Should we screen for type 2 diabetes? Lessons learnt from a national pilot programme

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Article points

1. A national pilot diabetes screening programme was undertaken to detect cases of undiagnosed type 2 diabetes.
2. People over 40 years old, with a BMI over 25, were screened to identify those at high risk.
3. The number of people with undiagnosed diabetes detected by screening was lower than expected and a number of practical difficulties with implementing screening were identified.
4. Even if earlier intervention can improve outcomes, there may be significant practical problems to overcome before effective systematic screening can be implemented universally.

Key words
- Screening
- Diagnostic testing

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Screening for type 2 diabetes remains controversial. This is largely because, despite strong circumstantial evidence (Harris et al, 1992), there is not yet any direct evidence from trials that screening and earlier diagnosis have an impact on health outcomes (Wareham and Griffin, 2001). A recent editorial in the *BMJ* suggested that until the multicentre trial of screening and intensive intervention, ADDITION (Lauritzen et al, 2003), reports, we would do best to 'wait until people present with the classic symptoms of thirst and polyuria before screening them' (Stolk, 2007). In other words, we'd be best to not screen at all. However, every day in primary care, many people with risk factors for type 2 diabetes will be seen and many will have their blood glucose measured. In this context, we discuss some of the findings from a national pilot screening programme and outline some of the lessons learnt.

A number of primary-care based research projects have demonstrated that it is feasible to screen for type 2 diabetes in general practice (Lawrence et al, 2001; Greaves et al, 2004; Cogneau et al, 2006). Despite only circumstantial evidence to support systematic screening, the UK National Screening Committee decided that, since there was considerable ad hoc screening activity, there was enough evidence to pilot a programme and to evaluate the feasibility and impact of screening in the 'real world' of busy general practices. They recruited practices from teaching PCTs in some of the most diverse and economically deprived areas of England because such areas tend to have high incidences of type 2 diabetes and therefore might be expected to have even higher numbers of undiagnosed cases (Riste et al, 2001). Twenty-four general practices from eight PCTs were recruited for the pilot study. (The eight PCTs were: Sunderland, Bradford, Liverpool, Luton, Leicester, Bristol, Portsmouth and Haringey.) In each PCT, three general practices were randomly selected as pilot sites from those that volunteered and a further three volunteer practices were selected as comparison sites. A multidisciplinary team based in Sheffield and Edinburgh was appointed to conduct an independent evaluation of the pilot programme

that ran from autumn 2003 to autumn 2005.

Organisation of screening

Each PCT had a project facilitator funded by the national pilot programme to support them and the participating practices in delivering the screening programme. The pilot practices in each participating PCT were funded to provide screening and appropriate interventions for all registered patients who fulfilled the screening criteria. The original criteria for screening was an age of over 40 years with a BMI over 25 kg/m^2 without diagnosed diabetes. Individuals who fulfilled the screening criteria were invited to have a random capillary blood glucose test using a glucometer. Practices used a diverse range of invitation methods, often both systematic mailing of letters and opportunistic invitations when people attended for other reasons. A cut-off of 6 mmol/l or over was used to identify high-risk individuals in whom to undertake diagnostic tests to avoid missing cases. People with coronary heart disease (CHD) were excluded in most practices as they were already routinely screened as an element of CHD annual reviews. Some practices also identified and excluded all individuals with a normal blood glucose result in the previous 2 years.

Many practices widened the criteria for screening as they felt they excluded people at significant risk, particularly in ethnic minority communities, preferring to include all those over 30 years (Haringey) or all those over 40 years (Bradford), regardless of BMI. There was also considerable screening activity outside the protocol. Anecdotally, a significant amount of screening outside the protocol was offered either on the clinical judgement of the screener (often owing to the presence of other risk factors such as family history or ethnic background) or because of the perceived or expressed patient expectation that if invited to an appointment they would be screened. Only half the practices used oral glucose tolerance testing (OGTT) as a diagnostic test for reasons of feasibility, despite the availability of project funds for diagnostic testing. Where it was offered in the practice, the testing was usually done by healthcare assistants.

The pilot practices used two methods for collecting information on screening. These were either a data collection form, or a template developed locally for their own clinical information systems. Twelve practices completed the data collection form. The other 12 practices designed their own templates within their clinical information system or simply entered data in fields already existing on local systems so that any data collected on screening was integrated with the main practice information system. This had the advantage that the information collected for the screening programme was available when the patient attended the practice for other reasons. The 24 practices used seven different systems on which at least some of the screening data were collected.

Findings

Implementation of screening was not straightforward, even in volunteer practices with additional funding and the support of a facilitator. There were major difficulties in using clinical information systems to identify those eligible, exclude those who had recently had a blood glucose test and invite people to a screening appointment. Many practices found it more efficient to offer screening opportunistically when individuals attended for other reasons. *Box 1* lists the main issues that influenced the feasibility of screening.

Screening was undertaken in 24 practices with a combined patient population of 165 828. After exclusions on the basis of diagnosed diabetes, age, known BMI and previous blood glucose testing (usually in the previous 2 years), approximately one quarter of the population (41 418) were invited for screening. Of those invited, 25 356 (62%) were screened. In this population, 31 % had a positive screening test (capillary blood glucose ≥6 mmol/l). Overall, 358 individuals (1.4 %) were diagnosed with diabetes. This means that approximately one in 70 of those screened were given a new diagnosis of diabetes. However, adjusting for the number of new cases detected by comparison practices without screening

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4. There were major difficulties in using clinical information systems to identify those eligible, exclude those who had recently had a blood glucose measurement and invite people to a screening appointment.

Box 1. Main issues that influenced feasibility of establishing screening.

