

Screening for diabetes in optometry practices: acceptability to users

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Abstract

Purpose: *Diabetes is a leading cause of blindness in the working age population. While optometrists have an established role in screening people with known diabetes for eye disease, their role in screening for diabetes has not been evaluated. For diabetes screening in optometry practices to be successful it must be acceptable to both optometrists and to the public. The purpose is to determine acceptability to people attending optometry practices of using random capillary blood glucose (rCBG) tests to detect raised blood glucose levels in optometry practices*

Methods: *A screening service offering people with risk factors or symptoms of diabetes rCBG tests was piloted in five high street opticians' practices in North East England. 1002 people used the screening service during a 20 week period. Each was given a questionnaire to complete and return following a rCBG test.*

Results: *939 questionnaires were returned (return rate 93.7%). Mean age of participants was 54.5 years; 63.3% were female, 75.0% had not been screened for diabetes previously. 99.1% agreed or strongly agreed that the location was convenient for them. Only 3.2% reported that the test procedure was uncomfortable. 98.0% would recommend others to use the screening service. 83.8% of the participants would not have gone elsewhere to have any tests done. 148 (15.8%) responded that they would have sought a test elsewhere; 91.5% at the GP, 4.7% at a pharmacy and 3.5% elsewhere.*

Conclusions: *To those attending opticians' practices, screening using rCBG tests is acceptable in terms of convenience and test comfort, and would recommend the test to others. Screening in optometry practices provides an opportunity to identify people at risk of diabetes in a hitherto unutilised setting.*

Introduction

Worldwide, there are increasing numbers of people with type 2 diabetes¹ many of whom are unaware they have the disease²⁻⁴. In the UK it has been estimated that 22% of diabetes in men aged over 50 years remains undiagnosed⁴. Identification of these people presents a challenge. Screening for undiagnosed disease may help identify some of these missing people. Currently much of the screening is carried out in medical settings, often by family doctors⁵. Providing alternative locations as a setting for screening may widen access to those at risk who do not routinely access conventional health care settings.

Optometrists may have an important role to play in the detection and management of systemic diseases. Hypertension has been considered as a condition suitable for optometrists to screen for and it has been suggested that blood pressure measurement could be included as part of a routine eye examination⁶. Surveys have shown that around one tenth of practices have equipment to measure blood pressure⁷. It has also been suggested that optometrists may have a role to play in screening for depression⁸ and in providing smoking cessation services⁹.

Like hypertension, diabetes is a systemic disease which can lead to a variety of ocular complications including cataract, nerve palsies and diabetic retinopathy¹⁰. While optometrists have been involved for many years in screening people with known diabetes for eye disease¹¹, and have been shown to be effective and in detecting and managing retinopathy^{12,13}. More recently it has been suggested that optometrists can use colour vision screening to detect changes in early diabetes¹⁴ and may have a role to play in detecting diabetic neuropathy by measuring corneal sensitivity¹⁵. It is known that diabetes can cause both myopic and hyperopic shifts¹⁶, and this can allow optometrists to detect previously undiagnosed diabetes. However, their role in routine screening for diabetes itself has only recently been considered. It has been shown that some optometrists may be willing to carry out screening for diabetes providing certain barriers such as cost, training and time can be

overcome¹⁷. Optometrists are in a position to ask every patient about some diabetic risk factors during the course of a sight test. For example, it is known that nearly two-fifth of Australian optometrists always ask patients over the age of 40 about diabetes¹³. Case histories taken in the course of an optometric examination should always include questions regarding family history of diabetes¹⁸.

To be suitable for screening a disease must be common, have effective treatment or management and have a suitable test. Screening using random capillary blood glucose (rCBG) or “finger-prick” tests have been used in a number of situations to identify those who would benefit from further investigations¹⁹⁻²⁴. rCBG testing has the advantage that it is less invasive and time consuming than oral glucose tolerance test, does not require the subject to fast and the results are available immediately, so can be carried out in situations where it is not possible to get samples to laboratories to be tested. Currently, in the UK, the Royal Pharmaceutical Society of Great Britain has developed guidelines in association with Diabetes UK²⁵ for screening using rCBG testing in high street pharmacy practices and this service is offered by some high street pharmacists²⁶.

