

Should we screen for type 2 diabetes?

Kamlesh Khunti and **Melanie Davies** believe that screening for diabetes is feasible and cost effective, but **Elizabeth Goyer and colleagues** think that a population approach to modifying risk factors would be better



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Yes 83% (582)

No 17% (118)

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News: Risk assessments for diabetes should be offered widely, says NICE (BMJ 2012;345:e4778)

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YES Type 2 diabetes is common, increasing in prevalence, and associated with high morbidity, mortality, and healthcare costs. Current estimates suggest that there are about 3.1 million adults in England with diabetes, of whom roughly a quarter are undiagnosed.¹ For several years many countries have been debating whether to screen for diabetes.² The disease certainly meets many of the criteria for screening: its natural course is well characterised, it can be asymptomatic, many people remain undiagnosed, high numbers of people have complications at diagnosis, and there is now good quality evidence regarding effective management for those with established diabetes. There is also evidence that screening for diabetes does not result in any harm to patients.³⁻⁴ Although there has been some uncertainty about the uptake of a screening programme in the real world setting,⁵ we believe it should be implemented.

Evidence for screening

No trials have compared screening for diabetes with no screening, which would be the ideal plat-

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NO The main evidence for the benefits of identifying people at increased risk of type 2 diabetes, as well as those who already have diabetes, comes from trials of early intervention and modelling. These suggest that screening followed by lifestyle interventions promoting changes in diet and physical activity is both effective and cost effective in people at increased risk.¹⁻² However, none of the models directly examines the relative benefits of these individualised approaches compared with population approaches. We suggest that screening has several disadvantages and that a mean population approach to risk reduction may be more appropriate.

Disadvantages of screening

Cost effectiveness modelling clearly shows the advantages of making management decisions on the basis of overall cardiovascular risk rather than on the presence or absence of individual cardiovascular risk factors such as hypertension.³

form to establish whether screening is cost effective. The recent ADDITION Europe randomised study of 3055 people investigated the effect of intensive treatment of multiple risk factors in people with screen detected type 2 diabetes. The patients in the control arm were also screen detected but received routine care from primary care practitioners.⁴ At five year follow-up, the intensive group had significant improvements in cardiovascular risk factors compared with the control group, although the 17% relative risk reduction in the primary outcome (first cardiovascular event) was non-significant (13.5/1000 person years in the intensive treatment group compared with 15.9/1000 in the control group).⁴ However, the UK Prospective Diabetes Study showed that the effects of tight glycaemic control on development of diabetes related complications are longer term⁶ and therefore would be unlikely to be seen within the five year follow-up of the ADDITION study. The ACCORD and Veterans Administration diabetes randomised trials also showed benefits of tight control for people without previous cardiovascular events who were earlier in their disease trajectory (duration of diabetes less than 15 years).⁷⁻⁸

In the absence of a control arm without screening, it is difficult to ascertain the true benefits of screening. Current recommendations have therefore been based on modelled cost effectiveness

Focusing on diabetes risk alone... ignores the additional benefits of weight loss and exercise

Recent modelling suggests that it may be as effective to treat on the basis of age alone as on the basis of a more complex risk assessment including blood pressure and cholesterol levels.⁴ Similarly, diabetes specific risk assessment and measurement of blood glucose may contribute little to management decisions. Changes to diet or physical activity levels will always be advisable for people who are overweight or sedentary, whatever their overall diabetes or cardiovascular risk score and whatever their glucose result.

Moreover, focusing on diabetes risk alone will underestimate the health risks for someone who is overweight but has a normal glucose level (notably those of cardiovascular disease and cancer)⁵ and ignores the additional benefits of weight loss and exercise (including the effect on psychological and social wellbeing).⁶ Given that the benefits of lifestyle intervention also depend on the extent to which someone can change their diet and physical activity patterns, a focus on diabetes risk will not always identify those who could benefit most.

Giving individuals an accurate assessment of their personal risk of diabetes may still be valuable because it could motivate behaviour

analyses. Any screening programme for diabetes will also identify people at high risk of type 2 diabetes, and the evidence for prevention of diabetes in this group is unequivocal.⁹ One recent economic decision analysis model estimated that compared with no screening, the cost of screening for diabetes and impaired glucose tolerance followed by lifestyle interventions was £6242 (€7750; \$9750) for each quality adjusted life year (QALY) gained.¹⁰ A simulated study using the Archimedes model suggested that compared with no screening, screening for type 2 diabetes is cost effective when started between the ages of 30 years and 45 years, with screening repeated every three to five years.¹¹ Compared with no screening, all screening strategies reduced the incidence of myocardial infarction (3.9 events prevented per 1000 people screened) and microvascular complications (3.9 events prevented per 1000 people screened) and deaths (2 to 5 events per 1000 people).¹¹

