Effective diabetes management leads to a reduction in carbon emissions as well as treatment cost

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INTRODUCTION

- The UK's Healthcare sector is a significant contributor of carbon footprint, which is estimated to be 32 million tonnes of carbon dioxide (CO_2) equivalent [1]
- The environment is damaged by this CO_2 emission (CO_2e), mainly due to the resources used in delivering care for various ailments, including diabetes
- Pharmaceuticals alone contribute 16% of the healthcare system carbon footprint [1] and 22% of the National Health Service's (NHS's) carbon footprint in the UK [2]
- Diabetes is a global problem which is prevalent in 4.5 million adults in the UK [3] and being a chronic ailment, it is a major contributor to healthcare related carbon emission
- Improving the glycaemic control (HbA1c) reduces diabetes-related complications, which reduces healthcare resource utilisation and in turn, causes less CO_2e production from the healthcare sector [4]
- This reduction in CO_2e is imperative for the UK to achieve its commitment towards reducing carbon emissions by 80% under the Climate Change Act (2008) [1]

OBJECTIVE

The study aims to assess the environment impact (in terms of CO_2e) and economic impact of active type 2 diabetes mellitus (T2DM) management achieved through glycaemic control

METHODOLOGY

- IQVIA Core Diabetes Model (CDM) was used to carry out the assessment using two approaches:
  a. Approach 1 – Each complication was segregated into source of CO_2e and healthcare components
  b. Approach 2 – Costs for each complication were obtained from published literature, adjusted to 2016 rates. Carbon intensity factor was used to arrive at carbon footprint associated with each complication
- Patient population used in the model was representative of T2DM adult population in the UK, and was assessed as patients on initial therapy (Cohort 1) and patients on second intensification therapy (Cohort 2) [5]
- For both the study cohorts, two scenarios were modelled:
  a. Scenario 1: Maintain HbA1c level at 7% throughout model simulation
  b. Scenario 2: HbA1c permanently reduced by 1% point from baseline

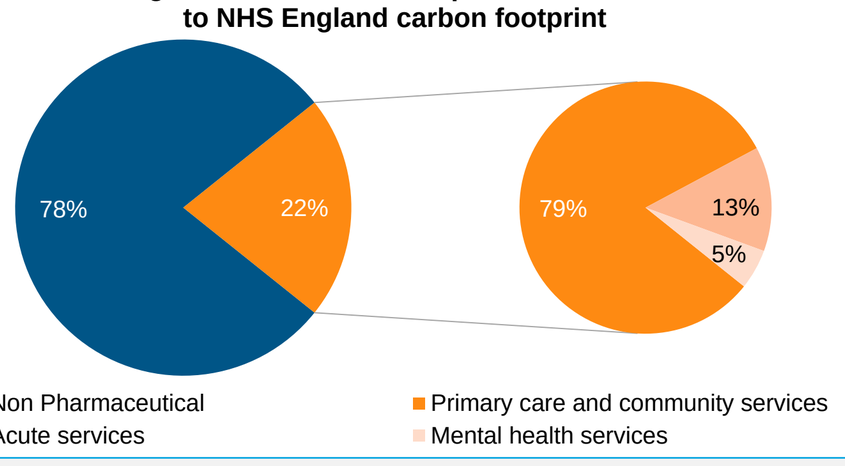
RESULTS

- The analysis showed the impact of improved glycaemic control with active treatment in reducing the T2DM related carbon emission
- Carbon emission analysis: The analysis demonstrated improvement in quality adjusted life years (QALY), life expectancy (LE), and a reduction in CO_2e levels with active treatment in both cohorts (Figure 2):
  a. Approach 1: Reduction in CO_2e was approximately 18% and 13% in Cohort 1 and 2, respectively, when HbA1c levels were maintained at 7% with active treatment and was approximately 12% and 9%, respectively, when HbA1c level was permanently reduced by 1% by active treatment (Figure 3)
  b. Approach 2: Reduction in CO_2e was 15% and 11% in Cohort 1 and 2, respectively, when HbA1c levels were maintained at 7% with active treatment and was 12% and 10%, respectively, when HbA1c level was permanently reduced by 1% using active treatment (Figure 4)
- Economic analysis: In Scenario 1, the cost of T2DM management reduced by £2,944 (14%) for Cohort 1 and by £1,763 (10%) for Cohort 2. In Scenario 2, the cost of T2DM management was reduced by £2,197 (11%) for Cohort 1 and £2,197 (8%) for Cohort 2 due to active treatment (Figure 5)