However, for screening to be successful, it needs to be accessible and acceptable to the target population. Ways of making these tests accessible to those at risk need to be indentified. Optometrists may have an important role to play in this as they may provide services to people who do not access other health care services.

Aims

We aimed to ascertain acceptability of using rCBG tests to screen for diabetes and pre-diabetes in optometrists' practices to users of the service.

Methods

A screening programme was implemented in five optometry practices (two multiple practices, three independents) in North East England. Practices were contacted by letter and

those expressing an interest in participating were selected. Screening ran for 4 weeks in each practice. Adults attending for sight tests were given a list of risk factors for diabetes based on Diabetes UK criteria (A-K in figure 1)²⁷. Those who self reported the presence of one or more risk factors were offered a rCBG test. If the optometrist found any ocular finding suggestive of diabetes a rCBG was also offered (L in figure 1).

Figure 1 Risk factors for inclusion in screening programme

- A. White aged over 40 years or black, Asian and minority ethnic groups aged over 25 with first degree family history of diabetes
- B. White aged over 40 years or black, Asian and minority ethnic groups aged over 25 with BMI of 25 kg/m² and above
- C. Waist measurement of ≥ 94 cm (≥ 37 inches) for white men aged over 40 years and black men aged over 25 years and ≥ 90 cm (35 inches) for Asian men aged over 25, and ≥ 80 cm (31.5 inches) for white women aged over 40 years and black and Asian women aged over 25 years.
- D. People who have ischaemic heart disease, cerebrovascular disease, peripheral vascular disease or treated hypertension
- E. People who are known to have impaired glucose tolerance or impaired fasting glycaemia
- F. People with severe mental illness (SMI)
- G. People with raised cholesterol
- H. Women who have had gestational diabetes who have tested normal following delivery
- I. Women who have given birth to a baby weighing more than 4kg (8lb 8oz)
- J. Women with polycystic ovary syndrome
- K. People experiencing symptoms of diabetes (Increased thirst, going to the toilet all the time, extreme tiredness, weight loss, genital itching or regular episodes of thrush, slow healing of wounds, blurred vision)
- L. Ocular signs/symptoms of diabetes – dot/blot haemorrhages, recurrent infections, variable refraction, complaints of visual disturbances, early appearance of cataract.

Blood glucose capillary tests were carried out by a healthcare assistant using Bayer Contour® meter. This meter uses a sample of capillary whole blood and converts the reading to plasma equivalent and gives a result within 5 seconds. Participants with a rCBG measurement of ≥ 6.1 mmol/l (whole blood ≥ 5.6 mmol/l) were advised to see their own GP for further investigations in line with Diabetes UK/Royal Pharmaceutical Society of Great Britain guidelines²⁵. This cut off point has been calculated to be the most efficient when screening for diabetes and prediabetes with sensitivity of 62% and specificity of 70%²⁸. It is also the most economic cut off when screening for diabetes²⁸. Full details of the results of the screening programme and subsequent follow up has been described elsewhere^{25, 29}. Immediately after being given the results of the rCBG test, participants were given a short written questionnaire (appendix 1) and asked to complete and return it either by post or to the practice. Results were entered and analysed using SPSS 15.0 software.

Ethics approval was gained from Durham University School of Medicine and Health ethics committee.

Results

Of the 1303 adults eligible to participate, 1002 adults (77%) were screened. Of these 318 (31.7%) were subsequently found to have raised rCBG (≥ 6.1 mmol/l) and it was suggested that they should visit their GP for further investigations.

939 questionnaires were returned (response rate 93.7%). There were no significant differences between those who returned the questionnaires and those who did not with regards to mean age, mean rCBG levels, gender or practice type attended.

Table 1 Characteristics of participants in screening and respondents and non-respondents to the questionnaire

