50%	-0.01200	-0.01800	[3]
Unstable Angina Pectoris (hospitalization)*	-0.10%	-0.00080	-0.00120	[3]
All-cause mortality*	-1.40%	-0.01120	-0.01680	[3]
Clinical parameters from the TECOS Trial.				
MI#	-0.10%	-0.00080	-0.00120	[4]
Ischemic Stroke#	-0.20%	-0.00160	-0.00240	[4]

*rate difference with and without liraglutide, #rate difference with and without sitagliptin

T2DM: type 2 diabetes mellitus, CV: cardiovascular, GLP1-RA; Glucagon like peptide 1 receptor agonist, HF: heart failure, MI: myocardial infarction, SU: sulphonyl urea, TZD: thiazolidinediones, SGLT2i: Sodium/glucose cotransporter-2 inhibitors

Parameter	Base Value	Low Value	High Value	Source
Unstable Angina Pectoris (hospitalization) [#]	-0.20%	-0.00160	-0.00240	[4]
Severe hypoglycemia [#]	0.30%	0.00240	0.00360	[4]
CV Death [#]	0.30%	0.00240	0.00360	[4]
Acute pancreatitis [#]	0.10%	0.00080	0.00120	[4]
HF (hospitalization) [#]	0.10%	0.00080	0.00120	[4]
Pancreatic cancer [#]	-0.10%	-0.00080	-0.00120	[4]
Treatment Costs per unit (Egyptian Pounds)				
Liraglutide	87.60	70.08	105.12	[8]
Sitagliptin 100	11.00	8.80	13.20	[8]
Metformin 1000	0.90	0.72	1.08	[8]
Insulin (Glargine) 100 IU	126.00	100.80	151.20	[8]
SU (Gliclazide 60 mg)	1.58	1.26	1.89	[8]
TZD (Pioglitazone 15mg)	5.13	4.11	6.16	[8]
Novonorm 2 mg (Repaglinide)	1.47	1.17	1.76	[8]
SGLT2i (Empagliflozin)	16.53	13.23	19.84	[8]
Event Costs excluding medicines (in Egyptian Pounds)				
Non-fatal MI	76719	61375	92062	[8]
Non-fatal Stroke	65928	52742	79113	[8]
HF (hospitalization)	161249	128999	193498	[8]
Coronary Revascularization	67919	54335	81502	[8]
Retinopathy	20000	16000	24000	[8]
Nephropathy	215695	172556	258834	[8]
Unstable Angina Pectoris (hospitalization)	76719	61375	92062	[8]
*rate difference with and without liraglutide, #rate difference with and without sitagliptin				
T2DM: type 2 diabetes mellitus, CV: cardiovascular, GLP1-RA; Glucagon like peptide 1 receptor agonist, HF: heart failure, MI: myocardial infarction, SU: sulphonyl urea, TZD: thiazolidinediones, SGLT2i: Sodium/glucose cotransporter-2 inhibitors				

Parameter	Base Value	Low Value	High Value	Source
Acute Pancreatitis	55883	44706	67059	[8]
Severe Hypoglycemia	8059	6447	9670	[8]
Pancreatic cancer	92136	73708	110563	[8]
Mortality	750,000	600,000	900,000	[8]
*rate difference with and without liraglutide, #rate difference with and without sitagliptin				
T2DM: type 2 diabetes mellitus, CV: cardiovascular, GLP1-RA; Glucagon like peptide 1 receptor agonist, HF: heart failure, MI: myocardial infarction, SU: sulphonyl urea, TZD: thiazolidinediones, SGLT2i: Sodium/glucose cotransporter-2 inhibitors				

2.3 Costs

Direct medical costs were estimated for drug acquisition, drug administration, complication management, follow up and adverse events costs. All unit costs of medications were extracted from the private health insurance payer's lists, as fixed reimbursement amount, and multiplied by the drug utilization to obtain monthly and annual costs for liraglutide, sitagliptin, metformin, thiazolidinediones, sulfonylureas, insulin, meglitinides and SGLT2i. The drug utilization proportions were extracted from the LEADER and TECOS trials [3, 4].

The average management cost for a MI and unstable angina included cost of diagnostic tests (CT scan and ECG test), either percutaneous coronary intervention (PCI) or Coronary artery bypass graft (CABG) intervention, and a 7-day hospital stay including appropriate treatment. The management cost for stroke included a brain magnetic resonance imaging (MRI), 6 days in the ICU and 6 days in general ward including appropriate treatment. The heart failure management costs composed of diagnostic tests (echo doppler and ECG tests), 4 days in the ICU and 10 days in general ward costs including appropriate treatment. The costs of retinopathy included corrective surgery and measures for better glycaemic control, and the costs of nephropathy included measures to control blood pressure, haemodialysis to counteract the kidney damage, and glomerular filtration rate (GFR) test every three months.

