



Cardiovascular disease risk prediction in people with type 2 diabetes



AIMS

We investigated the risk of heart attacks and strokes (cardiovascular disease) in people with type 2 diabetes compared to people without diabetes. Current clinical guidelines recommend that doctors and nurses use risk scores to identify people with type 2 diabetes at high risk of developing cardiovascular disease and to suggest best treatment approaches. We tested how well these risk scores perform in people with type 2 diabetes in Scotland and developed a new and better risk score for people with type 2 diabetes in Scotland.



KEY FINDINGS

- The number of people with type 2 diabetes in Scotland has continued to increase in recent years in Scotland. This is mainly due to people with type 2 diabetes living longer rather than there being large increases in the number of new cases.
- Risk of cardiovascular disease has reduced in recent years both in people with type 2 diabetes and in people without diabetes. However people with type 2 diabetes continue to have a two- to three-fold increased risk of cardiovascular disease compared to people without diabetes.
- Many existing risk scores perform poorly in people with type 2 diabetes in Scotland.
- QRISK2, a risk score developed in the QRESEARCH database and recommended by UK clinical guidelines, tends to overestimate risk of cardiovascular disease in people with type 2 diabetes.
- Our new risk score is able to classify people with type 2 diabetes as low or high risk of cardiovascular disease more accurately.



WHAT DID THE STUDY INVOLVE?

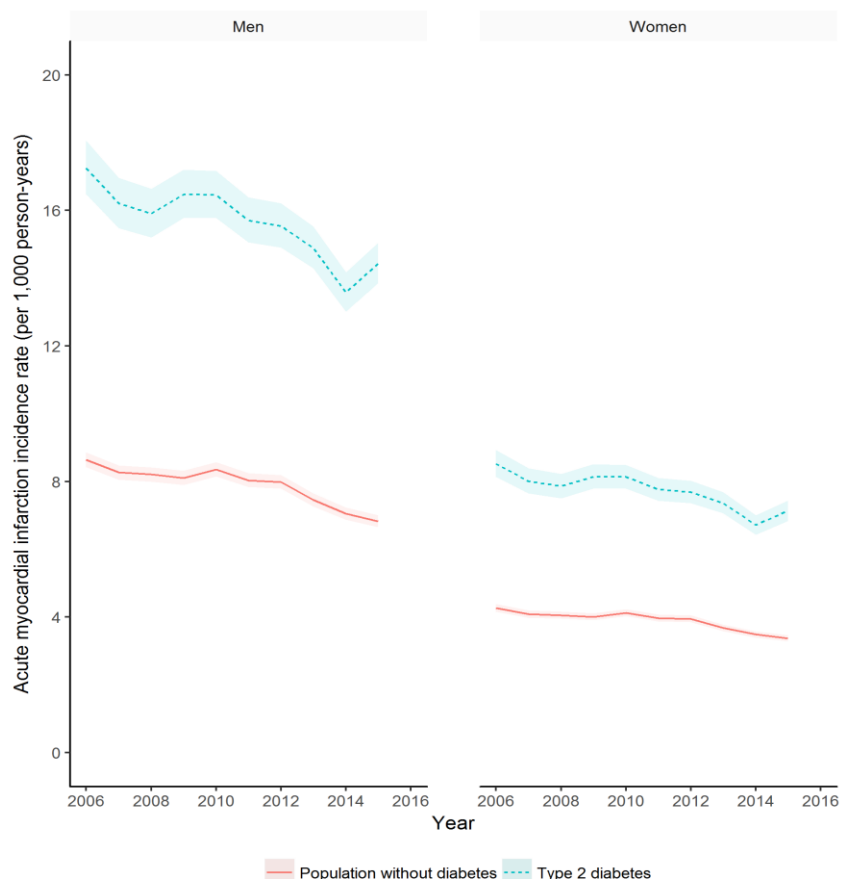
We used health data collected in Scotland from the diabetes register, also known as SCI-Diabetes, from hospital admissions and from the death registry. We first compared risk of cardiovascular disease in people with and without diabetes, taking into account different patterns of age, sex and socio-economic status. Next, for all adults with type 2 diabetes and without a previous history of cardiovascular disease in Scotland, we calculated predicted risk of cardiovascular disease at the time of diabetes diagnosis using several existing risk scores (e.g. QRISK2, ADVANCE developed using data from the Action in Diabetes and Vascular Disease: Preterax and Diamicron MR Controlled Evaluation trial). Using information on cardiovascular disease from hospital admissions and the death registry, we then used statistical tests to find out whether the predicted risks were accurate. Finally, we used statistical models to make a new risk score that was better at classifying people into low and high risk groups. We tested the new risk score in similar health data from Sweden and Australia to test the performance of the risk score in other populations of people with type 2 diabetes.



WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?

The graph shows that risk of cardiovascular diseases reduced between 2006 and 2016 in people with and without diabetes. The risk of cardiovascular disease was higher in people with type 2 diabetes than people without diabetes and the higher risk has not changed over time. This means that there are still opportunities to reduce risk of cardiovascular disease in people with type 2 diabetes.

We also found that, in people who are admitted to hospital with cardiovascular disease, people with type 2 diabetes were more likely to die within 30 days of admission. For example, 13% of people with type 2 diabetes admitted to hospital due to a heart attack during the study period died within 30 days compared to 9.5% of people without diabetes.



These graphs show the rates of acute myocardial infarction (heart attacks) for men and women with and without type 2 diabetes between 2006 and 2016.





WHAT WERE THE RESULTS AND WHAT DO THEY MEAN?

We assessed the performance of six existing risk tools for predicting risk of cardiovascular disease. We found that none accurately predicted the risk of cardiovascular disease in people with type 2 diabetes. In particular, we found that QRISK2, the risk score recommended

by the National Institute for Health and Care Excellence guidelines, performed poorly in this population. For example, QRISK2 estimated that the average five-year risk of cardiovascular disease in the population to be 24.1% when the actual risk was 9.7%.

This means that the current tools available for estimating cardiovascular risk are not appropriate for use in people with type 2 diabetes in Scotland.

We developed and evaluated a new risk score. This new risk score more accurately estimates risk of cardiovascular disease in people with type 2 diabetes in Scotland.

The image shows a screenshot of the QRISK2 online risk score calculator. The form is divided into two main sections: 'About you' and 'Clinical information'.
About you:
- Age (25-84): 64
- Sex: Male (selected), Female
- Ethnicity: White or not stated
- UK postcode: leave blank if unknown
- Postcode: [empty field]
Clinical information:
- Smoking status: non-smoker
- Diabetes status: none
- Angina or heart attack in a 1st degree relative < 60? [checkbox]
- Chronic kidney disease (stage 4 or 5)? [checkbox]
- Atrial fibrillation? [checkbox]
- On blood pressure treatment? [checkbox]
- Rheumatoid arthritis? [checkbox]
- Leave blank if unknown:
- Cholesterol/HDL ratio: [empty field]
- Systolic blood pressure (mmHg): [empty field]
- Body mass index:
- Height (cm): [empty field]
- Weight (kg): [empty field]
At the bottom of the form is a 'Calculate risk' button.

This figure presents the QRISK2 risk score which is available online (<https://qrisk.org/2017/>). By entering the necessary patient information, doctors are able to calculate a patients risk of developing cardiovascular disease and base treatment decisions on this predicted risk.



WHAT IMPACT COULD THE FINDINGS HAVE?

- Our findings highlight the importance of intensive cardiovascular disease risk factor management in people with type 2 diabetes.
- Current guidelines advocating the use of QRISK2 to identify people with type 2 diabetes at high risk of cardiovascular disease may require revision.
- The application of the new risk score for predicting risk of cardiovascular disease in people with type 2 diabetes could help better identification of people at high risk and improve recommendations to reduce their risk of having a heart attack or stroke.



HOW WILL THE OUTCOMES BE DISSEMINATED?

Many of the findings from this work have already been published in widely-read medical journals including Diabetes Care and Diabetologia. We have also presented some of this work to a wide range of audiences including fellow researchers, clinicians and patients at several national and international conferences. We anticipate that the final aspect of this work, the development of a new cardiovascular disease risk score will be published in a medical journal shortly and we also intend to submit the work for presentation at a conference.

An important next step of this research is the evaluation of the use of these risk scores in clinical practice and identifying whether their use does lead to improved health outcomes in people with type 2 diabetes and should be included in clinical guidelines.



CONCLUSION

Cardiovascular disease remains a common complication of type 2 diabetes and therefore reducing risk is an important priority. Clinicians can use risk scores to ensure effective approaches to risk reduction are targeted at people with the most to gain. Unfortunately many existing risk scores perform poorly in real life. A new risk score has been developed that may be more useful to clinicians who advise people with type 2 diabetes in Scotland.



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Additional Information

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