Clinical reviews

Our panel of GPs review recent research papers in their specialist areas that may influence the way you practise

Reviewers

Addiction
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Diabetes

How accurate are screening tests for pre-diabetes?

A recent meta-analysis has confirmed that interventions in patients with pre-diabetes reduce the rate of progression to overt diabetes, but found that the screening tests used to identify pre-diabetes are inaccurate.

The study was commissioned by policy makers in a London borough who wanted to identify an effective screen and treat policy in an area of high diabetes prevalence.

The UK investigators trawled through Medline, PreMedline and Embase for eligible papers evaluating the accuracy of tests for pre-diabetes, and controlled studies of interventions (lifestyle changes or metformin) in pre-diabetes patients identified by screening. A total of 2,874 titles were scanned and 148 eligible papers reviewed. The final analysis included 49 studies of screening tests and 50 intervention trials.

Lifestyle changes were associated with a 36% (95% CI: 28-43%) reduction in the relative risk of developing diabetes over six months to six years. After the trial period, the relative risk reduction fell to 20% (95% CI: 8-31%).

This finding agrees with the accepted view that lifestyle improvement consistently reduces the risk of developing diabetes in high-risk individuals, and is superior to the reductions in trials in similar patient groups using hypoglycaemic drugs such as metformin (demonstrated as showing a 26% reduction in this analysis).

It has also been known for a long time that there are different pre-diabetic states: impaired fasting glucose (IFG), impaired glucose tolerance (IGT) and abnormal HbA_{1c}. These abnormalities can exist separately or together, and no single test will identify all at-risk patients.

Not all patients will go on to develop diabetes, and the risk of progression is different for each glycaemic abnormality. Those patients with more than one abnormal finding are at the greatest risk of progression to diabetes. The new diagnostic label of pre-diabetes is an arbitrary category that encompasses IFG, IGT, abnormal HbA_{1c} or any combination of the three.

The surprise from the meta-analysis is the poor performance of the screening tests when analysed for sensitivity and specificity.

HbA_{1c} had a mean sensitivity of 0.49 (95% CI: 0.40-0.58). This suggests that over half the patients would be falsely reassured by a negative test when they did in fact have pre-diabetes. The specificity of the HbA_{1c} test was 0.79 (95% CI: 0.73-0.84). This suggests that a fifth of patients with a positive HbA_{1c} for pre-diabetes will not actually have the condition.

Fasting blood glucose had a mean sensitivity of 0.25 (95% CI: 0.19-0.32) and specificity of 0.94 (95% CI: 0.92-0.96).

Different measures of glycaemic abnormality identified different subpopulations (for example 47% of people with an abnormal HbA_{1c} had no other glycaemic abnormality).

The researchers also noted that there are different thresholds for pre-diabetes in the USA and in countries such as the UK that use the WHO criteria. Using the American criteria increases the overlap between the test results, but doubles the number of patients classified as having pre-diabetes.

This study shows that in the group of patients where there is true pre-diabetes, lifestyle modification can be a successful intervention to prevent progression to diabetes. For screening to be effective the tests used must be both sensitive and specific. However, IFG was shown to have adequate specificity, but not sensitivity, and HbA_{1c} is neither sensitive nor specific.

This analysis does not challenge the received wisdom about the success of lifestyle change for these patients at high risk of diabetes or about the overlap between the various abnormal glycaemic changes that can precede diabetes. However, it is an important paper for GPs because it suggests that the current diagnostic tests used to diagnose overt diabetes, are neither sensitive nor specific enough to screen for pre-diabetes.

DR MATTHEW LOCKYER

Barry E, Roberts S, Oke J et al. Efficacy and effectiveness of screen and treat policies in prevention of type 2 diabetes: systematic review and meta-analysis of screening tests and interventions. *BMJ* 2017;356:i6538

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