The drug related adverse events included were acute pancreatitis, pancreatic cancer, and severe hypoglycaemia [3, 4]. Pancreatitis management costs composed of the cost of 7 days in the intensive care unit (ICU), 3 days of hospitalization in a ward, pain killers and antibiotic. As for the average management cost of pancreatic cancer it was assumed to be limited to the annual price of erlotinib, an epidermal growth factor receptor (EGFR) tyrosine kinase inhibitor approved for the management of pancreatic cancer, which is given daily via oral route. The cost of severe hypoglycaemia management was calculated as the summation of 4 days of hospitalization, admission to the emergency room, glucose intravenous administration, and laboratory tests (creatinine test, GFR tests, liver function tests, and glucose tests). All unit costs were extracted from the private insurance hospitals [8].

The mortality costs were also considered in our analysis. Even though indirect costs are not typically included in budget impact analysis, according to the ISPOR task force for good research practices for budget impact analysis, we considered the mortality as the private insurance companies have to pay compensation to the patients' family in case of death based on the contracted life insurance policies [9]. To measure the cost of mortality, each patient life was estimated to have the stated value mentioned in the life insurance policy agreements.

The total event cost for each complication was multiplied by the event rate in each treatment arm (from the LEADER and TECOS trials) to determine the total cost per event. The medication costs were included with event costs, and the total cost difference of liraglutide vs without liraglutide was calculated as the budget impact of adopting liraglutide in T2DM patients with cardiovascular risks from the private health insurance perspective in Egypt. Similarly, the budget impact of sitagliptin vs without sitagliptin was calculated in T2DM patients with cardiovascular risks from the private health insurance perspective. Both liraglutide and sitagliptin were compared to placebo/standard of care. No direct comparison was made between the two interventions. All unit costs in this study were calculated in Egyptian Pounds (EGP) set in 2020 and were exchanged to USD using purchasing power parity rate. The time horizon for the study was 3 years.

2.4 Sensitivity Analyses

To investigate the robustness of our study, several sensitivity analyses were conducted. Clinical and cost parameters were varied from 10–20% more or less from their original value to investigate the impact they would have on the results and to confirm which parameter has the highest impact on our conclusion.

Results

The estimated target population of 120,574 T2DM adult patients associated with CV risk in Egypt were modelled in the budget impact analysis to compare treatment with liraglutide and sitagliptin, both in addition to the standard of care. The annual results from the perspective of the private health insurers over three-year horizon (Figs. 2 and 3) suggests liraglutide use results in EGP232.5 million (\$54 million) budget savings in medical costs while sitagliptin use results in budget increase EGP29 million (\$6.7 million) in medical costs due to increased number of complications associated with sitagliptin. The liraglutide scenario resulted in a significant reduction in nephropathy (-1.5% difference), mortality (-1.4% difference), lower event rates for HF, coronary revascularization, MI, unstable angina pectoris, and stroke (-0.6%, -0.7%, -0.8%, -0.10% and - 0.4% respectively), and low increase in cases of retinopathy (0.3% difference). While sitagliptin scenario resulted in increase in CV mortality, severe hypoglycaemia, HF hospitalization and acute pancreatitis (0.3%, 0.3%, 0.1%, and 0.1% respectively), lower event rates for unstable angina pectoris, stroke, MI and pancreatic cancer (-0.2%, -0.2%, -0.1% and - 0.1% respectively).

The budget impact per patient per month (PPPM) for liraglutide is EGP29 (\$6.7), EGP39 (\$9), and EGP49 (\$11.3) in the first, second, and third year, respectively (Table 2). The budget impact PPPM for sitagliptin

is EGP11 (\$2.5), EGP14 (\$3.2), and EGP18 (\$4.1) in the first, second, and third year, respectively (as shown in Table 3). Furthermore, adoption of liraglutide resulted in 203 fewer deaths and 550 avoided hospitalizations, while sitagliptin resulted in 43 increased deaths and 14 avoided hospitalizations. The treatment costs of liraglutide use are mostly offset by substantial savings due to fewer CV-related events, avoided mortality and avoided hospitalizations over 3-years.

