NICE National Institute for Health and Care Excellence

Appendix A2: Summary of evidence from surveillance

2018 surveillance of Type 2 diabetes: prevention in people at high risk (2012) NICE guideline PH38

Summary of evidence from surveillance

Studies identified in searches are summarised from the information presented in their abstracts. Full texts are consulted in specific circumstances, for example if the full text is necessary to make a definitive statement about the impact of the study on current recommendations. For this surveillance review we looked for new evidence relating to the whole guideline.

Feedback from topic experts who advised us on the approach to this surveillance review, and from stakeholders if public consultation was conducted, was considered alongside the evidence to reach a final decision on the need to update each section of the guideline.

This document follows the structure of the guideline, with the recommendations cited at the start of each section, and the new evidence discussed below the relevant recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Risk assessment		
None	None	None
Encouraging people to have a risk assessment		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Alternative settings for risk assessment A cohort study(1) assessed routine HbA1c testing in an urban Australian public hospital emergency department. All patients (n=4,580) having blood samples taken over a 6-week period had random blood glucose testing (n=2,652), if this indicated non-diabetic hyperglycaemia (NDH), HbA1c was measured on the same sample (n=1,267). Including people with previous diagnoses, 38% had type 2 diabetes, and 32% of these cases were new diagnoses. NDH was identified in 27% of people. A cohort study(2) investigated use of a 'free public health station' for assessing hypertension and diabetes in a government medical centre in Israel. Of the participants (total number not reported in the abstract), 868 had a random blood glucose result indicating NDH, and 341 (39%) responded to a telephone follow-up survey. Almost all of these participants (n=313, 92%) visited their health service for fasting blood glucose measurement, and about a third of those results indicated NDH. Half of the respondents (n=173) started interventions including antidiabetic treatment, low-sugar diets, or physical activity programmes. About two-thirds of	Alternative settings for risk assessment Topic experts highlighted a study(4) indicating that risk assessment and blood glucose testing in faith centres in the UK successfully identified people at high risk of type 2 diabetes, and identified a number of people with undiagnosed type 2 diabetes.	Alternative settings for risk assessment New evidence assessed risk of type 2 diabetes in healthcare settings other than primary care consultations. In one study, risk assessment and blood glucose testing in faith centres appeared to be effective, and importantly may reach people who do not engage with standard health services. The Australian study of blood-glucose testing in emergency health settings, indicates that targeting people using emergency health services may be feasible to implement in the UK. Overall, the new evidence supports the recommendations to undertake risk assessments in a range of settings. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
participants (n=216) found the station to be effective and 80% (n=273) would recommend it. A retrospective study(3) assessed risk of type 2 diabetes in people attending a community hospital in the USA, who did not have health insurance or a primary care physician. Participants underwent risk assessment according to ADA criteria, and eligible people had HbA1c and fasting plasma glucose testing. Overall, 460 people had risk assessment, and 92 people were analysed. Of these, 9% had diabetes and 39% had NDH. Age and presence of hypertension were positively correlated with increased risk of diabetes. A study(4) assessed opportunistic risk assessment and blood glucose testing events in local faith centres for people of South Asian origin in the UK. People at high risk of diabetes were offered an intervention (Walking Away from Diabetes). Over 4 events, 252 people had risk assessment, 202 of whom gave consent for inclusion in the analysis. Overall, 72% of participants had high risk of type 2 diabetes. An HbA1c result indicating NDH was seen in 16% of participants, and in 4% the result indicated type 2 diabetes. Of those eligible for the diabetes prevention programme, 56% attended.		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Views of diabetes risk A qualitative study(5) assessed factors affecting enrolment and participation in a purposeful sample (n=24) from a cluster RCT of dietitian-delivered lifestyle advice in people of South Asian origin living in Scotland. The authors noted that the intervention resulted in modest weight loss, but did not significantly reduce the incidence of type 2 diabetes. Many participants were motivated to participate because of: known family history of diabetes and the desire to better understand diabetes-related risks to their own and their family's health; ways to mitigate these risks and to benefit from personalised monitoring. Home-based interventions, communication in the participant's chosen language and continuity in dietitians supported their continuing engagement with the trial. Adaptations in food choices were initially accommodated by participants, although social and faith-based responsibilities were reported as important barriers to persevering with agreed dietary goals. Many participants reported that increasing their level of physical activity was difficult because of long working hours, physically demanding employment and domestic	Views of diabetes risk None	Views of diabetes risk The evidence suggests that people's views of their diabetes risk, can affect their motivation to make lifestyle changes. However, there are other barriers to making lifestyle changes, such as family responsibilities, work commitments, and reluctance to undertake outdoor physical activity. These findings support current recommendations to explain that risk of diabetes can be reduced by making lifestyle changes, and to advise people with type 2 diabetes to encourage family members to have risk assessment. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
commitments; participants were also reluctant to undertake outdoor physical activity. A qualitative study(6) investigated how people with NDH perceive their risk of developing type 2 diabetes, and their preferences for preventative interventions (n=35). The sample consisted of 'middle aged' people, 77% of whom were non-white. Knowledge gaps about NDH and its medical management were pervasive. Most patients overestimated the risk of developing diabetes and were not familiar with evidence-based treatment options for NDH. They suggested that receiving brief, yet specific information about these topics during the study interview motivated them to act. The majority of participants considered both intensive lifestyle intervention and metformin acceptable treatment options. Many preferred initial treatment with intensive lifestyle intervention but would take metformin if their efforts at lifestyle change failed and their primary care physician recommended it. Some participants expressed wanting to combine both treatments. A qualitative study(7) investigated how people aged 40–64 years with NDH perceive their risk of developing diabetes, and the effects on uptake of physical activity (n=14). Interviews were conducted		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
twice, with a 2-year interval between interviews. Two themes of risk perception emerged from the data: 'threatening' and 'rejecting'. The 'threatening' risk perception occurred when the risk was unexpected by the participant. The 'threatening' perception also involved a commitment to increase physical activity to prevent type 2 diabetes. However, short-term anxiety and subsequently emerging hopelessness were also part of this perception. The 'rejecting' risk perception involved indifference and scepticism regarding the risk. Here, physical activity behaviour and cognitions appeared to remain unchanged. Rejection also involved difficulties in accepting one's high-risk identity. The 'rejecting' group lacked motivation for increased physical activity, while the 'threatening' group showed determination regarding increased physical activity, often leading to success.		
Risk identification (stage 1)		
Comparative effectiveness of risk assessment tools A cohort study(8) assessed 3 validated type 2 diabetes risk assessment tools: QDiabetes, the Leicester Risk Assessment, FINDRISC, and the Cambridge Risk Score in 676 people who	Topic experts highlighted studies showing further validation of the Leicester diabetes risk assessment tools.(10,11) A response to public consultation, noted that the QDiabetes-2018 tool will be	Comparative effectiveness of risk assessment tools Evidence suggests that different tools categorise differing proportions of people as being at high risk of developing type 2 diabetes. In practice, changing

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
participated in a workplace-based diabetes risk assessment in South Wales, UK. From highest to lowest, the proportion of people categorised at high risk by each tool were Cambridge Risk Score (13.6%) FINDRISC (6.6%), QDiabetes (6.1%), and Leicester Risk Assessment (3.1%). The authors concluded that changing to a different risk assessment tool could alter the predicted risk of an individual. QDiabetes-2018 A derivation and validation study(9) assessed the QDiabetes-2018 risk prediction tool. Data from 1,457 general practices in England, 1094 of which provided data to derive the scores (n=8.87 million) and 363 of which were used to validate the scores (n=2.63 million). Risk factors considered in model A included those already in QDiabetes (age, ethnicity, deprivation, body mass index [BMI], smoking, family history of diabetes in a first degree relative, cardiovascular disease, treated hypertension, and regular use of corticosteroids) and new risk factors: atypical antipsychotics, statins, schizophrenia or bipolar affective disorder, learning disability, gestational diabetes, and polycystic ovary syndrome. Additional models included fasting blood glucose (model B) and glycated haemoglobin	integrated into many GP systems in the UK in 2018.	to a different risk score could change the predicted risk of an individual. QDiabetes-2018 Evidence suggests that the QDiabetes-2018 tool may have potential for predicting 10-year risk of type 2 diabetes. A response to public consultation, noted that this tool will be integrated into many GP systems in the UK in 2018, therefore an update to the guideline is not necessary. Risk assessment tools based on the Leicester score Although there are several versions of the Leicester risk score, and they are known by many names, the evidence suggests that the Leicester risk scores have high sensitivity and the risk assessment should select most people at high risk of type 2 diabetes for further investigation. This supports current recommendations, which list a tool provided by Diabetes UK as an example of a validated computerised tool as an option for risk assessment. The Diabetes UK tool is based on the Leicester risk tool. Additionally, the sensitivity of this score was similar in the general population and in people of South-Asian origin. However, people may be less likely to attend for blood testing after self-

