



Public Health
England

Protecting and improving the nation's health

NHS Health Check: Diabetes Filter Consultation

About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

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Introduction

Introduced in 2009, the NHS Health Check programme aims to prevent heart disease, stroke, type 2 diabetes and kidney disease and raise awareness of dementia both across the population and within high risk groups. In April 2013, secondary legislation came into force requiring local authorities to offer an NHS Health Check to all eligible people aged between 40 and 74 years of age in England. This legislation also clearly defined what should be included in an NHS Health Check. A summary of the current NHS Health Check is shown in Appendix A.

Since then, PHE has received requests to extend its benefits to other areas by amending existing or including new elements in the check. PHE recognises the importance of considering these requests and of doing so through a robust process.

To facilitate this, the NHS Health Check expert scientific and clinical advisory panel (ESCAP) agreed a content review process, set out in Appendix B. This process ensures that proposals are considered against a range of criteria including clinical and cost effectiveness, feasibility and impact on equity. It also ensures that where ESCAP is recommending a change this is consulted on with stakeholders.

So far, ESCAP has considered 13 proposals at stage one and recommended two progress through the remaining stages of the content review process. More information on these proposals and ESCAP's recommendations are available on the NHS Health Check [website](#).

One of the proposals ESCAP has considered and is now making a recommendation on is changing the existing diabetes filter. This document summarises ESCAP's recommendation and provides background information on the evidence that has informed it. PHE is now inviting stakeholders to share their views on ESCAP's recommendation **by 25 October 2016** by returning a completed consultation response form to nhshealthchecks.mailbox@phe.gov.uk.

1. ESCAP recommendation

Having reviewed a range of evidence, summarised in sections 3 to 7, PHE is now inviting stakeholders to share their views on ESCAP’s diabetes filter recommendation. To identify individuals at high risk of diabetes and so eligible for a blood glucose test, as part of an NHS Health Check, providers can continue to use the existing diabetes filter and thresholds as set out in the programmes best practice guidance or use one of the validated assessment tools. For each validated assessment tool high risk should be defined using the threshold in Table 1.

Table 1. Diabetes risk tools and thresholds

| Diabetes risk tool | Diabetes high risk threshold |
|---------------------------|-------------------------------------|
| QDiabetes | >5.6 |
| Cambridge | >0.2 |
| Leicester practice risk | >4.8 |
| Leicester risk tool | ≥16 |

We would welcome your views on this recommendation by the 25 October 2016. Please use the consultation response form and submit it to nhshealthchecks.mailbox@phe.gov.uk.

2. Background to the ESCAP recommendation

Original proposal

During an NHS Health Check, a diabetes filter is currently used to decide whether a person is at high risk of developing diabetes. This comprises two criteria:

- the individual’s Body Mass Index (BMI) is ≥30 or ≥27.5 and they are from a black or Asian ethnic group
- the individual’s blood pressure is ≥140/90

If either of these criteria is met the individual should go on to have a blood glucose test to determine whether they are diabetic, non-diabetic hyperglycaemic (NDH) or have normal levels of blood glucose. As part of the content review process ESCAP were

asked to consider substituting the current diabetes filter for a validated diabetes risk assessment tool.

Clinical effectiveness

The current diabetes filter is not validated and research suggests this tool may miss a third of people at high risk (1). Therefore, Health Survey for England data was used to establish the sensitivity and specificity of the current filter and validated tools.

This demonstrated that:

- the ability of the current filter to correctly identify people who do not have diabetes or NDH was broadly comparable to the other tools
- the filter was less sensitive than the other tools in correctly identifying people who would later be diagnosed with diabetes or NDH, see table 2.

Table 2. A comparison of the sensitivity, specificity (95% confidence interval) of the current diabetes filter and validated tools.

| | N | Sensitivity | Sensitivity (NDH) | Sensitivity (Undiagnosed diabetes) | Specificity |
|---------------------------|------|---------------------------|---------------------------|------------------------------------|---------------------------|
| Diabetes filter | 40.6 | 57.4 (54.6 – 60.1) | 53.7 (50.7 – 56.7) | 78.6 (72.8 – 84.9) | 62.6 (61.4 – 63.8) |
| Cambridge | 42.6 | 64.5 (61.7 – 67.4) | 62.3 (59.5 – 65.3) | 77.4 (71.5 – 83.9) | 62.1 (60.9 – 63.3) |
| Leicester Risk Assessment | 44.2 | 69.2 (66.5 – 72.1) | 66.5 (63.7 – 69.4) | 85.2 (80.1 – 90.8) | 60.5 (59.3 – 61.7) |
| Leicester Practice Risk | 43.6 | 69.6 (66.9 – 72.5) | 66.7 (64.0 – 69.6) | 86.5 (81.7 – 91.9) | 61.4 (60.2 – 62.6) |
| QDiabetes | 40.5 | 66.3 (63.5 – 69.1) | 63.5 (60.6 – 66.4) | 82.3 (76.9 – 88.2) | 64.4 (63.2 – 65.6) |

In completing this analysis two issues were identified.

