

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.



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Authors: Maxine Johnson
Crystal Freeman
Josie Messina
Roy Jones
Helen Buckley Woods
Elizabeth Goyder
Jim Chilcott
Nick Payne

Correspondence to: Vivienne Walker
School of Health and Related Research
(ScHARR)
University of Sheffield
Regent Court
30 Regent Street
Sheffield
S1 4DA
v.walker@sheffield.ac.uk

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About the SchARR Public Health Collaborating Centre

The School of Health and Related Research (SchARR), in the Faculty of Medicine, Dentistry and Health, University of Sheffield, is a multidisciplinary research-led academic department with established strengths in health technology assessment, health services research, public health, medical statistics, information science, health economics, operational research and mathematical modelling, and qualitative research methods. It has close links with the NHS locally and nationally and an extensive programme of undergraduate and postgraduate teaching, with Masters courses in public health, health services research, health economics and decision modelling.

SchARR is one of the two Public Health Collaborating Centres for the Centre for Public Health Excellence (CPHE) in the National Institute for Health and Clinical Excellence (NICE) established in May 2008. The Public Health Collaborating Centres work closely with colleagues in the Centre for Public Health Excellence to produce evidence reviews, economic appraisals, systematic reviews and other evidence based products to support the development of guidance by the public health advisory committees of NICE (the Public Health Interventions Advisory Committee (PHIAC) and Programme Development Groups).

Contribution of Authors

Maxine Johnson was the systematic review lead. Roy Jones, Josie Messina and Crystal Freeman were reviewers on the project. Helen Buckley Woods developed and undertook literature searches. Nick Payne and Jim Chilcott were the senior leads. Elizabeth Goyder was the topic expert.

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Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Contents

1. LIST OF ABBREVIATIONS	4
2. EXECUTIVE SUMMARY	5
2.1 Background	5
2.2 Aims and Objectives	5
2.3 Methods	6
2.4 Results	6
2.5 Evidence statements	9
2.7 Discussion	27
3. BACKGROUND	30
3.1 Description of the health problem	30
3.2 Remit of the assessment	31
4. INTRODUCTION	34
4.1 Aims and objectives	34
5. METHODS	36
5.1 Methods for identification of evidence	36
5.2 Study selection	37
5.3 Data extraction	39
5.4 Quality assessment	39
5.5 Data analysis and synthesis	40
6. RESULTS	41
6.1 Quantity of retrieved and included studies	41
6.2 Quality of included studies	42
6.3 Characteristics of included studies	42
6.4 Synthesis of findings	51
7. DISCUSSION	76
8. REFERENCES	79
9. APPENDICES	81
Appendix 1: Included studies	81
Appendix 2: Excluded studies	83
Appendix 3: Search strategies and details of evidence sources	87
Appendix 4: Quality rating of included papers	90
Appendix 5: Evidence Tables	93

TABLES AND FIGURES

Figure 1: Flow chart of paper selection	38
Table 1: Study quality	40
Table 2: Study characteristics	44

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

1. LIST OF ABBREVIATIONS

BME	Black and Minority Ethnic groups
BMI	Body Mass Index
CHD	Coronary Heart Disease
DH	Department of Health
DPP	Diabetes Prevention Programme
DPS	Diabetes Prevention Study
GP	General Practitioner
IFG	Impaired Fasting Glucose
IGT	Impaired Glucose Tolerance
n-RCT	Non-Randomised Controlled Trial
NHS	National Health Service
NICE	National Institute for Health and Clinical Excellence
OGTT	Oral Glucose Tolerance Test
RCT	Randomised Controlled Trial
SES	Socio-economic status
SRQ	Symptom Risk Questionnaire
T2DM	Type 2 Diabetes Mellitus

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

2. EXECUTIVE SUMMARY

2.1 Background

Type 2 diabetes is associated with significant clinical and social consequences. The National Institute for Health and Clinical Excellence has been asked by the Department of Health to develop public health guidance on the prevention of type 2 diabetes among high-risk groups. The referral is divided into 2 separate pieces of guidance. The first addressed the prevention of pre-diabetes (raised and impaired glucose levels) in populations and communities of high risk adults aged 18-74 using determinants of health such as creating an environment supportive of behaviour change. The second piece of guidance will address how to prevent the progression from pre-diabetes to type 2 diabetes. To inform development of this second piece of guidance, four reviews of international evidence will be carried out that address the prevention of progression to type 2 diabetes. This document reports on the fourth of such reviews. It focuses on barriers and facilitators to implementation and uptake of preventive interventions and to behaviour change, specifically in individuals. The first piece of guidance addressed barriers and facilitators to implementation of community lifestyle interventions and lifestyle change in BME and SES groups, therefore this review will not include papers that were reviewed in those pieces of work unless they provide data on interventions aimed at individuals that was not used previously. It is recognised that the term 'pre-diabetes' is not ideal, as not everyone with raised or impaired blood glucose levels will go on to develop type 2 diabetes. However, the term 'pre-diabetes' has been chosen because of its widespread use and recognition by a broad range of stakeholder groups and because of the lack of consensus on a suitable alternative.

2.2 Aims and Objectives

The aim of this, the fourth of four reviews, was to undertake an assessment of barriers and facilitators to the effectiveness of strategies and tools designed to assess the risk of progression to diabetes in diagnosed and undiagnosed populations with pre-diabetes, as well as barriers and facilitators to implementation of preventive interventions and to behaviour change, specifically in individuals.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Review Questions:

What is the evidence identifying views, barriers and facilitators that may affect the implementation and effectiveness of strategies and tools designed to assess the risk of progression to type 2 diabetes in diagnosed and undiagnosed populations with a high risk for developing type 2 diabetes?

What is the evidence in terms of views, barriers and facilitators to the implementation of preventive interventions (e.g. lifestyle)?

What is the evidence in terms of views, barriers and facilitators to lifestyle behaviour change, especially in high-risk individuals?

These questions will be addressed by searching for and reviewing both qualitative literature, and quantitative literature (e.g. surveys and service evaluations). This evidence would include the views of professionals and practitioners as well as patients/service users/potential users and carers.

2.3 Methods

A systematic review of evidence to address barriers and facilitators to implementation of risk assessment and lifestyle change strategies was carried out according to the general principles recommended in the methods guide for development of NICE public health guidance (2009a). Methods followed the development of a review protocol and search protocol (see Appendix 3). An initial overarching search strategy was developed supplemented by an additional more focussed search for review four. The focussed search was generated for review four by identifying free text and subject headings from studies identified from the initial search and key known literature as being relevant to the review question. No restrictions were made regarding study type.

2.4 Results

This report includes the findings of the fourth systematic review in this programme of reviews. It assessed barriers and facilitators to the three main stages in implementing risk assessment and lifestyle change in those at risk of progressing to type 2 diabetes. These are risk assessment, implementation of interventions, carrying out and sustaining behaviour change.

This review considered studies in which the population had diagnosed or undiagnosed Impaired Glucose Tolerance (IGT) or Impaired Fasting Glucose (IFG), collectively known

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

as pre-diabetes, or where the study population was specifically defined as at risk for type 2 diabetes. It also considered barriers and facilitators from the perspective of health professionals, policy makers and carers.

A total of 14 published studies were included in the review. Six studies were carried out in the UK. Four were based in Europe (two in Finland, one in Sweden and one in the Netherlands), two in the US, one in Canada and one in Australia. Ten studies used qualitative methods such as interviews and focus groups or mixed methods and were all of good quality [++ or +]. A further four studies used surveys to obtain data. Three of these were rated as very good quality [++] and one good quality [+]. Five studies identified barriers and facilitators to risk assessment, two studies reported factors relating to the implementation of lifestyle interventions, and seven studies explored lifestyle behaviour change experiences in service users.

Findings reported relate to barriers or facilitators to risk assessment, intervention implementation and changing dietary and physical activity lifestyle behaviours.

Potential barriers to implementation of risk assessment included lack of provider understanding of the aims of risk assessment programmes, as well as lack of knowledge of providers relating to pre-diabetes and the impact of an increasing number of cases on practice workloads. The need to match workload with protected time and adequate resources was a common concern for practitioners.

The implementation of risk assessment however promoted the awareness of both practitioner and service user in respect of the risks of having pre-diabetes due to the increased engagement in health prevention discussions.

Practitioners were deterred by their perception that service users might not be motivated to carry out changes once they had been identified as at risk from diabetes. In more proactive practices, there were attempts to motivate users from the start of the programme by explaining the risks and discussing lifestyle during the stages of risk assessment. Arranging specific appointments in invitations to attend for risk assessment, and following up users by telephone were strategies used to encourage attendance.

For service users, a stepped approach to risk assessment facilitated psychological adaptation to the identification of pre-diabetes or type 2 diabetes. Service user perceptions of their personal risk, and of the seriousness of diabetes was reported as a barrier to engagement with risk assessment. In addition, understanding of the term 'pre-diabetes' was often lacking, though understanding was better in those with family members affected by diabetes.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Two included studies identified barriers to implementing lifestyle interventions. Lack of continued funding, lack of staff time given increased workload and lack of cohesive aims between planners and providers were identified as barriers. Some practitioners were not aware of the interventions available for those identified as at risk. Often trial programmes were not continued in practice, and this affected continuity of care.

Many barriers and some facilitators to changing lifestyle were identified. In terms of physical activity, deteriorating physical health, fear of injury, and increasing age were common barriers. Lack of access to physical activity facilities was a barrier if facilities were not locally available. In addition, costs could be a deterrent. Even if admission to facilities were offered free of charge, the purchase of special equipment or clothing was a barrier to some users at risk of diabetes. Lack of outside areas to perform activities, as well as adverse weather conditions were also reported as factors that limit physical activity.

For dietary change, lack of access to reasonably priced healthy food retailers was a barrier.

Lack of time, the impact of other commitments and responsibilities, habitual behaviours that were difficult to change also had an impact on both dietary and physical activity behaviour change. There were reports that a low sense of control and autonomy were associated with difficulty in achieving and maintaining weight management. Again, the sense that diabetes is not serious and the uncertainty of what 'pre-diabetes' means was likely to reduce motivation to change lifestyle practices.

Facilitators to lifestyle behaviour changes include the feeling of wellbeing that can be achieved following healthy changes. Adequate support from family, friends and professionals encouraged change and maintenance of those changes. Regular monitoring visits that included measurements and tests were motivators to sustain efforts, as was self-monitoring of dietary and physical activity behaviours. A sense of autonomy was a factor in those that were able to manage their weight by implementing and maintaining lifestyle changes.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

2.5 Evidence statements

Barriers and facilitators to optimum provision of risk assessment programme:

a) Provider accounts of risk assessment and provision of services

Evidence statement 1:

Provider understanding and attitudes toward risk assessment

There was evidence from two interview studies [++; +] and one mixed method study [++] of the impact of provider understanding of risk assessment aims on its implementation.

Findings from one interview study that formed part of a risk assessment programme suggest that providers that are more involved in implementing a programme develop increased understanding of programme aims, as well as of the general issues around risk assessment. Staff not involved at the planning stage may feel that they do not have a grasp of the risk assessment programme as a whole (Graffy *et al* 2010 + UK).

Evidence from one interview study (Williams *et al* 2004 ++ UK) and one mixed method study (Wylie *et al* 2002 ++ UK) carried out in routine practice highlighted concerns that primary care was an inappropriate setting within which to address pre-diabetes due to its perception as a social, rather than medical, problem. Instead, there were suggestions that prevention activity was the responsibility of agencies and individuals outside the NHS, such as the Government.

In the mixed method study (Wylie *et al* 2002 ++ UK) it was reported that some general practitioners are unaware of the extent of pre-diabetes cases in their practice population. In the questionnaire findings, almost half the sample (47%) lacked awareness of the risk of progression from impaired glucose tolerance to type 2 diabetes. There was uncertainty regarding how to manage patients with pre-diabetes which according to the authors has implications for training.

Applicability: Evidence statement 1:

This evidence is directly applicable to UK general practice as both studies were carried out in UK general practices with populations at risk for type 2 diabetes. One study was

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

carried out as part of a screening programme therefore the participants may have different knowledge levels and motivation to those interviewed in routine practice.

Evidence statement 2:

Identification of increased numbers of individuals with pre-diabetes

Evidence from two interview [+; ++] and one mixed method [++] studies reported concerns of increased cases arising from risk assessment.

There were concerns reported in one study (Wylie *et al* 2002 ++ UK) that the role of primary care was moving from general to specialised practice, and that practitioners were concerned that guidelines were not available to support such practice.

In one interview and one mixed method study (Williams *et al* 2004++ UK; Wylie *et al* 2002 ++ UK) carried out in routine practice, increased numbers of cases were a concern for practitioners who did not believe that adequate resources were available to address additional activities.

(Graffy *et al* 2010 + UK) reported mixed views from nurses in primary care units participating in a screening programme. In units that did not offer adequate administrative and software support there were reports of having to work in their own time. By contrast, those units that did provide such support reported better efficiency.

Applicability: Evidence statement 2:

This evidence is directly applicable to UK general practice as all three studies were carried out in UK general practices with populations at risk for type 2 diabetes. One study was carried out as part of a screening programme therefore the participants may have different knowledge levels and motivation to those interviewed in routine practice.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 3:

Practitioner perceptions of barriers and facilitators to intervention implementation

There was evidence from one interview study [+], one focus group study [++] and one mixed methods study [++].

Graffy *et al* (2010 ++UK) reported from screening programme interviews that practitioners perceived a good relationship between user and practitioner facilitated attendance for risk assessment.

However, Williams *et al* (2004 ++ UK) and Wylie *et al* (2002 ++ UK) reported that practitioners in routine practice were concerned that patients with pre-diabetes but without symptoms lack the motivation to ultimately make lifestyle changes despite the efforts of practice staff. There was the perception that trying to encourage patients that have low motivation to change their lifestyle behaviours would be time consuming.

Applicability: Evidence statement 3:

This evidence is directly applicable to UK general practice as all three studies were carried out in UK practices with populations at risk for type 2 diabetes. However, one study was carried out as part of a screening programme therefore the participants may have different knowledge levels and motivation to those interviewed in routine practice.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 4:

Strategies to facilitate risk assessment attendance

Evidence from one interview study [+] was available for strategies used to increase service user motivation to attend for risk assessment.

Graffy *et al* (2010 + UK) report that providers are using strategies to increase attendance for assessment. These include raising awareness and discussing lifestyle issues with service users during consultations. Arranging a specific appointment to attend rather than inviting users to make their own appointment also was reported to facilitate the engagement of service users. A range of strategies around reaching users was evident, such as addressing risk assessment during consultations for other conditions, or following up user invitations with phone call reminders.

Applicability: Evidence statement 4:

This evidence is directly applicable to UK general practice as the study was carried out in UK general practices. The findings are more applicable to practices that are developing a screening programme than those that are not.

Evidence statement 5:

Perceived risk and seriousness of type 2 diabetes and engagement with prevention activities

Evidence from two interview studies [+] suggests that service user engagement with risk assessment programmes is negatively affected by low perceived personal risk of type 2 diabetes as well as the low perceived seriousness of the condition.

Eborall *et al* (2007 + UK) reported that participants in a stepwise screening programme (identifying risk and then following a protocol for measuring blood glucose at set criteria with the OGTT being the final diagnostic test if all other tests show positive) who were at risk from type 2 diabetes generally considered screening to be 'good'. There was evidence from this study of mixed understanding of the aims of risk assessment and the meaning of blood test results. Those with pre-diabetes tended to lack awareness of the meaning of the term and the implications of having the condition identified. Adriannse *et al* (2001 + Netherlands) also identified a lack of understanding of the meaning of raised blood glucose in more than two thirds of the sample. Those with most understanding had family members affected by diabetes. For those without prior experience relating to diabetes, there was no personal meaning of the impact of impaired glucose measures. Lack of understanding could also lead to acceptance of the facts being presented by practitioners without questioning. Only one of the interviewees found the process bothersome, and two reported that time could be an issue if participants were in paid work.

In one study (Eborall *et al* 2007 + UK) the stepwise approach was reported to provide users with an opportunity to gradually adapt psychologically to the possibility or reality of a diagnosis of pre-diabetes or type 2 diabetes. Evidence from the two studies showed that the first stage was less of a concern to users, who generally expect a negative result (Adriannse *et al* 2001 + Netherlands; Eborall *et al* 2007 + UK), particularly in the absence of symptoms. Receiving a positive result at the first stage of risk assessment did not necessarily heighten expectations of a second positive result, though in some users this shift was made.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Applicability: Evidence statement 5:

This evidence is partially applicable to UK general practice as one study was carried out in UK general practices and one in the Netherlands. Both studies were part of a programme with a shared protocol. The findings are more applicable to practices that are developing a screening programme than those that are not.

Barriers and facilitators to implementing lifestyle change interventions

Evidence statement 6:

Organisational factors

There was evidence from one case study [+] and one survey study [+] for organisational barriers to lifestyle intervention implementation.

One case study (Santana *et al* + US) of an intervention translated from a diabetes prevention initiative (DPI) to a community health centre identified lack of a shared definition of pre-diabetes and purpose of testing in those organising and implementing the initiative. In addition, lack of sustained funding was a barrier to quality improvement. The amount of extra workload involved in sustained programmes was perceived to require additional resource. Lack of cohesive aims between the planning team and the rest of the programme staff was a barrier in the sense that clinic staff felt excluded from decision making. The importance of early involvement in planning was mentioned by only one participant. Sustainability of a programme was reported to be reduced if the programme was not integrated into usual practice. Lack of time, space and finances were considered as barriers, as well as the prospect of not being able to meet the needs of patients with more cases being identified.

One survey study (Harris *et al* 2004 + Canada) of family physicians reported that practitioners viewed lack of time as a barrier to implementing lifestyle interventions.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Applicability: Evidence statement 6:

This evidence is only partially applicable to UK general practice as the studies were carried out in the US and Canada where health service delivery and funding differs from the NHS.

Evidence statement 7:

Perceived barriers to intervention implementation in practice

Evidence was available from one survey study [+].

Harris *et al* (2004 + Canada) reported that a lack of awareness of available intervention tools, meant that behaviour change techniques were less likely to be used than generic advice or handouts. Practitioners also suggested that service user motivation to make lifestyle changes was a barrier to implementing interventions. There was a perception among practitioners that service users may not engage in lifestyle change due to lack of motivation and commitment, lack of interest and the presence of co-morbidities.

Applicability: Evidence statement 7:

This evidence is only partially applicable to UK general practice as the study was carried out in Canada where health service delivery and funding differs from the NHS.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Barriers and facilitators to carrying out lifestyle changes:

a) Barriers

Evidence statement 8:

Physical Health

Evidence was found from one interview study [++] and two survey studies [++] for physical health factors as a barrier to carrying out physical activity.

One survey that focussed on physical activity and was carried out as part of a population-based cross-sectional study (Hume *et al* 2010 + Australia) reported injury, disability and increasing age as barriers, particularly for those with abnormal glucose metabolism.

A survey that focussed on physical activity (Korkinkanga *et al* 2011 ++ Finland) that was carried out with a subset of the Finnish Diabetes Prevention Study sample showed that health problems could become a barrier. However, barriers in this study were few compared to the facilitators reported from carrying out physical activity.

One interview study linked to an RCT of diet and physical activity interventions (Penn *et al* 2008 ++ UK) showed that deteriorating physical health or injury created setbacks when attempting to maintain physical activity behaviour changes.

Applicability: Evidence statement 8:

This evidence is partially applicable to UK general practice as one study was carried out in UK general practice, one in Australia and one in Finland. All three studies were part of diabetes prevention programmes that assessed high risk individuals. Therefore the findings are more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 9:

Habitual activities

Evidence exists in two survey [++] and one focus group study [+] that existing habitual practices are difficult for service users to change.

In one survey study (Brekke *et al* 2004 ++ Sweden) respondents reported that forgetfulness and reverting to old habits were barriers to change. There were reports of lacking ideas when cooking healthy foods and also that healthy foods were not liked by other family members. Evidence from another survey study (Korkinkanga *et al* 2011 ++ Finland) suggested that “laziness” might be a barrier to change.

Evidence from one focus group study (Satterfield *et al* 2003 + US) showed that sedentary behaviours such as watching TV, or using the computer, as well as consuming fast food had become habitual and were difficult to change.

Applicability: Evidence statement 9:

This evidence is not directly applicable to UK general practice as the studies were carried out in the US, Finland and Sweden where health care services and funding arrangements differ from those in the UK.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 10:

Lack of time and other commitments

There was evidence from one survey study, one interview study [++] and one focus group study [+] that making lifestyle changes was hindered by other daily commitments and priorities.

One focus group study with a diverse American population (Satterfield *et al* 2003 + US) and one interview study (Penn *et al* 2008 ++ UK) highlighted that job and family responsibilities were barriers to carrying out physical activity. This was supported by Hume *et al* (2010 + Australia) in their survey which showed that lack of time, busy schedules, work commitments, hobbies and community priorities were barriers to making lifestyle changes in people at risk of type 2 diabetes.

Applicability: Evidence statement 10:

This evidence is partially applicable to UK general practice as one study was carried out in UK general practice. One survey was carried out in Australia and one focus group in the US where health care differs from the UK. The US study included Latino populations which are less likely to be among the practice population in the UK.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 11:

Health Beliefs

Evidence from four interview studies [++] highlights that some health beliefs can hinder healthy lifestyle change.

In one study (Eborall *et al* 2007 + UK) there were no reported expressions of intent in respect of changing lifestyle despite high blood glucose readings. Type 2 diabetes was perceived as 'mild' by some users, which may reduce the likelihood of engaging with prevention strategies.

One interview study (Troughton *et al* 2008 ++ UK) provides evidence that individuals at risk may fail to recognise the relevance of diabetes and the impact that lifestyle changes might have on their lives. There was a belief that sufficient care was already being taken and that there was no more that could be done.

A second interview study (Jallinoja *et al* 2007 ++ Finland), provided evidence for a range of attitudes among those attempting to manage their weight. Those who presented with a 'hopelessness' attitude might give up trying due to their belief that changing behaviour was not working compared to those with a 'self-governing' approach who did not find it a struggle to change health related behaviours.

A third interview study (Penn *et al* ++ UK) provided evidence that some individuals who found great difficulty in managing their weight reported a sense of unfairness, particularly if they perceived that a lot of effort was being made for little achievement.

Applicability: Evidence statement 11:

This evidence is partially applicable to UK general practice as two studies were carried out in UK general practice, and one in Finland. All three studies were part of diabetes prevention programmes that assessed high risk individuals. Therefore the findings are more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 12:

Lack of information and advice

Evidence from two interview studies [++] and one focus group study [+] identified lack of optimum advice and information as barriers to lifestyle change.