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(HBA1c; model C). Model B explained 63.3% of the variation in time to diagnosis of type 2 diabetes in women and 58.4% of the variation in time to diagnosis in women. Model B also had the highest sensitivity compared with current recommended practice in the NHS based on bands of either fasting blood glucose or HBA1c. However, the authors noted that additional external validation with datasets with more complete data on blood glucose would be valuable before models B and C are used in clinical practice. Risk assessment tools based on the Leicester score A validation study(10) assessed the Leicester self-assessment score for detecting risk of developing type 2 diabetes within 10 years using data from the English Longitudinal Study of Ageing. The size of the entire dataset was not reported in the abstract. The Leicester self-assessment tool had an area under the curve (AUC) of 69.4% in people with a baseline HbA1c measurement indicating NDH or diabetes (n=3,203). The tool had an AUC of 74.9% in people with diabetes status recorded at 10 years (n=3,550). The score threshold of 16 had sensitivity of 89.2% and specificity of 42.3% for detecting a diagnosis of type 2 diabetes at 10 years. The		assessment than if the tool is administered by a health care professional. FINDRISC Evidence suggests that the FINDRISC tool may have differing effectiveness by gender and by ethnicity. Additionally, altering the cut-off score that determines a high risk status may not improve its diagnostic accuracy. Other risk assessment tools Evidence for other risk assessment tools indicates that new tools that may be more applicable in specific populations may help to increase accuracy in different ethnic groups. However, none of the studies indicated a clear need to update current recommendations in this area. Genetic testing New evidence suggests that knowledge of genetic risk factors does not affect risk factors (for example, by the person modifying their diet and physical activity) to a greater degree than standard risk counselling, which does not support a role for genetic testing in diabetes risk assessment at this time.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
authors concluded that people with a high score are at high risk of developing diabetes in the future. A validation study(11) assessed Leicester Practice Risk Score and the Leicester Risk Assessment Score in people of South Asian origin aged 25–39 years. Of 331 participants in a population-based screening study, 2% had undiagnosed type 2 diabetes and 9% had NDH. The Leicester Practice Risk Score had an AUC of 91% for undiagnosed diabetes and 72% for NDH. The results were noted to be similar for the Leicester Risk Assessment Score, but the values were not reported in the abstract. An RCT(12) assessed the computerised Leicester Practice Risk Score for health care professionals and the patient-administered Leicester Self-Assessment Score in people aged 40–75 years with no previous diagnosis of diabetes (n=577). The rate of self-referral blood tests was significantly higher when the Leicester Practice Risk Score was used; however, the rate of diagnosis of type 2 diabetes or NDH was similar in the two groups. The cost per new case of type 2 diabetes diagnosed was lower for the Leicester Practice Risk Score		Overall message from studies of risk assessment. Evidence suggests that several tools are available for assessing risk of type 2 diabetes, but they result in notable differences in the proportion of people classed as at high risk. The development of population-specific tools may offer better accuracy for racial and ethnic minority populations in the UK. Recommendations note that GPs and other primary healthcare professionals should use a validated computer-based risk-assessment tool. If a computer-based risk-assessment tool is not available, they should provide a validated self-assessment questionnaire, for example, the Diabetes Risk Score assessment tool. Other providers, such as pharmacists should offer a validated self-assessment tool, with the Diabetes UK tool cited as an example. With recommendations that are permissive of choice in risk assessment tools, and no clear indication of superiority of a particular tool, an update in this area is not necessary at this time. New evidence is unlikely to change guideline recommendations.

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compared with the Leicester Self-Assessment Score. FINDRISC A cohort study(13) assessed a modified FINDRISC tool in a cohort of black and white middle-aged participants in the US-based Atherosclerosis Risk in Communities study (n=9,754) who did not have diabetes at baseline. The modified FINDRISC used comprised age, BMI, waist circumference, blood pressure medication and family history. The mean FINDRISC score was higher for black women than for white women or black men or white men. However, no statistical comparison of these values was reported in the abstract. The AUC was highest for white women (77%) and lowest for black men (70%) A study in a cohort of participants recruited for an RCT(14) assessed a FINDRISC threshold of 12 in a population of obese and overweight people in New Zealand who participated in the PREVention of diabetes through lifestyle Interventions in Europe and Worldwide (PREVIEW) study (n=424). Overall, 65% of those assessed had NDH and 7% had undiagnosed type 2 diabetes. Higher FINDRISC scores were significantly associated with NDH.		

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Increasing the FINDRISC cut-off score to 15 did not significantly increase accuracy of detecting NDH (AUC=60%, sensitivity=60.3%, specificity=55.4%). Other risk assessment tools A validation study(15) assessed a newly-developed risk assessment tool for detecting NDH in an Indonesian population. The validation dataset included 21,730 people with fasting plasma glucose test results. A random sample of 6,933 people were selected for validation of the risk assessment tool. In the validation sample, the AUC was 64.6%; and at a threshold score of 12, it had a sensitivity of 55.1% and specificity of 65.8%. A retrospective analysis(16) assessed the United States Preventive Services Task Force recommendations on risk assessment to target blood-glucose testing. Electronic health record data from 50,515 patients with a first office visit between 2008 and 2010 were identified and followed for 3 years. People with NDH at baseline and those with fewer than 2 visits during the follow-up period were excluded. The primary outcome was diagnosis of NDH or type 2 diabetes. Overall, 29,946 people had a blood glucose test within the study period, of whom, 8,478 had NDH. The United		

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States Preventive Services Task Force recommendations, for identifying people at high risk of type 2 diabetes, and therefore eligible for blood-glucose testing had sensitivity of 45% and specificity of 72% for detecting NDH. Racial and ethnic minority populations were significantly less likely to be eligible for blood-glucose testing, but had higher odds of developing NDH than white people. A derivation and validation study(17) used a population-based dataset to develop, and 3 additional population-based datasets to validate, a diabetes risk assessment tool developed for the southern Chinese population. Age, waist circumference, BMI and family history of diabetes were included in the risk score for both men and women, with the additional factor of hypertension for men. The AUC was 70% for men and women. A threshold of 28 for men resulted in sensitivity of 56.6%, specificity of 71.7%, positive predictive value of 13.0% and negative predictive value of 96.0%. A threshold of 18 in women resulted in sensitivity of 68.7%, specificity of 60.2%, positive predictive value of 11% and negative predictive value of 96.0% for women in the derivation population. In the validation datasets, the score performed well in 2, and poorly in the other. No		

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data for these findings were reported in the abstract. Additionally, a risk assessment tool from the USA and 2 other Chinese tools were also noted to perform poorly in the study population. Genetic testing One RCT(18) examined the clinical utility of supplementing type 2 diabetes risk counselling with genetic testing (n=601). Non-diabetic overweight or obese veteran outpatients aged 21 to 65 years received risk estimates for lifetime risk of diabetes, including family history and fasting plasma glucose. Participants were randomly assigned to genetic testing or control (eye disease counselling). All participants received brief lifestyle counselling encouraging weight loss to reduce the risk of diabetes. There was no difference between groups in weight, insulin resistance, perceived risk, or physical activity at 3 or 6 months.		
Risk identification (stage 2)		
Performance using standard thresholds A systematic review(19) assessed 99 studies (number of participants not reported in the abstract)	None	Performance using standard thresholds Evidence suggests that blood glucose testing may have fairly low sensitivity but high specificity.

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of blood glucose tests for detecting NDH. To be included in the systematic review, studies needed to assess interventions with a control group in people identified through 'screening'. HbA1c had a mean sensitivity of 49% and specificity of 79%, but studies used differing threshold values. Fasting plasma glucose had mean sensitivity of 25% and specificity of 94%. A diagnostic performance study(20) assessed a 50 g oral glucose challenge test with blood glucose measurement after 1 hour, random blood glucose, and HbA1c with a 75 g glucose tolerance test used as the gold standard (n=1,535). The study population had obesity and consisted of 94% men and 74% black people. The gold standard oral glucose tolerance test detected type 2 diabetes in 10% of participants and NDH in 22% of participants. Diagnostic performance of the other tests was: • glucose challenge test (plasma) AUC was 85% to detect diabetes and 76% to detect NDH • glucose challenge test (capillary) AUC was 82% to detect type 2 diabetes and 73% to detect NDH		Diagnostic accuracy of blood glucose tests appears to be moderate-to-high. However, evidence indicates that tests should not be used in isolation, which is consistent with the recommended 2-stage process for risk identification. Optimum thresholds for blood glucose tests Evidence suggested that Middle-Eastern, Japanese, and Chinese populations may need lower blood-glucose thresholds than other populations, which is broadly consistent with current recommendations, which note that people of South Asian or Chinese descent are regarded as at high risk of diabetes at lower thresholds than other populations. Diagnostic testing strategies – risk assessment or initial blood glucose testing Evidence suggests that blood-glucose testing may be an effective strategy for detecting NDH or type 2 diabetes. Other studies suggested that combining HbA1c with a risk assessment was better than either strategy alone. Practically, if a risk-assessment is not done, the person will not have the benefit of knowing how they can reduce their personal risk in the future. It is unclear whether