The validated tools assess different outcomes:

- the Cambridge risk score was developed to identify those at risk of having prevalent but undiagnosed type 2 diabetes and has been shown to be predictive of incident type diabetes (2)
- the Leicester risk assessment score (3) and the Leicester Practice Risk score (4) were developed to identify those at high risk of impaired glucose regulation and type 2 diabetes

- QDiabetes (5) estimates an individual's 10-year risk of developing diabetes

There is not a commonly accepted definition of 'high risk' for type 2 diabetes.

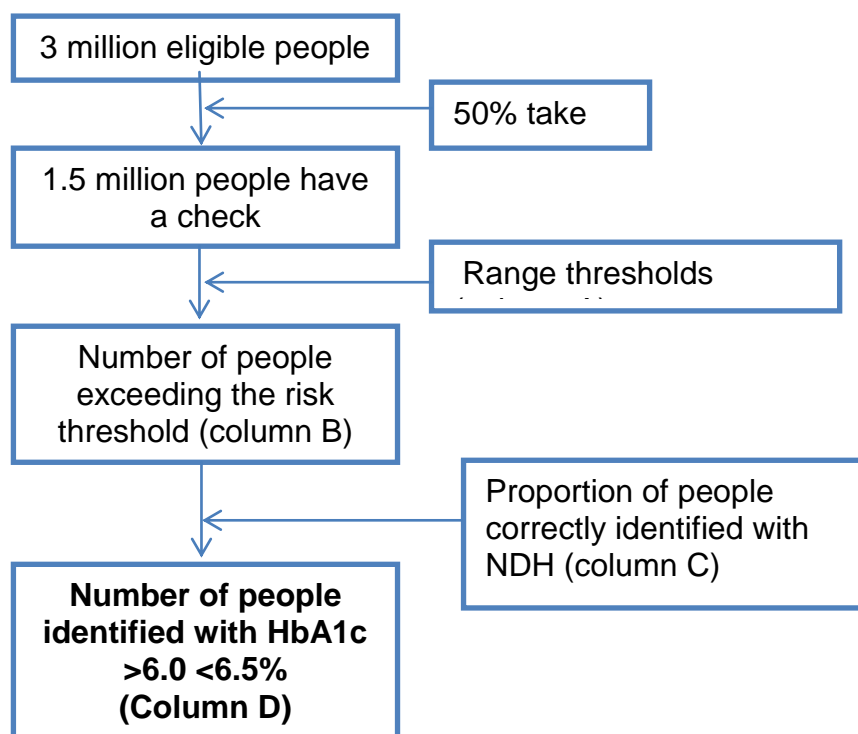
With the launch of the NHS national diabetes prevention programme (NHS DPP) ESCAP members agreed that it would be important to take a consistent approach to identifying people at high risk of type 2 diabetes. To do this, a consistent definition of high risk for each of the different tools is needed.

Defining high risk of type 2 diabetes

A range of thresholds for each of the tools were chosen in order to calculate the number of people that would be identified as being at high risk of type 2 diabetes using different cut-off points.

It was assumed that three million people are eligible for an NHS Health Check each year and that half attend their check. The thresholds were then applied to estimate the number of people who would be identified as being at high risk of type 2 diabetes and so eligible for a blood glucose test. Health Survey England (HSE) validation data was then used to estimate the number of people at high risk whose blood glucose test would confirm that they were NDH and the number who have type 2 diabetes. These steps are summarised in figure 1.

Figure 1. Steps in calculating the number of people confirmed as NDH



Unfortunately, family history of diabetes is not available through the HSE dataset. This means that the number of people identified as being at high risk is likely to have been underestimated for all of the tools because they each require this information.

Table 3 shows that, in comparison to option 1 (the current diabetes filter) options 6 (QDiabetes cut-point 5.6) and 18 (Leicester cut-point 16) identify a roughly similar number of people as being at high risk of type 2 diabetes (column B). However, both options 6 and 18 are likely to identify more people with confirmed NDH (column D). All three of these options identify a sizeable number of people with prevalent but previously undiagnosed type 2 diabetes (column E).