CONCLUSION

- The study reports approximately 10-20% reduction in total CO_2e, and approximately 8-15% cost reduction due to glycaemic control
- Additionally, about 10-20% overall reduction is reported in the CO_2e per life year gained in diabetes patients
- These findings are encouraging, since reductions are likely to have a huge impact on the overall CO_2 emission and cost reduction when considering the 4.5 million Diabetes patients in the UK
- In conclusion, improved glycaemic control of patients with T2DM plays a vital role in reducing the UK healthcare system's carbon footprint, thereby improving patient health and reducing treatment costs

Figure 1: Contribution of pharmaceuticals to NHS England carbon footprint



RESULTS (contd.)

Figure 2: Improvement in QALY and LE

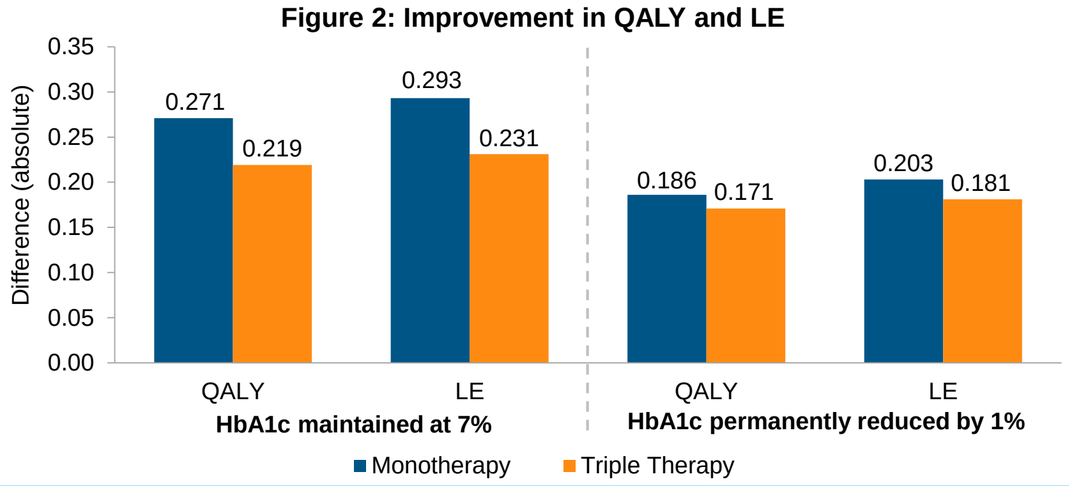
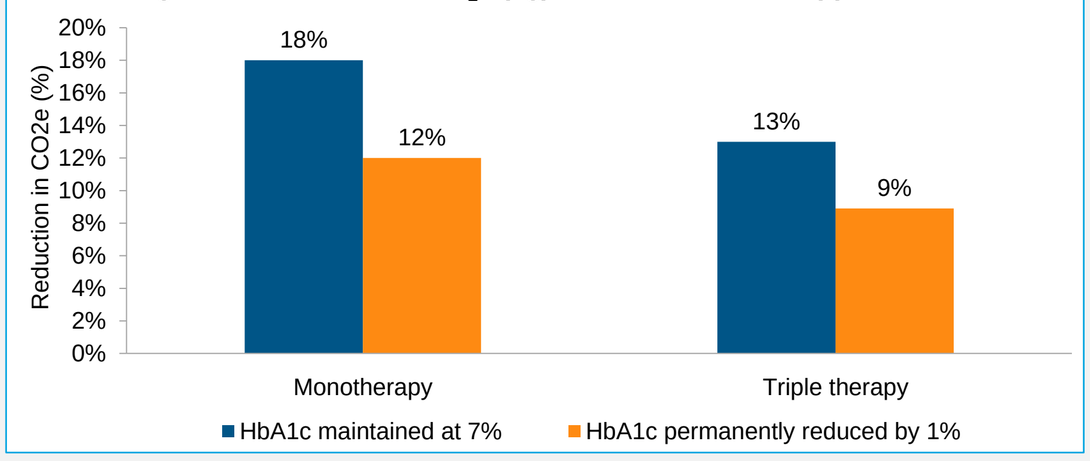
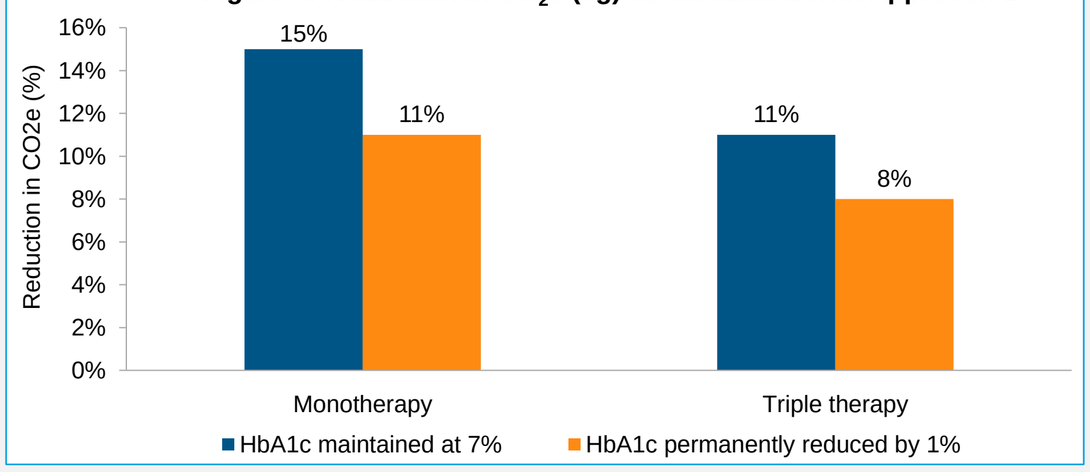


