To screen, or not to screen, that is the question

The study reviewed here used UK Biobank data to estimate the reduction in time to diagnosis of type 2 diabetes that could be achieved with population screening using HbA_{1c} in adults aged 40–70 years. HbA_{1c} was checked at Biobank enrolment and this result was not relayed back to participants or their clinicians, thus allowing an opportunity to assess any improvement in time to a diagnosis of type 2 diabetes with HbA_{1c} screening. In total, 1703 participants (1.0%) had undiagnosed diabetes according to an HbA_{1c} diagnostic threshold of ≥48 mmol/mol (6.5%). The median time to clinical diagnosis in this group was 2.2 years, with a median HbA_{1c} of 58.2 mmol/mol at diagnosis, compared with 51.3 mmol/mol at study enrolment. The results provide compelling evidence that population screening with HbA_{1c} can effectively reduce the time to diagnosis of type 2 diabetes in middle-aged adults in the UK.

Kevin Fernando
GP in North Berwick

"All screening programmes do harm; some do good as well, and of these, some do more good than harm at reasonable cost."

Sir Muir Gray, former Director of the UK National Screening Committee (Gray et al, 2008)

Population screening for type 2 diabetes is instinctively a good strategy to reduce the morbidity and mortality associated with uncontrolled hyperglycaemia and the associated costs to the NHS. However, the evidence base for type 2 diabetes screening at the population level is limited with regard to impact on health outcomes.

Previously, Shaw (2017) examined past evidence and found that, overall, there was little benefit directly related to centrally organised screening programmes, partly due to high levels of opportunistic screening in control groups. However, the author did highlight the influence of newer cardioprotective therapies for type 2 diabetes (i.e. SGLT2 inhibitors and GLP-1 receptor agonists), which have been found to reduce the risk of major adverse cardiovascular events (MACE) in people living with type 2 diabetes at high cardiovascular risk. If these therapies also demonstrated benefits in people with type 2 diabetes at lower cardiovascular risk, this might sway the argument for screening. Indeed, recent studies such as DECLARE-TIMI 58 (dapagliflozin) and REWIND (dulaglutide) have demonstrated improvements in MACE in cohorts with mixed cardiovascular risk (Wiviott et al, 2019; Gerstein et al, 2019).

In England, the NHS Health Check screens for type 2 diabetes in adults aged 40–74 years, whereas in the US, the US Preventive Services Taskforce (2021) recommends screening for prediabetes or type 2 diabetes in adults aged 35–70 years who have overweight or obesity.

The population-based, cohort study reviewed here used UK Biobank data to estimate the reduction in time to diagnosis of type 2 diabetes that could be achieved with population screening using HbA_{1c} in adults aged 40–70 years. In the UK Biobank, HbA_{1c} was checked at enrolment and this result was not relayed back to participants or their clinicians, thus allowing an opportunity to assess any improvement in time to a diagnosis of type 2 diabetes with HbA_{1c} screening.

A total of 179 923 Biobank participants had an HbA_{1c} measured at enrolment. Of these, 13 077 (7.3%) had a pre-existing diagnosis of type 2 diabetes, while 1703 (1.0%) had undiagnosed diabetes according to an HbA_{1c} diagnostic threshold of ≥48 mmol/mol (6.5%). Median HbA_{1c} was 51.3 mmol/mol in the latter group.

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"This well-conducted cohort study provides compelling evidence that population screening with HbA_{1c} can effectively reduce the time to diagnosis of type 2 diabetes in middle-aged adults in the UK."

The median time to clinical diagnosis for those with undiagnosed type 2 diabetes was 2.2 years, with a median HbA_{1c} of 58.2 mmol/mol at diagnosis. Notably, females with lower HbA_{1c} results and BMI measurements at enrolment appeared to have the longest delay in diagnosing type 2 diabetes.

The authors conclude that HbA_{1c} screening at enrolment of the UK Biobank study would have diagnosed type 2 diabetes cases a median of 2.2 years earlier than they received a clinical diagnosis. Furthermore, the gender inequality in diagnosis requires further exploration.

The authors do acknowledge some limitations of this study, principally that the UK Biobank has previously been established not to be a representative UK cohort. Participants are from less deprived areas, predominantly of white ethnicity and tend to have better health outcomes than the general UK population.