Satterfield *et al* (2003 + US) reported that participants in their focus group study spoke of the lack of public awareness of the potential impact of diabetes upon health and how diabetes can be prevented. This was compared to the higher recognition given to some other conditions such as coronary heart disease. Troughton *et al* (2008 ++ UK) and Penn *et al* (2008 ++UK) reported on the uncertainty that users have about the risks and seriousness of diabetes and pre-diabetes, relating this to unhelpful advice and information from general practitioners and the media. Pre-diabetes in particular was regarded as a 'grey area' that had little meaning. There was also uncertainty in service user's understanding of the effectiveness of lifestyle change for overall health (Troughton *et al* 2008 ++ UK).

Applicability: Evidence statement 12:

This evidence is partially applicable to UK general practice as two studies were carried out in UK based general practices. One study was carried out in the US where health care delivery and funding differ from that in the UK. One UK study was part of a diabetes prevention programme. Therefore the findings are more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 13:

Environmental factors

Evidence from two survey studies [++], one interview study [++] and one focus group study [+] suggests that certain aspects of the environment provide barriers to lifestyle change.

Satterfield *et al* (2003 + US) reported from focus groups that low availability of local inexpensive food choices was a barrier to making healthy dietary changes.

In terms of physical activity changes, Satterfield *et al* (2003 + US) reported from focus groups that environments favouring vehicular transport over walking facilities make physical activity inaccessible.

Physical activity could also be discouraged by lack of accessibility to local facilities such as inconvenient opening times, absence of a swimming pool or a perceived lack of safety in one interview study (Penn *et al* 2008 ++ UK).

Hume *et al* 2010 ++ Australia) reported in a survey study that pollution was a potential barrier to taking physical activity. Penn *et al* (2008 ++ UK) and Korkinkanga *et al* (2011 ++ Finland) reported in interview and survey studies that outside activities may be hindered by adverse weather conditions.

Applicability: Evidence statement 13:

This evidence is only partially applicable to UK general practice as one study was carried out in UK based general practices. One study was carried out in the US and one in Finland where health care delivery and funding differ from that in the UK. In addition, weather conditions are more severe in Finland than in the UK. The UK study was part of a diabetes prevention programme, therefore the findings may be more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 14:

Cost

There was evidence from one interview study [++] that costs are a barrier to carrying out some physical activities and that reducing costs might facilitate access and therefore uptake.

In one interview study (Penn *et al* 2008 ++ UK), costs were identified as a potential barrier to carrying out physical activity. Even when physical activities are offered free of charge, there is often a requirement for special equipment or clothing. Supplying free bus passes can reduce the cost of accessing places to carry out physical activity.

Applicability: Evidence statement 14:

This evidence is only partially applicable to UK general practice as one study was carried out in UK based general practices. One study was carried out in the US where health care delivery and funding differ from that in the UK. The UK study was part of a diabetes prevention programme, therefore the findings may be more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

b) Facilitators

Evidence statement 15:

Positive impact of behaviour change

Evidence was found in one interview study [++] and one survey study [++] for the positive effects of behaviour change on wellbeing.

Penn *et al* (2008 ++ UK) reported from interview findings that feeling better or fitter following the accomplishment of change helped sustain physical activity behaviour changes. There was also a sense of satisfaction expressed by participants that had achieved their goals. Whilst social occasions could present a challenge to maintaining healthy dietary changes, deviation from such practices could sometimes be accommodated, which allowed a balance to be achieved between optimal and realistic goals.

In one survey study (Korkinkanga *et al* 2011 Finland ++), the motivational effect of carrying out physical activity, such as the continuation of functional ability in later life, and generally feeling good were reported.

Applicability: Evidence statement 15:

This evidence is only partially applicable to UK general practice as one study was carried out in UK based general practices. One study was carried out in Finland where health care delivery and funding differ from that in the UK. The UK study was part of a diabetes prevention programme, therefore the findings may be more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 16:

Social support

There was evidence from one interview study [++], two focus group studies [++; +] and one survey study [++] that family and social support was a facilitator in carrying out behaviour change.

One focus group study (Jallinoja *et al* 2007 ++ Finland) found that families could be supportive by giving encouragement to engage in physical activity. One interview study (Penn *et al* 2008 ++; UK) identified social relationships as an important factor in maintaining changes, and a survey study identified peer support as a facilitator to behaviour change (Korkinkanga *et al* 2011 ++ Finland).

Stories of known individuals relating to the challenges of having diabetes were motivators for change in one interview study and one focus group study (Penn *et al* 2008 ++ UK; Satterfield *et al* + US).

Applicability: Evidence statement 16:

This evidence is only partially applicable to UK general practice as one study was carried out in UK based general practices. Two studies were carried out in Finland and one in the US where health care delivery and funding differ from that in the UK. The UK study was part of a diabetes prevention programme, therefore the findings may be more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 17:

Information and support from professionals

Evidence was available from two interview studies [++] and one focus group study [++] that health information and support could facilitate healthy lifestyle changes.

Penn *et al* (2008 ++; UK) found from interview findings that professional support was appreciated and was helpful in keeping to plans. Motivational interviewing, a style of counselling that encourages behaviour change, was particularly appreciated.

Penn *et al* (2008 ++; UK) also found that attention to the optimal timing of information-giving allowed gradual absorption of change and therefore was a facilitator in allowing adjustment to changes.

Jallinoja *et al* (2007 ++; Finland) reported that focus group participants found check-up visits helpful in maintaining new behaviours. The prospect of undergoing formal measurements was a motivator to increase efforts. Similarly, interviewees in the Troughton *et al* (2008 ++ UK) study reported that having repeat tests was reassuring in term of maintaining efforts to change behaviour.

Applicability: Evidence statement 17:

This evidence is applicable to UK general practice as two studies were carried out in UK based general practices. One study was carried out in Finland where health care delivery and funding differ from that in the UK. The UK study was part of a diabetes prevention programme, therefore the findings may be more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 18:

Autonomy and control

There was evidence from one interview study [++] and one focus group study [++] that a sense of individual autonomy and control was a facilitator to behaviour change.

Jallinoja *et al* (2007 ++; Finland) identified increased autonomy and control over behaviour in focus group participants that were able to manage their weight. These individuals did not associate weight management with a battle in the same way as those who found it difficult to lose weight. They were able to motivate themselves and plan their own lifestyle without the aid of a clinician or advisor.

Penn *et al* (2008 ++; UK) also reported from interview findings that self-efficacy was an important factor in changing behaviour that was eventually incorporated into daily routines. Self-monitoring was a way of keeping to plans and allowing a balance between optimal and realistic goals.

Applicability: Evidence statement 18:

This evidence is only partially applicable to UK general practice as one study was carried out in UK based general practices. One study was carried out in Finland where health care delivery and funding differ from that in the UK. The UK study was part of a diabetes prevention programme, therefore the findings may be more applicable to practices that are developing intervention programmes than those that are not.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 19:

Environmental factors

Evidence from one interview study [++] was available regarding the influence of environmental factors on carrying out physical activity.

Evidence from one interview study [++] suggests that individuals can be motivated to carry out physical activity by the presence of a stimulating environment such as a coastal walk, or the provision of good facilities (Penn *et al* 2008 ++ UK).

Applicability: Evidence statement 19:

This evidence is directly applicable to UK general practice as the study was carried out in UK based general practices, though being part of a diabetes prevention programme, the findings may be more applicable to practices that are developing intervention programmes than those that are not.

2.7 Discussion

This review aimed to assess potential barriers and facilitators to implementing risk assessment strategies and lifestyle interventions as well as barriers and facilitators for those participating in such strategies. Over a third of the studies were carried out in the UK, so that findings are largely applicable to UK settings. Though findings from other countries did not differ substantially from those reported in the UK, in practice there may be differences in the organisation of care and funding. A number of the studies were carried out within a research environment, whilst others were carried out in primary care or in the community.

There was less evidence available relating to implementing lifestyle interventions than for risk assessment implementation or for carrying out lifestyle behaviour change. This may be due to a lack of published evaluations, since it is known that many interventions are being delivered both in the UK and elsewhere.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

There appears to be a positive consensus for risk assessment efforts in both service user and provider groups. However, a perceived increase in workload associated with the identification of more cases, and need for adequate resources was identified. For service users, there is evidence of a required psychological adjustment to test results over time. The term 'pre-diabetes' lacks meaning and does not, from the available evidence, appear to convey a sense of risk sufficient to trigger lifestyle change. This may be partially due to mixed health messages from practitioners, which in turn implies that there is a need for training in this area.

Within practitioner groups there was divided opinion about whether primary care is the appropriate setting for carrying out risk assessment. More positive views were expressed in units that provide adequate administrative support, and in practices that were participating in a research programme. Involving staff in the planning stage of programmes was reported as a facilitating factor for both risk assessment and intervention implementation. In both risk assessment and intervention implementation, some practitioners doubted the effect that lifestyle advice might have in users with low motivation.

Encouraging changes in lifestyle behaviours needs to take into account accessibility, particular for service users that have family and caring commitments, or are working full-time. Some people require appropriate and timely support from providers as well as from family and friends in order to achieve and sustain lifestyle changes, while others find such changes much easier.

Previous reviews carried out to inform NICE guidance assessed the barriers and facilitators of implementing population and community lifestyle change interventions to prevent type 2 diabetes and pre-diabetes (www.nice.org.uk/guidance/PH35). It was found that community interventions need to be culturally sensitive, delivered by providers that are familiar with the delivery settings. Interventions aimed at individuals at risk also require cultural sensitivity though this was not such a focus of the findings. Adequate organisational support is required particularly when providing risk assessment through primary care. Support is needed for providers to deliver accurate advice and encouragement.

For individuals attempting to carry out behaviour change, a relatively high sense of autonomy, control and self-efficacy was identified as a facilitator. Practitioners might assist individuals reporting lower feelings of control by providing appropriate support and encouragement.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Previous reviews relating to this piece of guidance have assessed risk assessment tools, interventions for prevention of type 2 diabetes and the components of those interventions. They have also explored ways in which the protocols of large diabetes prevention trials have been adapted within communities.

In terms of risk assessment, stepped strategies that include an initial risk assessment followed by a series of blood glucose measures to identify or eliminate pre-diabetes or type 2 diabetes were found to have good sensitivity and specificity. The current review shows that for service users, this strategy also allows a gradual psychological acceptance to identified changes in blood glucose.

The review of lifestyle interventions showed that changes in dietary and physical activity behaviours can, in trials with a range of follow up, reduce the incidence of type 2 diabetes. They were also shown to increase weight loss and management, which indirectly affect diabetes risk. The current review highlights the main issues that providers and users face in implementing and carrying out interventions; it cannot be assumed that all individuals will be similarly motivated or that behaviour change is necessarily carried out following advice.

This highlights the need for intervention design to incorporate behavioural theory and tailoring to individual capabilities. These aspects were integrated into the design of major trials such as the DPP and the DPS, as well as in smaller scale translational studies that were based on these two trials. The review of translational studies showed similar trends in weight loss to those found in the major trials though effects were weaker and mainly non-significant. This was likely due to smaller sample sizes and shorter follow ups.

However the current review also shows the variation in organisational support and provider commitment as well as user motivation that can affect outcomes. It also highlights the reasons for some of these factors. Whilst the risks of type 2 diabetes are generally recognised, uncertainty around the concept of pre-diabetes in terms of diagnosis and subsequent intervention has been shown to be a factor for both providers and service users.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

3. BACKGROUND

3.1 Description of the health problem

Every year, 100,000 people in the UK are diagnosed with type 2 diabetes and many more may have the condition (Diabetes UK 2006). Type 2 diabetes can lead to long-term complications including micro- and macro-vascular diseases such as eye problems, kidney disease, foot ulcers and cardiovascular disease. Between 33% and 66% of people with pre-diabetes – raised or impaired blood glucose levels – will go on to develop type 2 diabetes over a period of 3–6 years (Diabetes Prevention Programme Research Group 2002; Lindstrom *et al.* 2003; Pan *et al.* 1997; Ramachandran *et al.* 2006). During that time they may also be at increased risk of coronary heart disease (Waugh 2007).

In addition to the personal cost to individuals, families and communities, diabetes is estimated to account for at least 5% of UK healthcare expenditure. Up to 10% of hospital budgets are used for the care of people with the condition – drug costs alone for people with type 2 diabetes have been estimated to account for about 7% of the total NHS drugs budget (Waugh *et al.* 2007). Preventing the development of type 2 diabetes in individuals diagnosed with pre-diabetes could help save some of these NHS resources.

In 2007, 60% of primary care trusts (PCTs) had programmes in place to raise public awareness of the risk factors for diabetes and 37% were raising awareness of its signs and symptoms. Only 42% had assessed the needs of their population in relation to diabetes and less than 40% had developed a diabetes strategy (Innove 2008).

An individual's risk factors for pre-diabetes include: obesity (a body mass index [BMI] of more than 30 kg/m²); a high waist circumference measurement (more than 80 cm in women and 94 cm in men); a sedentary lifestyle; a close family history of type 2 diabetes; a history of gestational diabetes in women; and being older than 40 (or older than 25 for some black and minority ethnic groups). In addition, certain groups of people are at greater overall risk of developing pre-diabetes, for example people of south Asian, African–Caribbean and black African descent. With rates of obesity on the increase and the population becoming more sedentary (The Health and Social Care Information Centre 2009) type 2 diabetes (and pre-diabetes) is becoming more prevalent.

For most people, both pre-diabetes and type 2 diabetes can be prevented by improving dietary intake behaviours and physical activity levels. In some cases where these are

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

not possible or have not been successful, certain drug therapies and surgical procedures are available that aim to reduce BMI.

In order to identify individuals that are at risk from progressing from pre-diabetes to type 2 diabetes, a range of tools and strategies have been developed. These are sometimes used in conjunction as part of a stepped programme. The first part of the strategy involves identification of individuals from practice registers that are reported to have risk factors such as a raised BMI and / or waist circumference, a family history of type 2 diabetes, and previous gestational diabetes. In addition, those over the age of 40, and of South Asian, African and Caribbean descent are at increased risk.

Review One “Preventing the progression of pre-diabetes to type 2 diabetes in adults: Identification and Risk Assessment of adults with pre-diabetes” assessed a range of tools and strategies that can be used to identify individuals at risk of type 2 diabetes. This review will extend Review One by assessing the kinds of issues that might arise in this endeavour.

Once identified as having a high risk of type 2 diabetes, interventions are available to prevent or delay the onset. These interventions were identified in Review 2 “*Preventing the progression of pre-diabetes to type 2 diabetes in adults: Systematic review and meta-analysis of lifestyle, pharmacological and surgical interventions*” and Review 3 “*Prevention of type 2 diabetes: Reviewing mechanisms of successful interventions and translation of major trial evidence to practice*”. This review assesses barriers and facilitators to implementing such interventions as well as to carrying out the lifestyle changes that are encouraged whilst participating in these interventions.

This review explores potential reasons for variations in uptake, attendance and outcomes in both risk assessment and lifestyle change strategies. The perspectives of participants (i.e. patients / clients), health professionals, policy makers and carers, where evidence is available,

3.2 Remit of the assessment

3.2.1 Individuals / groups that will be covered

Adults aged 18 years and over with a diagnosis of pre-diabetes using current World Health Organization criteria (World Health Organization 2006), that is either or both:

- Impaired fasting glucose (IFG) – a fasting plasma glucose (FPG) between 6.1 and 6.9 mmol/litre.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

- Impaired glucose tolerance (IGT) – FPG less than 7.0 mmol/litre and a plasma glucose (2 hours after ingestion of a 75 g oral glucose load, the oral glucose tolerance test) between 7.8 and 11.0 mmol/litre.

WHO (2011) have recently published new criteria that allows the diagnosis of type 2 diabetes to be made using the HbA1c blood test at a cut point of 5.6%. There was no statement regarding the diagnosis of IFG or IGT using HbA1c due to insufficient evidence.

The review will focus on the following populations:

- South Asian, African–Caribbean, Chinese or black African descent and older than 25 years, or white and aged 40 years or older, and who have one or more of the following characteristics:
 - obesity (a body mass index [BMI] of 30 kg/m² or above, or 27.5 kg/m² or above if of south Asian or Chinese descent)
 - a waist circumference:
 - ◇ greater than 80 cm for women of European or African descent
 - ◇ greater than 94 cm for men of European or African descent
 - ◇ equal to or greater than 80 cm for women of south Asian or Chinese descent
 - ◇ equal to or greater than 90 cm for men of south Asian or Chinese descent (Alberti *et al.* 2007)
 - a history of cardiovascular disease
 - abnormal blood lipids or lipoprotein level (for example low high-density lipoprotein [HDL] cholesterol)
 - hypertension
 - a first-degree relative with type 2 diabetes
 - sedentary lifestyle.

a) If the evidence allows, people with the following characteristics will be covered:

- severe mental health problems
- learning disabilities
- taking medication that can increase the risk of developing diabetes such as steroids, anti-retrovirals and some antipsychotics

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

- polycystic ovary syndrome
- low birth weight, that is less than 2.5 kg (5.5 lbs)
- women with a history of diabetes in pregnancy and women who have had a baby over 4.5 kg (9 lbs).

3.2.2 Groups that will not be covered

- People younger than 18 years of age.
- People with a diagnosis of type 2 diabetes or other forms of diabetes.
- Pregnant women.

3.2.3 Strategies / Tools that will be covered

Interventions delivered at individual level in primary, secondary and tertiary care, the community, residential care sector, and prisons. For this review, this will focus on:

- Identification and risk assessment of adults with IFG/IGT or raised glycated haemoglobin (HbA1c).
- Implementation of lifestyle interventions for the prevention of progression to T2DM.
- Undertaking behaviour change as a diabetes prevention strategy.

3.2.4 Strategies / Tools that will not be covered

Identification and risk assessment for individuals with type 2 diabetes, gestational diabetes or any other form of diabetes. (Type 1 diabetes, type 2 diabetes and diabetes in pregnancy are the subjects of previously published NICE guidance).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

4. INTRODUCTION

4.1 Aims and objectives

The National Institute for Health and Clinical Excellence has been asked by the Department of Health to develop public health guidance on the prevention of type 2 diabetes. The referral is divided into 2 separate pieces of guidance. The first addressed the prevention of pre-diabetes (raised and impaired glucose levels) in populations and communities of high risk adults aged 18-74 using determinants of health such as creating an environment supportive of behaviour change. This, the fourth review relating to the second piece of guidance will address how to prevent the progression of pre-diabetes to type 2 diabetes at the individual level.

Rationale for review focus

The focus of this review is to synthesise evidence for the barriers and facilitators to implementing strategies and tools for assessing risk for type 2 diabetes in those with pre-diabetes, either diagnosed or not. It also assesses barriers and facilitators to implementation of diabetes prevention interventions in individuals identified as high risk, as well as barriers and facilitators to achieving behaviour change in those individuals.

It is recognised that the term 'pre-diabetes' is not ideal, as not everyone with raised or impaired blood glucose levels will go on to develop type 2 diabetes. However, the term 'pre-diabetes' has been chosen because of its widespread use and recognition by a broad range of stakeholder groups, and because of the lack of consensus on a suitable alternative.

What is the evidence identifying views, barriers and facilitators that may affect the implementation and effectiveness of strategies and tools designed to assess the risk of progression to type 2 diabetes in diagnosed and undiagnosed populations with a high risk for developing type 2 diabetes?

What is the evidence in terms of views, barriers and facilitators to the implementation of preventive interventions (e.g., lifestyle)?

What is the evidence in terms of views, barriers and facilitators to lifestyle behaviour change, especially in high-risk individuals?

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

These questions will be addressed by searching for and reviewing both qualitative literature, and quantitative literature (e.g. surveys and service evaluations). This evidence would include the views of professionals and practitioners as well as patients/service users/potential users and carers.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

5. METHODS

5.1 Methods for identification of evidence

A systematic review of barriers and facilitators to the implementation and uptake of strategies to prevent the progression of pre-diabetes to type 2 diabetes was undertaken according to the general principles recommended in the methods guide for development of NICE public health guidance (2009a). Methods followed the development of a review protocol and search protocol, which are detailed below. There was no restriction in terms of study type for this review.

5.1.1 Search Strategy

The standard NICE Methods, as outlined in the Methods for the Development of NICE Public Health Guidance (2009a) were used to guide the development of the search methods. The aim of the search strategy was to retrieve the best available evidence to inform the barriers and facilitators review.

An initial search strategy was developed supplemented by additional more focussed searches in order to ensure that the review topic was fully explored as the reviews progressed. Instead of aiming to identify the relevant literature for a specific question using one search, we adopted an emergent approach which attempts to identify key literature. The initial search strategy, using concepts taken from the scope, formed the basis of the search strategies for the review questions. A further review focussed search was then generated for review four by identifying free text and subject headings from studies identified from the initial search and key known literature as being relevant to the review question.

The questions to be addressed in the reviews have differing existing evidence bases. Therefore, decisions on the type of evidence (e.g. RCTs, qualitative studies) to be used in the reviews were made through an iterative searching process that allows decisions to be made based on the available evidence. The focussed search strategy for review four was not restricted to particular study types in order to retrieve both qualitative and quantitative evidence.

The initial overarching search and the review focussed search were limited to 1990-current, English language and human studies. A thorough audit trail of the search process was maintained; this includes all searches, number of results and number of

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

relevant references identified. This process ensures that the search process is transparent, systematic and replicable.

An overview of evidence sources is listed below, with sample search strategies presented in Appendix 3.