Figure 3: Reduction in CO_2e (kg) as calculated with Approach 1



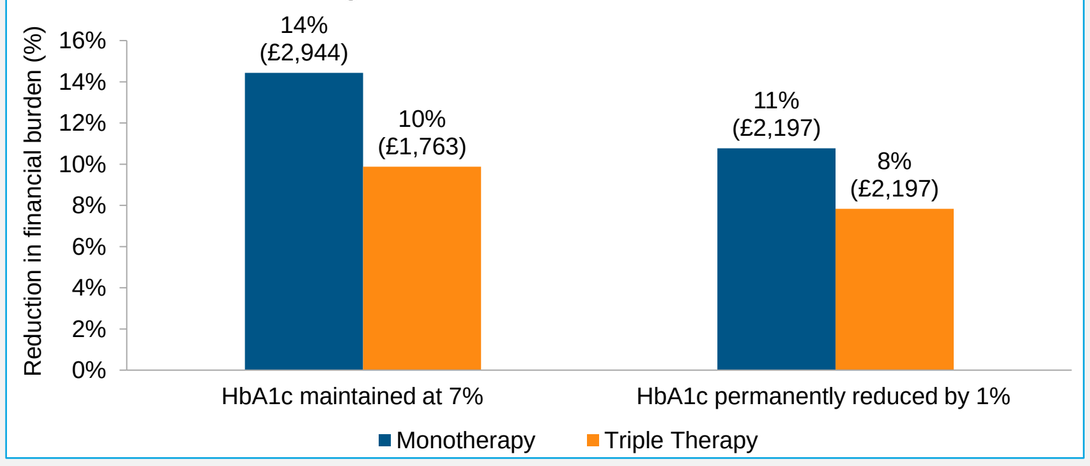
***Approach 1** – Each complication was segregated into source of CO_2e and healthcare components*

Figure 4: Reduction in CO_2e (kg) as calculated with Approach 2



***Approach 2 –** Costs for each complication were obtained from published literature and adjusted to 2016. Carbon intensity factor was used to arrive at carbon footprint*

Figure 5: Reduction in financial burden



References:
[1] Sustainable Development Unit, 2014. NHS, Public Health and Social Care Carbon Footprint 2012. [Online]. [2] NHS Sustainable Development Unit. Goods and services carbon hotspots: NHS England breakdown of goods and services carbon footprint by organization type (Full Report); 2012 [3] Diabetes UK: Facts & Figures [4] Preventing healthcare's CO2 emissions through improved diabetes management, October 2016 [5] Appendix F: Full Health Economics Report, Type 2 diabetes in adults: management, NICE guideline. 2015.
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