Table 2
Base case results of liraglutide versus without liraglutide (in Egyptian Pounds)

Parameters	Year 1	Year 2	Year 3	Cumulative
Cost of liraglutide Acquisition	114,072,451	152,096,602	190,120,752	456,289,805
Cost of standard of care by Substitution*	(13,000,266)	(17,333,688)	(21,667,110)	(52,001,064)
Drug Cost	101,072,185	134,762,914	168,453,642	404,288,741
Non-fatal Myocardial Infarction	(2,220,074)	(2,960,099)	(3,700,124)	(8,880,297)
Non-fatal Stroke	(953,906)	(1,271,875)	(1,589,844)	(3,815,625)
Hospitalization for heart failure	(3,499,637)	(4,666,183)	(5,832,729)	(13,998,549)
Coronary Revascularization	(1,719,736)	(2,292,982)	(2,866,227)	(6,878,946)
Retinopathy	217,033	289,377	361,721	868,131
Nephropathy	(11,703,224)	(15,604,298)	(19,505,373)	(46,812,895)
Hospitalization_Unstable Angina Pectoris	(277,509)	(370,012)	(462,515)	(1,110,037)
Mortality	(37,980,744)	(50,640,992)	(63,301,240)	(151,922,975)
Medical costs	(58,137,798)	(77,517,064)	(96,896,330)	(232,551,192)
Total Costs PPPM	29	39	49	39
PPPM; per patient per month, *we substituted the market share of the glucose lowering drugs with liraglutide				

Table 3
Base case results of sitagliptin versus without sitagliptin (in Egyptian Pounds)

Parameter	Year 1	Year 2	Year 3	Cumulative
Cost of sitagliptin Acquisition	14,324,166	19,098,888	23,873,610	57,296,665
Cost of standard of care by Substitution*	(5,823,714)	(7,764,952)	(9,706,190)	(23,294,856)
Drug Cost	8,500,452	11,333,936	14,167,420	34,001,809
MI	(277,509)	(370,012)	(462,515)	(1,110,037)
Ischemic Stroke	(476,953)	(635,938)	(794,922)	(1,907,813)
Hospitalization for unstable angina	(555,019)	(740,025)	(925,031)	(2,220,074)
Severe hypoglycemia	87,453	116,605	145,756	349,814
CV Death	8,138,731	10,851,641	13,564,551	32,554,923
Hospitalization for heart failure or CV death	583,273	777,697	972,121	2,333,091
Acute pancreatitis	202,139	269,519	336,898	808,556
Pancreatic cancer	(333,276)	(444,367)	(555,459)	(1,333,102)
Medical costs	7,368,839	9,825,119	12,281,399	29,475,358
Total Costs PPPM	11	14	18	14
PPPM; per patient per month, *we substituted the market share of the glucose lowering drugs with sitagliptin				

Liraglutide results in a total initial savings of EGP58 million (\$13 million), EGP77 million (\$17 million), EGP96 million (\$22 million) in the first, second and third year in medical costs, respectively due to avoided complications and hospitalizations. The total cumulative savings over the three years from a private health insurance perspective is estimated at EGP232.5 million (\$54 million) (Table 2). While sitagliptin results in a total increased medical cost of EGP7 million (\$1.6 million), EGP9 million (\$2 million), EGP12 million (\$2.7 million) in the first, second and third year, respectively due to increased complications and hospitalizations. The total cumulative medical costs over the three years from a private health insurance perspective is estimated at EGP29 million (\$6.7 million) (Table 3).

3.1 Sensitivity Analyses

The results of a one-way deterministic sensitivity analyses (Fig. 4) suggests that the drug acquisition costs of liraglutide and its market share had the largest impact on the liraglutide model results. T2DM prevalence and the target patients diagnosed and treated with T2DM had the largest impact on the sitagliptin model results (Fig. 5).

We conducted another scenario analysis (without mortality cost) in liraglutide budget impact model, we found that it has the same conclusion but it resulted in budget savings EGP80 million (\$18 million) only instead of EGP232 million (\$54 million) if we included the mortality cost.

Discussion

Liraglutide was approved by the European Medicines Agency in 2009 and is sold in more than 80 countries to treat T2DM patients [10]. Our results demonstrate that the upfront costs of liraglutide 1.8 mg are mostly offset by the budget savings due to fewer CV-related events and premature mortality avoided (550 avoided hospitalizations and 203 avoided deaths, respectively).

Prior analyses on liraglutide use among T2DM patients also reported cost-savings. In a budget impact study conducted from the Algerian healthcare payer's perspective, liraglutide 1.2 mg resulted in cost-savings when compared to insulin glargine among patients insufficiently controlled on oral antidiabetics [11]. Authors reported that more patients reached the target HbA1c level without the need for intensified treatment regimens, unlike basal insulin that in 79% of cases requires intensification to a basal-bolus regime or twice daily premix therapy, both of which have higher direct costs [11]. A study in Italy used real world market consumption data and found that adding liraglutide versus standard of care increased the cost per patient between €8.04 - €25.00. This study did not consider the cost of complications, and thus did not offset the elevated drug acquisition cost with the cost savings from the reduced rates of complications associated with liraglutide [12]. Another study assessed the budget impact as well as the cost-effectiveness of liraglutide versus the standard of care from the US healthcare payer perspective. Over the lifetime of T2DM patients included in the analysis and with confirmed cardiovascular disease or high cardiovascular risk, liraglutide use was budget neutral and cost-effective [13].