List of Databases Searched for Review Four

Medline via OVID SP

Embase via OVID SP

CINAHL via EBSCO

British Nursing Index via OVID SP

The Cochrane Library via Wiley

Science Citation Index via Thomson ISI

Social Science Citation Index via Thomson ISI

PsycINFO via OVID SP

Selected EPPI Centre Databases

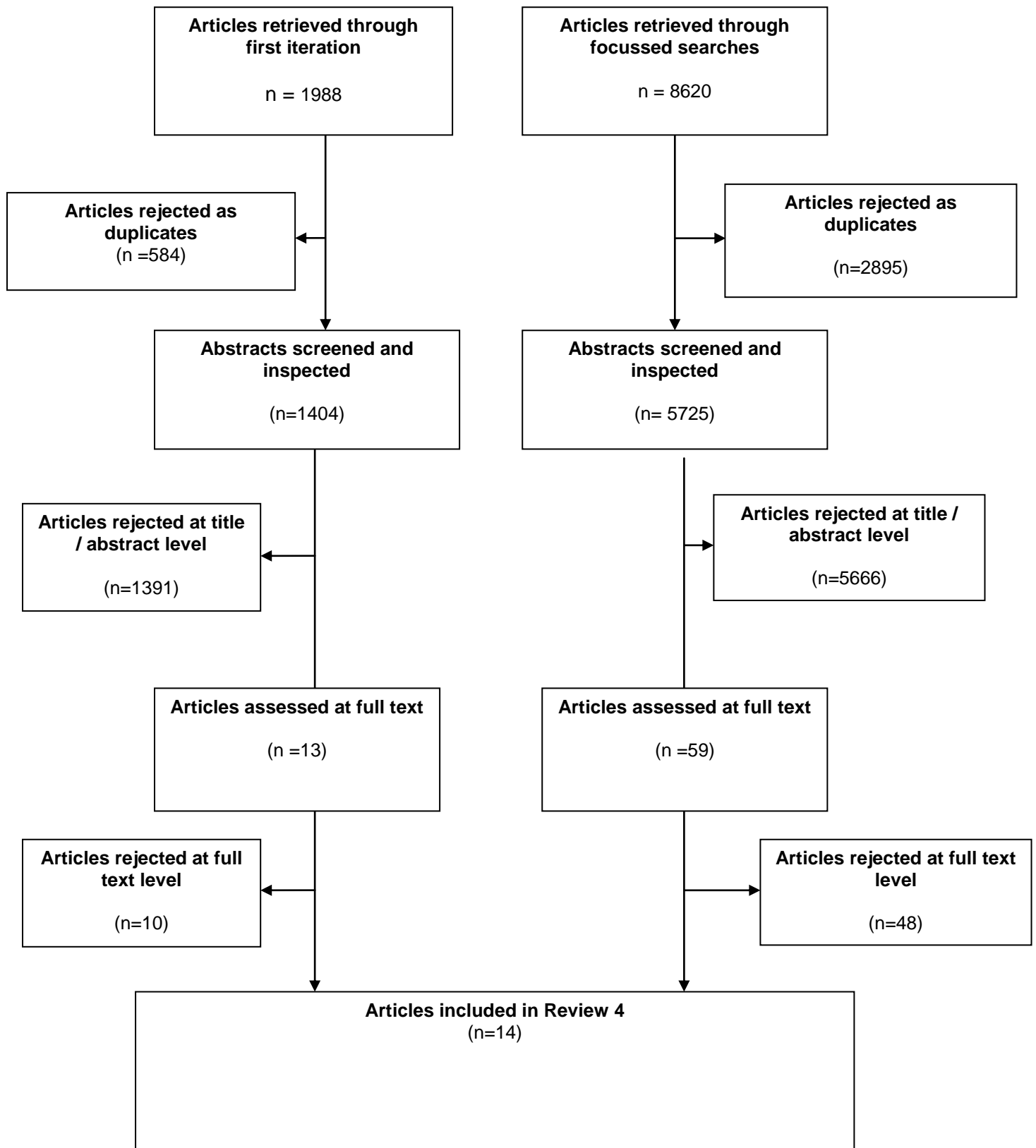
5.2 Study selection

All of the retrieved literature was screened by one of four reviewers (MJ, JM, CF and RJ) and double-checked by one other reviewer at title and abstract level for relevance, and those relevant were taken through to full paper appraisal (see section 5.4 for full process details).

Figure 1 shows the quantities of papers generated from an overarching search as well as the focussed search before and after sifting for relevance.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Figure 1: Flow chart of paper selection



Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

5.3 Data extraction

Data were extracted with no blinding to authors or journal. Data were extracted by one of four reviewers (MJ, JM, CF, RJ) using an adaptation of a standardised form. As highlighted in the Cochrane Collaboration guidelines for systematic reviews of health promotion and public health interventions, extraction forms should be developed for each review in order to make them relevant to the information that is required. The forms for extracting data on diagnostic tools were based on the example forms presented within the NICE public health guidance (2009a).

The forms were piloted on two randomly selected articles in order to confirm appropriateness for use. Information relating to the review question, study design, outcomes and conclusions were collated. The data extracted for barriers, facilitators and views evidence included information relating to perceptions of patients and health professionals in relation to identification tools, risk assessment strategies, and interventions as well as practical implications of delivery.

Data extracted by each reviewer was checked by a second reviewer to ensure reliability. Any studies giving rise to uncertainty were reviewed independently by a third reviewer, and discrepancies, for example where studies were not clearly reported, were resolved by discussion. It should be noted that preliminary findings are presented here, with related evidence tables in Appendix 6.

5.4 Quality assessment

Quality criteria were based on those developed for the assessment of qualitative data presented within the methods guide for development of NICE public health guidance (2009a). The methods guide (2009a) recommends that studies are categorised according to study type and methodological rigour and quality (categories ++, + or -) in order to provide a clear representation of type of evidence.

Studies have been quality assessed for methodological quality using the qualitative checklist recommended in the NICE methods manual (2009). The qualitative study checklist contained 14 questions relating to the appropriateness of qualitative approach, methodological rigour, and analysis of findings. Survey studies were quality assessed using a tool designed specifically for the appraisal of surveys

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

(Crombie 1996). Following piloting of the tool and discussion between team members, four of the items of the 18 included in the tool were not used in assessing the papers for this review as they were not deemed to contribute to the assessment. The items used and the results of the quality assessment are charted in Appendix 4.

The quality of included studies was assessed by one of four reviewers (MJ, JM, CF,RJ) and double checked by a reviewer not involved in the initial assessment. Quality assessment was confirmed by a second reviewer in order to minimise any potential bias.

Table 1: Study quality

Grade	Criteria
++	All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions are thought very unlikely to alter.
+	Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or adequately described are thought unlikely to alter the conclusions.
-	Few or no criteria have been fulfilled. The conclusions of the study are thought likely or very likely to alter.

5.5 Data analysis and synthesis

A synthesis of available evidence is presented in Section 6. Data synthesis was informed by the methods advocated by NICE public health guidance (2009a). Characteristics and findings of included studies are presented in tabular form as well as within narrative summaries.

Key themes within the findings from included papers are categorised according to the stage of strategy under scrutiny (i.e. risk assessment, intervention implementation or carrying out lifestyle change behaviour), and population (for example service user or practitioner, provider, etc). A thematic analysis (Harden *et al* 2004) was carried out within each of these categories to identify the main issues that facilitate or hinder identification of at risk individuals, risk assessment and delivery of relevant interventions. This involved identifying themes from the data, coding and then

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

grouping together commonalities and contradictory statements within each code. The themes were discussed by the review team to ensure that the overall findings and conclusions can be linked to the individual studies.

6. RESULTS

The following section presents findings from available evidence that addresses the questions:

What is the evidence identifying views, barriers and facilitators that may affect the implementation and effectiveness of strategies and tools designed to assess the risk of progression to diabetes in diagnosed and undiagnosed populations with a high risk for diabetes?

What is the evidence in terms of views, barriers and facilitators to the implementation of preventive interventions?

What is the evidence in terms of views, barriers and facilitators to behaviour change, especially in high-risk individuals?

This question will be addressed by searching for and reviewing both qualitative literature, and quantitative literature (e.g. surveys and service evaluations). This evidence would include the views of professionals and practitioners as well as patients/service users/potential users and carers.

6.1 Quantity of retrieved and included studies

From the original 1404 references following de-duplication that were captured in an overarching search for this piece of guidance, 1391 references were rejected at title / abstract level leaving 13 references potentially useful to this review. A focused search for this review generated 5725 references following de-duplication. Of these, 5666 were rejected at title / abstract level. A total of 59 studies were found to be relevant to this review from this search.

A total of 72 papers (13 + 59) covering a range of study types were assessed at full text for this review. Further assessment at full text level resulted in 58 rejections, with a total of 14 papers being included in this review.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

6.2 Quality of included studies

Barriers and facilitators to risk assessment

Five qualitative studies were assessed using the checklist for qualitative studies within the NICE methods manual (2009); two were rated very good [++] (Williams *et al* 2004; Wylie *et al* 2002), and three as good [+] (Adriannse *et al* 2001; Eborall *et al* 2007; Graffy *et al* 2010).

Barriers and facilitators to implementing lifestyle interventions

Both included papers (Santana *et al* 2010; Harris *et al* 2004) used survey methods and as such were assessed using the Crombie (1996) checklist. Both papers were rated as good quality [+].

Barriers and facilitators to changing lifestyle behaviours

Four studies were evaluated using the NICE qualitative checklist and were rated as good to very good quality with three very good [++] (Jallinoja *et al* 2007; Penn *et al* 2008; Troughton *et al* 2008), and one good [+] (Satterfield *et al* 2003). Three studies used survey methods and as such were assessed using the Crombie (1996) checklist. All three papers were rated as very good quality [++] (Brekke *et al* 2004; Hume *et al* 2010; Korkinkanga 2011). See Appendix 4 for details of study quality.

6.3 Characteristics of included studies

Barriers and facilitators to risk assessment

A total of five papers addressed barriers and facilitators to risk assessment for type 2 diabetes. Three of these studies examined provider accounts (Graffy *et al* 2010; Wylie *et al* 2002 and Williams *et al* 2004). Two explored the views of service users (Adriannse *et al* 2001 and Eborall *et al* 2007). The service users interviewed in Graffy *et al* (2010) and the providers interviewed in Eborall *et al* (2007) were participating in the same study (ADDITION Cambridge).

One study (Adriannse *et al* 2001) included two groups of service users, one with type 2 diabetes and one at risk of type 2 diabetes. This review only considered findings from interviews with the latter group since the population with type 2 diabetes is outside our remit. Four studies used qualitative methods (either interviews or focus

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

groups), and one study (Wylie *et al* 2002) used mixed methods (quantitative and qualitative) to collect data. All were based in the UK apart from one (Adriannse *et al* 2001) which was carried out in the Netherlands.

Barriers and facilitators to implementing lifestyle interventions

Two studies were identified as addressing barriers and facilitators to implementing lifestyle interventions. One was a survey of family physicians from Canada (Harris *et al* 2004) and one a case study assessing a diabetes prevention initiative in the US (Santana *et al* 2010)

Barriers and facilitators to changing lifestyle behaviours

Seven papers assessed the limitations to carrying out behaviour change such as the dietary and physical activity modifications advised in diabetes prevention programmes. Two studies were based in the UK (Troughton *et al* 2008; Penn *et al* 2008), two in Finland (Jallinoja *et al* 2008; Korkiakangas *et al* 2011), one in Sweden (Brekke *et al* 2004), one in the US (Satterfield *et al* 2003) and one in Australia (Hume *et al* 2010). Three studies used cross sectional methods (Brekke *et al* 2004; Hume *et al* 2010; Korkiakangas *et al* 2011) whilst the remaining studies utilised qualitative methods such as interviews and focus groups to collect data. Five of the seven studies were embedded within larger studies assessing lifestyle interventions (Penn *et al* 2008; Korkiakangas *et al* 2011; Jallinoja *et al* 2008; Hume *et al* 2010) as well as a screening programme (Troughton *et al* 2008).

Brekke *et al* (2004) focussed on dietary behaviour change, Hume *et al* (2010) and Korkiakangas *et al* focussed on (2011) on physical activity change. The remaining studies included barriers and facilitators to both diet and physical activity changes.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Table 2: Study characteristics

Study	Aim	Population	Setting	Sample	Data collection methods
Barriers to risk assessment					
Adriannse 2001 + Explorative interview study	To explore the psychological impact of a stepwise population-screening project for Type 2 diabetes.	All 50–75-year-old inhabitants, registered in three local municipalities. Subjects received study information along with the Symptom Risk Questionnaire (SRQ), a short, self-administered questionnaire on symptoms and risk factors, used as a screening tool to identify people in the general population at increased risk for Type 2 diabetes. Those with a SRQ score > 6 were invited for a fasting capillary blood glucose measurement. If this was > 5.5 mmol/ l, a venous fasting plasma glucose was measured, and within 2 weeks a 75-g OGTT was performed for diagnostic purposes (WHO 1998).	Hoorn, a semi-rural area in The Netherlands	40 (20 identified as having T2DM) as a result of being screened) and 20 classified as having an initial elevated risk of diabetes, but who did not meet the WHO diagnostic criteria for diabetes. These non-diabetic subjects served as controls and were interviewed approx. 2 weeks after receiving the test result.	Semi-structured interviews lasting 30–60 minute for the newly diagnosed subjects and 15–30 minutes for the non-diabetic participants. Participants without diabetes were interviewed by telephone. They were asked about the impact of the test result in terms of relief. In addition, they were asked about their intention to change lifestyle factors and to have their blood glucose checked in the future, and whether they would recommend others to participate in screening. Both the newly diagnosed diabetic subjects and non-diabetic subjects were invited to express their views on the screening procedure itself.
Eborall 2007 + Prospective qualitative interview study	To provide insight into factors that contribute to the anxiety reported in a quantitative study of the psychological effect of screening for type 2	ADDITION (Cambridge) trial screening Programme: A stepwise procedure in people aged 40-69 years without known diabetes. Participants with oral	Seven general practices in the ADDITION (Cambridge) trial in the east of England.	23 participants (aged 50-69) attending different stages in the screening process.	Thirteen participants were interviewed both before and after OGTT test results, and a further 5 were interviewed only before the initial random blood glucose test. Five more participants were

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study	Aim	Population	Setting	Sample	Data collection methods
	diabetes. To explore expectations of and reactions to the screening experience of patients.	glucose tolerance tests scheduled during a defined period were invited for interview (n=65).			interviewed only following all test results. All interviews took place in participants' homes or workplaces.
Graffy 2010 + Qualitative analysis of interviews	To learn from the experiences of practice staff undertaking a diabetes screening programme in order to inform future screening initiatives.	In the ADDITION-Cambridge trial, 49 practices screened for type 2 diabetes and 5 others were randomized to serve as no-screening controls. Screening practices were randomly allocated to offer either routine care or intensive multifactorial treatment to those diagnosed	UK	7 practice nurses, 4doctors, 3 HCAs and 4 managers. 8 worked in practices allocated to provide routine care and 10 in the intensive treatment practices	The interview schedule explored the participant's experiences of screening and if relevant intensive management as part of the ADDITION study Interviews (mean duration 47; range 26–72 minutes), and were audio recorded and transcribed verbatim.
Williams 2004 ++ Qualitative: Focus Groups	To explore the views of general practitioners and practice nurses about the detection and management of people at risk of developing type 2 diabetes.	From one local health board in Wales, 41 practices were invited to send one GP and one practice nurse to attend one of three focus groups. Twenty-two practices accepted the invitation, and, of these, 21 practices (51% of the 41practices invited) were represented at the sessions.	UK: One local health board area in Wales	The three sessions were attended by 21 GPs and 22 nurses. The first session involved 15 people (8 GPs and 7 practice nurses), the second 21, and the third 7. Practice nurses attended the same focus groups as the doctors with whom they worked.	Three hour-long focus groups held at local venues chosen for their central position and ease of access for all participants involved. Practices were offered remuneration of £100 for attending. Focus groups were facilitated by three research team members. The discussion was recorded, and two other members of the team took notes and recorded group dynamics and non-verbal information, such as body language and emotive elements.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study	Aim	Population	Setting	Sample	Data collection methods
<p>Wylie 2002 ++</p> <p>Mixed methodology qualitative and quantitative study with semi-structured interviews, focus groups, and questionnaires.</p>	<p>To investigate general practitioners' knowledge of and attitudes to impaired glucose tolerance.</p>	<p>26 general practitioners</p>	<p>UK: General practices in Derwentside, Sunderland West, South Tyneside, and Gateshead West and Central Primary Care Groups.</p>	<p>18 men and 8 women in four focus groups (three groups of seven participants and one group of five participants). Eight participants (six men, two women) in the semi-structured interviews.</p>	<p>Two focus groups held in district general hospital post-graduate centres, one in a general practitioner surgery, and one in the Centre for Health Studies. Average duration of focus groups was 75 minutes, and interviews had an average duration of 35 minutes. Before each focus group, a questionnaire evaluating knowledge of the clinical significance and prevalence of impaired glucose tolerance was completed. Responses were explored in the focus group discussion. A similar approach was taken with the semi-structured interviews.</p>
<p>Barriers to intervention implementation</p>					

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study	Aim	Population	Setting	Sample	Data collection methods
Harris 2004 Confidential mail survey	To survey and assess the practices and perceptions of Canadian family physicians regarding lifestyle interventions for T2DM prevention and management.	A random stratified sample of 1499 respondents to the 2001 National Family Physician Workforce Survey.	College of Family Physicians of Canada (CFPC) members	The response rate was 53% (749/1410).	A modified version of the Dillman method was used for the survey. The Dillman method offers a survey method that promises that high return rate and describes specific steps that if followed faithfully, are "guaranteed" to result in a 75%-80% return rate. The survey contained four parts: parts 1 and 2 explored practice behaviours with patients at risk for T2D diabetes and patients diagnosed with T2D, respectively; part 3 explored general perceptions about lifestyle counselling in practice, and part 4 assessed socio-demographic characteristics of respondents.
Santana 2010 + Case study	To explore key aspects of the CHC microsystem (composed of healthcare professionals, a defined population, and their care and information environment) that impacted the implementation and integration of this new initiative into clinical activities.	People working in a community-health centre implementing a Diabetes Prevention Initiative (DPI)	Community-health centre (CHC) in a mid-sized urban city in the USA.	27 administrators, clinicians, and staff.	Interview guide with broad 'grand tour' questions and probes to elicit perceptions of whether and how microsystem characteristics would influence the DPI implementation process. Individual interviews approximately one hour in length. Interviews were digitally recorded and professionally transcribed.
Barriers to lifestyle change					

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study	Aim	Population	Setting	Sample	Data collection methods
Brekke 2004 Questionnaire from controlled intervention	To evaluate the attitudes to and adoption of dietary advice in non-diabetic first-degree relatives of patients with type 2 diabetes and to examine barriers to adherence.	One-year controlled intervention study, where treatment group (n =73) received lifestyle education. Non -diabetic relatives (25–55 years; males and females) of individuals with type 2 diabetes were recruited.	Sweden	67 of 73 intervened subjects completed the 1 year study.	At examination, one year after education, each participant in the intervention groups filled in a questionnaire evaluating perception of given advice.
Hume 2010 Population-based cross-sectional study	To examine perceived barriers to physical activity among adults with and without abnormal glucose metabolism (AGM), and whether barriers varied according to physical activity status.	Participants in the 1999 to 2000 Australian Diabetes, Obesity, and Lifestyle Study (AusDiab) which was a population-based cross-sectional study among adults aged ≥ 25 years.	Australia	7,088 participants	AGM was identified through an oral glucose tolerance test. The participants reported the frequency and duration of their physical activity during the previous week using the Active Australia Questionnaire. This questionnaire is a valid and reliable measure of adults' physical activity during leisure time and includes walking for transport or recreation, and other moderate and vigorous activity. Participants also self-reported their barriers to physical activity by responding to a question asking if any of the following 13 factors were a barrier to them engaging in greater amounts of physical activity. Individual-level barriers (5 items) included having other priorities, having a disability or injury, not having enough time, their age, and feeling tired. Social-level barriers (2 items) were having young children or family demands and work commitments. Physical environmental-level barriers (6

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study	Aim	Population	Setting	Sample	Data collection methods
					items) included the weather, pollution or noise, cost, safety, accessibility of facilities, and a lack of footpaths, cycle lanes, or parks.
Jallinoja 2008 ++ Focus groups from sample of intervention	To analyse participants' accounts of their experiences of lifestyle change during and after the intervention to prevent type 2 diabetes.	Participants in 20 GOAL intervention groups in spring 2003. Targeted persons aged 50–65 years at moderate risk for type 2 diabetes.	Primary health care centres in Finland	A total of 216 persons who participated in 20 GOAL intervention groups.	Three weight-reducers' interview groups (5 women, 10 men) and three weight-gainers' interview groups (12 women, 3 men) were formed. The group interviews were conducted between October 2004 and December 2004, the interviews lasted between 70–120 minutes and were tape-recorded and transcribed verbatim.
Korkiakanga 2011 Part of RCT, questionnaire using open ended questions	To describe the motivators and barriers to physical activity among individuals with high risk of type 2 diabetes who participated in a sub-study of the Finnish Diabetes Prevention Study in Oulu and to consider whether the motivators or barriers changed during the follow-up from 2003 to 2008.	Participants in a sub-study of the Finnish Diabetes Prevention Study.	Oulu, Finland	In the first follow-up in 2003 63 out of 93 participants answered the questionnaire. In the second follow-up in 2008 71 out of 82 participants answered the questionnaire.	Participants filled in questionnaires concerning their exercise level; questionnaires about motivators and barriers to taking part in physical activity were obtained by post in the year 2003, and filled again at a follow-up visit with the study nurse in 2008. The written answers to open ended questions were written up/transcribed.
Penn 2008 ++ Qualitative study embedded within the EDIPS RCT in Newcastle upon Tyne.	To understand the experience of participants who maintained behaviour change, in order to inform future interventions.	Participants in the European Diabetes Prevention Study (EDIPS) in Newcastle	Newcastle-upon-Tyne, UK.	15 participants (7 female, 8 male) of the EDIPS RCT, 8 were part of the original intervention and 7 were from control.	Purposively sampled, according to success criteria for diet and physical activity change maintenance, and invited to attend individual semi-structured interviews. Semi-structured interviews were undertaken in a

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study	Aim	Population	Setting	Sample	Data collection methods
					private, quiet room in Newcastle University.
Satterfield 2003 +	To understand the views of adults at risk of diabetes and community leaders from five racial and ethnic groups about diabetes prevention	Communities in USA	USA	235 participants in 27 focus groups.	Focus groups with community members at risk and community stakeholders.
Troughton 2008 ++	To inform the development of an educational intervention for people with pre-diabetes in the UK by seeking patient views, experience with health system	Participants from original study cohort with pre-diabetes from the community (Midlands, UK) as part of a screening programme.	Midlands, UK	15 participants, 8 (53%) were male, 7 (47%) were female, 9 (60%) were White European and 8 (40%) were South Asian with an average age of 59.6 years (S.D. 11.7). Thirteen patients were diagnosed with IGT and two with IFG.	Semi-structured interviews (held in participant's home or in a diabetes centre) and data validations with sub-sample. Interviews lasted between 30 and 45 minutes and were tape-recorded and transcribed verbatim.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

6.4 Synthesis of findings

The following section is a synthesis of findings relating to risk assessment, intervention implementation and behaviour change. Within each section the relevant papers are referred to by theme.

