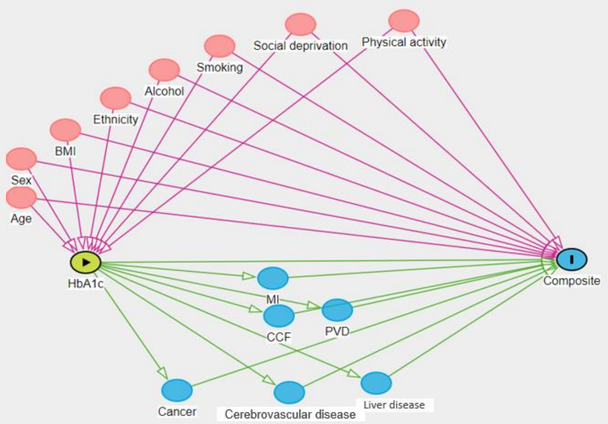
Glycated Haemoglobin (HbA_{1c}) and the risk of postoperative complications in people without diabetes

Stephen Lam[1, 2], Bhaskar Kumar[1, 2], Yoon Loke[2], Sophie Orme[2], Ketan Dhatariya[2, 3]

1. Department of Surgery, Norfolk and Norwich University Hospital NHS Trust, Norwich, UK.
2. Norwich Medical School, University of East Anglia, Norwich, UK.
3. Elsie Bertram Diabetes Centre, Norfolk and Norwich University Hospital NHS Trust, Norwich, United Kingdom.

Introduction

- **The relationship between elevated preoperative glycated haemoglobin (HbA_{1c}) and adverse postoperative outcomes remains contentious.**
- **Previous observational work has suggested that people without diabetes but with elevated preoperative HbA_{1c} have at least double the risk of postoperative morbidity and mortality compared to people without diabetes.[1,2]**
- **However, existing work is limited by insufficient sample sizes and potential confounding due to chronic hyperglycaemia related co-morbidity (see Figure 1) [3-4]**
- **The aim of this work was to clarify the association between preoperative HbA_{1c} and postoperative outcomes in people without diabetes undergoing surgery using a large population-based prospective cohort design.**



HbA1c= Glycated haemoglobin, BMI=body mass index, MI=myocardial infarction, CCF=congestive cardiac disease, PVD=peripheral vascular disease, Composite=30-day major postoperative complication and 90-day allcause mortality. The blue risk factors represent mediators through which HbA1c also acts

***Figure 1:* Directed Acyclic Graph of the presumed casual pathway for HbA1c and the composite primary outcome**

Methods

- **We identified 26,653 participants in the UK Biobank who had underwent surgery within one year of recruitment.**
- **We stratified participants into 3 groups based on both diabetes status and baseline HbA1c (see Figure 2).**
- **A composite primary outcome of 30-day major post-operative complications and 90-day all cause mortality was analysed using adjusted logistic regression to estimate odds ratios per group.**

***Table 1*: Logistic Regression analyses to estimate the odds of the composite primary outcome (major 30-day post-operative complications and 90-day mortality) by disease status**

Disease status	Age and sex adjusted OR (95% CI), p-value	Adjusted for total effect OR (95% CI), p-value	Adjusted for direct effect OR (95% CI), p-value
No diagnosis of diabetes HbA_{1c} <42 mmol/mol	*Ref.*	*Ref.*	*Ref.*
No diagnosis of diabetes HbA_{1c} ≥42 mmol/mol	1·49 (1·10-2·01), p=0·01	1·43 (1·02-2·02), p=0·04	1·37 (0·97-1·93), p=0·07
Prevalent diabetes	2·21 1·80-2·72, p=<0·0001	2·00 (1·53-2·54), p=<0·0001	1·79 (1·37-2·31), p=<0·0001

Total effect adjustment=age, sex, body mass index (continuous), ethnicity (white, mixed, Asian, Black, other), alcohol frequency (daily, 3-4 times/week, 1-2 times/week, 1-3 times/month, rarely, never), smoking status (never, former, current) Townsend deprivation index (1-5), International Physical Activity Index (low, moderate, high), and assessment centre location.

Direct affects adjustment=as per total effect model + comorbidity (myocardial infarction, congestive cardiac failure, peripheral vascular disease, cancer, cerebrovascular disease, and liver disease)

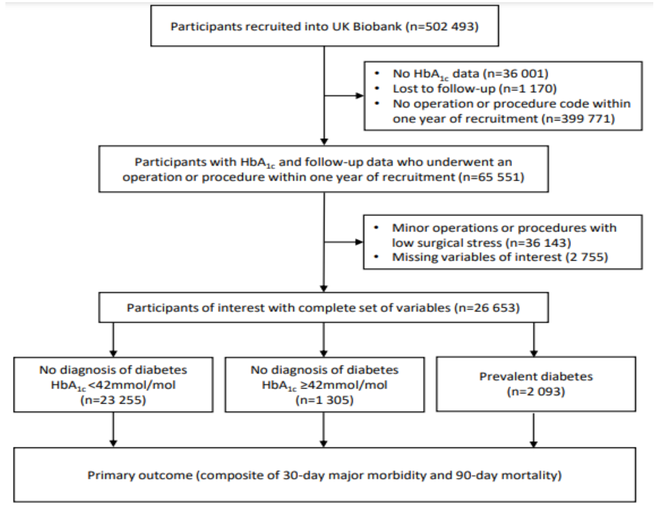


***Figure 2:* Study Flow Diagram**

Results

- **Elevated preoperative HbA_{1c} in people without diabetes was associated with an increased risk of complications (OR 1·43, 95% CI 1·02-2·02), but the association was confounded by end organ comorbidity (adjusted OR 1·37, 95% CI 0·97-1·93).**

Conclusions

- **HbA_{1c} can be used as a preoperative risk marker for postoperative complications in people without diabetes.**
- **However, in people without diabetes but with elevated HbA_{1c} increased postoperative risk is likely attributed to underlying comorbid disease.**
- **As such, our findings suggest that in order to prevent adverse postoperative outcomes, optimisation of pre-existing co-morbidites should take precedence over the diabetes.**

References:

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