Reducing the threshold further within each of the tools increases the number of people identified as high risk and subsequently the number with NDH. But because the percentage of eligible individuals confirmed as having NDH reduces with the lower-risk thresholds, this gain is marginal. It also comes at the cost of a very marked increase in the number of blood glucose tests that would need to be undertaken.

Table 3. Estimated number of people identified as having non-diabetic hyperglycaemia for each of the tools, by different risk thresholds

| Diabetes risk tool | Option | A Diabetes risk tool threshold | B Estimated number of individuals exceeding risk threshold and eligible for a blood glucose test | C Percentage of eligible individuals exceeding risk threshold with confirmed non-diabetic hyperglycaemia | D Estimated number of individuals whose HbA1c is >6.0 but < 6.5 | E Estimated number of individuals with newly diagnosed prevalent diabetes (HbA1c ≥6.5) |
|---------------------------|--------|-----------------------------------|--|---|---|---|
| Diabetes filter | 1 | BMI >30 | 609,041 | 18.1 | 109,994 | 27,948 |
| | 2 | BMI >27.5 | 819,510 | 16.7 | 137,114 | 31,023 |
| | 3 | BMI >25 | 1,106,233 | 15.4 | 170,572 | 33,882 |
| QDiabetes | 4 | 16.4 | 147,783 | 26.8 | 39,571 | 12,731 |
| | 5 | 10.5 | 340,760 | 24.2 | 82,538 | 22,385 |
| | 6 | 5.6* | 607,681 | 21.4 | 129,854 | 29,069 |
| | 7 | 4.2 | 841,608 | 18.8 | 157,967 | 31,933 |
| Cambridge | 8 | 0.5 | 146,832 | 27.3 | 40,151 | 11,230 |
| | 9 | 0.375 | 303,411 | 23.6 | 71,615 | 20,129 |
| | 10 | 0.2 | 577,265 | 20.6 | 118,652 | 25,531 |
| | 11 | 0.125 | 776,962 | 18.6 | 144,290 | 29,451 |
| Leicester practice risk | 12 | 6 | 53,916 | 30.5 | 16,451 | 7,111 |
| | 13 | 5.6 | 159,733 | 26.0 | 41,605 | 12,736 |
| | 14 | 5.2** | 363,723 | 21.4 | 87,667 | 22,182 |
| | 15 | 4.8 | 653,577 | 20.9 | 136,277 | 30,567 |
| Leicester risk assessment | 16 | 25 | 96,767 | 29.2 | 28,304 | 9,506 |
| | 17 | 20 | 297,138 | 24.4 | 72,629 | 20,400 |
| | 18 | 16** | 528,802 | 21.5 | 113,856 | 26,809 |
| | 19 | 14 | 663,059 | 20.3 | 134,897 | 30,013 |

*Threshold is defined as the 40% of people at highest risk of type 2 diabetes by tool authors

**Threshold is defined as high risk by tool authors

Feasibility

To understand the implications of using validated diabetes risk assessment tools in practice, a feasibility study was completed on two of the tools. This confirmed that the validated tools require the collection of additional data:

- QDiabetes requires: family history of diabetes and whether the individual is taking steroids
- Leicester Risk Assessment requires: family history and waist circumference

The addition of waist circumference also requires equipment – a sprung loaded tape measure – and training for the healthcare professional to ensure that they are using the appropriate measurement technique.

All validated tools also require the practitioner to have access to the actual risk assessment tool to calculate the risk score.

Overall, the feasibility study (6) demonstrated that as long as these additional operational requirements are met it is possible to use a validated tool as part of a check.

Delivery risks

As part of the feasibility study the following risks were identified:

- women from some ethnic minority groups may not consent to having a waist circumference measure taken if a female practitioner is not available
- mis-classification of type 2 diabetes risk could arise as a result from inaccurate measurement of waist circumference, particularly if a practitioner is using the “no touch technique”
- there is limited availability of diabetes risk assessment templates for the validated tools within NHS clinical systems
- using the validated tools requires additional information beyond that already collected during an NHS Health Check This increases the time requirement of the check

Equity impact

The feasibility study used data from Durham to demonstrate that both the current filter and Leicester Risk Assessment identify more people at risk of type 2 diabetes from low-income households, table 4. This data also shows that there is greater variation in the proportion of people identified at high risk between quintiles using the current filter. This

may suggest that those in higher income households may be more likely to be missed with the current filter.

The QDiabetes tool includes a data item to assess the Townsend deprivation score and therefore is sensitive to changing need with increasing deprivation.