- Flexibility in invitation/screening/follow-up protocols.
- Ability to use clinical information systems for identifying those eligible for screening and for organising screening.
- Ability to use clinical information systems for recording screening activity.
- Availability of additional staff, particularly recruitment and training of healthcare assistants.
- Availability of other resources required for implementing screening – administrative staff, rooms and computers, diagnostic blood testing by practice or by hospital/walk-in centre.
- The extent to which diabetes screening could be integrated with meeting other practice goals including the nGMS contract requirements, integration into chronic disease management systems and integration with wider health promotion activities.

Box 2. Main issues influencing the impact of screening in terms of new cases detected.

- Level of adhoc and risk group screening already done by practice.
- Uptake of offers of screening by patients.
- Non-attendance for screening or diagnostic testing.
- Lack of availability of OGTTs.
- Difficulty ensuring all abnormal screening results were followed up.

pilots, the additional cases diagnosed by the pilot activity represent an increase of about two new cases per thousand registered population; equivalent to three or four additional cases per GP. Overall, practices found fewer new cases than they had anticipated relative to their expectation that there might be almost as many individuals undiagnosed as there were on registers (Forouhi et al, 2006). *Box 2* lists some of the main factors that influenced the number of new cases detected by screening.

Lessons learnt

Some of the difficulties that arose were the result of conducting a screening pilot in the 'real world' rather than as a research project. Many of the issues would never have arisen in a research project because of the stringent requirements to develop a detailed protocol for the intervention and for data collection, which is then carried out without scope for variation to suit local circumstances. Only when

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1. The restriction of blood testing to those at high risk, the provision of information to patients, the collection and retrieval of clinical information and adequate follow up of those with a positive screening test all proved difficult to implement in every-day practice.
2. Screening invitation letters should be as simple as possible.
3. Limiting screening to those at highest risk is only likely to be feasible if risk information can be obtained without patients being invited to attend the surgery.
4. The overall impact of screening will vary widely between practices depending on the underlying prevalence of undiagnosed diabetes and the screening strategies adopted.
5. Many of the pilot practices found it extremely difficult to collect or report adequate information on their screening activity.

screening is attempted outside of research does it become apparent that there may be both ethical and practical difficulties. Ethical issues include limiting access to a screening test on the basis of BMI, which may be seen as inequitable, and 'informed consent'. It was not clear that patients understood the implications of screening and, particularly where it was offered opportunistically, may not have had time to consider the offer.

The main limitations to the effectiveness of the screening programme were the difficulty in collecting process and outcome information that would allow audit of the screening activity and a lack of access to diagnostic tests, in particular limiting the proportion of those with positive screening tests having undergone an OGTT.

Implications for practice

Primary care has an increasing responsibility for primary prevention and early detection of diabetes and cardiovascular risk. Some major issues that are relatively straightforward in a research screening context proved much more problematic when attempting to implement systematic screening into clinical practice. The restriction of blood glucose testing to those at high risk, the provision of information to people, the collection and retrieval of clinical information and adequate follow up of those with a positive screening test all proved difficult to implement in everyday practice.

Some specific practical suggestions about how to ensure any screening activity is as effective as possible have been derived from this pilot programme and are outlined below.

Uptake of screening

Screening invitation letters should be as simple as possible. There may be limited value in using letters in languages other than English and the value of translated materials needs to be explored in each location. Opportunistic invitation may increase uptake and represent a more cost-effective strategy for both general practices and patients. People who are in work may find it particularly difficult to attend within normal practice opening hours and may therefore need appointments outside normal working hours.

Inclusion criteria for screening

Limiting screening to those at highest risk is only likely to be feasible if risk information can be obtained without individuals being invited to attend the surgery, and if the criteria are understood and accepted by practice staff. Age criteria (for example, over 45 years of age) may be more feasible to use to identify risk groups than BMI, ethnicity or other criteria that are still not yet universally recorded. Practices may wish to use their discretion to screen younger individuals who have other risk factors (based on BMI, ethnicity and family history).

Understanding the purpose of screening

The objective of screening for diabetes might be better understood if the language of 'risk reduction' was used so that all individuals expect to be given advice about what they could do to reduce future risks, rather than the reassurance of an 'all-clear' result. There is also a need to manage patient expectations to avoid increasing dissatisfaction due to unrealistic assumptions about the nature or purpose of risk assessment.

Impact of screening

The overall impact of screening will vary widely between practices depending on the underlying prevalence of undiagnosed diabetes and the screening strategies adopted. Both the overall impact and resource implications will depend largely on the inclusion criteria and choice of diagnostic tests. In particular, the use of OGTTs will increase both the impact and accuracy of testing, but has resource and organisational implications.

Screening personnel

Healthcare assistants can be recruited and trained to offer screening and health promotion advice. Further work is needed to assess the effectiveness of health promotion or risk-reduction interventions offered by healthcare assistants to individuals at increased risk.

Audit of screening

Many of the pilot sites found it extremely difficult to collect or report adequate information on their screening activity. Paper-based systems were unpopular and ultimately proved to be unsuitable since the information collected was not accessible when people attended the practice or when diagnostic test results arrived in the practice. Practice systems may be appropriate but consistency in recording and coding information on risk factors, screening results and diagnostic results using system templates would need to be further developed. Adequate audit and quality assurance is vital to any screening programme and practices need to be able to record screening activity in a consistent way and in a format that allows for audit of the screening process that is consistent with existing data collection systems.

Conclusion

Guidance on cardiovascular risk reduction programmes is currently being developed by the UK National Screening Committee. It is unlikely that screening for diabetes would be feasible or cost-effective, relative to an integrated assessment of cardiovascular risk. If such programmes are developed, the resource and workload implications are significant and lessons from the evaluation of such pilot programmes will be invaluable in informing this activity. ■

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