	Screening (n=1002)	Questionnaire returned (n=939)	Questionnaire not returned (n=63)	
Mean age years (SD)	54.40 (16.31)	54.50 (16.36)	53.0 (15.8)	T=0.71, p=0.47
Male (%)	363 (36.2%)	345 (36.7%)	18 (28.6%)	
Female (%)	639 (63.8%)	594 (63.3%)	45 (71.4%)	
White (%)	992 (99.0%)	929 (98.9%)	63 (100%)	
Mixed (%)	3 (0.3%)	3 (0.3%)	0 (0.0%)	
Asian/British Asian	5 (0.5%)	5 (0.5%)	0 (0.0%)	
Black/Black British	1 (0.1%)	1 (0.1%)	0 (0.0%)	
Chinese or other	1 (0.1%)	1 (0.1%)	0 (0.0%)	
Blood glucose				
Mean mmol/l (SD)	5.78 (1.34)	5.79 (1.36)	5.51 (1.04)	t=1.6, p=0.11
<6.1mmol/l	684 (68.3%)	635 (67.6%)	49 (77.8%)	
≥6.1mmol/l	318 (31.7%)	304 (32.4%)	14 (22.2%)	
Multiple practice	559 (55.8%)	527 (56.1%)	32 (50.8%)	
Independent practice	443 (44.2%)	412 (43.9%)	31 (49.2%)	

Participants were asked to rate the convenience, comfort, whether they would recommend the test and their expectations of opticians ability to detect health problems using a 5 point Likert scale. The responses to the four statements are shown in Table 2.

Table 2 – Participants’ responses

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
The opticians practice was convenient for the screening test (n=937)	82.5% (773)	16.6% (156)	0.6% (6)	0.1% (1)	0.1% (1)
The screening test was uncomfortable (n=926)	2.6% (24)	0.6% (6)	1.7% (16)	17.0% (157)	78.1% (723)
I would recommend friends/family to have the test (n=937)	82.2% (770)	15.8% (148)	0.6% (6)	0.6% (6)	0.7% (7)
I expect opticians to detect health problems (n=932)	56.7% (528)	26.2% (244)	12.6% (117)	3.0% (28)	1.6% (15)

Only two participants (0.2%) disagreed or strongly disagreed with the idea that the optician's practice was a convenient location. The majority felt that the location was convenient for them. Thirty participants, from the 926 who responded to the statement, reported that the test was uncomfortable (24 strongly agreed, 6 agreed). However, only one of these reported that they would not recommend the test to family and friends. Over 95% reported that they would recommend participation to other people. Comfort of the test and whether they would recommend the test to others was not affected by gender or whether a person was referred on top their GP as a result of having the rCBG test. Over three quarters of participants agreed that opticians should be able to detect health problems. There was no significant difference in responses between people attending different practices, between genders or for those who screened positive or negative.

148(16.2%) participants reported that they would have considered going elsewhere for a diabetes screening test, while 768 (83.8%) would not. Of the 148 who would have considered going somewhere else, 77 (52.0%) had never been tested previously and 69 (46.6%) reported that they had undergone screening for diabetes prior to participating in the study (no details on previous test status for two participants).

Nearly two-thirds of the population that participated in the screening reported that they had never been tested previously and that they would not have gone on to seek out screening (n=609). Details of whether a participant reported that they would have considered going elsewhere for a screening test shown in table 3. Those who reported that they had been screened previously were more likely to actively seek out screening elsewhere, whereas gender, practice attended or screening result did not influence this.

Table 3 - Responses by gender, previous test, blood glucose levels and practice type

	Would you go elsewhere				chi-square	p
	No		Yes			
Male	276	81.4%	63	18.6%	2.34	0.126
Female	492	85.3%	85	14.7%		
Not tested previously	609	88.8%	77	11.2%	49.01	<0.001*
Tested previously	153	68.9%	69	31.1%		
Blood glucose <6.1mmol/l	623	84.6%	95	15.4%	0.86	0.535
Blood glucose ≥6.1mmol/l	245	82.2%	53	17.8%		
Multiple practice	440	85.4%	75	14.6%	2.207	0.137
Independent practice	328	81.8%	73	18.2%		

Of the 148 people who reported that they would have gone elsewhere to request a screening test, most (87.8%) reported that they would have been prepared to see their GP or practice nurse. 7 (4.7%) would have gone to a pharmacy. 5 (3.4%) said they would have gone elsewhere, these included a shopping mall (n=1), self testing with friends or family member's machine (n=2), hospital (n=1) or with the off-shore medic at work (n=1). Six respondents who reported they would go elsewhere did not specify where they would go.

On the questionnaire space was provided for participants to make any additional comments. 35% (326) made some comment. These fell in to five broad categories; issues of convenience, location, ease and comfort of test, lack of awareness of diabetes and screening, and recommendation to others. Examples of participants' comments are shown in figure 2.