In the United Kingdom, a study on the cost-effectiveness of liraglutide (1.2 and 1.8 mg, daily) versus dapagliflozin (10 mg, daily) among T2DM patients, concluded that both doses of liraglutide may be cost-effective treatment as a second or third addition to standard of care for patients who are not eligible for SGLT-2i therapy [14]. In Italy, a cost-effectiveness study of liraglutide 1.8 mg versus lixisenatide 20 µg (both are GLP-1 receptor agonists) for treating T2DM patients unable to reach acceptable blood glucose levels on metformin, concluded that liraglutide 1.8 mg is likely to be cost-effective versus lixisenatide 20 µg in Italian settings [15]. In France, a study comparing liraglutide, sitagliptin and glimepiride as add-ons for patients not reaching the target HbA1c level found that while all fell below the willingness to pay threshold, liraglutide was the most cost-effective [16]. The findings of this study were of great significance, as they included CV death and all-cause death outcomes, which is the case with our model. Lastly, in Spain a study comparing 1.8 mg liraglutide and sitagliptin as intensifications for patients on metformin above the target HbA1c levels, concluded that 1.8 mg liraglutide is cost-effective compared to sitagliptin in Spanish settings [17].

When considering ISPOR Special Task Force in defining the elements of value in health care that were not captured in our model due to lack of local data [18], we can find that the addition of liraglutide not only

provided high quality adjusted life years (QALYs), life years gained (LYsG) and productivity values as innovative treatment of Egyptian T2DM patients when compared to standard of care, but also can provide the following novel health values; value of hope, real option value, adding more value in severity of disease and as a scientific spillover.

Our study was modelled on the best available evidence from the LEADER and TECOS trials. The budget impact model simulated a patient cohort covered by private health insurance in Egypt and integrated local clinical practice and epidemiological inputs validated by an Expert Panel. We also included various sensitivity analyses to ensure the robustness of the model and to detect any uncertainties. Our study was limited by the use of an international clinical trial with results that may not be specific to Egypt. Given that variations exist in treatment patterns between countries [3]. Our results would be strengthened with clinical parameters specific to Egypt. However, such variations may be negligible because the standard of care of Egypt does not differ compared to countries included in the clinical trials, and Egyptian clinical practice are based on international treatment guidelines (American Diabetes Association Guidelines) [19]. Another strength for our study was the inclusion of mortality cost, as our analysis was conducted from private health insurance perspective, and the private insurance companies pay life insurance to the families of the dead patients.

Conclusion

The adoption of liraglutide resulted in 203 deaths avoided and 550 hospitalizations avoided. Adding liraglutide resulted in a modest budget impact of EGP 29 - EGP 49 PPPM, suggesting that the upfront drug costs were offset by budget savings due to fewer CV-related complications and deaths avoided. While sitagliptin resulted in a budget impact of EGP 11 - EGP 18 PPPM but associated with 43 deaths increased and 14 hospitalizations avoided compared to the standard of care in Egypt from the private health insurance perspective.

Declarations

Competing interests

Elsisi G, Abgad A, Zakaria E, Nasif N, Naiem H, Raafat N, Carapinha J. have no conflicts of interest directly relevant to the content of this article. Afify A is employed in Novonordisk Egypt.

Authors' contributions

Abgad A, Zakaria E, Nasif N, Naiem H, and Raafat N analyzed and interpreted the collected data. Elsis G had a major contribution in writing the manuscript and building the model. Carapinha J. helped in writing the manuscript. Afify A collected needed data about treatments cost. All authors read and approved the final manuscript.

Ethics approval and consent to participate

“Not applicable”

Consent for publication

“Not applicable”

Availability of data and material

This article is a budget impact analysis, and thus there are no underlying data used for this research apart from the data extracted from the articles included in this review. Costs data included used to inform the budget impact analysis are available from the corresponding author upon reasonable request.