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• random glucose (plasma) AUC was 76% to detect type 2 diabetes and 66% to detect NDH • random glucose (capillary) AUC was 72% to detect type 2 diabetes and 64% to detect NDH • HbA1c AUC was 67% to detect type 2 diabetes and 63% to detect NDH. Optimum thresholds for blood glucose tests **Japanese population** A diagnostic performance study(21) assessed HbA1c for detecting type 2 diabetes and NDH in a Japanese population (n=1,372) with a 75 g oral glucose tolerance test used as the gold standard. HbA1c had an AUC of 91.8% for detecting type 2 diabetes and 71.4% for detecting NDH. The optimum HbA1c cut-off for diagnosing type 2 diabetes was 6.0% with sensitivity of 83.7%, and specificity of 87.6%. The optimum HbA1c cut-off for detecting NDH was 5.7% with sensitivity of 60.6% and specificity of 72.1%. However, the authors noted that the cut-off for NDH showed a low accuracy of 67.6% and a high false-negative rate of 39.4%. Agreement between HbA1c categorisation		strategies using multiple different blood tests would be more useful than repeating the same test. Oral glucose tolerance versus HbA1c testing There is evidence to suggest that oral glucose tolerance testing may be more effective than HbA1c testing, but participation in oral glucose tolerance testing may be low, Participation in oral glucose tolerance testing may be increased if offered after other risk identification methods, which is consistent with current recommendations. Finding an optimum threshold for NDH and type 2 diabetes Several studies investigated different cut-offs for risk assessment and blood-glucose testing separately and combined. Generally, the diagnostic performance improved when risk assessment and blood-glucose testing were used together. Risk assessment tends to have high sensitivity and lower specificity, but blood glucose testing tends to have high specificity with lower sensitivity, which provides some support for the current 2-stage case identification process.

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and OGTT-based diagnosis was low for type 2 diabetes and NDH. **Swedish and Middle Eastern populations** A diagnostic performance study(22) assessed HbA1c after an oral glucose tolerance test as a predictor for NDH and type 2 diabetes in Swedish and Middle-Eastern populations (n=3,954). HbA1c of 48 mmol/mol or higher for detecting type 2 diabetes had: • sensitivity of 31%, positive predictive value of 70% and negative predictive value of 96% in people of Middle-Eastern origin • sensitivity of 25%, positive predictive value of 96% and negative predictive value of 98% in people of Swedish origin. A cut-off for HbA1c of 42 mmol/mol as a predictor for NDH had: • sensitivity of 17% in people of Middle-Eastern origin • sensitivity of 15% in people of Swedish origin.		Record keeping on the provenance of blood-glucose samples One study suggested that recording of the type of glucose test performed could be improved in England and Wales. There was no information about the effectiveness of the different tests. Overall, evidence does not suggest a need to update guidance on stage 2 risk identification. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
A cut-off for HbA1c of 39 mmol/mol as a predictor for NDH had: • sensitivity of 36% in people of Middle-Eastern origin • sensitivity of 34% in people of Swedish origin. The authors concluded that HbA1c was insensitive for detecting type 2 diabetes and is inefficient for detecting NDH in these populations. **Chinese populations** A diagnostic performance study(23) assessed HbA1c thresholds in a Chinese population aged over 40 years (n=8,239). Overall, 10.7% of the sample had newly diagnosed type 2 diabetes and 19.0% had NDH. Fasting plasma glucose and postprandial plasma glucose were significantly positively correlated with HbA1c level. The AUC for diagnosing type 2 diabetes was 85.7% and for detecting NDH was 68.1%. The optimum HBA1c cut-off for diagnosing type 2 diabetes was 6.3% and for detecting NDH was 5.9%. A diagnostic performance study(24) assessed HbA1c for diagnosing type 2 diabetes in a Chinese population (n=4,325). The current threshold of		

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HbA1c (6.5% or 48 mmol/mol) showed low sensitivity (35.6%) and high specificity (98.9%) for diagnosing type 2 diabetes. The diagnostic efficiency of HbA1c in the people older than 75 years (AUC 75.5%) was significantly lower than that in people aged 45–54 years (87.8%). The AUC of HbA1c was negatively correlated with age. When adjusting for red blood cell count (lower values more common with increased age) the association between age and AUC disappeared. A diagnostic performance study(25) assessed fasting blood glucose, 2-hour oral glucose tolerance test and glycosylated haemoglobin for diagnosing type 2 diabetes and detecting NDH in a Chinese population aged 40 years or older (n=7,611). The prevalence of newly diagnosed type 2 diabetes was 12.7% and NDH was 29.4%. The AUC for detecting diabetes was 83.7% for fasting plasma glucose, 93.3% for 2-hour oral glucose tolerance test and was 80.6% for HbA1c. For NDH, the AUC was 80.2% for fasting plasma glucose, 92.9% for 2-hour oral glucose tolerance test, and 69.0% for HbA1c. The optimum HbA1c thresholds were 6.3% for detecting type 2 diabetes and 5.8% for detecting NDH.		

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A cross-sectional study(26) assessed HbA1c for diagnosing type 2 diabetes in a Chinese population with impaired fasting glucose (n=1,128). Overall, 20% of participants had diabetes. The sensitivity of HbA1c levels of 6.5% or more for diagnosing type 2 diabetes was 33.2%, the specificity was 93.5%, and the AUC was 77%, indicating HbA1c had fair discriminatory power. The optimum cut-off threshold of HbA1c for discriminating type 2 diabetes from NDH was 6.3% with sensitivity of 56.3% and specificity of 85.5%. A threshold HbA1c of 5.6% had the highest sensitivity, at 96.1% and the highest negative predictive value at 94.5%. Diagnostic strategies – risk assessment or initial blood glucose testing A systematic review and meta-analysis(27) assessed 47 studies (n=422,754) of case-identification or screening strategies to detect NDH, to determine the response rate and diagnostic yield. The populations included in these studies were not reported in the abstract. Studies were categorised as a one-step strategy (29 studies) if participants were invited directly for an oral glucose tolerance test and two-step (11 studies), or three–four-step (7 studies) if participants were screened at one or more levels before being invited for an		

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oral glucose tolerance test. The pooled response to invitation to the oral glucose tolerance test was 65.5% for one-step strategies, 63.1% in 2-step strategies, and 85.4% in 3–4-step strategies. The number needed to invite to the oral glucose tolerance test was 15 for one-step strategies, 7.6 in 2-step strategies, and 3.6 in 3–4-step strategies. A US cross-sectional study(28) of data from NHANES (n=7,161) in adults without a diagnosis of NDH or type 2 diabetes assessed strategies to select people for testing for diabetes (confirmed with HbA1c). The authors aimed to assess the use of random blood glucose for case-finding, with consideration of current risk assessment. Random blood glucose levels of more than 100 mg/dL (5.6 mmol/l) had sensitivity of 81.6% and specificity of 78% for selecting people for diabetes testing, with an AUC of 80%. Recommendations from the American Diabetes Association (ADA) had an AUC of 59%, and the US Preventive Services Task Force 2015 recommendations had an AUC of 64%. The authors noted that random glucose testing needed to screen 14 people to detect 1 case of undiagnosed type 2 diabetes, whereas the number needed to screen was 33 for the ADA		

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recommendations and 32 for the US Preventive Services Task Force 2015 recommendations. A prospective longitudinal study(29) assessed systematic HbA1c testing compared with standard care (n=488) in people aged 45 years or older. However, standard care was not defined in the abstract. Systematic screening identified significantly more people with NDH (53%) than standard care (33% of 22% who were tested). Oral glucose tolerance versus HbA1c testing A diagnostic performance study(30) assessed the performance of the oral glucose tolerance test and HbA1c in overweight and obese people without a previous diagnosis of diabetes (n=1,241). Overall, 47% had NDH and 12% had newly diagnosed type 2 diabetes according to American Diabetes Association criteria. Testing HbA1c only would result in 47% of new diagnoses of type 2 diabetes and 44.2% of diagnoses of NDH being missed. An analysis of data from the NHANES cross-sectional study(31) assessed the 2-hour glucose tolerance test for diagnosing diabetes in people who would be categorised as having NDH on the basis of HbA1c and fasting blood glucose levels (n=3,644). The 2-hour oral glucose tolerance test		