Table 4. Estimate of the number of people identified as at high risk by deprivation quintile for the current filter and Leicester risk assessment using a sample of population data from Durham

| Quintile of deprivation 1 (least) to 5 (most) | n | Average age (yrs) | Current diabetes filter | | Leicester Risk Assessment | |
|---|-------------|----------------------|---|-------------|--|-------------|
| | | | Identified as at high risk: require blood test | % | Identified at high risk: require blood test | % |
| 1 | 580 | 52.4 | 240 | 41.4 | 203 | 35.0 |
| 2 | 601 | 52.4 | 278 | 46.3 | 210 | 34.9 |
| 3 | 1021 | 51 | 496 | 48.6 | 393 | 38.5 |
| 4 | 1197 | 49.4 | 660 | 55.1 | 456 | 38.1 |
| 5 | 874 | 46.4 | 520 | 59.5 | 347 | 39.7 |
| Total | 4273 | | 2194 | 51.3 | 1609 | 37.7 |

The feasibility study also considered the impact of the tools on people with protected characteristics. This indicated that:

- the current filter, QDiabetes and the Leicester Risk Assessment perform slightly better in women
- QDiabetes performs slightly less well in older age groups
- the current filter is better for Asian groups
- the Leicester risk assessment may be better for white groups and QDiabetes can be calibrated for all the main ethnic groups and hence is more sensitive to ethnicity

There are no perceived impacts on other characteristics except that for women from some religious groups the need to take a waist circumference measurement might be problematic if the practitioner is male. There is a no-touch technique but it differs from the recommended method and so may over or underestimate waist circumference. This increases the likelihood of the mis-allocation of risk.

Cost

The estimated annual cost of each of the assessment methods assumes that 1.5 million people each year will have an NHS Health Check. The cost of a blood glucose test is based on a cost estimate of £14 for an HbA1c (as the most expensive test). The number of people needing an HbA1c is based on the number of people estimated as being at high risk, using the preferred thresholds, as shown in Table 1.

The feasibility study indicated that the additional measures required by two of the tools took 45 to 60 seconds to complete. The cost of this extra time per check was calculated using the average hourly rate of £11.80 for a registered nurse in England. The cost of a tape measure (required for the Leicester risk assessment tool) has not been included because it is assumed that this would be standard equipment available to practitioners working in general practice.

To ensure practitioners can access the risk assessment tool in clinical systems there would be an annual licensing cost of about £20,000 for a single tool. It was assumed that each of the tools would incur a similar licensing arrangement and fee. It has been assumed that the cost of embedding the tool within clinical systems would be addressed by the clinical system providers.

The feasibility study shows that familiarisation with the components and diabetes risk score can be done online and takes approximately five minutes (6). Training in understanding the meaning of a high risk score and how to explain this to the patient also takes approximately five minutes. It is assumed that this training would be included within routine local NHS Health Check training and updates so has not been included as an additional cost.

A summary of the estimated total annual cost and cost per case, compared to the current diabetes filter, are shown in Table 5.

Table 5. Cost of using a validated tool compared with the current diabetes filter

| Tool | Threshold | Number eligible for blood glucose test | Number NDH cases | Number Type 2 diabetes (T2D) cases | Total NDH and T2D cases | Total cost | difference to current filter | cost per case | Difference per case to current filter |
|---------------------------------|------------------|---|-------------------------|---|--------------------------------|-------------------|-------------------------------------|----------------------|--|
| Current filter | - | 609,041 | 109,994 | 27,948 | 137,942 | £ 8,526,574.00 | £ 0.00 | £ 61.81 | £ - |
| Q diabetes | 5.6 | 607,681 | 129,845 | 29,069 | 158,914 | £ 8,827,534.00 | £ 300,960.00 | £ 55.55 | - £ 6.26 |
| Cambridge Leicester | 0.2 | 577,265 | 118,652 | 25,531 | 144,183 | £ 8,401,710.00 | - £124,864.00 | £ 58.27 | -£ 3.54 |
| practice risk Leicester risk | 4.8 | 653,577 | 136,277 | 30,567 | 166,844 | £ 9,470,078.00 | £ 943,504.00 | £ 56.76 | -£ 5.05 |
| assessment | 16 | 528,802 | 113,856 | 26,809 | 140,665 | £ 8,827,534.00 | £ 300,960.00 | £ 62.76 | £ 0.94 |

Conclusion

Having reviewed a range of evidence, summarised in sections 3 to 7, PHE is now inviting stakeholders to share their views on ESCAP's recommendation.