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Figures

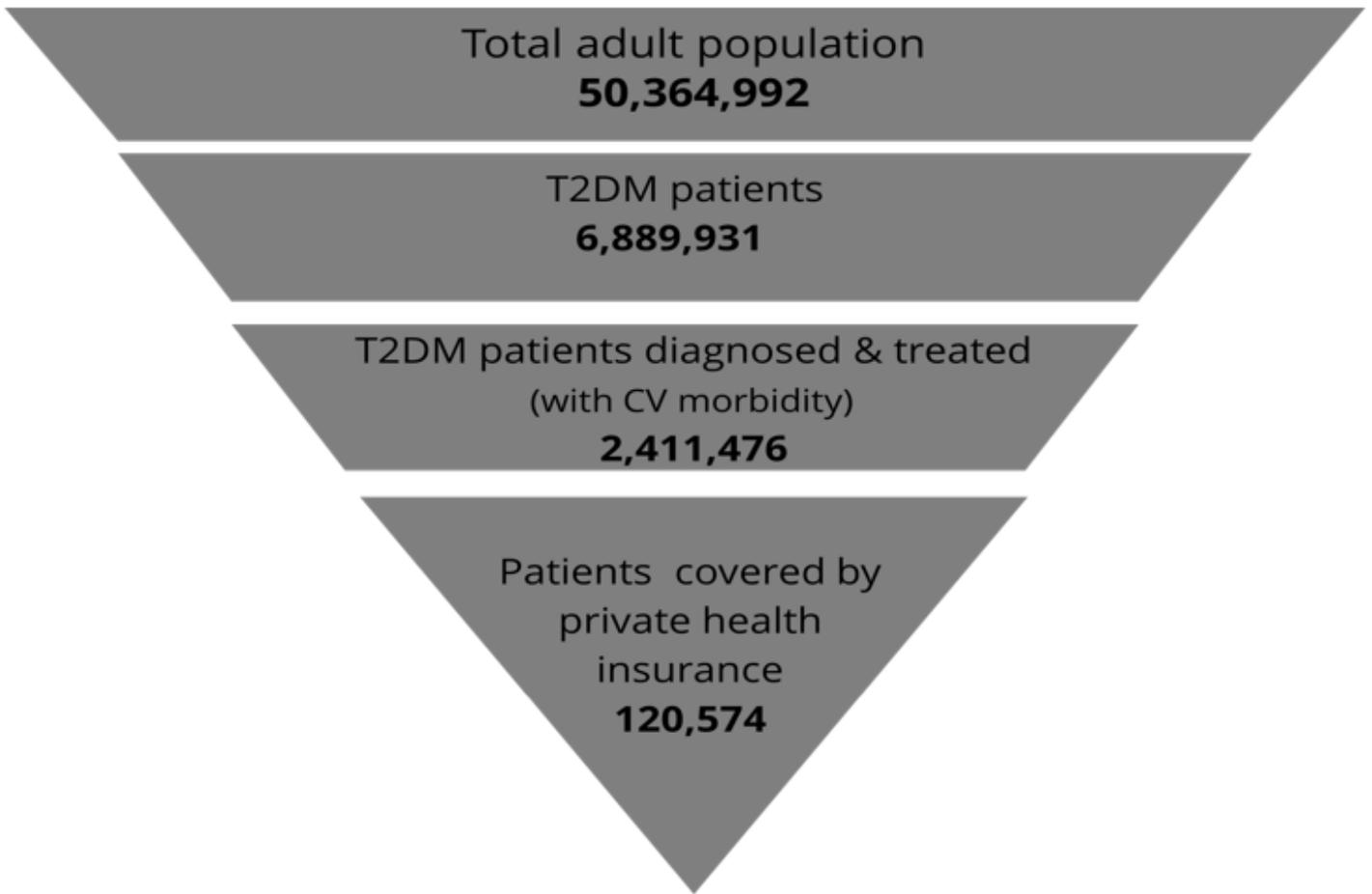


Figure 1

The Target population T2DM; type 2 diabetes mellitus, CV; cardiovascular

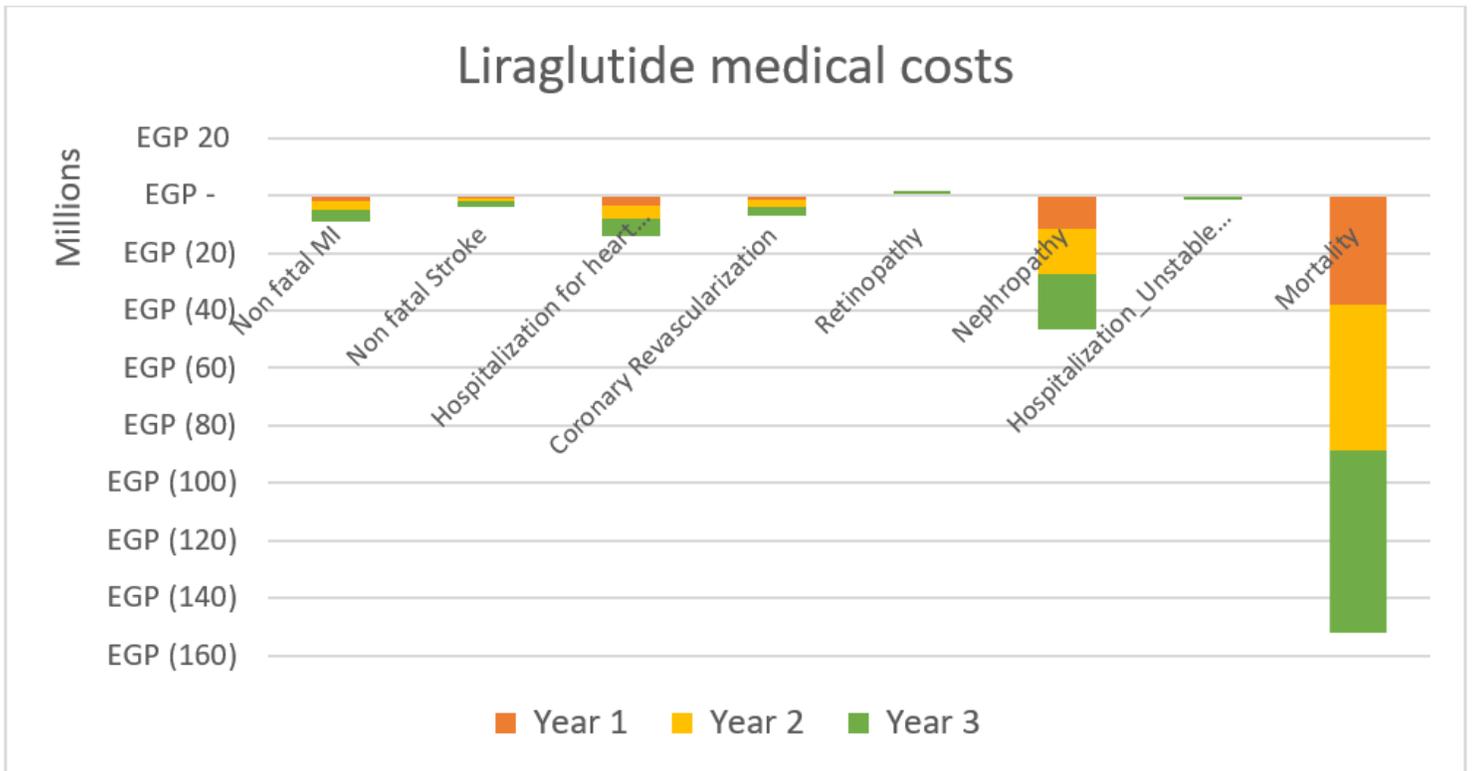


Figure 2

