Evaluating the impact of poor glycemic control associated with therapeutic inertia on life expectancy in patients with type 2 diabetes in the UK

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Background and aim

- Diabetes is a chronic metabolic disease associated with significant morbidity and mortality, characterized by elevated levels of blood glucose.
- In the UK, diabetes is estimated to affect approximately 4.7 million people, and over 13,000 deaths were attributable to the disease in 2019.[1,2]
- Type 2 diabetes (T2D) accounts for approximately 90% of diabetes cases, and life expectancy is estimated to be up to 10 years lower for people with T2D versus people without the disease.[3]
- Several landmark studies have shown that controlling blood glucose levels (maintaining good glycemic control) can reduce the incidence of diabetes-related complications in the long term, thereby improving patient outcomes.[4,5]
- However, therapeutic inertia (failure to intensify therapy to address poor glycemic control in a timely manner) has been widely reported in the UK despite the well-established importance of maintaining good glycemic control.[6]
- The aim of the present study was to evaluate the impact on life expectancy of poor glycemic control due to therapeutic inertia for the T2D population in the UK.

Methods

- A validated long-term model (IQVIA CORE Diabetes Model, version 9.0) was used to project outcomes for a population with T2D based on data from The Health Improvement Network (THIN) primary care database.
- Life expectancy and complication rates were estimated over a range of time horizons (3 years to patient lifetimes) for populations achieving a glycated hemoglobin (HbA_{1c}) target of 7.0% (53 mmol/mol) from a baseline HbA_{1c} of 8.2% (66 mmol/mol).
- Immediate treatment intensification was compared with intensification delayed by 1 or 7 years.
- Outcomes were discounted at 3.5% *per annum*, as per UK-specific guidelines released by the National Institute for Health and Care Excellence (NICE).
- Population estimates of burden were based on epidemiological studies and published studies of glycemic targets in the UK.[1,7]
- UK-specific life tables from the World Health Organization were used for all analyses to capture background mortality, with remaining mortality due to diabetes-related complications.

Results

- Modeling projections indicated that earlier and timely treatment intensification was associated with improved patient-level outcomes across all scenarios, with an increased discounted life expectancy of 0.02 and 0.07 years over a 10-year time horizon for immediate intensification versus maintaining poor glycemic control for 1 and 7 years, respectively (Table 1).
- Benefits in life expectancy correlated to longer time horizons and larger intensification delays, with an increased life expectancy of 0.05 and 0.27 years over patient lifetimes for timely treatment intensification versus delays of 1 and 7 years, respectively (Table 1).
- Increased benefits over longer time horizons were due to greater glycemic control reducing the incidence of long-term diabetes-related complications and associated mortality, which are not fully captured with shorter time horizons.

Table 1 Patient-level life expectancy associated with reaching glycemic targets versus poor glycemic control

Scenario	Discounted life expectancy (years)		
	Intensified	*Poor control*	*Difference*
Baseline HbA_{1c} 8.2%, 1-year intensification delay			
3-year time horizon	2.72	2.71	+0.01
5-year time horizon	4.30	4.29	+0.01
10-year time horizon	7.54	7.51	+0.02
Lifetime time horizon	12.79	12.74	+0.05
Baseline HbA_{1c} 8.2%, 7-year intensification delay			
10-year time horizon	7.54	7.47	+0.07
Lifetime time horizon	12.79	12.52	+0.27

HbA_{1c}, glycated hemoglobin. Values are means.

- Published data indicate that approximately 1,163,547 patients with T2D in the UK have poor glycemic control.[1,7]
- Assuming a mean baseline HbA_{1c} of 8.2% in line with primary care data, 1 year of poor control was projected to cost 5,818 life years in a population of this size versus good glycemic control (HbA_{1c} 7.0%) over a 3-year time horizon (Table 2).
- Projecting outcomes over patient lifetimes in a population of this size led to an estimated 57,014 life years gained with timely intensification versus a delay of 1 year (Table 2).
- 7 years of poor control across the T2D population was projected to cost 80,285 life years over a 10-year time horizon, and 315,321 life years over patient lifetimes, versus timely treatment intensification (Table 2).

Table 2 Population-level life expectancy associated with reaching glycemic targets versus poor glycemic control

Scenario	Discounted life expectancy (years)		
	Intensified	*Poor control*	*Difference*
Baseline HbA_{1c} 8.2%, 1-year intensification delay			
3-year time horizon	3,160,194	3,154,376	+5,818
5-year time horizon	5,006,743	4,992,780	+13,963
10-year time horizon	8,770,817	8,741,729	+27,925
Lifetime time horizon	14,884,093	14,827,079	+57,014
Baseline HbA_{1c} 8.2%, 7-year intensification delay			
10-year time horizon	8,770,817	8,689,369	+80,285
Lifetime time horizon	14,884,093	14,568,772	+315,321

HbA_{1c}, glycated hemoglobin; T2D, type 2 diabetes. Values are based on a population of 1,163,547 patients with T2D failing to meet glycemic targets.

Discussion

- Delays in achieving good glycemic control in patients with T2D are likely to account for a substantial loss of life expectancy in the UK, with even a short time in poor glycemic control potentially resulting in up to 315,321 life years lost compared with timely treatment intensification.
- A key strength of the present study was the use of data from a typical T2D population in the UK, with cohort characteristics taken from THIN primary care database used by NICE for the health economic analysis supporting the development of clinical guidelines and HbA_{1c} targets.
- Whilst estimates of population-level burden were in line with previous studies, these likely underestimate the true burden of disease, as incident patients (those diagnosed with T2D in subsequent years) are not included in the prevalence-based estimates.
- Timely intensification could also help to alleviate the large economic burden of T2D, with a reduction in the incidence of diabetes-related complications leading to a reduction in associated treatment costs.
- Whilst the focus of the present analysis was on quantifying the clinical burden associated with poor glycemic control, it should be noted that effective management of patients with T2D involves addressing multiple risk factors, including reduction of excess body weight, smoking cessation, and improving blood pressure and serum lipid levels.

Conclusion

- Efforts to avoid therapeutic inertia could substantially improve outcomes for patients with T2D even in the short term, thereby leading to a considerable gain in life years in the T2D population in the UK.

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