THE CLINICAL AND ECONOMIC IMPACT OF ADDING AN ADHERENCE MODULE TO THE IQVIA CORE DIABETES MODEL

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Background

- The IQVIA Core Diabetes Model (CDM) is a lifetime simulation model designed to assess the health outcomes and economic consequences of interventions in T1DM or T2DM. The 9.5 version of the CDM includes an adherence submodel.
- Poor adherence to medications is often seen in patients suffering from chronic diseases, like diabetes. Poor adherence is associated with a lack in achieving glycemic targets, resulting in potentially avoidable morbidity and mortality. In diabetes, 60-50% of patients do not take their medications as prescribed by the physician, resulting in inadequate glycemic control and weight.
- Whereas poor adherence will always negatively influence impact on HbA1c, impact on weight is drug dependent and can be either negative or positive. For example, poor adherence to metformin/SGLT/DPP4/GLP-1 will give less weight decrease (negative) and SU will result in less weight gain (positive).

Objective

- The current study aims to study poor adherence to medication on HbA1c and weight levels in T2D patients from the EDGE study and assess its impact on the outcomes of cost-effectiveness analyses using the CDM, by varying the adherence rate to medications from 100% to 80%.

Methods

- The CDM was programmed to run simulations using the EDGE study [1] population and to compare metformin + vildagliptin (M+V) against metformin + sulphonylurea (M+S) as test case.
- In this prospective, 1-year, worldwide, real-life observational study, 2957 physicians reported on the effects of second-line OADs in 45,868 patients with T2DM not reaching glycaemic targets with monotherapy. [1]
- Baseline characteristics and treatment effects from the EDGE study were employed: mean age at start of study was 57.8 years, diabetes duration 6 years, male proportion 54.8%, HbA1c 8.2% and BMI 29kg/m^2. [1]
- HbA1c reductions per treatment arm were -0.99% and -1.19%, with changes of -0.56kg and -0.1kg in body weight for M+S and M+V, respectively. Basal insulin rescue therapy was applied to both arms when HbA1c surpassed 7.5%. Lifelong analyses were submitted using a 50. years time horizon, using the UKPDS 82 cardiovascular risk equation with combined mortality approach [2].
- First line treatments (M+S) and (M+V) were tested with two different adherence rates (100% and 80%). The impact of adherence per 10% change on HbA1c (-0.08%-points) and BMI (DPP4= -0.0576 Kg/m^2; SU: 0.0072 Kg/m^2) was taken from literature [3].
- The economic analysis employed UK 2018 costs and applied an annual discount rate of 3.5% on costs and outcomes. Polynomial approach was used to assign disutility to changes in BMI. [4]
- Total lifelong life years, quality-adjusted life years (LY, QALY) and total costs were determined. Survival data at 10 years, treatment and complication costs were also extracted.

Table 1 – Treatment effects on HbA1c and BMI with 100% and 80% adherence rate

Treatment parameters	M+V		M+S		Basal bolus
Adherence rate	100% [1]	80%	100% [1]	80%	100% [1]
HbA1c change from baseline	-1.19	-1,03	-0.99	-0,83	-0.82
BMI change from baseline	-0,56	-0,44	-0,10	-0,25	0.55
NSHE rate per 100 patient years	1.79		13.97		8.84
SHE2 rate (req. med. assist.) per 100 patient years	0.32		2.47		1.56
Switch to next line treatment at HbA1c threshold	7.5				-

NSHE-Non severe hypoglycemia event, BMI – Body mass index, SHE – Severe hypoglycemia, HbA1c - Haemoglobin A1c

Table 2 –The cost-effectiveness results (absolute and incrementals) when applying 100% and 80% adherence rates on the first lines of treatment

Cost-effectiveness analysis	Adherence rate of 100%		Adherence rate of 80%	
Absolute values	M+V	M+S	M+V	M+S
LY (undiscounted)	16,247	16,195	16,230	16,196
LY	11,328	11,302	11,319	11,302
QALY (undiscounted)	6,928	6,872	6,912	6,883
QALY	9,854	9,769	9,830	9,785
Total costs (GBP)	29766	29115	29569	29223
Total Tx costs (GBP)	4898	4219	4705	4184
Complications costs	24014	23996	23999	24141
Survival at 10 years (%)	71,610	71,520	71,550	71,530
Incremental values	M+V vs M+S		M+V vs M+S	
∆ Life Expectancy	0,026		0,017	
∆ QALY	0,055		0,029	
∆ Total Costs (GBP)	650		346	
ICER (GBP/LY)	25017		20017	
ICUR (GBP/QALY)	11762		11900	

QALY-quality adjusted life-years, LY-Life-years, Tx-Treatment: ICER-Incremental cost-effectiveness ratio, ICUR-incremental cost-utility ratio

Results

- Diminishing adherence from 100% to 80% slightly changed life expectancy.
- Quality adjusted life years reduced from 6.93 to 6.91 in M+V and increased from 6.87 to 6.88 in M+S (due to more BMI decrease with lower adherence).
- Linked to the adherence rate, treatment costs diminish accordingly.
- Both complication costs and survival slightly increased in the comparator arm and decreased in the intervention arm. Better survival in the comparator arm is due to less heart failure given lower BMI.
- Incremental costs decreased with 300 GBP.
- ICER decrease by 5000 GBP per LY and ICUR change was minimal.

Conclusion

Lower adherence did not impact the ICER significantly, because of opposite effects on BMI, the same adherence rates in M+V and M+S arms, decrease in treatment costs, and patients switch to next line therapy quickly. Applying different adherence rates in the different arms, and other BMI effects, could however, result in considerable impact on final outcomes.

References

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