Liraglutide medical costs over three-year horizon MI; myocardial infarction

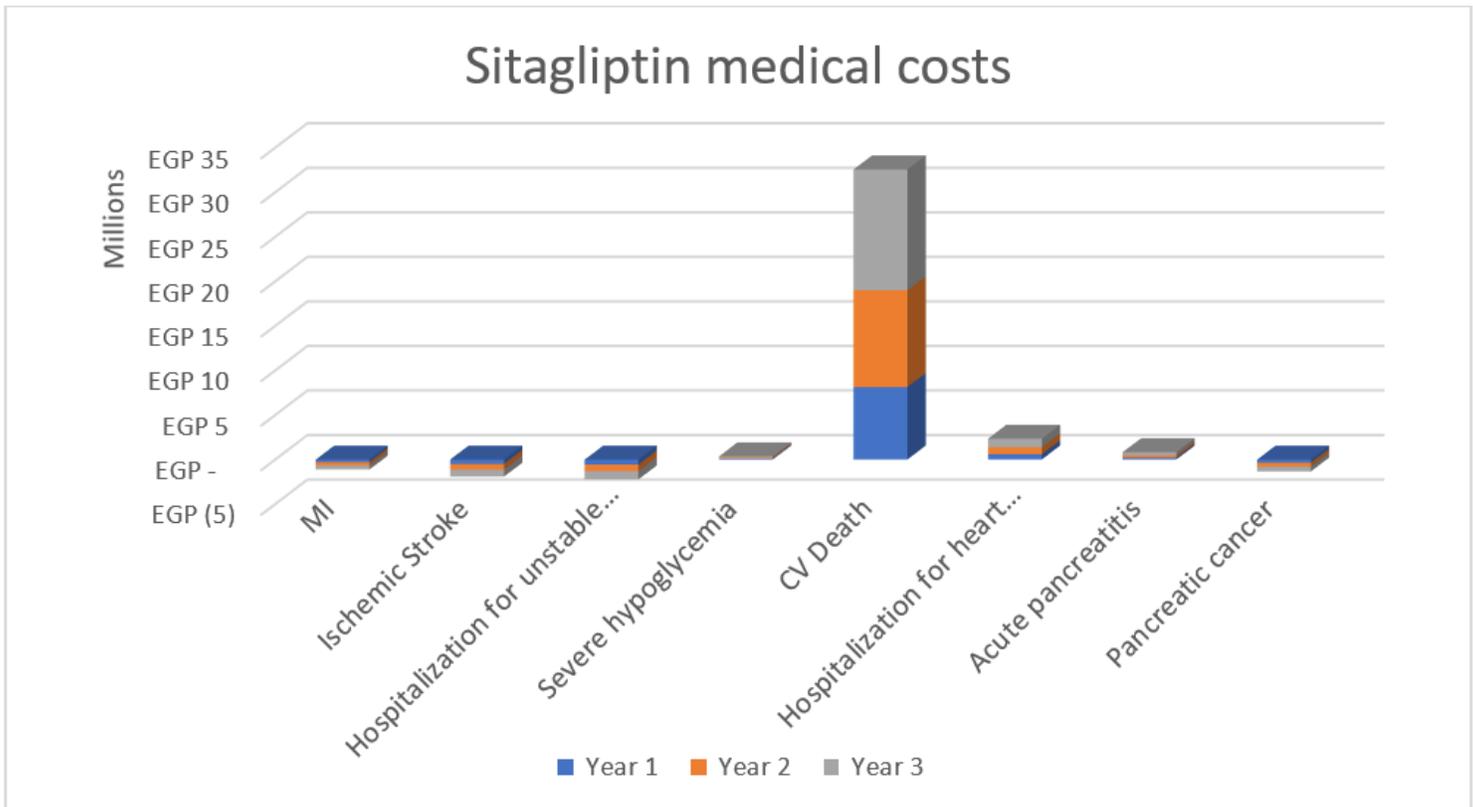


Figure 3

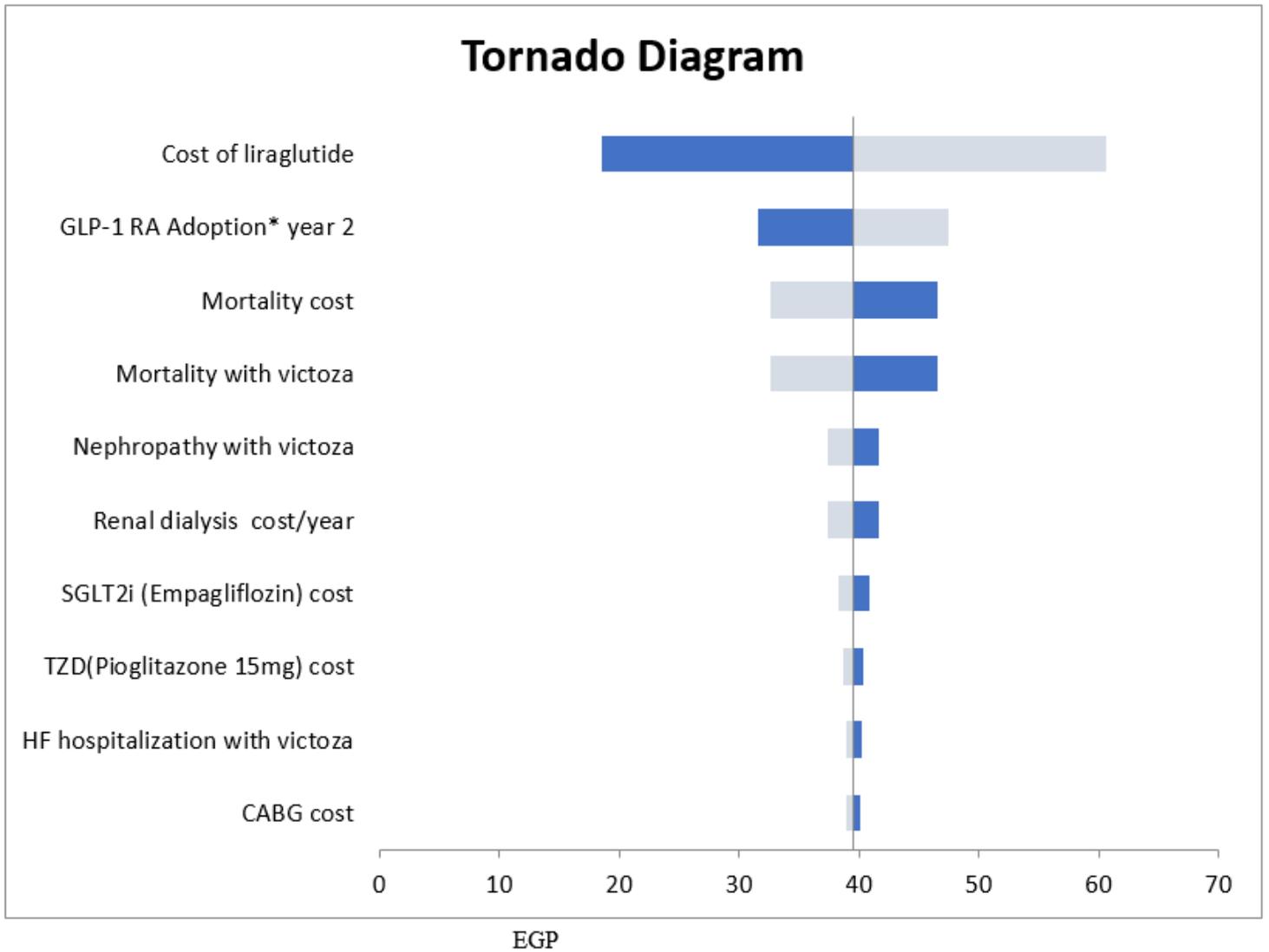


Figure 4

One-way sensitivity analysis results for liraglutide GLP1-RA; Glucagon like peptide 1 receptor agonist, SGLT2i; Sodium/glucose cotransporter-2 inhibitors, TZD; thiazolidinediones, HF; heart failure, CABG; Coronary artery bypass graft The light grey bar corresponds with the upper range, and the dark blue bar with the lower range of an input