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would result in 6.9% of participants being diagnosed with type 2 diabetes. These participants had greater odds of a diabetes diagnosis if they had hypertension, high triglycerides, low high-density lipoprotein cholesterol, albuminuria, and raised alanine aminotransferase. A diagnostic study(32) assessed the uptake and yield of HbA1c and oral glucose tolerance testing in a South Asian population (n=3,173) living in the Netherlands. Significantly more people who were invited attended for HbA1c testing than for oral glucose tolerance testing. Overall, HbA1c identified a similar proportion of type 2 diabetes cases as the oral glucose tolerance test, but identified a higher proportion of cases of NDH. Finding an optimum threshold for NDH and type 2 diabetes A diagnostic performance study(33) assessed HbA1c for predicting NDH in a Chinese population aged over 45 years who had a FINDRISC score of 9 or higher (n=619). The optimum cut-off for HbA1c was 5.4% for NDH (AUC=62%) and 5.8% for type 2 diabetes (AUC=85%). The combination of FINDRISC score and HBA1c result had better discrimination than either assessment alone (NDH		

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AUC=75%, type 2 diabetes AUC=88%), but this difference was not significant. A diagnostic performance study(34) assessed FINDRISC plus HbA1c in people without known diabetes who participated in the US NHANES study (n=3,886). The prevalence of NDH was 43% and of undiagnosed type 2 diabetes was 7%. At a cut-off of 6.5% for detecting diabetes, HbA1c had sensitivity of 24.2% and specificity of 99.6%. FINDRISC (threshold of 9 or higher) had sensitivity of 79.1% and specificity of 48.6% for detecting diabetes. Combining FINDRISC and HbA1c had sensitivity of 84.2% and specificity of 48.4% for detecting diabetes. At a cut-off for detecting NDH of 5.7%, HBA1c had sensitivity of 35.2% and specificity of 86.4%. FINDRISC had sensitivity of 60.2% and specificity of 61.4% for detecting NDH. Combining FINDRISC and HbA1c had had sensitivity of 74.2% and specificity of 53.0% A diagnostic performance study(35) assessed serum glycated albumin to determine the need for an oral glucose tolerance test in people without diabetes (n=1,559). Serum glycated albumin was significantly correlated with age, serum albumin, BMI, waist circumference and plasma glycated albumin, but not with diet. A threshold of glycated		

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albumin of 15% for diagnosing type 2 diabetes had sensitivity of 74%, specificity of 85%, and AUC of 86%. Fasting plasma glucose of 100 to 126 mg/dL had sensitivity of 78.8% and specificity of 100% and indicated that 14.4% of the study population needed an oral glucose tolerance test. When serum glycated albumin values of 14% and 17% were used to exclude and diagnose diabetes, respectively, the sensitivity improved to 83.3%, with a slight decrease in specificity to 98.2%, but led to a significant increase in oral glucose tolerance tests. Using combined fasting plasma glucose and serum glycated albumin serum, the need for oral glucose tolerance testing was reduced to 22.5% and the sensitivity increased to 85.6% with no change in specificity (98.2%). Record keeping on the provenance of blood-glucose samples A cross-sectional study(36) assessed the proportion of glucose tests with unrecorded provenance in routine primary care data in England and Wales (n=2,137,098). All blood glucose results recorded during 2013 were identified (n=203,350). Tests were grouped by provenance (fasting, oral glucose tolerance test, random, none specified and other). A clinical audit in a single primary care		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
practice was also performed to identify the impact of failing to record glucose provenance on diabetes diagnosis. Overall, 58% of tests did not have provenance information. The most commonly reported provenance was fasting glucose (37%). The distribution of glucose values where provenance was not recorded was most similar to that of fasting samples. The glucose measurements of 256 people with diabetes in the audit practice (size 11,514 people) were analysed. The initial glucose measurement had no provenance information in 64.1% of cases. A clinician questioned the provenance of a result in 41 cases (16.0%); of these, 14 (34.1%) required repeating. Lack of provenance led to a median delay in the diagnosis of diabetes of 30 days, ranging from 3 days to 614 days.		
Matching interventions to risk		
A UK cross-sectional study(37) assessed type 2 diabetes risk and knowledge about type 2 diabetes risk in 59 people who attended a risk assessment to determine eligibility for a diabetes prevention study. After an initial telephone screening step, participants completed the Diabetes UK Risk Score. The risk of type 2 diabetes was: 44% high	None	The evidence suggests that although people know that they have a risk of developing diabetes, they may not know that they can modify the risk with diet and weight management. This finding supports current recommendations, which include brief advice for people with low risk, a brief intervention for people with moderate risk and, lifestyle

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
risk, 42% moderate risk, and 14% increased risk. People who had previously been informed of their risk of developing type 2 diabetes (42% of participants) had significantly higher perceived risk scores, higher knowledge scores, and reduced optimism scores. However, they did not have increased knowledge that diet and weight management have a role in preventing diabetes.		intervention for people with high risk of diabetes. All these interventions should include advice on reducing their risk of diabetes with diet, weight management and physical activity. New evidence is unlikely to change guideline recommendations.
Reassessing risk		
A cluster RCT(38) (n=1,092) assessed a diabetes prevention intervention in community pharmacies involving 3 individual counselling sessions and 5 group-based sessions compared with control (standard written information) over 1 year. The FINDRISC diabetes risk assessment tool was used to assess risk of type 2 diabetes before and after the intervention. The diabetes prevention intervention was associated with significant reductions in FINDRISC score. The authors noted that this was attributed to improvements in the following risk factors: waist circumference, physical activity, high-fibre diet and body-mass index; however no statistical analysis of these outcomes was reported in the abstract.	None	The evidence suggests that interventions to prevent diabetes may result in reductions in diabetes risk score. This supports the recommendation to check risk factors in an annual review of the lifestyle changes the person has made. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Commissioning risk identification and intensive lifestyle-change programmes		
None	None	None
Quality-assured, intensive lifestyle-change programmes: design and delivery		
Lifestyle interventions We identified 5 systematic reviews that assessed the efficacy of lifestyle interventions for preventing type 2 diabetes.(39–44) Overall, compared with control, lifestyle interventions were associated with: • reduced incidence of type 2 diabetes(39,40,42) • reduced blood glucose levels (fasting blood glucose, HbA1c, or 2-hour glucose tolerance)(39–44) • increased weight loss.(39,41,43) In studies conducting additional subgroup analyses:	Lifestyle interventions Topic experts highlighted two studies of lifestyle interventions.(52,59) These studies were noted to add to the evidence base on lifestyle interventions, especially in a UK setting.(59)	Lifestyle interventions Overall, the new evidence suggested that lifestyle interventions were beneficial, and supports current recommendations on the provision of lifestyle interventions. The only study that found no significant effect of lifestyle interventions used an 'evidence-based' weight management programme, which suggests it was an effective active comparator, so a small between-group difference may be expected. The finding that weight loss was greater when interventions were delivered by a dietitian supports the recommendations: 'Ensure programmes are delivered by practitioners with relevant knowledge and skills who have received externally accredited training (see recommendations 1.18.1–1.18.5). Where relevant expertise is lacking, involve health professionals and specialists (such as dietitians and health psychologists) in the design and delivery

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
• interventions delivered by a dietitian were associated with greater weight loss than those delivered by non-dietitians(41) • interventions delivered in person did not have significantly different effects to those delivered by technology(41) • treatment effects showed no significant differences between men and women for any outcomes(42) • interventions with a maintenance component were associated with greater weight loss and improvements in blood glucose (although statistical analysis of this finding was not reported in the abstract)(43) • compared with a lifestyle intervention consisting of diet and physical activity, physical activity alone was not effective for reducing blood glucose levels.(44) A systematic review(45) assessed 27 health economic evaluations of lifestyle interventions and metformin for preventing type 2 diabetes. Studies had considerable heterogeneity in definitions of NDH and in intensity and duration of lifestyle interventions. The components of included lifestyle		of services.' However, this finding was from a sub-group analysis of a systematic review and it could have been influenced by other factors in the design of included studies. Therefore, an update in this area is not thought to be necessary at this time. The finding that lifestyle interventions as currently recommended in the guideline are the most cost-effective option supports the current recommendations. New evidence is unlikely to change guideline recommendations

