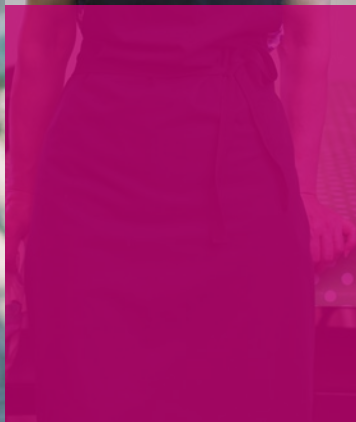


Emerging evidence on the NHS Health Check: findings and recommendations

A report from the Expert Scientific
and Clinical Advisory Panel



Contents

Foreword	3	Moving forward: ESCAP's recommendations for action	17
Background	5	1. NHS Health Check coverage	17
The case for action on prevention	6	2. Take-up	17
Putting prevention first	6	3. Patients' perspectives	19
Preventing CVD	6	4. Professionals' perspectives	19
An integrated approach to preventing CVD	7	5. The programme's impact	20
The continuing case for NHS Health Checks	7	6. Research	21
NHS Health Check: the latest figures	11	References	22
NHS Health Check programme: rapid evidence synthesis 2016	12	Contacts and acknowledgments	25
Key findings	12		

Foreword



Over the past 20 years we have seen considerable gains in life expectancy, largely due to reductions in deaths from cardiovascular disease (CVD) and cancer. While this is a great achievement it highlights the lack of similar improvements in the number of years spent in ill health due to these and other non-communicable diseases. Increasing longevity without corresponding improvement in prevalence of ill health has led to an inevitable increasing burden on the health and social care system in a situation

which is beginning to appear unsustainable without more direct action on prevention.

The UK Government, Public Health England (PHE) (1) and NHS England (2) are all committed to tackling this burden through population and individual prevention approaches. The NHS Health Check programme is a world leading example of putting this commitment into practice on the scale required to really make a difference. In support of local strategies for tackling preventable death and disability across England it offers three crucial benefits:

- it systematically measures a range of risk factors that are known to interact and affect the risk of CVD and other non-communicable diseases such as dementia, respiratory disease and some cancers;
- it offers everyone having a check the opportunity to understand their personal CVD risk profile and to modify the breadth of individual risk factors that contribute to their future health risk; and
- it identifies people early – from the age of 40 – enabling timely intervention to reduce exposure time to risk factors.

Despite being underpinned by a comprehensive evidence base on the effectiveness of its component parts, and by National Institute for Health and Care Excellence (NICE) recommendations, there has been very little direct evidence on the effectiveness of comparable programmes. This has understandably led to a degree of criticism and scepticism (3).

In 2014, PHE established the NHS Health Check Expert Scientific and Clinical Advisory Panel (ESCAP) explicitly to keep the evidence on the NHS Health Check programme under review. I would like to take this opportunity to thank all those who have given their time and expertise so freely to support the work of ESCAP either as members, invited attendees or in various essential support roles.

In our work on ESCAP we have seen a slow but steady growth in the literature on the programme including the publication of two landmark national studies in 2016. To consolidate the learning so far and to ensure a systematic view of the evidence is available, ESCAP recommended undertaking periodic rapid syntheses of published evidence. The first of these has been undertaken by the University of Cambridge and RAND Europe. The results are discussed in detail in this review but some highlights are as follows:

- The NHS Health Check is not just reaching the ‘worried well’, as people from poorer communities and high risk ethnic minority groups are more likely to have had a check. Even so, it seems that people from more affluent communities may be more likely to accept an NHS Health Check invitation, so going forward we need to ensure that tackling inequalities remains at the heart of the programme.
- The relationship between take-up age and gender may be more nuanced than we might think, with take up decreasing in women with increasing age and vice versa in men.