Tornado Diagram

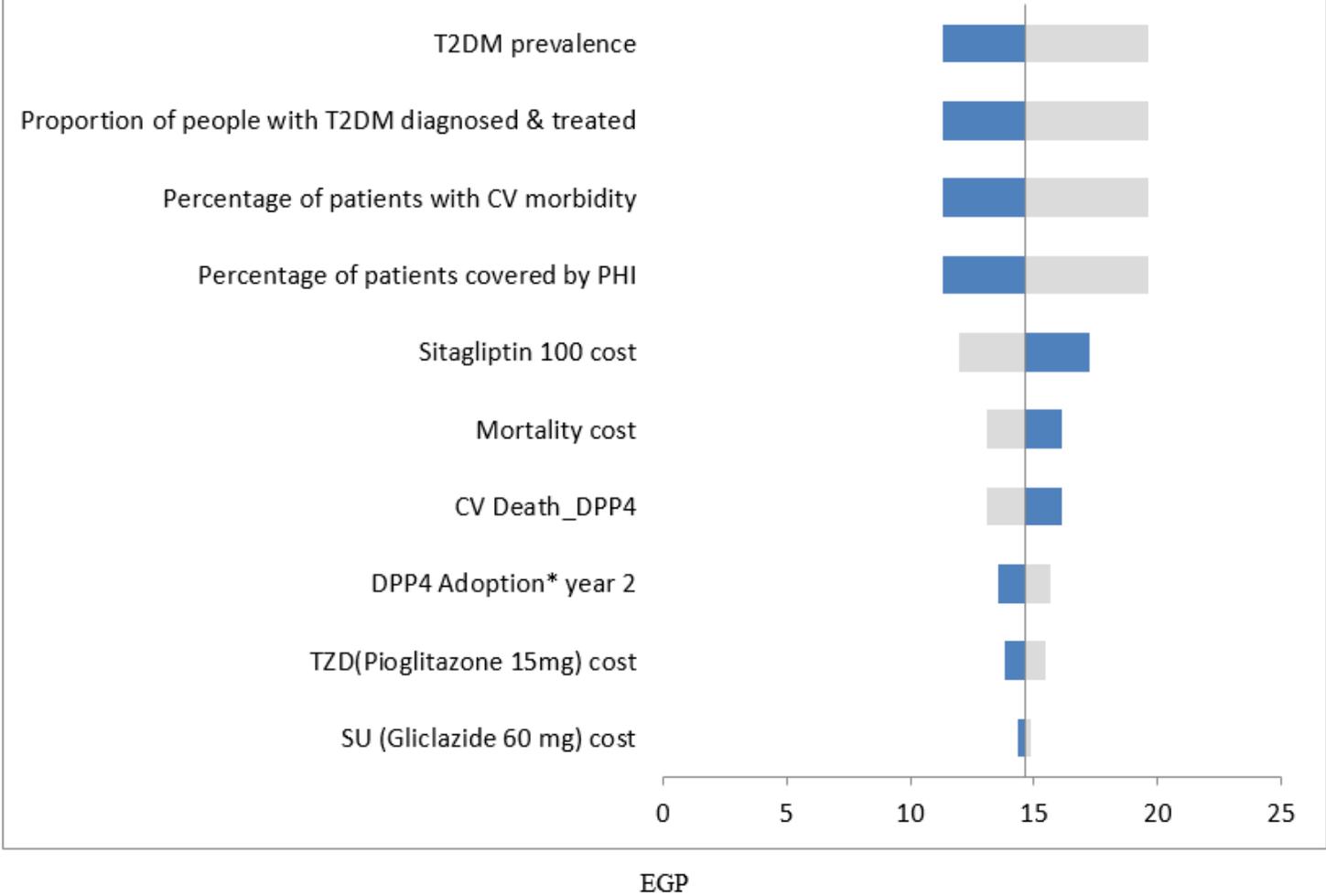


Figure 5

One-way sensitivity analysis results for sitagliptin T2DM; type 2 diabetes mellitus, CV; cardiovascular, PHI; private health insurance, DPP4; dipeptidyl peptidase 4, TZD; thiazolidinediones, SU; sulphonyl urea The light grey bar corresponds with the upper range, and the dark blue bar with the lower range of an input