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
interventions were not reported in the abstract. Lifestyle interventions and metformin appeared to be cost effective in preventing diabetes in high-risk individuals, but economic estimates varied widely between studies. Intervention-only programmes were generally more cost effective than programmes including a risk identification component. Interventions appeared to be more cost effective with longer periods of evaluation. One systematic review(46) assessed patient outcomes after detection of NDH. In 16 studies, treatment of NDH (the abstract did not define 'treatment', but appeared to include lifestyle modification) resulted in delayed progression to diabetes. However, in 2 studies, strategies to identify type 2 diabetes had no mortality benefits at 10 years. Most trials of treatment of NDH found no effects on all-cause or cardiovascular mortality, although lifestyle modification was associated with decreased risk of both outcomes after 23 years in 1 trial. Additionally, 10 RCTs(47–56) and 1 quasi-experimental study(57) were identified of lifestyle interventions in people with NDH that had a follow-up period of at least 1 year; of which, 2 included metformin alongside the lifestyle		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
intervention.(52,53) Lifestyle interventions were generally compared with standard care; however, one study(49) additionally included a comparator group receiving metformin and one study(54) used an 'evidence-based weight management programme' as the comparator. Overall, compared with control, lifestyle interventions were associated with: • reduced incidence of type 2 diabetes(51,52) • reduced blood glucose levels or insulin resistance (fasting blood glucose, HbA1c, glucose tolerance, or blood insulin)(50,55) • increased weight loss(49,50,55,56) • reduced cardiovascular events (including death from cardiovascular causes).(47,51) The quasi-experimental study(57) assessed use of a commercial weight loss organisation (Weight Watchers) in the UK to deliver a diabetes prevention programme in obese people with NDH. Of 149 eligible participants, 79% attended an activation session and 77% started weekly		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
sessions. The diabetes prevention programme was associated with reductions in weight and HbA1c. Lifestyle intervention (22 group-based sessions) did not significantly increase weight loss or improve blood glucose levels compared with an evidence-based weight management programme. However, the components of the weight management programme were not clear in the abstract.(54) In studies conducting additional analyses: • The constitution of the dietary component (moderate carbohydrate plus increased protein compared with high carbohydrate plus moderate protein) had no significant effect on the effectiveness of lifestyle intervention plus metformin (dose of metformin not reported in the abstract).(53) • Weight loss was significantly higher with lifestyle intervention compared with either metformin 850 mg or standard care. However, blood glucose (HbA1c) did not differ significantly from metformin or standard care.(49) • People with college-level education were more likely to have reduced type 2 diabetes incidence		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
after lifestyle intervention than people without college-level education.(48) A Cochrane review(58) of 12 RCTs (n=5,238) assessed the effect of diet, physical activity, or both, compared with usual care or no treatment on the risk of developing type 2 diabetes. Trials were eligible if they had a duration of 2 years or more. None of the trials were rated as at low risk of bias by the authors. Diet plus exercise (11 trials) significantly reduced the incidence of type 2 diabetes (moderate quality evidence), but had no significant effect on mortality (very low quality evidence). Diet alone (1 trial; very low quality evidence) had little effect on incidence of type 2 diabetes or mortality, although statistical analysis of these outcomes was not included in the abstract. Physical activity alone (2 trials; very low quality evidence) may have reduced incidence of type 2 diabetes but had little effect on mortality, although statistical analysis of these outcomes was not included in the abstract. A UK-based RCT(59) assessed a structured education (Let's Prevent) lifestyle intervention compared with standard care in people with NDH. People in the intervention arm had significantly greater gains in health-related quality of life than in		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
the control arm. This resulted in the intervention having an incremental cost-effectiveness ratio of £3,643 per quality-adjusted life year, and 86% probability of being cost-effective at a threshold of £20,000. A UK-based economic evaluation(45) assessed 4 interventions for preventing diabetes: high-intensity lifestyle interventions, low-intensity lifestyle interventions, metformin, and no treatment. A high intensity lifestyle intervention was defined as that used in trials of the US Diabetes Prevention Programme. A low intensity lifestyle intervention was defined as a pragmatic translation of such trials, as recommended in NICE's diabetes prevention guideline. The model assessed 3 types of non-diabetic hyperglycaemia (impaired fasting glucose, impaired glucose tolerance, and HbA1c). Compared with no intervention all assessed treatments were cost effective. Low-intensity lifestyle interventions were the most cost effective (£44 to £195 per quality-adjusted life year [QALY]). High intensity lifestyle interventions had a higher cost per QALY (£2,775 to £7,376 per QALY). Metformin had the highest range of cost-effectiveness, sitting between the two intensities of lifestyle intervention (£372 to £6,842).		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Cultural adaptations of lifestyle interventions A systematic review(60) included 33 RCTs of culturally adapted health education interventions for diabetes. Meta-analysis of 28 studies showed that culturally adapted diabetes health education was associated with significant improvements in HbA1c and diabetes knowledge compared with conventional care. A systematic review(61) included 6 studies of adaptations of the diabetes prevention programme for use in ethnic minority communities. Adaptations for the following populations were covered by the included studies: 'African American, Hispanic/Latino, Native Hawaiian and Other Pacific Islander, Arab American, and American Indian and Native Alaskan'. The most common translation strategies included group-based delivery and use of bilingual study personnel. Generally, these factors appeared to increase acceptability of the intervention within the populations reviewed. A systematic review(62) included 34 studies of culturally adapted diabetes prevention interventions. The abstract did not define the populations included in the adapted interventions. The authors used thematic analysis to develop a	Cultural adaptations of lifestyle interventions None	Cultural adaptations of lifestyle interventions Studies suggest that some cultural adaptations of lifestyle interventions may be more successful than others. However, overall the evidence is broadly consistent with the recommendation to ensure that the programme is sensitive and flexible to cultural or religious norms, for example, practical learning opportunities, particularly for those who have difficulties with communication or literacy or whose first language is not English. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
framework to assess each study (Facilitating [that is, delivering] Interventions Through Language, Location, and Message). Overall, 25 of the studies showed significant improvements in HbA1c, fasting blood glucose or weight loss; 21 of these studies incorporated at least 3 culturally targeted domains. In all 7 studies using all 4 domains (facilitators, language, location, and messaging), positive results were seen. The domain 'facilitators' was the least often used. A systematic review(63) included 12 studies of diabetes prevention programmes for in Hispanic populations in the USA. Eight of the studies included a mostly female population (more than 70%). All studies delivered the intervention in Spanish and took place in community settings. Effect sizes were small to moderate, study quality was moderate, and attrition was high in most trials. Nine studies showed significant effects of the intervention on blood glucose or weight loss, compared with control. Interventions with the largest effect sizes included one or more of the following adaptations: literacy modification, Hispanic foods/recipes, cultural diabetes beliefs, family/friend participation, structured community input, and innovative experiential learning.		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
A systematic review(64) assessed the effectiveness of components of cultural adaptations of diabetes prevention programmes. The abstract did not define the populations included in the adapted interventions. Overall, the type of modification or presence of a maintenance component had no significant effect on achieving significant reductions in weight or BMI. Programmes with fewer modifications reported significantly greater reduction in weight at 12 months and at the longest follow-up extracted from each study. Programmes with a maintenance component achieved significantly greater weight reduction at the longest follow-up extracted from each study. A systematic review(65) included 44 studies of cultural adaptations of diabetes prevention programmes, 15 of which reported on cultural adaptations, and 38 explored implementation. The abstract did not define the populations included in the adapted interventions. Many studies shortened the program length and reported a group format. The most commonly reported cultural adaptation (13 of 15 studies) was of content. At the individual level, the most frequently assessed implementation outcome (n=30) was adoption.		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
A qualitative study(66) assessed perspectives on behaviour change in 20 women of Pakistani origin who participated in a lifestyle intervention for preventing diabetes (New Life, New You) in an area of socioeconomic deprivation in the UK. Within the Theoretical Domains Framework (intentions and goals, reinforcement, knowledge, nature of the activity, social role and identity, social influences, capabilities and skills, regulation and decision, emotion and environment), we identified the importance of social factors relating to participants' own physical activity and dietary behaviour change. Benefits of the intervention included participants' 'psychological health', 'responsibility' (for others' health, especially family members included in the new physical activity and diet regimens) and 'inclusion' (an ethos of accommodating differences). A cohort study(67) assessed the effect of a diabetes prevention programme in Hispanic (n=567) compared with white participants (n=175). Overall, 45% of Hispanic participants selected the Spanish-language version of the programme. Mean attendance was 8.6 of 22 sessions. For each session attended, a significant weight loss of 0.3% was seen. Hispanic participants were half as likely to attend as white participants, and came to significantly fewer sessions. After adjusting for		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
attendance, the intervention had similar effects in both populations. An RCT(68) assessed a culturally adapted diabetes prevention programme compared with usual care in people of Iraqi origin living in Sweden. Of 636 people at high risk of diabetes who were invited to participate, 15% participated (n=96). The intervention group was offered seven group sessions addressing healthy diet and physical activity including one cooking class. About 30% of participants dropped out of the programme. The mean follow-up time was less than 4 months in both groups; however, significant increases in insulin sensitivity index and significant weight loss, and lower BMI was seen in the intervention group compared with usual care. A larger proportion of people in the intervention group achieved a weight loss of at least 5% of original bodyweight in the intervention group; however because none of the participants in the control group achieved this outcome, statistical analysis would not have been possible. An RCT(69) assessed a culturally adapted lifestyle intervention for preventing diabetes in a population of South Asian origin (n=536) who were at high risk of diabetes. The culturally targeted intervention		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
consisted of individual counselling using motivational interviewing (six to eight sessions in the first 6 months plus three to four booster sessions), a family session, cooking classes and a supervised physical activity programme. The control group received generic lifestyle advice. At 2 years, the change in amount of moderate to vigorous physical activity did not differ significantly between the intervention and control groups. No significant differences were found between the two groups in changes on any components of the diet or the social-cognitive determinants of diet and physical activity. The authors concluded that this culturally-adapted intervention 'led to high drop-out and was not effective in promoting healthy behaviour among South Asians at risk for diabetes'.		
Quality-assured, intensive lifestyle-change programmes: content		
None	None	None
Quality-assured, intensive lifestyle-change programmes: evaluation		
Participation in diabetes prevention programmes	Participation in diabetes prevention programmes None	Participation in diabetes prevention programmes