Barriers and facilitators to optimum provision of risk assessment programme.

Three UK based studies (Graffy *et al* 2010; Williams *et al* 2004; Wylie *et al* 2002) reported issues impacting upon health professionals engaged in the process of risk assessment and management of service users at risk of type 2 diabetes. All three samples were recruited from primary care and consisted of GPs and practice nurses. The providers in the Graffy *et al* (2010) interviews were taking part in the ADDITION Cambridge study. The remaining two samples were not participating in trials, but were commenting on their experiences in routine practice.

Provider understanding and attitudes toward risk assessment

Interviews carried out by Graffy *et al* (2010) found variations in practitioner's understanding of the screening process. This understanding was lacking if the practitioner had not been involved in the planning stages of a programme. Other members of staff were keen to extend the programme beyond the protocol by assessing family members of those at risk of diabetes, or those attending with other conditions.

Williams *et al* (2004) and Wylie *et al* (2002) reported that there were concerns among providers about carrying out risk assessment for type 2 diabetes in general practice. There was the view that primary care was an inappropriate setting within which to address pre-diabetes. This was because pre-diabetes was regarded as a social problem, not a medical issue, and some practitioners did not agree with the 'medicalisation' of pre-diabetes. For example, one GP interviewed was reported to comment: "*These people are not ill. Should we make them ill?*".

There were suggestions that diabetes prevention was the responsibility of agencies and individuals outside the NHS, such as the Government. It was also suggested that

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

prevention should be carried out in schools. The alternative view was that risk assessment should take place in primary care though with adequate resources.

Survey findings in a mixed method study showed that a number of general practitioners were unaware of the extent of pre-diabetes cases in their practice population (Wylie *et al* 2002). In addition, almost half the sample (47%) lacked awareness of the risk of progression from impaired glucose tolerance to type 2 diabetes. There was uncertainty regarding how to manage patients that were identified as having pre-diabetes. According to the authors this has implications for staff training.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 1:

Provider understanding and attitudes toward risk assessment

There was evidence from two interview studies [++; +] and one mixed method study [++] of the impact of provider understanding of risk assessment aims on its implementation.

Findings from one interview study that formed part of a risk assessment programme suggest that providers that are more involved in implementing a programme develop increased understanding of programme aims, as well as of the general issues around risk assessment. Staff not involved at the planning stage may feel that they do not have a grasp of the risk assessment programme as a whole (Graffy *et al* 2010 + UK).

Evidence from one interview study (Williams *et al* 2004 ++ UK) and one mixed method study (Wylie *et al* 2002 ++ UK) carried out in routine practice highlighted concerns that primary care was an inappropriate setting within which to address pre-diabetes due to its perception as a social, rather than medical, problem. Instead, there were suggestions that prevention activity was the responsibility of agencies and individuals outside the NHS, such as the Government.

In the mixed method study (Wylie *et al* 2002 ++ UK) it was reported that some general practitioners are unaware of the extent of pre-diabetes cases in their practice population. In the questionnaire findings, almost half the sample (47%) lacked awareness of the risk of progression from impaired glucose tolerance to type 2 diabetes. There was uncertainty regarding how to manage patients with pre-diabetes which according to the authors has implications for training.

Identification of increased numbers of individuals with pre-diabetes

Graffy *et al* (2010) reported mixed views (i.e. positive and negative) from nurses in primary care units participating in a UK based screening programme. Practices that did not offer adequate administrative support were struggling to keep up with demand and nurses reported that they working in their own time. Units that provided adequate

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

administrative support and / or software support reported coping better with the workload as well as speedier completion of assessments.

Williams *et al* (2004) and Wylie *et al* (2002) reported that one of the issues concerning practitioners was the increase in cases that would result from identification of individuals at risk of type 2 diabetes. Some practitioners did not believe that adequate resources were available to address the additional activities generated from risk assessment. In addition, the role of primary care staff was seen as changing, with nurses specialising in particular conditions and risk assessment being carried out rather than treatment. Wylie *et al* (2002) reported that practitioners were concerned that they did not have access to guidelines that support specialised practice.

Evidence statement 2:

Identification of increased numbers of individuals with pre-diabetes

Evidence from two interview [+; ++] and one mixed method [++] studies reported concerns of increased cases arising from risk assessment.

There were concerns reported in one study (Wylie *et al* 2002 ++ UK) that the role of primary care was moving from general to specialised practice, and that practitioners were concerned that guidelines were not available to support such practice.

In one interview and one mixed method study (Williams *et al* 2004++ UK; Wylie *et al* 2002 ++ UK) carried out in routine practice, increased numbers of cases were a concern for practitioners who did not believe that adequate resources were available to address additional activities.

(Graffy *et al* 2010 + UK) reported mixed views from nurses in primary care units participating in a screening programme. In units that did not offer adequate administrative and software support there were reports of having to work in their own time. By contrast, those units that did provide such support reported better efficiency.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Practitioner perceptions of barriers and facilitators to implementation

Graffy *et al* (2010) reported that practitioners perceived a positive relationship between user and practitioner as a facilitator to attendance for risk assessment. However, the quality of such relationships varied.

In their interviews with UK practitioners, Williams *et al* (2004) and Wylie *et al* (2002) reported that concern that patients who have pre-diabetes but do not experience symptoms may lack the motivation to ultimately make lifestyle changes despite the efforts of practice staff to encourage changes. Attempting to encourage those patients that lacked motivation to make lifestyle changes was seen as time consuming.

Evidence statement 3:

Practitioner perceptions of barriers and facilitators to intervention implementation

There was evidence from one interview study [+], one focus group study [++] and one mixed methods study [++].

Graffy *et al* (2010 ++UK) reported from screening programme interviews that practitioners perceived a good relationship between user and practitioner facilitated attendance for risk assessment.

However, Williams *et al* (2004 ++ UK) and Wylie *et al* (2002 ++ UK) reported that practitioners in routine practice were concerned that patients with pre-diabetes but without symptoms lack the motivation to ultimately make lifestyle changes despite the efforts of practice staff. There was the perception that trying to encourage patients that have low motivation to change their lifestyle behaviours would be time consuming.

Strategies to facilitate risk assessment attendance

Provider perceptions were reported that those living in urban areas were more sceptical about risk assessment, and that men working away from home (for example

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

business men) were least likely to attend. Some strategies for increasing attendance for risk assessment sessions were reported (Graffy *et al* 2010). These included raising awareness about the risks of pre-diabetes and discussing lifestyle issues with service users during blood test result consultations. Including a specific appointment to attend in invitation letters rather than inviting users to make an appointment was reported to be easier for service users, who were less likely to attend without such an appointment. Other strategies were also reported, such as following up user invitations with phone call reminders.

Evidence statement 4:

Strategies to facilitate risk assessment attendance

Evidence from one interview study [+] was available for strategies used to increase service user motivation to attend for risk assessment.

Graffy *et al* (2010 + UK) report that providers are using strategies to increase attendance for assessment. These include raising awareness and discussing lifestyle issues with service users during test result consultations. Arranging a specific appointment to attend rather than inviting users to make their own appointment also was reported by health professionals to facilitate the attendance of service users. A range of strategies around reaching users was evident, such as addressing risk assessment during consultations for other conditions, or following up user invitations with phone call reminders.

Service user understanding and attitudes to risk assessment

Two interview studies, one from the Netherlands (Adriannse *et al* 2001) and one carried out in the UK (Eborall *et al* 2007) explored the psychological impact on service users in respect to screening. Both studies explore the impact on service users of participating in a stepwise screening programme. Such a programme identifies those at high risk of type 2 diabetes and invites them for random blood glucose measurement. Those with blood glucose measurements equal to or higher than the stated criteria receive a fasting glucose measurement. An OGTT is performed when the fasting blood glucose measurement is equal to or higher than the stated criteria. The service users in Eborall *et al* (2007) were taking part in the

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

ADDITION Cambridge study, the same study in which providers interviewed in Graffy *et al* (2010) were involved.

Eborall *et al* (2007) reported that participants in risk assessment considered screening to be a 'good' thing. However, there was mixed understanding among service users of the aims of risk assessment and the meaning of different blood tests, and the implications of their results. People that had been given results associated with pre-diabetes appeared confused and tended to lack awareness of the meaning of the term and the implications of having the condition. Messages from practitioners were confused. The identification of risk did not result in lifestyle change even in people that had previously expressed intent to change in the event of a diabetes diagnosis.

In the Netherlands, Adriannse *et al* (2001) also carried out interviews as part of a stepwise screening programme. They identified a lack of understanding of the meaning of raised blood glucose in more than two thirds of the sample. There was increased understanding in those participants who had family members affected by diabetes. For those without this frame of reference, the term has no personal meaning. Lack of understanding can lead to acceptance of the facts being presented by practitioners without questioning their meaning. One of the interviewees found the screening process bothersome, and two participants reported that time could be an issue for those in paid work (most of the sample were retired).

Perceived risk and seriousness of type 2 diabetes

Eborall *et al* (2007) reported that the stepwise approach to screening allows users the opportunity to adapt psychologically during each stage to the possibility or reality of a diagnosis of pre-diabetes or type 2 diabetes. Adriannse *et al* (2001) and Eborall *et al* (2007) reported that participants were less concerned during the first stage. These participants tend to expect a negative result, particularly if they are not experiencing symptoms. A positive result for pre-diabetes was sometimes met with relief. Again, heightened risk perception was more likely in those who had family members affected by diabetes (Adriannse *et al* 2001).

Even when participants received a positive result at the first stage of risk assessment, they did not necessarily expect a second positive result, though in some

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

cases this shift toward accepting a positive result was made. Some participants attributed the result to consumption of food prior to the test. There was a perception by some users that type 2 diabetes is a 'mild' condition, which may reduce the incentive to participate in prevention strategies (Eborall *et al* (2007)).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 5:

Perceived risk and seriousness of type 2 diabetes and engagement with prevention activities

Evidence from two interview studies [+] suggests that service user engagement with risk assessment programmes is negatively affected by low perceived personal risk of type 2 diabetes as well as the low perceived seriousness of the condition.

Eborall *et al* (2007 + UK) reported that participants in a stepwise screening programme (identifying risk and then following a protocol for measuring blood glucose at set criteria with the OGTT being the final diagnostic test if all other tests show positive) who were at risk from type 2 diabetes generally considered screening to be 'good'. There was evidence from this study of mixed understanding of the aims of risk assessment and the meaning of blood test results. Those with pre-diabetes tended to lack awareness of the meaning of the term and the implications of having the condition identified. Adriannse *et al* (2001 + Netherlands) also identified a lack of understanding of the meaning of raised blood glucose in more than two thirds of the sample. Those with most understanding had family members affected by diabetes. For those without prior experience relating to diabetes, there was no personal meaning of the impact of impaired glucose measures. Lack of understanding could also lead to acceptance of the facts being presented by practitioners without questioning. Only one of the interviewees found the process bothersome, and two reported that time could be an issue if participants were in paid work.

In one study (Eborall *et al* 2007 + UK) the stepwise approach was reported to provide users with an opportunity to gradually adapt psychologically to the possibility or reality of a diagnosis of pre-diabetes or type 2 diabetes. Evidence from the two studies showed that the first stage was less of a concern to users, who generally expect a negative result (Adriannse *et al* 2001 + Netherlands; Eborall *et al* 2007 + UK), particularly in the absence of symptoms. Receiving a positive result at the first stage of risk assessment did not necessarily heighten expectations of a second positive result, though in some users this shift was made.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Barriers and facilitators to implementing lifestyle change interventions

Two studies addressed barriers and facilitators to implementing lifestyle interventions. One was a survey of family physicians from Canada (Harris *et al* 2004). The other study was a case study assessing a diabetes prevention initiative in the US (Santana *et al* 2010).

Organisational factors

Santana *et al* (2010) provided a case study of an intervention translated from a diabetes prevention initiative (DPI) to a community health centre. They identified a lack of shared definition of pre-diabetes and lacked a shared purpose toward testing. Lack of sustained funding was also a barrier to quality improvement. The amount of extra workload involved in maintaining prevention programmes was perceived to require additional resource. There was a reported lack of cohesive aims between the planning team and the rest of the programme staff. Some clinics felt excluded from decision making, with the importance of early involvement in planning being mentioned by one participant. There was concern that prevention programmes could not be sustained unless they were integrated into usual practice. Lack of time, space and finances were also reported barriers, as well as the prospect of not being able to meet the needs of patients who were identified with pre-diabetes, as more cases were being identified.

Harris *et al* (2004) carried out a survey of Canadian family physicians, reporting that there was a perceived lack of time for implementing lifestyle interventions.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 6:

Organisational factors

There was evidence from one case study [+] and one survey study [+] for organisational barriers to lifestyle intervention implementation.

One case study (Santana *et al* + US) of an intervention translated from a diabetes prevention initiative (DPI) to a community health centre identified lack of a shared definition of pre-diabetes and purpose of testing in those organising and implementing the initiative. In addition, lack of sustained funding was a barrier to quality improvement. The amount of extra workload involved in sustained programmes was perceived to require additional resource. Lack of cohesive aims between the planning team and the rest of the programme staff was a barrier in the sense that clinic staff felt excluded from decision making. The importance of early involvement in planning was mentioned by only one participant. Sustainability of a programme was reported to be reduced if the programme was not integrated into usual practice. Lack of time, space and finances were considered as barriers, as well as the prospect of not being able to meet the needs of patients with more cases being identified.

One survey study (Harris *et al* 2004 + Canada) of family physicians reported that practitioners viewed lack of time as a barrier to implementing lifestyle interventions.

Perceived barriers to intervention implementation in practice

In a Canadian survey of family practitioners, Harris *et al* (2004) reported general support for the role of lifestyle interventions in the prevention of type 2 diabetes. However, there was a reported lack of awareness of available tools that might facilitate intervention. Behaviour change techniques were therefore less likely to be used than generic advice or handouts. Practitioners suggested that a lack of motivation to make lifestyle changes among service users was a barrier to implementing interventions. There was a perception among practitioners that service

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

users may not engage in lifestyle change due to lack of commitment and interest and due to the presence of co-morbidities.

Evidence statement 7:

Perceived barriers to intervention implementation in practice

Evidence was available from one survey study [+].

Harris *et al* (2004 + Canada) reported that a lack of awareness of available intervention tools, meant that behaviour change techniques were less likely to be used than generic advice or handouts. Practitioners also suggested that service user motivation to make lifestyle changes was a barrier to implementing interventions. There was a perception among practitioners that service users may not engage in lifestyle change due to lack of motivation and commitment, lack of interest and the presence of co-morbidities.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Barriers and facilitators to carrying out lifestyle changes.

Seven papers assessed the limitations that individuals face when carrying out behaviour change such as the dietary and physical activity modifications advised in diabetes prevention programmes. Two studies were based in the UK (Troughton *et al* 2008; Penn *et al* 2008), two in Finland (Jallinoja *et al* 2008; Korkiakangas *et al* 2011), one in Sweden (Brekke *et al* 2004), one in the US (Satterfield *et al* 2003) and one in Australia (Hume *et al* 2010). Three studies used cross sectional methods (Brekke *et al* 2004; Hume *et al* 2010; Korkiakangas *et al* 2011) whilst the remaining studies utilised qualitative methods such as interviews and focus groups to collect data. Five of the seven studies were embedded within larger studies assessing lifestyle interventions (Penn *et al* 2008; Korkiakangas *et al* 2011; Jallinoja *et al* 2008; Hume *et al* 2010) as well as a screening programme (Troughton *et al* 2008).

Brekke *et al* (2004) focussed on dietary behaviour change, Hume *et al* (2010) and Korkiakangas *et al* (2011) focussed on physical activity change. The remaining studies included barriers and facilitators to both diet and physical activity changes.

a) Barriers

Physical Health

Two surveys that focussed on physical activity and were carried out as part of population-based studies in Australia and Finland (Hume *et al* 2010; Korinkanga *et al* 2011) reported that injuries, disability and increasing age were perceived barriers to carrying out physical activity, particularly for those with abnormal glucose metabolism. Barriers in the Finnish study were much fewer than reported facilitators to carrying out physical activity. Deteriorating physical health and injury were also barriers reported in a UK based interview study that was linked to an RCT of diet and physical activity interventions (Penn *et al* 2008). Such barriers created setbacks when attempting to maintain physical activity behaviour changes.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 8:

Physical Health

Evidence was found from one interview study [++] and two survey studies [++] for physical health factors as a barrier to carrying out physical activity.

One survey that focussed on physical activity and was carried out as part of a population-based cross-sectional study (Hume *et al* 2010 + Australia) reported injury, disability and increasing age as barriers, particularly for those with abnormal glucose metabolism.

A survey that focussed on physical activity (Korkinkanga *et al* 2011 ++ Finland) that was carried out with a subset of the Finnish Diabetes Prevention Study sample showed that health problems could become a barrier. However, barriers in this study were few compared to the facilitators reported from carrying out physical activity.

One interview study linked to an RCT of diet and physical activity interventions (Penn *et al* 2008 ++ UK) showed that deteriorating physical health or injury created setbacks when attempting to maintain physical activity behaviour changes.

Habitual activities

Adopting poor habits that were difficult to change was another reported barrier to carrying out lifestyle change. A Swedish survey study by Brekke *et al* (2004) reported that forgetfulness and reverting back to old habits were barriers to change. A lack of new ideas for cooking healthy foods was a disincentive, particularly if healthy foods were not liked by family members. Participants in a Finnish survey (Korkinkanga *et al* 2011) suggested that “laziness” might be a barrier to changing lifestyle behaviours. Sedentary behaviours such as watching TV, or using the computer, as well as consuming fast food were reported as difficult to change (Satterfield *et al* 2003).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 9:

Habitual activities

Evidence exists in two survey [++] and one focus group study [+] that existing habitual practices are difficult for service users to change.

In one survey study (Brekke *et al* 2004 ++ Sweden) respondents reported that forgetfulness and reverting to old habits were barriers to change. There were reports of lacking ideas when cooking healthy foods and also that healthy foods were not liked by other family members. Evidence from another survey study (Korkinkanga *et al* 2011 ++ Finland) suggested that “laziness” might be a barrier to change.

Evidence from one focus group study (Satterfield *et al* 2003 + US) showed that sedentary behaviours such as watching TV, or using the computer, as well as consuming fast food had become habitual and were difficult to change.

Lack of time; other commitments

A focus group sample that included a diverse American population (Satterfield *et al* 2003) and one UK interview study (Penn *et al* 2008) both highlighted that work commitments and family responsibilities were barriers to carrying out physical activity. This was supported by Hume *et al* (2010) in an Australian survey of service users that showed lack of time, busy schedules, work commitments, hobbies and community priorities were barriers to making lifestyle changes in an ‘at risk’ population.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 10:

Lack of time and other commitments

There was evidence from one survey study, one interview study [++] and one focus group study [+] that making lifestyle changes was hindered by other daily commitments and priorities.

One focus group study with a diverse American population (Satterfield *et al* 2003 + US) and one interview study (Penn *et al* 2008 ++ UK) highlighted that job and family responsibilities were barriers to carrying out physical activity. This was supported by Hume *et al* (2010 + Australia) in their survey which showed that lack of time, busy schedules, work commitments, hobbies and community priorities were barriers to making lifestyle changes in people at risk of type 2 diabetes.

Health beliefs and attitudes

Troughton *et al* (2008) suggests from UK practice based interviews that individuals at risk may not recognise the relevance of diabetes and the impact that lifestyle changes might have on their lives. Some participants expressed a belief that sufficient care was already being taken and that there was no more that could be done to change lifestyle behaviours.

Jallinoja *et al* (2007) reported a range of attitudes among Finnish participants attempting to manage their weight. In the 'hopeless repertoire', mainly used by those who were 'weight-gainers', there was the suggestion that changing ones' behaviour is often difficult or impossible, and people are stuck with a certain lifestyle. There is a battle between external controls and situations, and the desire to maintain a healthy lifestyle. Those who presented with a 'hopelessness' attitude might give up trying due to their belief that changing behaviour was not working, compared to those with a 'self-governing' approach who did not find it a struggle to change health related behaviours.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Penn *et al* (2010) reported that in among UK participants in a diabetes prevention study, some found great difficulty in managing their weight. These individuals reported a sense of unfairness, particularly if they perceived that a lot of effort was being made for little achievement.

Evidence statement 11:

Health Beliefs

Evidence from four interview studies [++] highlights that some health beliefs can hinder healthy lifestyle change.

In one study (Eborall *et al* 2007 + UK) there were no reported expressions of intent in respect of changing lifestyle despite high blood glucose readings. Type 2 diabetes was perceived as 'mild' by some users, which may reduce the likelihood of engaging with prevention strategies.

One interview study (Troughton *et al* 2008 ++ UK) provides evidence that individuals at risk may fail to recognise the relevance of diabetes and the impact that lifestyle changes might have on their lives. There was a belief that sufficient care was already being taken and that there was no more that could be done.

A second interview study (Jallinoja *et al* 2007 ++ Finland), provided evidence for a range of attitudes among those attempting to manage their weight. Those who presented with a 'hopelessness' attitude might give up trying due to their belief that changing behaviour was not working compared to those with a 'self-governing' approach who did not find it a struggle to change health related behaviours.

A third interview study (Penn *et al* ++ UK) provided evidence that some individuals who found great difficulty in managing their weight reported a sense of unfairness, particularly if they perceived that a lot of effort was being made for little achievement.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Lack of information and advice

Three papers identified lack of information about pre-diabetes as a barrier to change. Participants of a focus group study (Satterfield *et al* 2003) reported a lack of public awareness of the potential impact of diabetes upon health and how diabetes can be prevented. It was stated that there was little media coverage of these issues compared to that given to conditions such as coronary heart disease. Troughton *et al* (2008) and Penn *et al* (2008) also found that users reported uncertainty about the risks and seriousness of diabetes and pre-diabetes, relating this to unhelpful advice and information from general practitioners and the media. Pre-diabetes in particular was reported as a 'grey area' that had little meaning. For example, one service user was reported to comment: "*I can't really see that I have got, that I am Pre-Diabetic, because I am not a great sugary lover*" (Troughton *et al* 2008)

Troughton *et al* (2008) reported that concern for the future was discussed more by patients from the South Asian community. There was also uncertainty generally in service user's understanding of the effectiveness of lifestyle change for overall health. This suggests a need for more consistent advice about diabetes.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 12:

Lack of information and advice

Evidence from two interview studies [++] and one focus group study [+] identified lack of optimum advice and information as barriers to lifestyle change.