4 Emerging evidence on the NHS Health Check: findings and recommendations

- Higher levels of hypertension, chronic kidney disease, peripheral vascular disease, familial hypercholesterolemia and type 2 diabetes are detected among people having a check compared to non-attendees.
- Lifestyle and clinical follow up is variable. While statin prescribing is higher among attendees, rates overall remain low. Ensuring that people receive appropriate follow-up is crucial to helping them reduce their risk and maximise health gains.
- Most patients are confused by or incorrectly understand their CVD risk score and we need to find ways of communicating this more effectively.
- The invitation has a role to play in increasing uptake. If everyone adopted the new national letter template we could see 100,000 more people having a check each year.
- Targeting the programme at high-risk people is cost-effective.
- The programme can prevent illness, but the size of that benefit remains uncertain. It is essential to use more recent and see more complete data than that already analysed to evaluate the programme's overall impact.

These findings provide extremely valuable insight. Yet it is apparent that what we know about the programme is significantly limited by the quality and scope of the available research. Current evidence is characterised by missing data, absence of comparator groups and samples that are not nationally representative. This is clearly an unacceptable situation that needs to be addressed by the research community given the importance of the programme.

Every NHS Health Check should now be reliably recorded in practice records using the new data standard. This raises the possibility of creating a national NHS Health Check data set, which could subsequently be linked to sources of outcome data, such as routine vital statistics and health care

activity, and more sophisticated cardiovascular and cancer registries. This would offer a remarkable opportunity to greatly enhance the quality and precision of the research evidence, and improve our knowledge of the programme's impact and our understanding of population health more generally in the current era of the epidemiological transition. We very much hope that such a resource will be available for future research studies.

I commend this report to you as the first systematic look at what the contemporary evidence tells us about the NHS Health Check Programme and an important step forward in the history of this landmark programme. The findings are limited by the research base but nevertheless more than sufficient in many areas to be used to improve delivery and impact on the ground.

These early findings provide us with a measure of confidence that the programme is achieving its objectives while also highlighting areas for further development and study. In the spirit of continuing this journey of learning and improving I would like to encourage everyone reading the report to consider how you can put its recommendations into practice.



John Newton

Chief Knowledge Officer, Public Health England

Background

In 2014 PHE established [ESCAP](#) to provide advice on the NHS Health Check programme and other related CVD topics. The panel performs a vital role in advising PHE on:

- changes to the content of the NHS Health Check to ensure it remains fit for purpose and is underpinned by the best available evidence;
- emerging evidence on the programme;
- research needs and priorities; and
- opportunities for future research and evaluation of the programme.

Since PHE published *Our approach to the evidence* (4) ESCAP has played a central role in identifying and informing NHS Health Check research priorities (5), responding to the findings of emerging research (6) and in shaping new advice from PHE on how diabetes risk should be assessed during an NHS Health Check.

The panel continues to provide fundamental support to work that brings a strong scientific and clinical grounding and steer to the programme. In doing so, ESCAP has recognised that there is a growing literature of published studies evaluating the first eight years of the programme. To fully understand what has been learnt so far and what should shape both research and implementation priorities going forward, ESCAP recommended undertaking a rapid evidence synthesis of the literature.

In this report, ESCAP sets out the ongoing case for prevention, summarises the key findings of the evidence synthesis and presents recommendations for future priorities for action.



The case for action on prevention

Putting prevention first

Over the past 20 years there have been tremendous improvements in life expectancy (7), largely due to reductions in deaths from cardiovascular disease and cancer. Yet the burden of ill health has not reduced to the same extent and in some cases it is going up (7).

Ischaemic heart disease, cerebrovascular disease, Alzheimer's disease, lung cancer and chronic obstructive pulmonary disease remain the top causes of death and disability in England (7), and place a considerable strain on the NHS.

For example, every day there are more than 1,200 attendances at accident and emergency departments because of heart problems and 290 as a result of cerebrovascular problems (8). But the size of the burden faced by the NHS in helping people to manage these diseases is not inevitable.

We not only know that these diseases share common environmental, behavioural and metabolic risk factors (7, 9), but that these factors are modifiable (10) and account for a substantial proportion of disability adjusted life years resulting from these diseases (7).

Despite this, the leading risk factors remain unacceptably high across England. For every 10 adults, two are smokers (11), at least six are overweight or obese (12), three have high blood pressure (13), four are drinking above low risk levels of alcohol consumption (14), six have raised levels of cholesterol (15) and three are physically inactive (16).