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
A cohort study(70) assessed the factors associated with participants joining a diabetes prevention programme in the USA. People registered with one health system (n=1,249) referred to the diabetes prevention programme were included. The sample was mostly women (71%) and aged 45 years or older (71%). People aged 18–44 years enrolled significantly less often than people older than 60 years. Enrolment was higher in the summer than in the winter, and people who preferred the sessions in Spanish were less often placed in the programme (although the abstract did not provide statistical data for these analyses). People who started sessions within 2 months of their referral were significantly more likely to participate than those who waited 4 or more months. A before and after study(71) assessed the effects of a change to electronic medical records plus a provider education intervention to support patient referrals to a diabetes prevention programme. Before the change, 0 to 2 people were referred each month, which increased to 5 to 11 people per month. A cross-sectional study(72) assessed characteristics associated with participating or not participating in a diabetes prevention programme in		Evidence has identified several factors that may reduce uptake of lifestyle interventions, for example winter rather than summer enrolment, or the level of education of the attendee. One study focusing on invitation to the NHS Health Check, which includes diabetes risk assessment, found that a simplified, more direct invitation letter increased attendance. Overall, these studies indicate that a diabetes prevention programme could have problems recruiting and retaining people because of environmental factors as well as individuals' characteristics. These factors could inform areas for improvement in the recommended regular evaluation of diabetes prevention programmes. Evaluations of the NHS Diabetes Prevention Programme, expected from 2020, may provide further information in this area relevant to the UK population. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Norway (n=332). Overall, 86% declined to participate in the programme. Non-participating women had significantly fewer years of education than women who participated; however no such association was seen for men. An analysis(73) of the Let's Prevent Diabetes cluster-RCT assessed engagement and retention in the intervention (n=880). Overall, 77% of people engaged with the intervention and 29% were described as 'retainers'. People who engaged or were 'retainers' were more likely to be older, leaner, and non-smokers; however, no statistical data for these outcomes was reported in the abstract. Participants who attended the initial session and at least one refresher session were less likely to develop type 2 diabetes compared with those in the control arm. People described as 'retainers' were also significantly less likely to develop type 2 diabetes than the control group. A pragmatic quasi-RCT(74) (n=3,511) assessed attendance at The NHS Health Check programme (which includes diabetes risk assessment) using the standard national invitation template letter (control) compared with an enhanced invitation		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
letter using insights from behavioural science (intervention). The intervention letter included: • simplification - reducing letter content • behavioural instruction - action focused language • personal salience – appointment due rather than invited • addressing implementation intentions with a tear-off slip to record the date, time and location of the appointment. Significantly more people who received the intervention letter attended their health check.		
Adherence A cohort analysis(75) assessed the effects of a diabetes prevention programme over 4 years (n=14,747). Participants attended a median of 14 sessions over an average of 172 days. Overall, 35.5% achieved the 5% weight loss goal, and 42% met the physical activity goal of 150 min per week. For every additional session attended and every	Adherence None	Adherence Evidence suggests that although people may initially engage with a diabetes prevention programme, adherence may be a problem in the longer term. However, one study suggested that each additional session attended may increase

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
30 min of activity reported, participants lost 0.3% of body weight. An RCT(76) assessed a group-based adaptation of a diabetes prevention programme compared with brief counselling in people with low income. The diabetes prevention programme showed no evidence of an effect on moderate to vigorous physical activity or sedentary behaviour. Baseline physical activity and local crime levels were associated with lower levels of moderate to vigorous physical activity. Lower baseline sedentary behaviour, higher perceived health, and more green space were related to lower levels of continued sedentary behaviour. A cohort study(77) assessed a scoring system for predicting attrition from a diabetes prevention programme in American Indian and Alaskan Native communities (a derivation cohort, n=1,600 and a validation cohort, n=801) were used. The factors predicting attrition were gender, age, household income, comorbidity, chronic pain, site's user population size, and average age of site staff. Long-term attrition was predicted by gender, age, marital status, chronic pain, site's user population size, and average age of site staff. The authors		adherence. Therefore, re-engaging with participants who stop attending may be beneficial. The guideline currently has no recommendations on strategies to increase adherence and attendance at programme sessions. The evidence provides useful information that could support the evaluation of diabetes prevention programmes. However, the evidence did not assess the effectiveness of strategies to improve attendance, which could be used to develop recommendations to address this issue. Therefore, no update in this area is necessary at this time. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
noted that the models had moderate to fair discriminatory power. An RCT(78) assessed high-intensity compared with low intensity maintenance of a resistance training physical activity intervention in overweight and obese people with NDH aged 50–69 years (n=170). After the initial 3-month physical activity intervention, participants were randomly assigned to either the high-intensity or the low-intensity 6 month maintenance phase. The high-intensity intervention included continued tailored, interactive personal, and web-based check-ups focused on resistance training, self-regulation, and a barrier/strategies approach. Low-intensity maintenance included generic personal, and web-based check-ups. Adherence to maintenance was about 74% in both groups.		
Raising awareness of the importance of physical activity		
None	None	None
Providing tailored advice on physical activity		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
We identified 2 systematic reviews of physical activity-only interventions for preventing diabetes,(79,80) of which 1 assessed walking interventions only.(80) Overall, physical activity interventions reduced blood glucose levels (fasting blood glucose, HbA1c, or glucose tolerance) or insulin resistance.(79,80) Supervised walking interventions or unsupervised walking interventions using motivational strategies appeared to be effective in reducing blood glucose, whereas unsupervised walking interventions were not effective.(80) We also identified 3 RCTs of physical activity-only interventions in people with NDH that had a follow-up period of at least 1 year.(81–83) In one UK-based cluster-RCT(81) (n=818), an exercise intervention (Walking Away from Diabetes) showed significant effects on daily steps and amount of vigorous physical activity at 12 months; however, these outcomes were not sustained at 3 years. The abstract did not report what the control consisted of. A further analysis(84) from this study suggested that increased time in moderate to		Generally, the new evidence supports a variety of modes of physical activity as useful for preventing type 2 diabetes. This is consistent with current recommendations, including the recommendation to encourage people to choose physical activities they enjoy or that fit easily within their daily lives. Current recommendations also recognise that small increments in physical activity may be beneficial, for example choosing to take the stairs rather than the lift, or breaking up time spent sitting with small amounts of standing or walking. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
vigorous physical activity was associated with reductions in blood glucose levels. An RCT (n=170) assessed a social cognitive theory-based maintenance phase after a resistance training intervention(82). All participants completed 3 months of resistance training; then received either social cognitive theory-based maintenance or standard care for 6 months, with a further 6 months of follow-up. The initial resistance training component reversed NDH in around a third of participants. However, the assessed maintenance phases showed no significant differences between the groups. An RCT(83) assessed a yoga intervention compared with active stretching in people with metabolic syndrome. Blood glucose levels were improved significantly more in the yoga group compared with the active stretching group at 6 months, which was maintained at 12 months. An RCT(85) assessed the effects of unbroken sitting for 7.5 hours compared with either standing or walking for 5 minutes every 30 minutes in overweight or obese postmenopausal women with NDH (n=22). Participants undertook each intervention in a randomly allocated order on		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
consecutive days. Compared with prolonged sitting, standing and walking both significantly reduced the incremental AUC for glucose, and insulin.		
Weight management advice		
None	None	None
Dietary advice		
Effectiveness of following specific diets One meta-analysis compared various healthy diets and their association to diabetes risk.(86) Healthy diets (such as Mediterranean and Dietary Approaches to Stop Hypertension [DASH]) are generally associated with a reduced risk of type 2 diabetes; however, there was no difference in results when comparing different healthy diets. One meta-analysis considered diets low in advanced glycation end products (AGEs)(87). The authors concluded that low AGE diets significantly decreased insulin resistance, total cholesterol and LDL.	None	Effectiveness of following specific diets and including specific foodstuffs in diets. Overall, dietary interventions appear to reduce the risk of developing type 2 diabetes. Specific diets did not show effectiveness over other diets, but dragon fruit and aloe vera appear to be effective components of a healthy diet. This is broadly consistent with the approach of the guideline which recommends increasing intake of dietary fibre, fruit and vegetables, and reducing intake of foods high in fats and sugar. Dietary supplements and traditional or herbal remedies