In conclusion, this well-conducted cohort study provides compelling evidence that population screening with HbA_{1c} can effectively reduce the time to diagnosis of type 2 diabetes in middle-aged adults in the UK. This has important implications for us in primary care: should we consider a routine HbA_{1c} check for all new patients registering with our practices? ■

Gerstein HC, Colhoun HM, Dagenais GR et al; REWIND investigators (2019) Dulaglutide and cardiovascular outcomes in type 2 diabetes (REWIND): a double-blind, randomised placebo-controlled trial. *Lancet* **394**: 121–30

Gray JAM, Patnick J, Blanks RG (2008) Maximising benefit and minimising harm of screening. *BMJ* **336**: 480–3

Shaw JE (2017) Does the evidence support population-wide screening for type 2 diabetes? No. *Diabetologia* **60**: 2153–6

US Preventive Services Task Force (2021) Screening for prediabetes and type 2 diabetes: US Preventive Services Task Force recommendation statement. *JAMA* **326**: 736–43

Wiviott SD, Raz I, Bonaca MP et al; DECLARE–TIMI 58 investigators (2019) Dapagliflozin and cardiovascular outcomes in type 2 diabetes. *N Engl J Med* **380**: 347–57

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ARTICLE

The impact of population-level HbA_{1c} screening on reducing diabetes diagnostic delay in middle-aged adults: a UK Biobank analysis

Katherine G. Young[1] · Andrew P. McGovern[1,2] · Inês Barroso[1] · Andrew T. Hattersley[1,2] · Angus G. Jones[1,2] · Beverley M. Shields[1] · Nicholas J. Thomas[1,2] · John M. Dennis[1]

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Abstract

Aims/hypothesis Screening programmes can detect cases of undiagnosed diabetes earlier than symptomatic or incidental diagnosis. However, the improvement in time to diagnosis achieved by screening programmes compared with routine clinical care is unclear. We aimed to use the UK Biobank population-based study to provide the first population-based estimate of the reduction in time to diabetes diagnosis that could be achieved by HbA_{1c}-based screening in middle-aged adults.

Methods We studied UK Biobank participants aged 40–70 years with HbA_{1c} measured at enrolment (but not fed back to participants/clinicians) and linked primary and secondary healthcare data (n=179,923) and identified those with a pre-existing diabetes diagnosis (n=13,077, 7.3%). Among the remaining participants (n=166,846) without a diabetes diagnosis, we used an elevated enrolment HbA_{1c} level (≥48 mmol/mol [≥6.5%]) to identify those with undiagnosed diabetes. For this group, we used Kaplan–Meier analysis to assess the time between enrolment HbA_{1c} measurement and subsequent clinical diabetes diagnosis up to 10 years, and Cox regression to identify clinical factors associated with delayed diabetes diagnosis.

Results In total, 1.0% (1703/166,846) of participants without a diabetes diagnosis had undiagnosed diabetes based on calibrated HbA_{1c} levels at UK Biobank enrolment, with a median HbA_{1c} level of 51.3 mmol/mol (IQR 49.1–57.2) (6.8% [6.6–7.4]). These participants represented an additional 13.0% of diabetes cases in the study population relative to the 13,077 participants with a diabetes diagnosis. The median time to clinical diagnosis for those with undiagnosed diabetes was 2.2 years, with a median HbA_{1c} at clinical diagnosis of 58.2 mmol/mol (IQR 51.0–80.0) (7.5% [6.8–9.5]). Female participants with lower HbA_{1c} and BMI measurements at enrolment experienced the longest delay to clinical diagnosis.

Conclusions/interpretation Our population-based study shows that HbA_{1c} screening in adults aged 40–70 years can reduce the time to diabetes diagnosis by a median of 2.2 years compared with routine clinical care. The findings support the use of HbA_{1c} screening to reduce the time for which individuals are living with undiagnosed diabetes.

Keywords Diabetes · HbA_{1c} · Public health · Screening · UK Biobank

Nicholas J. Thomas and John M. Dennis are joint senior authors.

✉ Katherine G. Young
k.young3@exeter.ac.uk

[1] Exeter Centre of Excellence in Diabetes (EXCEED), University of Exeter Medical School, Exeter, UK.
[2] Department of Diabetes and Endocrinology, Royal Devon and Exeter NHS Foundation Trust, Exeter, UK

Abbreviations

ADA-RTS	ADA Risk Test Score
FINDRISC	Finnish Diabetes Risk Score
IMD	Index of Multiple Deprivation
LRS	Leicester Risk Score
NNS	Number needed to screen
NSC	National Screening Committee
UKPDS	UK Prospective Diabetes Study

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