Figure 2 – Participants' comments

Convenience

'It was good to have the test done without making an appointment at the doctors, especially as I work out of town and it was a Saturday' MI ≥ 6.1

'Very convenient to have test when come to opticians regularly (annually) to have eyes tested, Less likely to seek a specific test even if at a pharmacy' FI < 6.1

'I visit my optician every year. It's a brilliant idea to have this test at the same time. I had the test done while I waited for the optician. It's a great offer, buy one get one free.' FM < 6.1

Location

'Quick and comfortable, and not stressed out by waiting at a doctors surgery' FI ≥ 6.1

'Convenient, comfortable atmosphere and friendly staff all helped keep the experience trauma free' FI ≥ 6.1

Ease and comfort of test

'Pain free and very informative' FI < 6.1

Lack of awareness of diabetes and screening

'Test at optician seem to me to be a good idea. Even though mother had Type 2 diabetes I would not have bothered to get tested until symptoms showed. I did not know about slow healing of wounds, it is this that encouraged me to take part' FI ≥ 6.1

'Very convenient and helpful, I would not have booked an appointment with my GP just to see about any symptoms unless they were very severe' FM < 6.1

Recommendation to others

'It was completely painless and only took a few minutes. I would therefore recommend everyone to have it done' FM < 6.1

Key

Gender(F=female, M=male)Practice type attended (I=independent, M=Multiple) rCBG result (< 6.1 , ≥ 6.1)

Discussion

The relatively high uptake of screening suggested that people attending optometry practice are willing to participate in screening, with 77% of those eligible participating. Around one-third of participants in the screening programme were found to have rCBG requiring further investigation which is similar to other studies in Australian pharmacies³⁰.

Some participants voiced concerns over how painful the test would be prior to taking part, and reported a dislike of needles. When the equipment was demonstrated and they could see that no needle was visible they were happy to take part. Around 3% reported that the test was uncomfortable. Only one of those who reported discomfort would not have recommended others to have the screening test done. This may reflect the fact that the participants believed that the test was worthwhile even if it did cause some discomfort. However, it is also possible that some participants may not have fully read the statements and ticked the same agreement level for all four statements. This was true in just over half of the thirty cases where they either agreed or strongly agreed that the test was uncomfortable (14 strongly agreed with all statements, 3 agreed with all statements).

The setting of high street optometry practices appears to be convenient for this population. This may not be surprising, as people are not tied to a specific practice as they would be with a GP, and so can choose a practice that is convenient to them at that particular time. Several participants commented that they liked the convenience of being able to have different tests done at the same time and location instead of attending two different places. The Danish arm of the ADDITION study found that employed people were less likely to attend screening than other groups who were not in employment. They suggested that this may be due to the fact that, as they did not feel unwell, the employed did not prioritise screening over other demands on their time³¹. If attendance at screening requires an individual to take time off work, this may affect their willingness to take up screening. We did not investigate the employment status of participants in this study. All the practices that took

part in the screening were open six days a week, some with early morning or late night opening and one testing seven days a week, in an attempt to provide a service to those who were employed and found it difficult to attend in normal office hours. Some participants did report that the ability to attend on a Saturday was convenient as they were working and were not able to attend during the week.

The responses showed that offering screening in conjunction with the sight test may result in people taking up screening when they would not go out and actively seek it. Nearly two thirds of the people who took part reported that they had not been screened previously and that they would not have considered going elsewhere to be tested. It had been suggested by optometrists that the people most likely to accept the offer of screening in optometry practices would be those who would have sought healthcare from other locations³².

However, from this data we can see that, while some would have been screened before and would consider going to the GP or pharmacist for a test, there is a significant number of people attending optometry practices who have not considered taking part in any form of screening test. Although pharmacies in the UK have been offering screening for several years, very few people in this study (4.7% of those who reported that they would somewhere else for a test, 0.7% of all respondents) considered going to a pharmacist to request a test.

In a series of focus groups and interviews with optometrists working in a variety of practice types³², concerns were expressed that the public viewed multiple and independent practices differently, treating the large multiple chains more like retail outlet, while viewing the smaller independent practices as health care providers. Over three-quarters of people who participated in the screening believed that optometrists should be able to detect health problems. There was no difference between the proportion of people agreeing or strongly agreeing with the statement between those attending multiple practices and independent practices.