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
One study evaluated the effects of an advice intervention to increase fibre intake. Advice was given on dietary fibre or resistant starch.(88) Both types of intervention were found to decrease total cholesterol and non-HDL cholesterol and glucose regulation was significantly improved in the dietary fibre advice group. One RCT compared two diets of varying monounsaturated fat and glycaemic index compared with a control.(89) There were no differences between groups for weight regain and body after 18 months, however the LDL/HDL ratio was more improved in the high monounsaturated fat group compared with the control group. Including specific foodstuffs in diets One meta-analysis considered the effect of dragon fruit.(90) The intervention was found to significantly lower fasting plasma glucose levels in people with NDH but not for people with type 2 diabetes. Two meta-analyses considered the effect of aloe vera. Both studies found that aloe vera significantly improved fasting plasma glucose in people with NDH.(91,92) The effect of aloe vera on HbA1c is unclear, with one study reporting no effect in people with NDH(91) and one reporting a significant		Evidence suggests that vitamin D, selenium, and polyphenol supplementation have no significant effects on preventing type 2 diabetes. Evidence appears to be mixed for zinc supplementation, but overall less than 400 people participated in the studies identified. Similarly, the study of l-arginine included fewer than 200 participants. Therefore, it is unlikely that the available evidence is sufficient to add recommendations for these supplements. Saturated fatty acid effects on diabetes incidence Evidence suggests that different saturated fatty acids may have differing beneficial or harmful associations with type 2 diabetes. However, this information does not easily translate into dietary advice. For example, dairy foods contain palmitic acid, which the evidence suggests as increasing the incidence of type 2 diabetes. Yet, dairy products also contain small amounts of pentadecanoic acid and heptadecanoic acid, which were reported to be associated with lower incidence of type 2 diabetes. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
reduction(92) but it was not clear the proportion of people with NDH and type 2 diabetes in the included studies. For people with type 2 diabetes, there was a marginal significant improvement in fasting plasma glucose and a significant improvement in HbA1c with the intervention.(91) Dietary supplements and traditional or herbal remedies 14 studies were identified focusing on dietary supplements or traditional or herbal remedies for prevention of type 2 diabetes. • Two studies considered zinc supplementation(93,94). Results were mixed, with a Cochrane review concluding that there was no evidence to support zinc supplementation in preventing type 2 diabetes (93) and an RCT finding that significantly fewer people developed type-2 diabetes with zinc supplementation compared with control.(94) Significant improvements were also found in blood glucose levels and insulin resistance, as well as beta-cell function. • Three studies were identified that examined the effect of vitamin D supplementation in people with NDH.(95–97) All three studies reported that		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
there was no significant effect of vitamin D supplementation on diabetes prevention and glycaemic control. • One meta-analysis of investigated the association between selenium supplementation and the risk of type 2 diabetes(98) and found that it did not have an effect on risk of type 2 diabetes. • One RCT considered l-arginine supplementation.(99) There was no significant effect of the intervention on the probability of becoming diabetic; however, l-arginine could significantly delay the development of type 2 diabetes over a long period. • One systematic review examined the effect of polyphenol supplementation.(100) Polyphenol supplementation was found to significantly reduce HbA1c in people with diabetes but no effect was found in people without diabetes or with NDH. • Three systematic reviews(101–103) and three RCTs(104–106) of traditional Chinese medicines were identified. However these were considered to have no impact on the guideline		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
because none of the preparations are licensed for use in the UK. Saturated fatty acid effects on diabetes incidence A case-cohort study(107) evaluated the association with specific fatty acids present in plasma phospholipids and incident type 2 diabetes. The cohort included 12,403 people with incident diabetes and 16,154 people defined as a representative sub-cohort from the EPIC study of 340,234 people. The distribution of fatty acids was measured by gas chromatography. Findings suggested that different saturated fatty acids have different associations with incident type 2 diabetes. Shorter even chain saturated fatty acids (myristic acid, palmitic acid, and stearic acid) were associated with increased incidence of type 2 diabetes. However, odd-chain saturated fatty acids (pentadecanoic acid and heptadecanoic acid) were associated with reduced incidence of type 2 diabetes. Longer even-chain saturated fatty acids (arachidic acid, behenic acid, tricosanoic acid, and lignoceric acid) were also associated with reduced incidence of type 2 diabetes.		
Vulnerable groups: information and services		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
Thirteen studies were identified focusing on technology for prevention of type 2 diabetes. Eight studies examined digital health programmes for prevention of diabetes.(108–115) • Results were mixed with some reporting improvements in weight(108–111,113,114) and glucose control(109,110,114) and other studies reporting no effect on glucose control.(111,112) Another study reported no improvement in weight loss following the intervention.(115) Three studies evaluated telephone programmes including phone messaging services.(116–118) • All 3 studies reported a benefit of the telephone programmes on measured outcomes including HbA1c,(117) development of type 2 diabetes(116) and fasting plasma glucose.(118)	The NHS DPP will be contributing future evidence to this specific question; a pilot in 5,000 people is live, and will assess whether digital behaviour change interventions delivered at scale and under service conditions are associated with change in clinical outcomes associated with diabetes prevention. The NHS DPP noted that digital interventions offer substantial potential for increasing the scalability of, access to, and cost-effectiveness of lifestyle behaviour change advice. The NHS DPP acknowledges that the evidence base is not yet sufficiently robust to warrant inclusion in NICE guidance under current evidence standards. However, the NHS DPP noted that there are particular challenges with generating an evidence base to this level in this field.	Evidence for digital health programmes showed, inconsistent results, whereas telephone programmes consistently showed effectiveness for preventing diabetes. Electronic means of communication are currently recommended to help engage with mobile populations. However, the guideline does not recommend electronic delivery of the entire intervention. NICE has guidance on individual approaches to behaviour change (NICE PH49), which is being updated to consider the use of technology such as apps, text messaging and the internet to drive improvements in behaviours such as physical activity, diet and weight. Therefore, the guideline on diabetes prevention should not be updated to cover technology-based interventions at this time. New evidence is unlikely to change guideline recommendations.
Vulnerable groups: supporting lifestyle change		
A systematic review(119) included 54 RCTs of interventions for improving glycaemic control in people with severe mental illness (n=4,392). Drug	None	The evidence suggests that lifestyle interventions to prevent type 2 diabetes can be effective in vulnerable groups such as people with physical and

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
treatments and behavioural interventions significantly lowered fasting blood glucose, but not HbA1c compared with usual care or placebo. In subgroup analysis of drug interventions, metformin and antipsychotic switching strategies improved HbA1c. Behavioural interventions of longer duration and those including repeated physical activity had greater effects on fasting glucose than those without these characteristics. A single-group pre-test post-test pilot study(120) assessed a modified group-based diabetes prevention programme in 10 overweight or obese people with permanent disability. Participants received 15 conference calls to encourage reduced calorie and fat intake, and increasing physical activity. Overall, the programme retained 70% of participants, who attended an average of 79.3% of conference calls and self-monitored more than half of the weeks. Participants rated the program highly, with mean overall scores of 6.3 out of 7 for helpfulness and 6.2 out of 7 for satisfaction scales, respectively. Program completers experienced a significant mean weight loss, and reduced their BMI. A study(121) assessed a multi-component lifestyle behaviour change intervention (STOP Diabetes) for		intellectual disabilities and people with severe mental health disorders). This finding supports the recommendation that everyone (including older people, those from minority ethnic groups and vulnerable or socially disadvantaged people should be offered risk assessments and lifestyle programmes at times and in locations that meet their needs. New evidence is unlikely to change guideline recommendations.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
adults with intellectual disabilities. The intervention was developed by evidence review plus qualitative stakeholder interviews. It was piloted in 2 cycles, with additional stakeholder interviews to refine the intervention. Qualitative data suggested that two educators and one support person delivering a programme of one carer session followed by seven sessions over 7 weeks was acceptable to service users, carers and educators and appeared to benefit the participants.		
Intensive lifestyle-change programmes: quality assurance		
None	None	None
Training and professional development		
None	None	None
Metformin		
Insulin secretagogues A Cochrane review(122) included 6 RCTs (n=10,018) assessed insulin secretagogues	None	Overall, the new evidence suggests that there is limited or no evidence of effectiveness in preventing type 2 diabetes for insulin secretagogues, DPP-4 inhibitors, GLP-1