Satterfield *et al* (2003 + US) reported that participants in their focus group study spoke of the lack of public awareness of the potential impact of diabetes upon health and how diabetes can be prevented. This was compared to the higher recognition given to some other conditions such as coronary heart disease. Troughton *et al* (2008 ++ UK) and Penn *et al* (2008 ++UK) reported on the uncertainty that users have about the risks and seriousness of diabetes and pre-diabetes, relating this to unhelpful advice and information from general practitioners and the media. Pre-diabetes in particular was regarded as a 'grey area' that had little meaning. There was also uncertainty in service user's understanding of the effectiveness of lifestyle change for overall health (Troughton *et al* 2008 ++ UK).

Environmental factors

Satterfield *et al* (2003) reported that focus group participants cited low availability of local inexpensive food choices as a barrier to making healthy dietary changes. In addition, environments that favour vehicular transport over walking facilities make physical activity inaccessible.

Physical activity could also be discouraged by a lack of accessible local facilities such as a swimming pool. Inconvenient opening times, a perceived lack of safety and past experiences such as an injury are also disincentives to physical activity (Penn *et al* 2008). For Hume *et al* (2010), pollution was also a potential barrier. Penn *et al* (2008) and Korkinkanga *et al* (2011) reported that outside activities may be hindered by adverse weather conditions.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 13:

Environmental factors

Evidence from two survey studies [++], one interview study [++] and one focus group study [+] suggests that certain aspects of the environment provide barriers to lifestyle change.

Satterfield *et al* (2003 + US) reported from focus groups that low availability of local inexpensive food choices was a barrier to making healthy dietary changes.

In terms of physical activity changes, Satterfield *et al* (2003 + US) reported from focus groups that environments favouring vehicular transport over walking facilities make physical activity inaccessible.

Physical activity could also be discouraged by lack of accessibility to local facilities such as inconvenient opening times, absence of a swimming pool or a perceived lack of safety in one interview study (Penn *et al* 2008 ++ UK).

Hume *et al* 2010 ++ Australia) reported in a survey study that pollution was a potential barrier to taking physical activity. Penn *et al* (2008 ++ UK) and Korkinkanga *et al* (2011 ++ Finland) reported in interview and survey studies that outside activities may be hindered by adverse weather conditions.

Cost

The cost of required equipment could prevent people from carrying out physical activity, even when physical activities are offered free of charge (Penn *et al* 2008).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 14:

Cost

There was evidence from one interview study [++] that costs are a barrier to carrying out some physical activities and that reducing costs might facilitate access and therefore uptake.

In one interview study (Penn *et al* 2008 ++ UK), costs were identified as a potential barrier to carrying out physical activity. Even when physical activities are offered free of charge, there is often a requirement for special equipment or clothing. Supplying free bus passes can reduce the cost of accessing places to carry out physical activity.

b) Facilitators

Positive impact of behaviour change

As well as being a potential barrier, the motivation to achieve physical health can assist in making lifestyle changes. Penn *et al* (2008) reported that feeling better or fitter following accomplishments related to lifestyle change could help to sustain those changes. There was also a sense of satisfaction expressed by participants that had achieved their goals. Whilst social occasions and festivals could present a challenge to maintaining healthy dietary changes, temporary deviation from restrictive practices could sometimes be accommodated, allowing a balance to be achieved between optimal and realistic goals.

According to findings from a Finnish survey of service users, motivation can also be raised by the prospect of continuing functional ability in later life, the alleviation of symptoms of ill health and generally feeling good following activities (Korkinkanga *et al* 2011).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 15:

Positive impact of behaviour change

Evidence was found in one interview study [++] and one survey study [++] for the positive effects of behaviour change on wellbeing.

Penn *et al* (2008 ++ UK) reported from interview findings that feeling better or fitter following the accomplishment of change helped sustain physical activity behaviour changes. There was also a sense of satisfaction expressed by participants that had achieved their goals. Whilst social occasions could present a challenge to maintaining healthy dietary changes, deviation from such practices could sometimes be accommodated, which allowed a balance to be achieved between optimal and realistic goals.

In one survey study (Korkinkanga *et al* 2011 Finland ++), the motivational effect of carrying out physical activity, such as the continuation of functional ability in later life, and generally feeling good were reported.

Social support

Jallinoja *et al* (2007) found from focus group findings that Finnish families could be supportive to participants by providing encouragement to engage in physical activity. Penn *et al* (2008) also identified in UK interviews that social relationships are an important factor in maintaining changes, in keeping participants “on track”. A Finnish survey (Korkinkanga *et al* 2011) identified peer support as a facilitator to behaviour change. Motivation for achieving change can come from hearing stories of people that already have type 2 diabetes (Penn *et al* 2008; Satterfield *et al* 2003).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 16:

Social support

There was evidence from one interview study [++], two focus group studies [++; +] and one survey study [++] that family and social support was a facilitator in carrying out behaviour change.

One focus group study (Jallinoja *et al* 2007 ++ Finland) found that families could be supportive by giving encouragement to engage in physical activity. One interview study (Penn *et al* 2008 ++; UK) identified social relationships as an important factor in maintaining changes, and a survey study identified peer support as a facilitator to behaviour change (Korkinkanga *et al* 2011 ++ Finland).

Stories of known individuals relating to the challenges of having diabetes were motivators for change in one interview study and one focus group study (Penn *et al* 2008 ++ UK; Satterfield *et al* + US).

Information and support from professionals

Penn *et al* (2008) reported that professional support was appreciated and was helpful in keeping to lifestyle change plans. Motivational interviewing, a style of counselling by practitioners that encourages behaviour change, was particularly appreciated. Attention to timing of information-giving so that changes could be absorbed gradually was a facilitator in allowing adjustment to changes.

Jallinoja *et al* (2007) and Troughton *et al* (2008) reported that participants found check-up visits helpful in maintaining new behaviours. The prospect of undergoing formal measurements with a practitioner was a motivator to continue with dietary efforts.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 17:

Information and support from professionals

Evidence was available from two interview studies [++] and one focus group study [++] that health information and support could facilitate healthy lifestyle changes.

Penn *et al* (2008 ++; UK) found from interview findings that professional support was appreciated and was helpful in keeping to plans. Motivational interviewing, a style of counselling that encourages behaviour change, was particularly appreciated.

Penn *et al* (2008 ++; UK) also found that attention to the optimal timing of information-giving allowed gradual absorption of change and therefore was a facilitator in allowing adjustment to changes.

Jallinoja *et al* (2007 ++; Finland) reported that focus group participants found check-up visits helpful in maintaining new behaviours. The prospect of undergoing formal measurements was a motivator to increase efforts. Similarly, interviewees in the Troughton *et al* (2008 ++ UK) study reported that having repeat tests was reassuring in term of maintaining efforts to change behaviour.

Autonomy and control

Jallinoja *et al* (2007) identified a range of 'repertoires' that were evident in a study with individuals who were attempting to lose or maintain their weight. One group that seemed to be able to control their dietary behaviour did not report having such problems in maintaining weight loss as did those who reported a sense of 'hopelessness'.

In interviews carried out by Penn *et al* (2008), self-efficacy or 'will-power' was an important factor in achieving goals. Self-monitoring was a way of maintaining goals and a balance between the required achievements and realistic ones.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Evidence statement 18:

Autonomy and control

There was evidence from one interview study [++] and one focus group study [++] that a sense of individual autonomy and control was a facilitator to behaviour change.

Jallinoja *et al* (2007 ++; Finland) identified increased autonomy and control over behaviour in focus group participants that were able to manage their weight. These individuals did not associate weight management with a battle in the same way as those who found it difficult to lose weight. They were able to motivate themselves and plan their own lifestyle without the aid of a clinician or advisor.

Penn *et al* (2008 ++; UK) also reported from interview findings that self-efficacy was an important factor in changing behaviour that was eventually incorporated into daily routines. Self-monitoring was a way of keeping to plans and allowing a balance between optimal and realistic goals.

Environmental factors

Penn *et al* (2008) reported that carrying out physical activity can be motivated by being in a stimulating environment such as by the coast. It can also be motivated by access to good local facilities.

Evidence statement 19:

Environmental factors

Evidence from one interview study [++] was available regarding the influence of environmental factors on carrying out physical activity.

Evidence from one interview study [++] suggests that individuals can be motivated to carry out physical activity by the presence of a stimulating environment such as a coastal walk, or the provision of good facilities (Penn *et al* 2008 ++ UK).

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

7. DISCUSSION

This review aimed to assess potential barriers and facilitators to implementing risk assessment strategies and lifestyle interventions. It also aimed to identify barriers and facilitators for those participating in such strategies and those attempting to carry out lifestyle change. Over a third of the studies were carried out in the UK, so that findings are largely applicable to UK settings. Findings from other countries did not differ substantially from those reported in the UK, though in practice there may be differences in the organisation of care and funding. A number of the studies were carried out within a research environment, therefore caution is needed when comparing the results of these with findings from routine practice.

There was less evidence available relating to implementing lifestyle interventions than for risk assessment implementation or for carrying out lifestyle behaviour change. This may be due to a lack of published evaluations, since it is known that many interventions are being delivered both in the UK and elsewhere.

In terms of risk assessment, there appears to be a positive consensus for such efforts in both service user and provider groups. However, issues that hinder risk assessment programmes are a perceived increase in workload associated with the identification of more cases, and need for adequate resources. For service users, there is evidence of a required psychological adjustment to test results over time. The term 'pre-diabetes' lacks meaning and does not, from the available evidence, appear to convey a sense of risk sufficient to trigger lifestyle change. This may be partially due to mixed health messages from practitioners, which in turn implies that there is a need for training in this area.

Within the practitioner groups there was divided opinion about whether primary care is the appropriate setting for carrying out risk assessment. It appears that more positive views are expressed in units that provide adequate administrative support, and in practices that were participating in a research programme. Involving staff in the planning stage of programmes was reported as a facilitating factor for both risk assessment and intervention implementation. In both risk assessment and intervention implementation, some practitioners doubted the effect that lifestyle advice might have in users with low motivation.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Changing lifestyle behaviours was found to be difficult for some groups of people, and in certain situations. Implementation of such interventions needs to take into account accessibility, particular for service users that have family and caring commitments, or are working full-time. Some people require appropriate and timely support from providers as well as from family and friends in order to achieve and sustain lifestyle changes, while others find such changes much easier.

Previous reviews carried out to inform NICE guidance assessed the barriers and facilitators of implementing population and community lifestyle change interventions to prevent type 2 diabetes and pre-diabetes (www.nice.org.uk/guidance/PH35). The main difference between these findings and those in the present review is that the former focus on particular at risk groups in society and on community interventions rather than interventions for individuals. It was found that community interventions need to be culturally sensitive, delivered by providers that are familiar with the delivery settings. Interventions aimed at individuals at risk also require cultural sensitivity though this was not such a focus of the findings. Adequate organisational support is required particularly when providing risk assessment through primary care. Support is needed for providers to deliver accurate advice and encouragement.

For individuals attempting to carry out behaviour change, a relatively high sense of autonomy, control and self-efficacy was identified as a facilitator. Practitioners might assist individuals reporting lower feelings of control by providing appropriate support and encouragement.

Previous reviews relating to this piece of guidance have assessed risk assessment tools, interventions for prevention of type 2 diabetes and the components of those interventions. They have also explored ways in which the protocols of large diabetes prevention trials have been adapted within communities.

In terms of risk assessment, stepped strategies that include an initial risk assessment followed by a series of blood glucose measures to identify or eliminate pre-diabetes or type 2 diabetes were found to have good sensitivity and specificity. The current review shows that for service users, this strategy also allows a gradual psychological acceptance to identified changes in blood glucose.

The review of lifestyle interventions showed that changes in dietary and physical activity behaviours can, in trials with a range of follow up, reduce the incidence of

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

type 2 diabetes. They were also shown to increase weight loss and management, which indirectly affect diabetes risk. The current review highlights the main issues that providers and users face in implementing and carrying out interventions; it cannot be assumed that all individuals will be similarly motivated or that behaviour change is necessarily carried out following advice.

This highlights the need for intervention design to incorporate behavioural theory and tailoring to individual capabilities. These aspects were integrated into the design of major trials such as the DPP and the DPS, as well as in smaller scale translational studies that were based on these two trials. The review of translational studies showed similar trends in weight loss to those found in the major trials though effects were weaker and mainly non-significant. This was likely due to smaller sample sizes and shorter follow ups.

However the current review also shows the variation in organisational support and provider commitment as well as user motivation that can affect outcomes. It also highlights the reasons for some of these factors. Whilst the risks of type 2 diabetes are generally recognised, uncertainty around the concept of pre-diabetes in terms of diagnosis and subsequent intervention has been shown to be a factor for both providers and service users.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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Waugh N, Scotland G, McNamee P *et al.* (2007) Screening for type 2 diabetes literature review and economic modelling. Health Technology Assessment 11: 17 [online]. Available from www.ncbi.nlm.nih.gov/pubmed/17462167

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

9. APPENDICES

Appendix 1: Included studies

Adriannse MC., Snoek FJ., Dekker JM., van der Ploeg HM., Heine RJ., Screening for type 2 diabetes: an exploration of subjects' perceptions regarding diagnosis and procedure. *Diab Med* 2002; 19: 406-411

Brekke HK., Sunesson A., Alexsen M., Lenner RA. Attitudes and barriers to dietary advice aimed at reducing the risk of type 2 diabetes in first-degree relatives of patients with type 2 diabetes. *J Hum Nutr Dietet* 2004; 17: 513-521

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Harris SB., Petrella RJ., Lambert-Lanning A., Leadbeater W., Cranston L. Lifestyle management for type 2 diabetes: Are family physicians ready and willing? *Can Fam Physician* 2004; 50: 1235-1243

Hume C., Dunstan D., Salmon J., Healy G., Andrianopoulos N., Owen N. Are barriers to physical activity similar for adults with and without abnormal glucose metabolism? *The Diabetes Educator* 2010; 36: 495-502

Jallinoja P., Pajari P., Absetz P. Repertoires of lifestyle change and self-responsibility among participants in an intervention to prevent type 2 diabetes. *Scand J Caring Sci.* 2008; 22: 455-462

Korkiakangas E., Taanila AM., Keinanen-Kiukaanniemi S., Motivation to physical activity among adults with high risk of type 2 diabetes who participated in the Oulu substudy of the Finnish Diabetes Prevention Study. *Health and Social Care in the Community* 2011; 19: 15-22

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Appendix 2: Excluded studies

Studies excluded after review of full paper

Author	year	Ref ID	Reason for exclusion
Ben-Arye <i>et al</i>	2007	5384	Participants did not have pre-diabetes
Boltri <i>et al</i>	2007	982	No barriers/facilitators identified
Cramer <i>et al</i>	2007	5971	No barriers/facilitators identified
Davidson	2004	1412	No barriers/facilitators identified
Dodani & Fields	2010	131	No barriers/facilitators identified
Donahue <i>et al</i>	2006	1044	No barriers/facilitators identified
Dunbar	2010	2715	No barriers/facilitators identified
Echouffo-Tcheugui <i>et al</i>	2009	362	No barriers/facilitators identified
Ershow	2009	24	No barriers/facilitators identified
Estabrookes & Smith-Ray	2008	626	No barriers/facilitators identified
Farnkvist <i>et al</i>	2008	568	No barriers/facilitators identified
Finch	2009	2478	No barriers/facilitators identified
Hairi <i>et al</i>	2006	1158	No barriers/facilitators identified
Harris <i>et al</i>	2003	1534	No barriers/facilitators identified
Hivert <i>et al</i>	2009	293	No barriers/facilitators identified
Huebschmann & Crane	2010	6294	No barriers/facilitators identified
Hussain <i>et al</i>	2010	4605	No barriers/facilitators identified
Kettunen <i>et al</i>	2006	1091	No barriers/facilitators identified
Kolasa & Rickett	2010	4588	No barriers/facilitators identified
Kong e tal.	2010	5348	No barriers/facilitators identified
Korkiakangas <i>et al</i>	2010	215	No barriers/facilitators identified
Korkiakangas	2009	2443	Review
Lauritzen <i>et al</i>	1995	2195	No barriers/facilitators identified
Mann <i>et al</i>	2008	6308	Review
Mann & McAuley	2007	971	No barriers/facilitators identified
Michie <i>et al</i>	2008	5114	No barriers/facilitators identified
Muhlhauser <i>et al</i>	2006	1083	No barriers/facilitators identified
Paddison <i>et al</i>	2009	258	No barriers/facilitators identified
Piji <i>et al</i>	2009	405	No barriers/facilitators identified
Qureshi	2008	2812	No barriers/facilitators identified
Raberg Kjollesdal <i>et al</i>	2010	4585	Population not applicable
Roessler	2009	2573	Community intervention
Rosal <i>et al</i>	2008	715	No barriers/facilitators identified
Ruelaz <i>et al</i>	2007	6386	No barriers/facilitators identified
Schafer <i>et al</i>	2007	878	No barriers/facilitators identified
Schwarz	2008	2866	No barriers/facilitators identified
Simmons <i>et al</i>	2007	858	No barriers/facilitators identified
Walker <i>et al</i>	2008	4237	No barriers/facilitators identified
Yates <i>et al</i>	2007	907	No barriers/facilitators identified

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Appendix 3: Search strategies and details of evidence sources

List of databases searched

Medline and Medline in Process via OVID
Embase via OVID
CINAHL via EBSCO
British Nursing Index via OVID
Cochrane Library via Wiley
Science Citation Index via Web of Knowledge
Social Science Citation Index via Web of Knowledge
PsycINFO via OVID
EPPI Centre Databases – Bibliomap, Database of Promoting Health Effectiveness Reviews (DoPHER), Trials Register of Promoting Health Interventions (TRoPHI), The database on Obesity and Sedentary behaviour studies

<http://eppi.ioe.ac.uk/cms/>

Initial Search

Sample search strategy Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R)

1. *prediabetic state/
2. (pre-diabetes or pre diabetes or raised glucose intolerance or impaired glucose level\$ or impaired glucose tolerance or IGT or impaired fasting glucose or IFT or FPG or fasting plasma glucose or impaired glucose regulation or impaired glucose metabolism or raised glycated haemoglobin or raised glycated hemoglobin or high glycated Hb or hyperglycaemia or hyperglycemia).ti.
3. (prevention adj3 (type II diabetes or type 2 diabetes or T2D)).ti.
4. 1 or 2 or 3
5. *body mass index/
6. *obesity/
7. (south asia\$ or black africa\$ or black caribbean\$ or pakistan\$ or bangladesh\$ or india\$ or ethnic minorit\$ or chinese or obes\$ or waist circumference or "bmi > 3?" or BMI).ti.

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

8. 5 or 6 or 7

9. *Hemoglobin A, Glycosylated/ or *Mass screening/ or *Risk assessment/

10. (((risk assessment or monitoring or screening) adj2 diabetes) or HBA1C).ti.

11. 9 or 10

12. *Exercise/ or *Exercise therapy/ or *Diet therapy/

13. (lifestyle intervention\$ or slimming club\$ or diet or low glycaemic index or low glycemic index or reduced fat or low carbohydrate or low calorie or physical activit\$ or exercise or cardiorespiratory training).ti.

14. (Motivational support adj5 diet).ti,ab.

15. 12 or 13 or 14

16. 8 or 11 or 15

17. 4 and 16

Search Strategy Review Four

Database: Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) <1948 to Present>

Search Strategy:

1 ((prevent\$ or reduc\$ or protect\$ or limit\$ or control\$ or delay\$) adj5 (diabetes or pre-diabetes or pre diabetes or raised glucose intolerance or impaired glucose level\$ or impaired glucose tolerance or IGT or impaired fasting glucose or IFG or FPG or fasting plasma glucose or impaired glucose regulation or impaired glucose metabolism)).ti,ab.

2 *prediabetic state/

3 (prevent\$ or reduc\$ or protect\$ or limit\$ or control\$ or delay\$).ti,ab.

4 2 and 3

5 *Diabetes Mellitus, Type 2/pc

6 1 or 4 or 5

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

7 (barriers or facilitators or social inequality\$ or perception\$ or concern\$ or attitude\$ or informed choice or thoughts or physical or emotional or psychological or financial or culture or cultural or environment\$ or motivation\$ or focus group* or participant observation or delphi study or group meeting* or feedback or role-play or telephone survey or qualitative\$ or findings or interview\$).ti,ab.

8 Interview/

9 Qualitative Research/

10 7 or 8 or 9

11 (patient education or intervention or lifestyle\$ or behaviour change or behavior change or weight or diet or physical activity or exercise or screening or blood test\$ or pharmacology or pharmacological).ti,ab.

12 6 and 10 and 11

13 Diabetes, Gestational/

14 12 not 13

15 limit 14 to (english language and humans and yr="1990 -Current")

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Appendix 4: Quality rating of included papers

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Quality rating
Adriannse 2002	1	1	1	1	0	1	0	1	0	0	1	1	1	0	9 / 14 +
Brekke 2004															
Graffy2010	1	1	0	1	0	1	0	1	1	0	1	1	1	0	9 / 14 +
Harris 2004															
Hume 2010	1	1	1	1	0	1	1	1	1	1	1	1	1	1	13 / 14 ++
Jallinoja 2008															
Korkiakangas 2011															
Penn 2008	1	1	1	1	1	1	1	1	1	1	1	1	1	1	14 / 14 ++
Santana 2010	1	1	1	1	0	0	0	0	1	0	1	1	1	0	8 / 14 +
Satterfield 2003	1	1	1	1	0	1	0	1	0	1	1	1	1	0	10 / 14 +
Troughton 2008	1	1	1	1	0	1	1	1	1	1	1	1	1	1	13 / 14 ++
Williams 2004	1	1	1	1	1	1	0	1	1	0	1	1	1	0	11 / 14 ++
Wylie 2002	1	1	1	1	0	1	1	1	1	1	1	1	1	NA	12 / 14 ++

NR = Not Reported, NA = Not Applicable
1 = acceptable 0 = not acceptable

The checklist for qualitative studies contained the following items:

1. Is a qualitative approach appropriate?
2. Is the study clear in what it seeks to do?
3. How defensible/rigorous is the research methodology?
4. How well was the data collection carried out?
5. Is the role of the researcher clearly described?
6. Is the context clearly described?
7. Were the methods reliable?