It was also felt that people attending independent practices would be those who would take up the offer of screening more willingly, but would also be the people most likely to attend elsewhere for screening³². There was a small difference between the proportion of people screened previously between the practice types, 22.0% screened previously in those attending multiple practices and 28.9% in independent practices. Even though there is a statistically significant difference between the two practice types, over 70% of people who were screened in either practice type reported that they were not aware of being tested previously, which indicates that there is a large population attending both types of practice who have risk factors, but have not been screened previously or are not aware that they have been tested. Whether people attended a multiple or independent practice had no significant effect on whether they would have considered going elsewhere for a screening test if they had not been tested as part of the screening study.

Though the optometrists felt that there were differences between independent and multiple practices in terms of how the public viewed them and how those attending the different practice types accessed health care³², this was not reflected in the responses to this questionnaire to a great extent. The participants in our study showed little difference in responses between those who attended multiples and those attending independents.

In this screening programme, tests were provided at no cost to participants or the practices. Cost is known to be a major barrier in the implementation of a screening programme¹⁷. While the equipment to carry out the tests is relatively cheap (around £0.63 a test), the time taken for the test also needs to be considered and tests funded accordingly. The advantage of using rCBG as a screening tool is that the testing procedure is quick, simple and would require little training for a practitioner to become proficient.

Limitations and Strengths

This survey was only carried out among people who consented to take part in the screening procedure, so is self-selecting toward those who are more willing to accept screening.

However, only 22% of those eligible chose not to participate indicating a generally good level of acceptance among the population attending high street practices. We were unable to record details of people who did not wish to participate and why they refused screening tests due to ethical considerations so cannot see how they differ from those who did participate. However, several people volunteered a reason for non participation. The two most common reasons given were that they had been tested recently by their doctor or that they did not want to know if they had a problem. Other studies have found between 44%³¹ and 77%^{33,34} attendance after receiving an invitation to attend for rCBG screening. These studies differed from this in that the invitation was delivered by post and required the participants to make a trip to the test centre to participate. In our study the invitation was made while the person was already at the location where the test would take place and a research assistant was on hand to answer any questions they may have had.

Though the sample was biased towards those who would accept screening, by asking the participants to complete the questionnaire after the screening test had been carried out and the results given we could explore whether a negative or positive screening result affected the views of the participant. No significant differences were found in the attitudes of the participants who were advised that they should seek out further tests, to those who screened negative.

Conclusions

Screening for diabetes in optometric practice is acceptable to users and provides opportunities for those who may not access other health care providers to participate in screening. Potential barriers to screening that have been suggested include acceptance of the public and medical professionals, financial and time constraints¹⁷. We have shown that screening is acceptable to adults attending optometry practices. Further investigations of the views of medical professionals and practical implications of implementing a screening programme in optometry practices is required.

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Appendix 1 - Questionnaire



Feasibility and acceptability of offering finger-prick blood glucose testing in optometric practice

Participant ID

Thank you for taking part in the study today.

We would be very grateful if you could complete following questions as fully as possible.

The questionnaires are anonymous. The researcher who will look at the responses will not have access to your personal details and we will not report individual responses to your optician.

1. How often do you usually visit an optician? Please tick one response

- Every year
- Every 2 years
- Every 3-4 years
- Less frequently
- This was my first sight test

2. Have you ever been screened or tested for diabetes before the test that was carried out at the opticians? Please tick one response.

- Yes
- No

3. Please think about the diabetes test you had done at the opticians (not the sight test) and circle the response that you feel most accurately describes your response

	Strongly agree	Agree	Neither agree or disagree	Disagree	Strongly disagree
The opticians practice was convenient for the screening test	1	2	3	4	5
The screening test was uncomfortable	1	2	3	4	5
I would recommend friends/family to have the test	1	2	3	4	5
I expect opticians to be able to detect health problems	1	2	3	4	5

4. If you had not had the diabetes test done at the opticians, would you have gone anywhere else and asked for a screening test?

..... NO – please go to question 6

..... YES – please go to question 5

5. Where would you have gone for the diabetes test?

..... GP/practice nurse

..... Pharmacy

..... Other - Please indicate where.....

6. If you have any comments about the diabetes screening test you had at the opticians, please write below.

Thank you for help.

Please return the form in the stamped addressed envelope provided.