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
(sulphonylureas and meglitinide analogues) for preventing type 2 diabetes. Comparator groups were mostly placebo, however a small number of participants in the comparator groups received diet and physical activity or metformin. Most of the data came from one trial of nateglinide. None of the included studies were judged by the authors to have low risk of bias. In 2 studies (n=307), glimepiride showed no significant effect on incidence of diabetes. In 1 study, nateglintide showed no significant effect on incidence of diabetes. Nateglinide and glimepiride are not licenced in the UK for prevention of type 2 diabetes. Dipeptidyl-peptidase (DPP)-4 inhibitors and glucagon-like peptide (GLP)-1 analogues A Cochrane review(123) included 7 RCTs assessing dipeptidyl-peptidase (DPP)-4 inhibitors (n=98) and glucagon-like peptide (GLP)-1 analogues (n=1,620) for preventing diabetes. One RCT of liraglutide 3 mg contributed 85% of all participants. None of the studies were judged by the authors to have a low risk of bias. Liraglutide appeared to reverse NDH in more people (66%) than placebo (36%), but no statistical analysis of this outcome was reported in the abstract. In 1 study of vildagliptin, more people in the vildagliptin		analogues, thiazolidinediones, lorcaserin, or antihypertensives. New evidence is unlikely to change guideline recommendations

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
group had incident diabetes compared with placebo, but no statistical analysis of this outcome was reported in the abstract and the number of incident cases was very small, so would probably be underpowered to detect a difference between groups. No diabetes-related data for 1 study of exenatide were reported in the abstract. Vildagliptin and exenatide are licensed in the UK for treating type 2 diabetes, but not for diabetes prevention. An RCT(124) (n=3,731) assessed liraglutide 3 mg compared with placebo over in people with obesity (almost two-thirds of whom had NDH). All participants additionally received structured diet and physical activity. At 56 weeks, people in the liraglutide group had significantly greater weight loss, and lower blood glucose levels than those in the placebo group. An RCT(125) (n=2,254) assessed liraglutide 3 mg compared with placebo in obese people with NDH. All participants additionally received structured diet and physical activity. By week 160, about half of participants in both groups withdrew from the study. At 160 weeks, the time to diagnosis of diabetes was significantly longer in people in the liraglutide group than those in the placebo group. However, the proportion of people who progressed to type 2		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
diabetes was low in both groups (2% on liraglutide and 6% on placebo). This may indicate that the diet and physical activity components were effective, so liraglutide has a small additive effect. People in the liraglutide group also had significantly greater weight loss. A further report from this study(126) noted that significantly more people in the liraglutide group reverted to normoglycaemia compared with placebo. Liraglutide 1.2–1.8 mg is licensed in the UK for treating diabetes and liraglutide 3 mg is licensed for treating obesity. However, liraglutide is not licensed in the UK for preventing type 2 diabetes. NICE has published 'Obese, overweight with risk factors: liraglutide (Saxenda)' (ES14), which summarises the evidence base for use of liraglutide for weight management. Thiazolidinediones An RCT(127) (n=190) assessed rosiglitazone 8 mg compared with placebo in people with NDH. After 3.5 years, people on rosiglitazone had significantly more body fat, and abdominal fat than those on placebo. Rosiglitazone has been withdrawn from sale in the UK.		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
An RCT(128) (ACT NOW, n=293) assessed pioglitazone (dose not reported in the abstract) compared with placebo. At 12 months after stopping study drugs the cumulative incidence of type 2 diabetes was lower in the pioglitazone group. However, when analysing only the period after stopping the study drugs, there was no significant difference in incidence of diabetes between the pioglitazone and placebo groups. Pioglitazone is not licensed in the UK for preventing type 2 diabetes. Lorcaserin A post-hoc analysis(129) from 2 RCTs (BLOOM, BLOSSOM) assessed the weight-loss drug lorcaserin compared with placebo in people with NDH. Guidance on lorcaserin is the subject of an ongoing technology appraisal - Obesity - lorcaserin. This information will be passed onto the TA team for consideration. Antihypertensives An RCT(130) assessed losartan 50–100 mg daily and levamlodipine 2.5–5.0 mg daily in people with hypertension and NDH (n=244). After 24 and 36 months of treatment there was no significant difference between the groups in change in fasting		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
insulin levels or insulin sensitivity index. However, both outcomes showed significant improvement from baseline. Losartan is not licensed in the UK for preventing type 2 diabetes and levamlodipine is not licensed for use in the UK.		
Orlistat		
None	None	None
Areas not currently covered in the guideline Bariatric surgery		
Nine studies (6 observational studies, 2 systematic reviews and 1 follow-up of an RCT) were identified focusing on bariatric surgery as a tool for preventing type 2 diabetes in obese patients. The following interventions were considered: Roux-en-Y gastric bypass(131), partial ileal bypass(132), bariatric surgery (not otherwise specified),(133–136) sleeve gastrectomy,(137) gastric banding (138) and endoscopic sleeve gastroplasty.(139) In all studies, the surgical intervention had a beneficial	None	Evidence consistently shows that bariatric surgery may prevent diabetes. Although NICE's guideline on preventing type 2 diabetes in people at high risk has no recommendations on bariatric surgery; this intervention is covered in 'Obesity: identification, assessment and management' (NICE CG189). The new evidence did not suggest that bariatric surgery should be considered in people not covered by the obesity guideline. Therefore, new recommendations in this area should not be added at this time.

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
impact on reducing the development of type 2 diabetes. A cost-effectiveness analysis(134) suggested that bariatric surgery is cost-effective, with a cost per quality-adjusted life year gained (QALY) gained of £7,129.		
Research recommendation 1 Which combination of risk-assessment tools and blood tests (HbA1c or fasting plasma glucose [FPG]) are most cost effective and effective at identifying and assessing the risk of type 2 diabetes among populations at high risk? In addition, how frequently should testing take place to be efficient? How does effectiveness and cost effectiveness vary for different black and minority ethnic groups, for example, African-Caribbean and black African; people aged 18–40, people aged 75 and over, and for high-risk vulnerable adults?		
New evidence relevant to the research recommendation was found but an update of the related review question is not planned because the new evidence is insufficient to trigger an update. The new evidence includes further evidence on risk assessment tools and on blood testing options.	None	None
Research recommendation 2 What are the demographic characteristics and rates of progression to type 2 diabetes among people with a high risk score but normal blood glucose levels (fasting plasma glucose of less than 5.5 mmol/l or HbA1c of less than 42 mmol/mol)? How does this compare with people who have both a high risk score and blood glucose levels that indicate impaired glucose regulation (fasting plasma glucose 5.5–6.9 mmol/l or HbA1c 42–47 mmol/mol (6.0–6.4%)?		

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
None	None	None
Research recommendation 3 What are the most effective and cost-effective methods of increasing uptake of type 2 diabetes risk assessments and monitoring among those at greatest risk? Those at greatest risk include people from lower socioeconomic and black and minority ethnic groups, and those aged 75 or over.		
None	None	None
Research recommendation 4 Which components of an intensive lifestyle-change programme contribute most to the effectiveness and cost effectiveness of interventions to prevent or delay type 2 diabetes in those at high risk? How does this vary for different black and minority ethnic groups, for people of different ages for example, aged 18–24, 25–39 and 75 and over, and for vulnerable adults?		
None	None	None
Research recommendation 5 How effective and cost effective are different types of dietary regime in reducing short- and long-term blood glucose levels and preventing or delaying type 2 diabetes? How does this vary for different subgroups, for example, African-Caribbean and black African and other minority ethnic groups and for people of different ages, for example, aged 18–24, 25–39 and 75 and over?		
New evidence on diet relevant to the research recommendation was found but an update of the	None	None

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
related review question is not planned because the new evidence is insufficient to trigger an update.		
Research recommendation 6 How effective and cost effective are different types (and levels and frequency) of physical activity in reducing short- and long-term blood glucose levels and preventing or delaying type 2 diabetes? How does this vary for different subgroups, for example, different black and minority ethnic groups and people of different ages, for example, aged 18–24, 25–39 and 75 and over		
New evidence on physical activity relevant to the research recommendation was found but an update of the related review question is not planned because the new evidence is insufficient to trigger an update.	Topic experts highlighted studies of physical activity.(81,84)	None
Research recommendation 7 What are the most effective and cost-effective methods for identifying, assessing and managing the risk of type 2 diabetes among high-risk, vulnerable adults? This group includes: frail older adults, homeless people, those with severe mental illness, learning or physical disabilities, prisoners, refugees, recent migrants and travellers.		
New evidence on managing the risk of type 2 diabetes in vulnerable adults relevant to the research recommendation was found but an update of the related review question is not planned	None	None

Summary of new evidence from 8-year (PH12)	Summary of new intelligence from 8-year surveillance (from topic experts or initial internal intelligence gathering)	Impact
because the new evidence is insufficient to trigger an update.		
Research recommendation 8 What is the effectiveness of providing digitally delivered intensive lifestyle-change programmes in preventing type 2 diabetes in adults at high risk of type 2 diabetes?		
New evidence on digitally delivered interventions relevant to the research recommendation was found but an update of the related review question is not planned because the new evidence is insufficient to trigger an update.	The NHS DPP will be contributing future evidence to this specific question; a pilot of 5,000 people is live, and will assess whether digital behaviour change interventions delivered at scale and under service conditions are associated with change in clinical outcomes associated with diabetes prevention.	None

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