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

8. Is the data analysis sufficiently rigorous?
9. Is the data 'rich'?
10. Is the analysis reliable?
11. Are the findings convincing?
12. Are the findings relevant to the aims of the study?
13. Conclusions
14. How clear and coherent is the reporting of ethics?

Survey Studies

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Quality rating
Brekke 2004	1	1	0	1	1	1	1	1	1	1	1	N/A	1	1	12/14 ++
Harris 2004	1	1	1	1	1	0	0	0	1	1	0	N/A	1	1	9/14 +
Jallinoja 2008	1	1	0	1	1	1	1	1	1	1	0	N/A	1	1	11/14 ++
Korkiakangas 2011	1	1	0	1	1	1	0	1	0	1	1	N/A	1	1	10/14 ++

The checklist for survey studies contained the following items:

1. Are the aims clearly stated?
2. Is the design appropriate to the stated objectives?
3. Was the sample size justified?
4. Are the measurements likely to be valid and reliable?

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

5. Are the statistical methods described?
6. Did untoward events occur during the survey?
7. Were the basic data adequately described?
8. Do the numbers add up?
9. Was the statistical significance assessed?
10. Were the findings serendipitous?
11. How could selection bias arise?
12. How are null findings interpreted?
13. Are important effects overlooked?
14. Can the results be generalised?

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Appendix 5: Evidence Tables

Study details	Population and setting	Methods	Findings	Notes
<p>Author: Adriannse</p> <p>Year: 2001</p> <p>Setting / country: Netherlands</p> <p>Aim of study: To explore the psychological impact of a stepwise population-screening project for Type 2 diabetes.</p> <p>Study design: Explorative interview study</p> <p>Funding: The Health and Research and Development Council of The Netherlands</p> <p>Quality: +</p>	<p>Number of participants: 40 (20 with T2DM) and 20 classified as having an initial elevated risk of diabetes, but who did not meet the WHO diagnostic criteria for diabetes. These non-diabetic subjects served as controls and were interviewed approx. 2 weeks after receiving the test result.</p> <p>Mean Age: Range 51 – 74 Mean age T2DM group: 62.3 ± 5.9 years Mean age non-T2DM: 64.9 ± 6.2</p> <p>Gender: 10 (50%) were female in both groups.</p> <p>Other: 11 in each group reported a family history of diabetes.</p> <p>IFG: n = 17 IFG and IGT: n = 10</p>	<p>Research Question:</p> <p>Intervention aims and content if applicable: Pilot within ongoing screening project. General population of a semirural area in The Netherlands. Participants = 11 679 Age = 50–75-years SRQ score > 6, indicated a high risk of diabetes. If fasting capillary blood glucose > 5.5 mmol/l, venous fasting plasma glucose and 75-g OGTT performed for diagnostic purposes. The WHO criteria of 1998 used for diagnosis.</p> <p>Data collection methods: Semi-structured interviews 30–60 min for newly diagnosed (mostly at home) and 15–30 min for the non-diabetic participants (by telephone). Newly diagnosed participants were interviewed about the impact of diagnosis, prior expectations regarding risk, understanding of the test result, perceived severity and consequences, sense of control over diabetes and reactions from their social environment. Non-diabetic participants were asked about the impact of test result in terms of relief, as well as intention to change lifestyle factors and have blood glucose checked in the future, and whether they would recommend others to participate in screening.</p> <p>Data Analysis: Analytical categories to describe and explain perceptions regarding diagnosis and procedure. A database was created with variables grounded in responses to the</p>	<p>Main Themes relevant to research question:</p> <p><i>Expectations</i> Less than 1/3 of newly diagnosed had thought about having diabetes. One woman had thought about having diabetes, as her GP had previously checked her blood glucose levels. She was unsurprised to hear she had diabetes.</p> <p><i>Understanding</i> 6 said that information received regarding elevated blood glucose levels had a meaning to them. Most (5/6) had close relatives with diabetes to help them understand the implications. Patients seemed to accept elevated blood glucose levels as a fact, without any frame of reference. Having a relative with diabetes helped understanding the meaning of having diabetes, though not necessarily a perception of diabetes as serious.</p> <p><i>Perceived severity</i> One 68-year-old man felt alarmed by the diagnosis. People did not perceive themselves as being ill, particularly if they had no symptoms. 14/20 reported perceiving diabetes as mild. 5/20 of those without diabetes had been concerned about a possible positive test result. 3/4 reported experiencing some relief. All claimed to feel reassured and did not see a reason to change their lifestyle. 5 planned to have their blood glucose tested in the future. None reported any negative consequences of the screening process itself.</p> <p>Screening procedure Overall, the screening was reported as positive and not burdensome. One participant experienced the screening as burdensome. She didn't usually visit her GP and felt 'under research' since the detection. The overall time required was generally not experienced as a problem. It was perceived as 'just part of the procedure' and 'unavoidable'. Two participants reported that time could be a problem if one has a paid job (most were retired). No-one reported a specific part of the procedure as tiresome. 'Completing questionnaires' and 'Two hours waiting during OGTT' were reported as annoying four and three times, respectively, by newly diagnosed subjects. 'lack of privacy' was reported as a disturbing</p>	<p>Limitations identified by author: Newly diagnosed participants were interviewed at home, while the non-diagnosed were interviewed by telephone. This appeared reasonable as this interview was limited.</p> <p>Evidence gaps and/or recommendations for future research:</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study details	Population and setting	Methods	Findings	Notes
		<p>relevant questions per theme, resulting in a matrix of cells with abstracted text material. For each question, categories of answers were generated.</p>	<p>element of the screening procedure, where two people were tested in one room. All were positive about the perceived benefits of screening, all considering it useful. Participants wanted to know whether they had Type 2 diabetes or not, and one wanted to contribute to science.</p> <p>Authors conclusions: “While our findings with regard to the psychological impact of screening seem reassuring, there is a possible risk of a ‘certificate of good health effect’ in those with a negative test result. Indeed, we found in the non-diabetic group that the screening did not stimulate a change in lifestyle, although these subjects could profit from behaviour changes, given their increased risk. This is particularly relevant for people with impaired glucose tolerance, as at least 30% of that high-risk group will develop diabetes”.</p>	
<p>Author: Brekke <i>et al</i></p> <p>Year: 2004</p> <p>Setting / country: Sweden</p> <p>Aim of study: To evaluate the attitudes to and adoption of dietary advice in nondiabetic first-degree relatives of patients with type 2 diabetes and to examine barriers to adherence</p> <p>Study design: questionnaire from controlled intervention</p> <p>Funding: The Swedish Diabetes Association.</p>	<p>Number of participants: 67 of 73 intervened subjects completed the 1 year study.</p> <p>Five dropped out because of medical or personal reasons, one was not possible to reach. One evaluation sheet was missing.</p> <p>Mean Age: 43 years</p> <p>Gender: 23 women, 44 men</p> <p>Other: BMI 26</p>	<p>Research Question:</p> <p>Intervention aims and content if applicable: One-year controlled intervention study, where treatment group (n =73) received lifestyle education.</p> <p>Goals were devised to achieve a dietary composition based on the Nordic Nutrition Recommendations.</p> <p>Two dietary education sessions, performed in a group setting of three to 11 participants, were held 1– 2 weeks apart at study start. A goal regarding reduction of dietary glycaemic index was added as a diet with a high glycaemic load has been suggested to increase risk of type 2 diabetes in men and women</p> <p>Data collection methods: Non-diabetic relatives (25–55 years; males and females) of individuals with type 2 diabetes were recruited.</p>	<p>Main Themes relevant to research question:</p> <p>Forgetfulness – revert to old habits’ was a problem for 62%. Half of the participants gave the reason ‘low availability in lunch restaurant’. ‘Lack of ideas for meals/cooking’ was a problem for 37%. The most prevalent comments made by participants were ‘low fat cheese, oily fish, low-fat milk/milk products do not taste good’ or ‘family members do not like these foods’, ‘rapeseed oil is not suitable for frying’, ‘I forget to eat oily fish and to eat vegetables according to the plate model’ and ‘lean meat products, low-fat cheese and oily fish are more expensive than alternatives’.</p> <p>Barriers to advice regarding quality of carbohydrates</p> <p>The most prevalent reason for not adhering to advice regarding quality of carbohydrates was ‘forgetfulness – revert to old habits’ (59%). Fifty-one per cent of the participants found ‘beans and lentils are difficult to get used to’, and ‘recommended foods are not available at my lunch restaurant’ was also a problem for half of the population. Lack of ideas for meals/cooking and ‘family dislikes recommended foods’ were of importance for more than 30% of participants. The most prevalent comments made by participants were ‘kernel-based sourdough bread does not taste good, my family does not like it and availability is limited’, and ‘low-GI cereal does not taste good’.</p>	<p>Limitations identified by author:</p> <p>Barriers might be different in populations depending on country, setting, motivational factors like heredity for disease, and the number and type of advice given.</p> <p>Evidence gaps and/or recommendations for future research: NR</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study details	Population and setting	Methods	Findings	Notes
Quality:		<p>Data Analysis: At examination, 1 year after education, each participant in the intervention groups filled in a questionnaire evaluating perception of given advice</p> <p>Statistical analysis of survey. SPSS for Windows</p> <p>Attitudes and importance of barriers were classified by the intervened subjects into four categories ranging from 'No problem' to 'Yes, definitely a problem'. Dietary adherence was monitored by food frequency questionnaire at baseline and after 1 year.</p> <p>Attitudes and barriers to dietary advice were analysed in all intervened subjects who completed the evaluation sheets.</p>		
<p>Author: Eborall</p> <p>Year: 2007</p> <p>Setting / country: Seven general practices in the ADDITION (Cambridge) trial in the east of England.</p> <p>Aim of study: To provide insight into factors that contribute to the anxiety reported in a quantitative study of the psychological effect of screening for type 2 diabetes. To explore</p>	<p>Number of participants: 23 participants (aged 50-69) attending different stages in the screening process.</p> <p>Mean Age:</p> <p>Gender:</p> <p>Other: T2DM n = 8 IGT / IFG n = 7</p>	<p>Research Question:</p> <p>Intervention aims and content if applicable: The ADDITION (Cambridge) trial screening Programme: A stepwise screening procedure. Aged 40-69 years without known diabetes. Those in the top quartile of risk of having prevalent undiagnosed type 2 diabetes by automated search of medical records are invited by letter to attend their local general practice for screening. Visit 1: random whole blood (capillary) glucose and glycosylated haemoglobin tests If random blood glucose 5.5-11.0 mmol/l proceed to visit 2 If random blood glucose ≥ 11.1 mmol/l proceed to visit 3 Visit 2: fasting whole blood (capillary) glucose If fasting blood glucose ≥ 6.1 mmol/l</p>	<p>Main Themes relevant to research question: There was a reported change in perceptions of personal risk as the stepwise programme progressed. Psychological adjustment occurred as users moved from a low perception of risk to the possibility of receiving a diagnosis.</p> <p><i>Initial stages of the screening process:</i> Screening as 'good' – receipt of the first invitation. Initial test 'routine'. Low expectation of testing positive – this was higher when a family member had diabetes. Lack of understanding as to why participants invited for screening. Most participants that tested positive reported that they were not worried. They typically expected the next test to be negative. The health professionals' relaxed manner in giving results seemed to contribute to this lack of concern in some cases.</p> <p><i>Pre-diagnostic test expectations:</i> Some participants still expected to test negative after a second positive test. Expectation that the OGTT would be negative. Others had started to accept the possibility of having type 2 diabetes,</p>	<p>Limitations identified by author: The study's generalisability may be limited by its reliance on an opt-in procedure and low response rate. However, while it is impossible to establish whether participants were more or less anxious about their health than non-participants, the findings concur with previous literature and the larger quantitative study.</p> <p>Evidence gaps and/or recommendations for</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study details	Population and setting	Methods	Findings	Notes
<p>expectations of and reactions to the screening experience of patients with positive, negative, and intermediate results.</p> <p>Study design: Prospective qualitative interview study</p> <p>Funding: Royal College of General Practitioners scientific foundation board (SFB/2005/12). The ADDITION (Cambridge) trial was funded by the Wellcome Trust (G0000753). HE is funded by an ESRC/MRC post doctoral fellowship</p> <p>Quality: +</p>		<p>or fasting blood glucose 5.5-6.0 mmol/l and glycosylated haemoglobin (from visit 1) $\geq 6.1\%$ proceed to visit 3</p> <p>Visit 3 at hospital outpatient centre: oral glucose tolerance test¹³ and clinical, anthropometric, and biochemical measures</p> <p>A second oral glucose tolerance test needed if 5.5-11.0 mmol/l at random blood glucose, 5.5-6.0 mmol/l at fasting blood glucose, and glycosylated haemoglobin $\geq 6.1\%$</p> <p>Data collection methods:</p> <p>(1) sampling at the point of referral for the final test; all patients with oral glucose tolerance tests scheduled during a defined period were invited for interview (n=65). The resulting sample comprised 13 participants who were interviewed both before this test and again after receiving their test results.</p> <p>(2) A second group of participants (n=21) was purposively invited for interview after their final test results to redress the uneven balance of sex and diagnosis achieved in the first group. The resulting sample comprised five participants who were interviewed once (after test results).</p> <p>(3) To capture the views of participants at the initial test (random blood glucose), all patients attending for tests invited during one practice session (n=15). The resulting sample comprised five participants who were interviewed once, shortly after their test. All interviews took place in participants' homes or workplaces</p> <p>The initial question, "Thinking back to when you received the invitation to screening what were your initial feelings?" encouraged participants to tell their story of the screening experience from the beginning. Interviews were audio recorded and transcribed verbatim.</p>	<p>albeit "mild" (absence of symptoms). Information about type 2 diabetes obtained from the media, health professionals, friends, and family.</p> <p>Some participants (without a family history) could identify people with type 2 diabetes within their own networks. These people were often used as a benchmark against which to make favourable comparisons. Others reported how diabetes did not seem to affect their friends' lives, re-inforcing the positive perception of diabetes as a controllable condition.</p> <p><i>Intermediate and negative result:</i></p> <p>Those with IFG or IGT reported that they knew they didn't have diabetes. This was reinforced by lack of symptoms despite the awareness that there is an early asymptomatic stage.</p> <p>Many participants seemed confused. They appeared to be unaware of this diagnostic label or struggled to explain its meaning. Some reported that they had received confused messages from their general practitioner. Most appeared unconcerned by their result. The condition was often normalised, with reports that they felt reassured by their general practitioner or nurse who had recommended simply annual checks. This had not triggered lifestyle change even in those who had expressed intentions to change if diagnosed with type 2 diabetes in the pre-test interview.</p> <p>One participant was not happy with his GP's explanation and wanted further information about impaired glucose tolerance. Some patients accepted that lifestyle change would affect their risk of developing diabetes, but none appeared to be aware of the risk of cardiovascular disease associated with impaired fasting glucose or impaired glucose tolerance.</p> <p>DISCUSSION</p> <p>This study highlights the fluid and changing nature of participants' perceptions at different stages of a stepwise screening programme for type 2 diabetes. The data indicate that participants underwent a process of psychological adjustment as they progressed through the programme. The findings help to explain the low levels of anxiety seen among participants in the ADDITION (Cambridge) screening programme, including those eventually diagnosed with the disease.</p>	<p>future research: Diagnostic consultations between health professionals and people with screen detected type 2 diabetes and impaired fasting glucose or impaired glucose tolerance.</p> <p>The findings have important implications for people who implement screening. Even patients who tested negative at the first two tests remain at high risk of developing type 2 diabetes (as the risk score identified) Patients should be made aware of the risk factors leading to the screening invitation.</p> <p>The lack of intentions to change lifestyle in participants who did not test positive at the final diagnosis raises questions of when and how "risk of diabetes" might be effectively conveyed to patients to motivate changes in lifestyle. The interviews carried out before the oral glucose tolerance test indicate that this stage might be a useful point</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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		<p>Data Analysis: Informed by grounded theory, involving concurrent data collection and analysis, together with systematic efforts to check and refine emerging categories of data. Themes that emerged in early interviews were discussed in team meetings and were used to inform subsequent interviews and analysis. Throughout the interview and analysis phases, team meetings focused on exploring patients' underlying reasoning, discussing deviant cases, and reaching agreement on recurrent themes and findings. NVivo7 (QSR International), a qualitative data indexing package, was used to help in data coding and retrieval.</p>		<p>at which to give patients information about the consequences of a positive or negative test, so that those not diagnosed with type 2 diabetes are made aware of their risk of developing diabetes and cardiovascular disease.</p>
<p>Author: Graffy Year: 2010 Setting / country: UK Aim of study: To learn from the experiences of practice staff undertaking a diabetes screening programme in order to inform future screening initiatives. Study design: Qualitative analysis</p>	<p>Number of participants: 7 practice nurses, 4doctors, 3HCAs and 4 managers. 8 worked in practices allocated to provide routine care and 10 in the intensive treatment practices Mean Age: NR Gender: NR Other:</p>	<p>Research Question: Intervention aims and content if applicable: Part of the ADDITION-Cambridge trial. 49 practices screened for type 2 diabetes. 5 more practices randomized to serve as no-screening controls. Screening practices randomly allocated to either routine care or intensive treatment. Records used to identify those in the top quartile of risk of diabetes using a validated risk score. Those at risk invited for screening Random capillary blood glucose and HbA1c measured. RBG >5.5 mmol/l led to fasting blood glucose measurement. RBG >11.0 mmol/l was followed by OGTT.</p>	<p>Main Themes relevant to research question: <i>Implementation in different settings</i> Practice teams adopted different approaches. In smaller practices, staff shared out tasks, with each team member covering several tasks. They described a sense of identity as a small organization: Larger practices took a more structured approach. Individual staff had particular tasks and roles overlapped less. Sometimes nurses and administrative staff worked side by side to see patients and record data. Both small and large practices saw benefits from their respective size. The practice manager or administrator typically searched the electronic records to identify those at risk. Some needed ongoing assistance following training. Software provided to generate invitation and reminder letters was seen as vital for the programme's success. Several nurses and HCAs commented that the programme involved significantly more work than they had expected and there was a need for administrative support: One practice that made provision for administrative support, completed</p>	<p>Limitations identified by author: Practical constraints limited the number and location of practices that could be included. None of the practices were in deprived urban areas or had significant minority ethnic communities. Some participants had difficulty recalling specific details. T There was little scope to test emerging concepts in later interviews. Evidence gaps and/or recommendations for</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>of interviews</p> <p>Funding: National Institute for Health Research Programme Grant for Applied Research (RP-PG-0606-1259). The ADDITION-Cambridge trial has been funded by the Wellcome Trust, the Medical Research Council and NHS R&D Support Funding.</p> <p>Quality: +</p>		<p>Data collection methods: Purposively sampled routine care (3) and intensive treatment (3) practices. Practices with both high and low yields of screen-detected patients included. Interviews with doctors, practice nurses, health care assistants (HCAs) and managers who had been involved in the work. The interview schedule explored participant's experiences of screening and relevant intensive management. Interviews lasted an average of 47 minutes (range 26–72 minutes) and were audio recorded and transcribed verbatim.</p> <p>Data Analysis: Informed by grounded theory. NVivo8 (QSR International) for coding and retrieval.</p>	<p>their screening quickest. Several nurses commented that diabetes was 'their' territory, a view that was also put forward by GPs, who did little screening activity. HCA was able to develop role Reception manager was able to have more patient contact There was a sense of responsibility to see the programme through. There was a lack of understanding of the aims of the programme in those not involved in the routine management of diagnosed patients.</p> <p><i>Extending the scope of the programme</i> Criteria for screening were tightly specified. However, responders described ways that they had extended the programme. Spouses and others outside the target group had been screened. Health promotion advice was given even if the result was negative. Some practices flagged the notes of non-attenders so they could be screened when they next attended. One practice telephoned non-attenders and offered to rebook the appointment. Some resisted pressure to extend the work. One practice arranged brief appointments which they limited to tests in the protocol. Whereas some practices appeared primarily focussed on the needs of the individual patient, others thought more in terms of the needs of the population to be screened.</p> <p><i>Perceived impact</i> Most believed the programme was worthwhile, particularly if they had a family member with diabetes. Staff referred to particular patients whose health had improved after being diagnosed. This acted as a motivator. There were reported benefits for the practice from participating, such as updated records, improvements to procedures for diagnosing diabetes and greater awareness of the condition. Staff in the intensive management practices valued the meetings with the research team to review individual patients. Staff in intensive management practices referred to aiming for tighter control of risk factors, which then became the norm for other patients in the practice.</p> <p><i>Relationships with patients</i> Existing relationships with patients influenced the programme by improving attendance, medication adherence and patients' response to lifestyle advice. A good relationship offered the opportunity to discuss screening in future consultations if people did not attend. The strength of</p>	<p>future research: The findings suggest that the workload will vary between practices and may be considerable. The new programme needs to be evaluated to ensure that it merits the resources invested.</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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			relationships varied with some interviewees closer to the patients than others.	
<p>Author: Harris <i>et al.</i></p> <p>Year: 2004</p> <p>Setting / country: A random sample of College of Family Physicians of Canada (CFPC) members who responded to a question from the 2001 National Family Physician Workforce Survey (NFPWS)</p> <p>Aim of study: To survey and assess the practices and perceptions of Canadian family physicians regarding lifestyle interventions for T2D prevention and management</p> <p>Study design: Confidential mail survey</p> <p>Funding: The work was supported by a grant from Health Canada's Canadian Diabetes Strategy Prevention and Promotion Contribution Program</p>	<p>Number of participants: A random stratified sample of 1499 respondents to the 2001 National Family Physician Workforce Survey. The response rate was 53% (749/1410).</p> <p>Mean Age: Median age of respondents was 44 years</p> <p>Gender: 54.1% of respondents were male ; 43.4% were female; 2.5% chose not to answer the question</p> <p>Other: Median year of medical school graduation was 1984</p> <p>Baseline comparability: Not reported</p>	<p>Research Question: What are the practices and perceptions of Canadian family physicians regarding lifestyle interventions for T2D prevention and management?</p> <p>Methods used: Five basic stages of survey administration were completed during summer 2002 and included translation of the survey into French. A modified version of the Dillman method was used for the survey mailing (all surveys had a unique identifier to facilitate repeat mailings to nonrespondents</p> <p>Questionnaire: The survey contained four parts: parts 1 and 2 explored practice behaviours with patients at risk for T2D diabetes and patients diagnosed with T2D, respectively; part 3 explored general perceptions about lifestyle counselling in practice, and part 4 assessed sociodemographic characteristics of respondents.</p> <p>Analysis: The survey had the power to represent those sampled with 80% confidence if at least 500 respondents replied to the survey (5 × 100 dependent variables = 500). Descriptive univariate and bivariate analysis was performed, noting statistical significance at the < .05 level using SPSS version 11.5.0</p>	<p>Outcomes: Practices and perceptions regarding lifestyle interventions of T2D prevention and management</p> <p>Main Themes relevant to research question:</p> <p>Respondents thought that lifestyle interventions have a substantial role in preventing (725/749, or 96.8%) and managing (731/749, or 97.6%) T2D. Most respondents thought that family physicians should promote lifestyle change by advising and providing appropriate interventions, such as recommendations and generic patient handouts (711/749, or 94.9%). Fewer respondents (513/749, or 68.5%), however, thought that using behavioural change techniques (eg, scheduling specific appointments to provide stage-matched counselling on diet and physical activity) would be appropriate. Several respondents were unaware of the many tools and programs that facilitate these interventions</p> <p>Barriers that arise when initiating lifestyle modification strategies included:</p> <p>Patient not being interested in changing physical activity and eating habits</p> <p>Lack of long-term commitment from patient</p> <p>Lack of time to spend with patients in regular office visit</p> <p>Patients have co-morbidity</p> <p>Limited access to community based referrals (nutritionist or dietician, activity programmes, weight-loss centres)</p>	<p>Limitations identified by author: The authors' noted that a shorter survey could have yielded a much larger response rate; yet, given the numerous demands on clinicians' time, a response rate of 53% was impressive. Next, because the results are based on self-reported data, it is difficult to determine whether respondents practised what they reported; research shows that respondents tend to overestimate what are considered positive behaviours. The survey sampled only CFPC members, who (as a criterion of membership) must commit to continuing education. As a result, the sample potentially over-represents physicians who are up-to-date on current recommendations. Finally, the survey did not differentiate between dietary strategies (eg, reduce fat and carbohydrate intake) and weight loss in general.</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study details	Population and setting	Methods	Findings	Notes
Quality:				Evidence gaps and/or recommendations for future research: There is an urgent need to develop and evaluate strategies to help physicians overcome identified barriers and effect long-term behaviour change in their patients. Failure to do so will severely compromise family physicians' efforts to battle the T2D epidemic
<p>Author: Hume</p> <p>Year: 2010</p> <p>Setting / country: Australia</p> <p>Aim of study: to examine perceived barriers to physical activity among adults with and without abnormal glucose metabolism (AGM), and whether barriers varied according to physical activity status</p> <p>Study design: population-based cross-sectional</p> <p>Funding: National</p>	<p>Number of participants: 7088 participants</p> <p>Mean Age: 47.5</p> <p>Gender: 46% male</p> <p>Other: 18.5% had Abnormal glucose metabolism (AGM)</p> <p>Those with AGM tended to be older males, have low levels of education, to smoke, and to be overweight or obese.</p> <p>A lower proportion of those with AGM met the physical activity recommendation than did</p>	<p>Research Question: to examine perceived barriers to physical activity among adults with and without abnormal glucose metabolism (AGM), and whether barriers varied according to physical activity status</p> <p>Intervention aims: NA</p> <p>Data collection methods: 1999 to 2000 Australian Diabetes, Obesity, and Lifestyle Study (AusDiab) was a population-based cross-sectional study among adults aged ≥ 25 years. AGM was identified through an oral glucose tolerance test. The previous week's physical activity and individual, social, and environmental barriers to physical activity were self reported.</p> <p>A stratified cluster-based sampling frame was used to determine the households within 7 Australian states and territories to be approached for participation.</p>	<p>Summary of data: Key barriers to physical activity included lack of time, other priorities, and being tired.</p> <p>Following adjustment for socio-demographic and behavioural factors, there were few differences in barriers to physical activity between those with and without AGM, even after stratifying according to physical activity.</p> <p>Detailed description of data: Those with AGM tended to be older males, have low levels of education, to smoke, and to be overweight or obese. A lower proportion of those with AGM met the physical activity recommendation than did those without AGM.</p> <p>A higher proportion of those with AGM reported an injury or disability, age, and pollution as barriers to physical activity, and a lower proportion reported having other priorities, lack of time, being tired, and family and work commitments as barriers to physical activity compared to those without AGM.</p> <p>Results of logistic regression analyses examining the odds of agreeing with specific barriers among those with and without AGM (the referent category). For the total sample, those with AGM had lower odds of</p>	<p>Limitations identified by author: Self-reported physical activity and the cross-sectional nature of the study.</p> <p>Evidence gaps and/or recommendations for future research: programs should target the following common barriers to physical activity among those with and without AGM: to prioritize their physical activity and manage their time so that they can fit physical activity into their daily routines in terms of work and family commitments, to overcome perceptions of being too old for</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>Health and Medical Research Council</p> <p>Quality:</p>	<p>those without AGM.</p>	<p>Data Analysis: Logistic regression analyses examined differences in barriers to physical activity between those with and without AGM, and for those with and without AGM who did and did not meet the minimum recommendation of 150 minutes/week of moderate-to-vigorous intensity physical activity.</p>	<p>reporting other priorities, having a lack of time, family or work commitments, and higher odds of reporting an injury or disability, age, and pollution compared to those without AGM. However, in the adjusted analyses only 1 barrier (pollution) was significantly different statistically between the 2 groups.</p> <p>Some differences in barriers to physical activity were evident between groups in unadjusted models; however, after adjusting for demographic and behavioural factors, these differences were no longer significant for socio-demographic and behavioural factors.</p>	<p>physical activity, and, when they feel tired, to raise awareness of the benefits of increased energy levels from being physically active.</p>
<p>Author: Jallinoja</p> <p>Year: 2008</p> <p>Setting / country: Finland.</p> <p>Aim of study: to analyses participants' accounts on their experiences of lifestyle change during and after the intervention to prevent type 2 diabetes.</p> <p>Study design: Focus groups from sample of intervention</p> <p>Funding: Academy of Finland and the Social Insurance Institution of Finland.</p> <p>Quality:++</p>	<p>Number of participants: 30 interviewed</p> <p>Mean Age: 59</p> <p>Gender: 17 female; 13 male</p> <p>Other:</p> <p>Weight: mean weight at the beginning of the GOAL intervention was 91 kg among the interviewed weight-reducers [mean body mass index (BMI), 31.1] and 87 kg among the interviewed weight-gainers (mean BMI, 32.6). At the 1-year control the mean weight was 84 kg among the weight-reducers (mean BMI, 28.8) and 91 kg among the weight-gainers (mean BMI, 34.0).</p> <p>SES: eight blue-collar</p>	<p>Research Question: participants' accounts on their experiences of lifestyle change during and after the intervention to prevent type 2 diabetes.</p> <p>Intervention aims and content if applicable:</p> <p>A total of 216 persons participated in 20 GOAL intervention groups in spring 2003. Targeted persons aged 50–65 years at moderate risk for type 2 diabetes ; Finland.</p> <p>Recruited at primary health care centres during appointments with public health nurses.</p> <p>Intervention participants had been measured at the beginning of the intervention and 1 year after the first intervention session.</p> <p>The specific lifestyle objectives in the intervention programme were diet modification and exercise. The programme included six counselling sessions over 8 months.</p> <p>Personal goals were selected together with concrete step-by-step action plans. Further planning, initiation of novel behaviours, maintenance and lapse management were tackled.</p>	<p>Main Themes relevant to research question:</p> <p>Hopelessness repertoire was mainly used among the weight-gainers. Here, changing one's behaviour was seen as very difficult, even impossible. Individuals are seen as somehow stuck with or habituated in a certain kind of lifestyle.</p> <p>Hopelessness repertoire was sometimes associated with accounts on negative experiences of pursuing a healthy lifestyle and even accounts on relief when the weight management efforts were disrupted.</p> <p>Very few interviewees used predominantly the hopelessness repertoire. Instead, it was often accompanied with another repertoire bringing up a more hopeful view to lifestyle change, the struggle repertoire. This is characterizes the struggle repertoire commonly used especially by the weight-gainers, but also among weight-lossers: the person is presented to be aware of the principles of a healthy lifestyle, several concrete lifestyle changes are described but the new lifestyle is not being followed to the extent the intervention participant would have wanted.</p> <p>old habits interfere with her new habits and she has to constantly struggle against the temptation to eat more.</p> <p>Individual stories described abnormal situations where one could not help slipping into unhealthy habits.</p> <p>The use of self-control in the battle against lapses and temptation characterizes the struggle repertoire. This distinguished it from the hopelessness repertoire where the individual is to a greater extent dependent on formal external control.</p>	