To identify individuals at high risk of diabetes and so eligible for a blood glucose test, as part of an NHS Health Check, providers can continue to use the existing diabetes filter and thresholds as set out in the programmes best practice guidance or use one of the validated assessment tools. For each validated assessment tool high risk should be defined using the threshold in Table 1.

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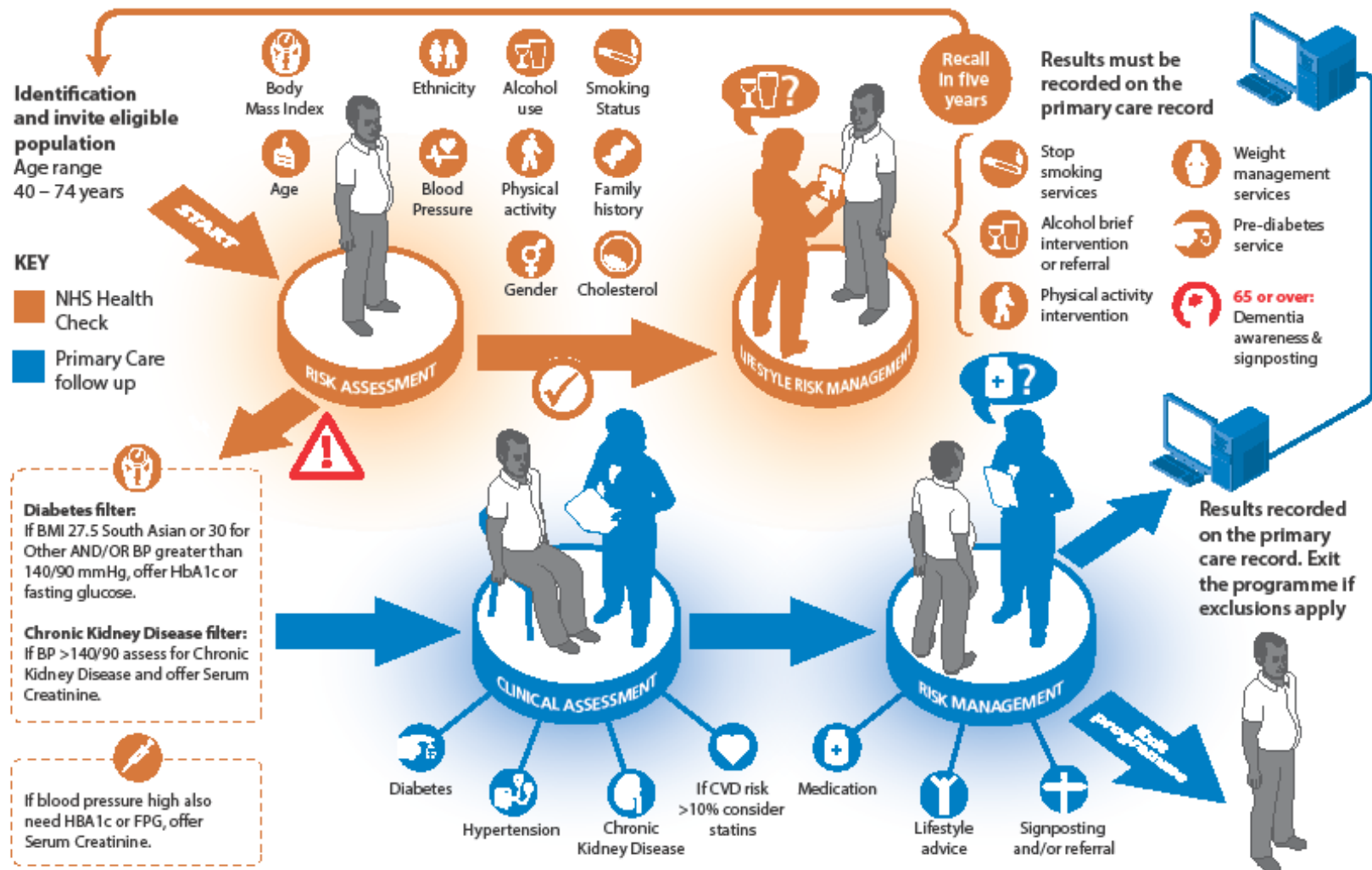
We would welcome your views on this recommendation by the 25 October 2016. Please use the consultation response form and submit it to nhshealthchecks.mailbox@phe.gov.uk.

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Appendix A: Summary of the current NHS Health Check

NHS Health Check



Appendix B: Content review process