Practicalities

Another review suggested that two stage screening for diabetes is cost effective for patients aged 40-70 years compared with no screening (£10 216/QALY).¹² However, most of the economic modelling studies have used the oral glucose tolerance test for diagnosis, which has been shown to be impractical and reduces uptake.¹³

change, but the evidence for this is equivocal. Evaluations of screening programmes that have measured psychological outcomes and behavioural intentions suggest that a negative screening result, carefully explained, will not cause “false reassurance”⁷ but that, equally, a personalised risk score doesn’t increase the chance of successful behaviour change.⁸

With an increasingly overweight and sedentary population and lower thresholds for intervention, the “population at risk” becomes the majority of the population. This makes the cost of individualised assessment and intensive interventions for everyone who could benefit an increasingly expensive option. It also makes a strategy that focuses on individual behaviour change even more likely to exacerbate health inequalities, as those with more resources and support will find it easier to change their lifestyle.⁹

Advantages of a population approach

The main interventions proposed for reducing the risk of diabetes among those at increased risk are increasing physical activity (and reducing sedentary activities) and dietary change (less sugar and fat; more fruit, vegetables, and fibre).¹ Since these interventions would benefit the whole population and impact on a wide range of conditions beyond diabetes, it seems rational to consider interventions to facilitate population-

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Recently the World Health Organization has recommended using glycated haemoglobin (A_{1c}) concentrations to diagnose diabetes,¹⁴ which should increase the uptake of screening.

The recent evidence makes the case for screening for diabetes (and those at high risk) much stronger, and two major initiatives in the UK are likely to help implement screening. The National Health Service Health Checks programme for adults aged 40-74 years was introduced in England in 2009 with the objective of assessing the risk of developing vascular or metabolic disease, including diabetes. The second initiative is the imminent publication of the National Institute for Health and Clinical Excellence’s guidance on identification and prevention of type 2 diabetes in people at high risk.¹⁵ The guidance makes practical recommendations on risk identification using simple self assessment risk scores or computer based risk scores in people aged 40 to 75 years and younger people from black and minority ethnic groups followed by a fasting glucose or a random haemoglobin A_{1c} assessment. The guidance also makes pragmatic recommendations to

wide behaviour change rather than focus on one risk group just because we can identify them.¹⁰

Moreover, given recent secular changes in our environment and habits that have led to even the average individual being overweight, a policy that focuses on interventions to reverse changes responsible for the increasing risk makes sense.¹¹ An additional benefit of such population level interventions is that not only do they facilitate individual efforts to change behaviour but they may have other benefits in terms of environmental sustainability—for example, through promotion of active travel or more local food production.¹² Regulation of the food and drink industry to create a level playing field for healthier products and more generally promoting the availability of healthier foods at reasonable prices might also be a promising place to start.¹³

Focusing on population approaches rather than individual risk assessment would free up health service resources for prevention of complications in people with clinical diabetes.¹⁴ For example, modelling of the current Health Check programme in England (screening every five years between the ages of 40 and 74 years, which includes diabetes screening as part of cardiovascular risk assessment) suggests 1600 vascular events and 650 deaths will be avoided annually.¹⁵ This is at a cost of around £30m

help people make long term lifestyle changes to reduce risk and delay onset of type 2 diabetes.¹⁵ The comprehensive modelling in this programme has also suggested that this strategy is likely to be cost effective.

Direct evidence of the benefits of early detection of type 2 diabetes by screening are lacking and are now unlikely to be obtained. However, the ADDITION study, the recent robust modelling studies, and a move to using non-invasive tests followed by haemoglobin A_{1c} as a diagnostic test for diabetes suggest that screening and intensive risk factor control of people with diabetes is feasible in primary care and is likely to be cost effective.

Competing interests: Both authors have completed the ICMJE uniform disclosure form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare that that had no support from any organisation for the submitted work; MJD has received funds for research, honorariums for speaking at meetings, and has served on advisory boards for Lilly, Sanofi Aventis, MSD, Novo Nordisk, BMS, BI, and Roche. KK has received funds for research, honorariums for speaking at meetings, or served on advisory boards for Astra Zeneca, GSK, Lilly, Novartis, Pfizer, Servier, Sanofi Aventis, MSD, and Novo Nordisk. KK (chair) and MJD are members of the National Institute for Health and Clinical Excellence public health guidance on preventing type 2 diabetes and both are advisers to the UK Department of Health for the NHS health checks programme.

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(€37m; \$47m) in direct payments to primary care providers (assuming 1.1 million people attend for a check each year at £25-£28 per check).^{16 17} Spending limited health service resources on a diabetes risk assessment and prevention programme reduces resources available for specialist management of these serious preventable diabetes complications. While, in the short term, the theoretical cost savings from reduced complication rates generated by screening programmes can rarely be realised in practice, the real savings generated by not screening could immediately be spent on diabetes patients’ care.

The striking variations in obesity rates between communities¹⁸ offer hope that increasing obesity and diabetes prevalence are not inevitable. Screening is a relatively expensive investment, targeting only a proportion of those who could benefit, whereas population level interventions hold promise in terms of potentially both reducing risk and reducing health inequalities.

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