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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	<p>employees, eight lower white-collar employees, eight upper white-collar employees, two farmers and one was an entrepreneur (three had not provided information).</p>	<p>Data collection methods: three weight-reducers' interview groups (5 women, 10 men) and three weight-gainers' interview groups (12 women, 3 men) were formed</p> <p>Data Analysis: Discourse analysis with an emphasis of talk as social practice and then later examined as 'interpretative repertoire' from discourse analysis.</p>	<p>An individual is presented as both a responsible actor who is able to govern one's behaviour, and as an irresponsible actor who tries to escape one's responsibilities and hence, who has to be manipulated.</p> <p>Interviewees brought up examples of external controls that served as tools in the struggle against lapses and fade-out of new healthy habits.</p> <p>Relatives were one source of external control, pushing the interviewees to physical activity. One form of external control was the GOAL intervention group</p> <p>The majority of our interviewees considered check-ups at the health care centre to be vital for weight management and maintenance of healthy habits. The knowledge of formal measurement in the near future was expected to encourage one to push oneself.</p> <p>In the struggle repertoire, an individual was seen as in a constant battle against enemies outside oneself – external temptations – and enemy within – one's weakness.</p> <p>Among weight-losers, a more peaceful repertoire, the self-governing individual repertoire, was also used describing at least an occasional ease of lifestyle change.</p> <p>The self-governing individual repertoire was used by weight-losers to describe new eating and physical exercise habits that were not the result of endless struggle but had to a great extent become a routine. It was associated with descriptions of self-responsibility and self-control that were concretized in planning of content, magnitude and duration of eating special treats. Treats are not forbidden, but their consumption is more controlled and planned than in the struggle repertoire</p> <p>Individual responsibility and autonomy from external controllers are exemplified in interviewees' accounts on their willingness to exercise alone, independently of others' timetables. Hence, individual is not seen as in need of someone to push in order to be physically active.</p> <p>An individual has a strong internal motivation for lifestyle change, seen as fundamentally responsible for one's lifestyle and health and may apply instructions, but is not dependant on external supervision.</p>	

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>Author: Korkiakangas <i>et al</i></p> <p>Year: 2011</p> <p>Setting / country: Oulu, Finland</p> <p>Aim of study: to describe the motivators and barriers to physical activity among individuals with high risk of type 2 diabetes who participated in a substudy of the Finnish Diabetes Prevention Study in Oulu and to consider whether the motivators or barriers changed during the follow-up from 2003 to 2008.</p> <p>Study design: part of RCT, questionnaire open ended questions</p> <p>Funding: Tyyni Tani Foundation and Oulu University Scholarship Foundation.</p> <p>Quality:</p>	<p>Number of participants: in the first follow-up in 2003 63 participants answered the questionnaire (n = 93), and in the second follow-up in 2008 altogether 71 participants answered the questionnaire (n = 82).</p> <p>Mean Age: NR</p> <p>Gender: 2003= 40% men; 2008 33% men completed the questionnaire</p> <p>Other:</p>	<p>Research Question: what are the barriers to physical activity?</p> <p>Intervention aims and content if applicable:</p> <p>The participants were recruited from a population based cohort study population, where each person born in 1935 and living in the city of Oulu was invited at the age of 55 years to take part in multi-factorial health examination including clinical and laboratory measurements.</p> <p>101 participants, 63 men and 38 women were randomised to an intervention group (n = 50) and a control group (51).</p> <p>Intervention group participants were given advice to increase their physical activity (up to at least 30 min per day). They were offered, free of charge, supervised individually tailored training sessions during 4 years (1998–2001).</p> <p>Each participant took part in training sessions approximately 33 times per year during the intervention</p> <p>Participants in the control group were only given basic information about health behaviour.</p> <p>During post-intervention follow-up, all participants visited the study nurse yearly, but were given no specific diet or exercise counselling.</p> <p>Completion rate: 87% in 2008; 68% 2003</p> <p>The number of participants decreased during</p>	<p>Main Themes relevant to research question:</p> <p>Motivators: 'quality of life' was motivator for physical activity.</p> <p>The motivation of physical activity consists of motives that describe the significance of physical activity to wellbeing. Among the participants wellbeing included physical fitness and functional ability, health, mental health and resources and a positive content of life, way of life and quality of life. Physical fitness as well as observations of its deterioration motivated people to exercise, because maintenance of physical fitness was considered important.</p> <p>maintenance of mobility and functional ability in the years ahead motivated participants to exercise, so that they could remain independent and cope at home as long as possible despite getting older.</p> <p>Peer support and participation in the Finnish Diabetes Prevention Study motivated to exercise.</p> <p>People were motivated to exercise by the following: health maintenance, weight control, disease prevention and alleviation of disease symptoms and problems through exercise.</p> <p>Motivators to physical activity also included enjoyment of exercise, feel good, wellbeing and better mental health.</p> <p>Barriers: The participants experienced a few barriers to regular physical activity, clearly fewer compared to motivators to physical activity.</p> <p>Barriers to regular physical activity included health problems, weather and season, other hobbies and duties, lack of time and laziness.</p> <p>Some participants (22%) did not experience any barriers to regular physical activity in 2003 (n = 15), and in 2008 there were even more participants (25%) who did not experience any barriers to regular physical activity at all (n = 18).</p> <p>Changes from first survey:</p>	<p>Limitations identified by author: the results may not be applied generally to population with high risk of T2D because of the small sample size. Sample might know more about T2D since they were part of the trial.</p> <p>Evidence gaps and/or recommendations for future research: NR</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

Study details	Population and setting	Methods	Findings	Notes
		<p>follow-up because of death or refusing to take part in follow-up of the Finnish Diabetes Prevention Study.</p> <p>Data collection methods: Participants filled in questionnaires concerning their exercise level; questionnaires about motivators and barriers to taking part in physical activity were obtained by post in the year 2003, and filled again at a follow-up visit with the study nurse in 2008.</p> <p>Data Analysis: inductive content analysis.</p>	<p>The participants experienced more motivators to physical activity in 2003.</p> <p>However, the barriers decreased in 2008, and the number of persons who did not experience any barriers increased from 2003 to 2008.</p> <p>Other motivators and barriers were similar in both intervention and control groups at both questionnaires in 2003 and 2008.</p>	
<p>Author: Penn <i>et al.</i></p> <p>Year: 2008</p> <p>Setting / country: Newcastle-upon-Tyne, UK</p> <p>Aim of study: to understand the experience of participants who maintained behaviour change, in order to inform future interventions</p> <p>Study design: Qualitative</p> <p>Funding: The European Diabetes Prevention Study in Newcastle was funded by the Wellcome Trust.</p>	<p>Number of participants: 15</p> <p>Mean Age: 64</p> <p>Gender: 7 female, 8 male</p> <p>Other: 8 out of the 15 were part of the original intervention. 7 were from control</p> <p>10 married/cohabiting</p> <p>Many participants had pre-existing physical conditions, such as arthritis and hypertension</p> <p>All were overweight or obese (BMI \geq 25 kgm⁻²) at the start of the trial.</p>	<p>Research Question: understanding behaviour change for future trials.</p> <p>Intervention aims and content if applicable: Qualitative study embedded within the EDIPS RCT in Newcastle upon Tyne to explore the maintenance of behaviour change with a view to informing and improving intervention design.</p> <p>The EDIPS trial intervention was based on individual motivational interviewing</p> <p>Data collection methods: Purposively sampled, according to success criteria for diet and physical activity change maintenance, and invited to attend individual semi-structured interviews. 15 completed an interview and reflected on their experience over three to five years. Sampled across original intervention study and control.</p> <p>Data Analysis: Framework method to analyse the transcribed data. data were further analysed using an empirical phenomenology approach</p>	<p>Outcomes:</p> <p>Main Themes relevant to research question:</p> <p>1.) Barriers</p> <p>Individual physical The occurrence of setbacks, such as deteriorating physical condition or injury, was mentioned by many participants. Where people were struggling to maintain changes in difficult situations, setbacks were particularly unwelcome. The added burden could have led to any progress made being abandoned. Some participants had had medication for co-morbidities which caused problems,</p> <p>Individual psychological This was a major theme and the successful participants still had problems. Too much or the wrong type of food was a temptation, exercise seemed like a lot of effort and a previous bad experience or lack of ability was a deterrent.</p> <p>In some cases they became resigned to deteriorating health. If they compared themselves with someone who seemed to have had no regard for their own health, but nevertheless managed to stay slim and healthy, it seemed unfair that they were burdened with problems. Sometimes they were disheartened and struggled to maintain the effort.</p>	<p>Limitations identified by author: The findings are based on a relatively small sample, caution must be exercised in generalising the findings beyond the study group.</p> <p>Evidence gaps and/or recommendations for future research: There is the opportunity to analyse the EDIPS trial data in further research investigating the utility of individual percentage beneficial change as an intervention target.</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>Quality: ++</p>		<p>which is about studying consciousness as it is experienced and trying to understand another person's subjective world as it is for that person.</p>	<p>Some referred to media information, which might be an advertisement and thus considered untrustworthy, or to previous problems and confusion with mixed messages.</p> <p>Social Many of the participants referred to the demands of their work and social situations. A number had caring responsibilities. The nature of caring responsibilities means that the demands vary and where the condition of the people.</p> <p>Some people mentioned work issues and explained how work stress made change difficult whilst others referred to social relationships that hindered their ability to maintain lifestyle changes.</p> <p>There was some criticism of unhelpful or insensitive advice given by GPs.</p> <p>Most of the people interviewed were retired and had time to devote to improving their lifestyle, but they were doubtful about the possibility of achieving behaviour change alongside work.</p> <p>Social occasions, such as Christmas festivities or parties and the associated food sometimes presented challenges.</p> <p>Environment Some participants expressed concern about facilities (i.e. opening hours of swimming or getting there).</p> <p>One respondent discouraged from walking by a bad experience in her locality.</p> <p>Cost was a consideration for many. Even though the most common exercise of choice was walking there were still cost considerations (i.e. walking shoes).</p> <p>The weather and seasons were regularly mentioned. Walking is often the cheapest and best exercise option, but poor weather can be a deterrent, especially for older people.</p> <p>2.) Facilitators Individual physical</p>	

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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			<p>Biological feedback, feeling better or feeling fitter after accomplishing changes, supported change maintenance.</p> <p>Being able to get the right professional help was also a facilitator. Also, timely medication to help cope with a setback was important, especially where people had made the effort to change and this was being undermined by a temporary problem.</p> <p>Individual psychological In general the tone of the interviews was positive. Problems were often cited to explain how they were able to overcome difficulties and develop strategies. For example where food was a temptation they might choose not to buy it. Self efficacy was a theme which was expected from the literature and some participants expressed this clearly and directly.</p> <p>Previous success contributed to self efficacy and some people had already started to make diet changes previous to joining the EDIPS trial. For some talking to and encouraging themselves was important.</p> <p>Some had routines, such as an afternoon walk which they felt good about completing or rules for themselves about portion size which they were pleased to achieve. Some were clearly orientated to goals and others expressed a more general desire to stay on track or avoid ill health.</p> <p>Many mentioned the time it took, usually about two years, to absorb the changes and routines into their lifestyles. Enjoyment of a new lifestyle, feeling pleased and rewarding themselves for maintaining a beneficial change was a strong theme. Many mentioned the satisfaction of achieving a goal, They took pride in staying on track. It was clear that in many cases the changes had become a way of life.</p> <p>The ways in which people monitored themselves, and gave themselves permission to deviate from the norm for special occasions or made allowances for changing burdensome circumstances were recurrent themes within the data. Most people set themselves rules or routines with allowances. This emphasised the ongoing nature of change maintenance and the quite complex systems people used to maintain an equilibrium or balance between best practice and realistically achievable changes.</p>	

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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			<p>Many mentioned the impact of the original diagnosis of IGT as a motivating factor. Even after some years, the shock of finding out was still with them and they were usually able to recall a cautionary tale of a friend or relative, who had diabetes.</p> <p>Social Many referred to social relationships which helped in making and maintaining change Sometimes the new regime would be keenly adopted.</p> <p>There was appreciation of the individual professional support and the way in which this had helped them to develop self regulation strategies. Intervention group participants appreciated the motivational interviewing process.</p> <p>The timescale for professional support reflected the time needed to absorb lifestyle change and the timeliness of the intervention in relation to life course was a strong theme.</p> <p>The trial monitoring was sometimes expressed explicitly as a motivating factor that contributed to maintaining lifestyle change.</p> <p>The control group only attend once a year for their review, but monitoring may contribute to control group success. This was an important finding in this study.</p> <p>Quite often participants would refer with pleasure to ways in which their lifestyle changes influenced people around them. i.e. grandchildren would eat fruit; or a friend/partner exercising)</p> <p>Environment A stimulating environment, ['walks along the coast'] and good facilities, encouraged exercise. Cost issues were mentioned (free bus passes to get places for healthy lifestyle).</p> <p>There was appreciation of the individual professional support and the way in which this had helped them to develop self regulation strategies. Intervention group participants appreciated the motivational interviewing process.</p>	
<p>Author: Santana <i>et al.</i></p>	<p>Number of participants: 27</p>	<p>Research Question: What are the key aspects of the CHC micro-system that</p>		

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>Year: 2010</p> <p>Setting / country: Community-health centre (CHC) in a mid-sized urban city in the USA</p> <p>Aim of study: To explore key aspects of the CHC microsystem that impacted the implementation and integration of this new initiative into clinical activities</p> <p>Study design:</p> <p>Case study</p> <p>Funding: Robert Wood Johnson Foundation, Clinical Scholars Program.</p> <p>Quality:+</p>	<p>administrators, clinicians and staff of a community-health centre implementing a Diabetes Prevention Initiative (DPI)</p> <p>Mean Age: Not applicable</p> <p>Gender: Not reported</p> <p>Other: Specialities included Family Medicine, Adult Medicine, Paediatric Medicine, Midwifery</p>	<p>impacted the implementation and integration of the intervention?</p> <p>Intervention aims and content if applicable:</p> <p>Components of the Diabetes Prevention Programme: randomised controlled Trial</p> <p>Adults at increased risk for diabetes based on BMI and impaired glucose tolerance</p> <p>Intensive individual intervention using lifestyle coaches with goal of 7% weight loss from baseline and 150 min/week of physical activity</p> <p>58% reduction in incidence of diabetes (vs 31% for group on metformin)</p> <p>Components of Diabetes Prevention Initiative: implementation at community-health centre</p> <p>Similar screening criteria but applied only to Hispanic women</p> <p>Risk factor assessment performed from a patient registry or by providers</p> <p>Glucose tolerance testing performed by the Diabetes Prevention Initiative planning team</p> <p>If the glucose test confirmed impaired tolerance or diabetes, subjects and their entire household were invited to a 12-week family-focused programme to improve nutrition and increase exercise</p> <p>Data collection methods: An interview</p>		

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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		<p>guide with broad 'grand tour' questions and probes was used to elicit participants' perceptions of whether and how microsystem characteristics would influence the DPI implementation process. The interview guide evolved as data collection progressed. In-person interviews were performed individually by one of two trained interviewers (physician and social worker) at the CHC and were approximately 1 h in length. Interviews were digitally recorded and professionally transcribed.</p> <p>Data Analysis: A constant comparative method, which is a systematic data-coding and analysis process was used. The authors' implemented several strategies to enhance credibility of their findings: maintenance of an audit trail to document analytic decisions, participant confirmation and a multidisciplinary research team. For participant confirmation, the author's presented findings to CHC administrators and then to providers and staff in separate meetings, and asked whether these findings represented a reasonable account of their experience. Discussions revealed no discordant views, and all endorsed the findings. Atlas software (version 5.2.9, Scientific Software Development GmbH, Berlin) was used to facilitate data organisation and retrieval.</p>		
<p>Author: Satterfield <i>et al.</i></p> <p>Year: 2003</p> <p>Setting / country: USA</p> <p>Aim of study: to understand views</p>	<p>Number of participants: 235 participants in 27 focus groups</p> <p>Mean Age: NR</p> <p>Gender: 116 male 119 female</p>	<p>Research Question: what attitudes about diabetes impact on lifestyle interventions?</p> <p>Intervention aims and content if applicable: NA</p> <p>Data collection methods: focus groups with community members at risk and community stakeholders</p>	<p>Main Themes relevant to research question:</p> <p>Attributions of diabetes- participants identified causes of diabetes:</p> <ul style="list-style-type: none"> ▪ Lack of physical activity ▪ Poor eating habits and obesity- 'American lifestyle' ▪ Family history of diabetes ▪ American lifestyle- fast paced, convenience based ▪ Stress- constraints in today's world 	<p>Limitations identified by author: NR</p> <p>Evidence gaps and/or recommendations for future research: More information on the threat of diabetes.</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>about diabetes prevention</p> <p>Study design: qualitative, focus groups</p> <p>Funding: Westat</p> <p>Quality: +</p>	<p>Other: 61 community members, remaining sample (n=174) people at risk from ethnic backgrounds</p>	<p>Data Analysis: inductive approach, code verified</p>	<p>Awareness of the potential for preventing diabetes as a motivator:</p> <ul style="list-style-type: none"> ▪ Realistic fear can play a role- seeing family suffer with diabetes ▪ Rewards connected to meaning- being there for family, feeling better ▪ Social support is important- social bonding, commitment to being healthy with support from others ▪ Cultural values- new habits to be consistent with historical and cultural values. Returning to healthier native foods ▪ Children- taught early to be healthy <p>Barriers to change:</p> <ul style="list-style-type: none"> ▪ Time- lack of time, busy schedules, working, time to create healthy meals ▪ Lifestyle- sedentary behaviour and entertainment, (TV, computer) fast food ▪ Cost- good food is expensive. Preparing two meals since some family members won't eat healthy ▪ Support- some families/people lack support ▪ Environment- can act as a constraint 'drive, don't walk', community designs ▪ Awareness- some people are not aware of how diabetes can be prevented or how dangerous it can be ▪ Priority- some community have other issues more important/urgent than diabetes so it is not on the agenda and people are not made aware of it. 	
<p>Author: Troughton <i>et al.</i></p> <p>Year: 2008</p> <p>Setting / country: Midlands, UK</p> <p>Aim of study to inform the development of an educational intervention for people with pre-diabetes in the UK by seeking patient views, experience with health system</p>	<p>Number of participants: 15 participants from original study cohort with pre-diabetes from the community (Midlands, UK) as part of a screening programme</p> <p>Mean Age: 59.6 years (S.D. 11.7)</p> <p>Gender: 53% male, 47% female</p> <p>Other: 5 participants had been diagnosed</p>	<p>Research Question: to provided insight into the condition of pre-diabetes</p> <p>Data collection methods: semi-structured interviews and data validations with subsample</p> <p>Sampling of participants from an existing database in Leicestershire, UK, of those previously diagnosed with pre-diabetes as part of an existing diabetes screening programme</p> <p>Participants had one or more of the following risk factors for diabetes: a BMI > 30 kg/ m2, family history of diabetes, history of gestational diabetes or history of cardiovascular disease. The database held</p>	<p>Main Themes relevant to research question:</p> <p>Identity. For most (n = 10), pre-diabetes was seen as a grey area, which led to uncertainty about the meaning of pre-diabetes, and the seriousness of the condition.</p> <p>Uncertainty about the seriousness of pre-diabetes was a strong theme throughout all of the interviews. These views were influenced by a variety of factors; prior experience of diabetes and pre-diabetes, knowledge of pre-diabetes, receiving the results, perceptions of responsibilities, lack of planned follow up and healthcare professional beliefs</p> <p>For many (n = 8) identifying that they had a diagnosis of pre-diabetes was made more difficult and confusing by being free of symptoms.</p> <p>Causes. Although most (n = 13) participants could give reasons why a person might develop pre-diabetes, many (n = 8) participants struggled</p>	<p>Limitations identified by author:</p> <p>no claim is made regarding the transferability and dependability of our findings as representing all those diagnosed with pre-diabetes, and wider consultation is undoubtedly required.</p> <p>Evidence gaps and/or recommendations for future research:</p> <p>Authors provide several practical actions for the</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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<p>Study design: Qualitative</p> <p>Funding: University Hospitals of Leicester NHS Trust Research Fellowship award</p> <p>Quality: ++</p>	<p>between 6 and 9 months 60% were White European and 40% were South Asian .This sample representative of the initial screened cohort diagnosed with pre-diabetes. Thirteen patients were diagnosed with IGT and two with IFG.</p>	<p>details of 136 people with pre-diabetes.</p> <p>Data Analysis: framework approach</p>	<p>to see why it had affected them.</p> <p>Taking action: During the interviews all participants (n = 15) reflected on their diagnosis and how they dealt with it. Whether to act on the diagnosis of pre-diabetes or not was influenced by many factors; uncertainty about preventative action, lack of planned follow up, written information and support.</p> <p>Uncertainty about preventative action: Most respondents (n = 10) expressed concerns about how to take preventative action and were uncertain what to do This lack of knowledge was, for some, accompanied by explicit cost–benefit analyses and a concern around legitimacy of lifestyle change, its magnitude and efficacy.</p> <p>What more can I do? A few (n = 2) respondents (both Asian) passively sought solution in medication. Some (n = 5) respondents believed that they were already judicious in their self-care that they already had made reasonable lifestyle changes and did not understand what further changes they could make.</p> <p>Support: All (n = 15) participants would have liked to have been seen a healthcare professional shortly after diagnosis. Throughout interviews were pleas for support to deal with the diagnosis, and more particularly the consequences of anxieties and behaviour change. Most participants (n = 12) reported discussing their diagnosis with friends and family who themselves had diabetes, perceiving this to be a valuable source of factual material.</p> <p>A few (n = 3) participants, particularly those who actively sought information on pre-diabetes, were convinced that there should be a specialist support service available for people with pre-diabetes comparable to other areas of care.</p> <p>Many participants (n = 7) could see the benefits of attending group education.</p> <p>Information: Respondents also noted the need for consistent information and coherent support from their health providers.</p> <p>Tests: Most (n = 13) participants expressed a wish for structured information and regular, responsive contact with a healthcare</p>	<p>management of pre-diabetes, but not information on future research.</p>

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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			<p>professional to help make lifestyle changes.</p> <p>All participants placed high value on a repeat test for pre-diabetes which would reassure them they were on the right tracks regarding the lifestyle changes made</p>	
<p>Author: Williams</p> <p>Year: 2004</p> <p>Setting / country: UK: One local health board area in Wales</p> <p>Aim of study: To explore the views of general practitioners and practice nurses about the detection and management of people at risk of developing type 2 diabetes.</p> <p>Study design: Qualitative: Focus Groups</p> <p>Funding: GlaxoSmithKline supported the study by meeting the hospitality costs and the practice honoraria.</p> <p>Quality: ++</p>	<p>Number of participants: Twenty-two practices accepted the invitation, and, of these, 21 (51%) practices were represented at the sessions. The three sessions were attended by 21 GPs and 22 nurses. The first session involved 15 people (8 GPs and 7 practice nurses), the second 21 and the third 7. Practice nurses attended the same focus groups as the doctors with whom they worked.</p>	<p>Research Question: What do GPs and practice nurses know about the detection of people who are at risk of developing type 2 diabetes? What sort of guidance (if any) do they need about the management, in their practices, of these individuals, particularly those with impaired glucose tolerance and impaired fasting glycaemia, and how should this guidance be prepared and disseminated? What resources and support would they need to be able to play their part in the primary prevention of type 2 diabetes?</p> <p>Intervention aims and content if applicable: NA</p> <p>Data collection methods: Three hour-long focus groups held at local venues. Practices were offered remuneration of £100 for attending. Focus groups facilitated by three research team members. Two members gave a brief introduction to the topic. Participants were reminded that recently published randomized controlled trials had demonstrated that interventions had shown that progression to type 2 diabetes could be prevented or at least delayed. The lead facilitator directed questions and prompted for responses where necessary.</p> <p>Data Analysis: Data recorded, transcribed and anonymised. Content analysis framework.</p>	<p>Main Themes relevant to research question Primary care was regarded as a 'treatment' and not a 'screening' service. Required resources were not available for these additional activities: Concern that primary care would be abandoning its generalist role, with increasing emphasis on specialisation. Tension between wishing to remain generalists and the pressure to become primary care specialists in diabetes. <i>Detection of those at high risk' and 'primary care activities.</i> Two closely inter-related themes. 'Pessimistic' views of primary care activities in relation to the detection of those at risk and 'Optimistic' view. Pessimism related to the existing workload in managing those who already have diabetes: Frustration and anger expressed that primary care not appropriate for the detection and management of those at risk of developing type 2 diabetes. 'Optimistic' view (held by a minority): this was a problem that primary care should tackle, though with adequate resource. 'Optimistic' attitude was tempered with concern about insufficient resources available to accomplish these activities and that, once identified, individuals would 'invariably' develop diabetes. <i>'Patient factors'</i>. Sympathetic but cynical attitude to the perception of low motivation of patients to modify lifestyle behaviour, especially in relation to weight management. Motivating asymptomatic patients was seen as particularly difficult. It was also observed that, although intense interventions in randomised controlled trials had been shown to be effective, there was no evidence to support this in relation to interventions delivered through primary care: <i>'Responsibility for prevention'</i>. The majority opinion was that impaired glucose tolerance and impaired fasting glycaemia should not be 'medicalised' and that they were social, rather than medical problems. <i>'It [asking primary care to take on the identification and management of patients with impaired glucose tolerance and impaired fasting glycaemia] almost medicalises something which actually is a social</i></p>	

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			<p><i>problem.</i> (Focus group 1, nurse 10.)</p> <p><i>'These people [those with impaired glucose tolerance and impaired fasting glycaemia] are not ill. Should we make them ill?'</i> (Focus group 1, GP 15.)</p> <p>Moreover, the primary prevention of type 2 diabetes was the responsibility of individuals and agencies other than primary care — indeed, of agencies outside the health sector:</p> <p><i>'I also think they [the patients] have responsibility, maybe it is the government's responsibility.'</i> (Focus group 2, nurse 6.)</p> <p><i>'These issues should be dealt with through education and political pressure.'</i> (Focus group 2, GP 21.)</p> <p><i>'Schools. Education in schools is a huge, huge part of it.'</i> (Focus group 1, GP 9.)</p> <p><i>'What used to happen in schools — you used to get the school meals ... [with] veg and something else and some fruit and they had playing fields — they used to go running around and do gym and PE and kids were safe to walk to school. What has happened [is] they've sold off all the ... playing fields, give them a ... lunch. It's all chips and pizza and this. They are not safe to walk to school because there are enough idiots around trying to do things to them and they [children] are getting fatter and fatter and fatter.'</i> (Focus group 1, GP 15.)</p>	
<p>Author: Wylie</p> <p>Year: 2002</p> <p>Setting / country: UK: General practices in Derwentside, Sunderland West, South Tyneside, and</p>	<p>Number of participants: 26 general practitioners (18 men, 8 women) in four focus groups (three groups of seven participants and one group of five participants). Eight participants (six men, two women) in the semi-structured</p>	<p>Research Question:</p> <p>Intervention aims and content if applicable: NA</p> <p>Data collection methods: Stratified random sampling (to give a representative male:female ratio from each primary care group) to recruit participants for the focus groups. Two focus groups were held in district general hospital post-graduate centres, one</p>	<p>Main Themes relevant to research question:</p> <p>Before participants received evidence based presentation on impaired glucose tolerance</p> <p>Low awareness of the prevalence and clinical significance of impaired glucose tolerance</p> <p><i>"I would have no idea . . . I mean, as I say I think . . . I doubt if we have very many that have been formally identified" (INT1)</i></p> <p><i>"Perhaps 2%?" (INT8)</i></p> <p><i>" . . . probably a lot of our colleagues are pretty ignorant about the implications of impaired glucose tolerance" (FG3f)</i></p> <p>Uncertainty about managing patients with impaired glucose tolerance</p>	

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<p>Gateshead West and Central Primary Care Groups.</p> <p>Aim of study: To investigate general practitioners' knowledge of and attitudes to impaired glucose tolerance.</p> <p>Study design: Mixed methodology qualitative and quantitative study with semi-structured interviews, focus groups, and questionnaires.</p> <p>Funding: Northern and Yorkshire Regional Health Authority, through a research training fellowship awarded to GW.</p> <p>Quality: ++</p>	<p>interviews.</p> <p>Mean Age: Focus Groups: 44(range 30-58) years Interviews: 41 (31-46) years</p> <p>Gender:</p> <p>Other: Focus groups: Mean of 11 (1-27) years' experience in general practice. Participants received an honorarium of £50.00. Interviews: All were principals, with an average of 12 (4-24) years' experience in general practice. Participants received an honorarium of £25.00.</p>	<p>in a general practitioner surgery, and one in the Centre for Health Studies, Durham University. The average duration of focus groups was 75 minutes, and interviews had an average duration of 35 minutes. Before each focus group, participants completed a questionnaire designed to evaluate their knowledge of the clinical significance and prevalence of impaired glucose tolerance. Their responses were then explored in the focus group discussion. The lead investigator then gave a short presentation, based on a review of the literature, on the anticipated rise in prevalence of type 2 diabetes, together with the clinical significance, prevalence, and management of impaired glucose tolerance. Further focus group discussion centred around participants' attitudes to impaired glucose tolerance in the light of what, for most of them, was new knowledge. A similar approach was taken with the semi-structured interviews, administering the questionnaire verbally and following this with open ended questions concerning knowledge of the clinical significance and prevalence of impaired glucose tolerance. A short presentation was given as above, and used subsequent open ended questions to explore attitudes to and perceptions of the detection and management of impaired glucose tolerance.</p> <p>Data Analysis: "Pragmatic variant" grounded theory approach to analyse the data by generating categories and themes. Data were coded independently to increase the reliability of the study. Iterative approach to data analysis, with analysis beginning after the first focus groups and interviews, to allow emerging</p>	<p><i>"There's the book of guidelines; is there one [a guideline for management of patients with impaired glucose tolerance] in there?" (INT5)</i> <i>"I must say, we don't repeat their glucose tolerance test . . . they might get a sugar level done" (FG2c)</i> <i>"I don't honestly have a . . . a . . . plan for what we would do" (INT1)</i> Support for a guideline for managing impaired glucose tolerance <i>"Of course, it would be excellent if we had a guideline to follow" (FG1g)</i> <i>"Yeah, I think the more that you have guidelines the more that actually these sort of things can be passed over to the nurses and to people who are actually probably much better than we are at monitoring these things" (FG1e)</i> <i>"There should be guidelines for us to have . . . and a greater ability to follow so that those patients who come up that we think we can succeed with . . . we can have a proper plan of action" (FG4f)</i></p> <p>After participants received evidence based presentation on impaired glucose tolerance Fear of being overwhelmed by the workload involved in screening and managing patients with impaired glucose tolerance <i>"I think we all probably fight shy of diagnosing too many people with impaired glucose tolerance, I mean, I'm sure we all do it. I mean, I occasionally get people who've had a borderline high sugar and it gets passed to the nurse for dietary intervention . . . they don't all have a glucose tolerance test; the reason for that is it involves a whole lot of workload" FG3c)</i> <i>"So there's a resistance from the profession because of the workload implications, is that what you're saying?" "Yes, basically" (FG2d)</i> <i>"Who wants to find someone you've got to treat and measure their blood every so often?" (FG3d)</i> Concern that widespread screening and management of patients with impaired glucose tolerance would be impossible without extra resources <i>"The practices simply can't be taking all the load. I think there are huge resource implications for the practices involved. Certainly there is a huge disincentive at the moment for me to find any more patients because I can't afford to treat them" (FG1a)</i> <i>"But our role shouldn't be to intervene unless we've got the resources to do it . . . we've done that before, and we just pay lip service to it" (FG4b)</i> <i>"It would be very difficult with the present staffing . . . I think it would be</i></p>	

Preventing the progression of pre-diabetes to type 2 diabetes in adults. Views, barriers and facilitators affecting the implementation and effectiveness of interventions to assess the risk of progression to diabetes and the implementation of preventive interventions and behavior change.

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		<p>themes to be explored in subsequent interviews. The coders agreed that no new themes were emerging after four focus groups and eight semi-structured interviews, and saturation was achieved.</p>	<p><i>very difficult. We would have to have additional resources to do it"</i> (INT2)</p> <p>Concern at diverting finite resources from other clinical areas <i>" . . . why should we be doing that when we haven't even . . . when we're not even treating the ones that have got it [type 2 diabetes] properly yet?"</i> INT6) <i>"Fine, yes, in theory [we could screen for impaired glucose tolerance], but we haven't only even got diabetes to look after . . . but you've got so many things to look after and outside issues as well, so where does it stop?"</i> (FG1e) <i>" [I wonder] where the money's going to come from to perhaps employ new staff and that sort of thing. There are barriers on a health authority scale—it's going to be, it might mean a shift of resource towards one thing rather than something else"</i> (INT8)</p> <p>Pessimism regarding the effectiveness of lifestyle intervention <i>" . . . we have diabetics who . . . who just totally ignore the advice you give them, and I think going further back than that and giving them advice when they haven't got diabetes as such is going to be very difficult"</i> (INT4) <i>"Around here, I just wonder how effective lifestyle advice is going to be"</i> (INT6) <i>" . . . trying to persuade them [patients with type 2 diabetes] to make any changes at all in their behaviour just makes my heart plummet . . . the initiative [giving lifestyle advice to patients with impaired glucose tolerance] coming from us, I think, is doomed to failure</i> (FG3e)</p> <p>Positive attitudes towards pharmacological intervention in patients with impaired glucose tolerance <i>"Well, even that [lifestyle intervention] is a tall order for a lot of them. I just feel as though, if you're going to do this, you've really got to put them on metformin. I mean that's what's happened with our [CHD patients] . . . I mean we started off with exercise, diet and that kind of thing, stopping smoking, and now, I mean we've substituted that with statins, atenolol, and lisinopril . . . I think it shouldn't be too expensive; metformin presumably is a comparatively cheap drug"</i> (FG2c) <i>"More than happy, I mean we . . . we're starting to come on board with this as a group . . . a high risk group that . . . um . . . sort of an aggressive treatment is the only way to possibly, to make any difference. So yes, I would be happy to prescribe"</i> (INT7) <i>"I think if I had impaired glucose tolerance I would take the metformin to delay the diabetes"</i> (FG4g)</p> <p>Uncertainty regarding the role of general practitioners in detecting and treating impaired glucose tolerance</p>	

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			<p><i>"I think it's our job to educate people and give them the information and let them make the choice. I think the people who are motivated, who are in control of their own lives, will take that advice and act on it and then the rest of the people will just carry on until something bad happens"</i> (FG2d)</p> <p><i>"I think we've got a role in that [detecting and lifestyle intervention for impaired glucose tolerance] to some degree, but I don't think it's educating everybody in town and sort of leading their lives for them"</i> (FG1f)</p> <p><i>"But that's not my job, you know; I'm a GP and I'm actually there probably not to do a lot of prevention but to actually do a little bit of tinkering with the people already ill"</i> (FG4f)</p> <p>Concern that screening and treating impaired glucose tolerance medicalises an essentially social problem</p> <p><i>"It's a society cop out; we're always trying to medicalise things, and it's the same as, you know, I think, the current vogue for medicalising teenage pregnancy . . . and underage smoking and everything else"</i> (INT5)</p> <p><i>". . . these [preventing chronic disease] are all kind of social things, and throughout history what we have to accept, as doctors, is that we have a very minimal impact on the health of society"</i> (FG4f)</p> <p><i>"I think it's on a bigger scale than us having to prevent it [type 2 diabetes] right at the end of the line. It's like us preventing suicides when there's unemployment and stress"</i> (FG3e)</p> <p>Positive attitudes towards a health educational approach</p> <p><i>"I think improvements could be made with people with glucose tolerance if they are educated about glucose intolerance at school; if they could have fruit at school instead of hamburgers and chips they probably . . . and therefore the change has to start from school up and the responsibility of educating I think should be put on to schools"</i> (FG1a)</p> <p><i>"If all schools had free fruit and free healthy living, free exercise . . . then in 20-30 years' time I suspect the impact of that would be enormous"</i> (FG4d)</p> <p><i>"I think health promotion must have a huge responsibility—they have a huge budget . . . I mean, hundreds of thousands of pounds go into health promotion. Why can't they organise themselves and, if needs be, set up opportunistic screening at supermarkets . . . to prevent people coming out with the wrong things in their baskets"</i> (FG1g)</p>	