Prevention is clearly the way forward. Reducing this breadth of risk factors offers the opportunity to reduce the burden of early deaths and illness from leading diseases, achieving a considerable health gain across

the population and relieving pressure on the NHS (17). Such benefits are recognised by both NHS England (2) and PHE (1) who make it clear that the system must 'get serious about prevention'.

Preventing CVD

One in 10 people continue to live with CVD. It remains the second biggest cause of death in England (18, 19), with 200 people dying each day from a heart attack or stroke (20). While clinical treatment and management has come a long way in saving lives, by the time someone is admitted to hospital the underlying cause of CVD – atherosclerosis, a narrowing of the arteries – is extremely well advanced and largely irreversible.

Although the greatest burden of death and disability from CVD occurs among people over the age of 50 (20, 21), we have known for some time that CVD is not an inevitable part of the ageing process.

Unlike some other diseases, we have evidence that not only highlights the modifiable risk factors but shows that achieving a favourable risk factor profile has the benefit of reducing cardiovascular events (17).

The development of atherosclerosis begins early, long before someone has a heart attack or stroke. We know from trials that around 1 in 5 teenagers already have a degree of atherosclerosis (22), and in those aged 50 or over, 4 in 5 have atherosclerosis in multiple sites (23). Recent evidence shows that exposure to modifiable risk factors over the first 50 years of life is the driver for many cases of CVD (24). This presents a key opportunity for prevention as intervening early to tackle this breadth of risk factors offers long-term benefits for lifetime cardiovascular health.

NICE (25, 26) and the World Health Organization (27) recommend adopting strategies that include primary prevention in order to reduce the burden of CVD. In England, PHE has demonstrated its commitment to continuing to address CVD through a range of primary, secondary and tertiary prevention initiatives and interventions in *Action on cardiovascular disease: getting serious about prevention* (28).

An integrated approach to preventing CVD

Research shows that prevention strategies that include population-wide interventions alongside NHS Health Checks have the greatest impact on reducing overall CVD burden and inequalities (17). A 'whole-systems approach' to prevention must include both population level activity to address unhealthy environments as well as interventions that spot high risk behaviours and conditions early on and help individuals make healthier choices (figure 2).

There is a significant opportunity for primary care to contribute to the prevention agenda. With 1 million conversations taking place with patients every day and high visibility of risk behaviours and social determinants, primary care offers a natural gateway to prevention resources and health information across a range of channels.

There is great work being done, but we are still seeing significant variation in the detection and management of high risk conditions, including high blood pressure, type 2 diabetes and chronic kidney disease (29).

For example, 4 in 10 people with hypertension, that is around 26,000 people in every local area, are undiagnosed (13). That means they are unaware of their high risk and are not receiving the lifestyle advice and medical treatment that we know can prevent heart attacks and strokes. Similarly, large numbers of people with atrial fibrillation and type 2 diabetes, both conditions that dramatically increase the risk of life-changing CVD, are undiagnosed or under-treated (29).

NHS Right Care has published a CVD optimal value pathway (30) that brings together the different ways that primary care can contribute to the prevention of cardiovascular disease, including managing atrial fibrillation, blood pressure and cholesterol, but also diabetes and pre-diabetes and chronic kidney disease (figure 3). The Right Care programme aims to support commissioners to improve performance in these areas.

The continuing case for NHS Health Checks

Nearly 10 years since its inception, the NHS Health Check remains a world-leading prevention programme. Underpinned by NICE evidence-based recommendations, it continues to provide a significant opportunity to reduce early death, disability and health inequality as part of a suite of individual and population interventions being delivered across England.

In its contribution to tackling CVD across England it offers three crucial benefits:

- it systematically measures a range of risk factors that are known to interact and affect CVD risk;
- it offers everyone having a check the opportunity to understand their personal CVD risk profile and to modify the breadth of individual risk factors that contribute to their future CVD risk; and
- it identifies people early – from the age of 40 – enabling timely intervention to reduce exposure time to CVD risk factors.

By identifying people who are at high risk of having a heart attack or stroke in the next 10 years the NHS Health Check can help to tackle health inequalities, as the burden of early death from CVD is three times higher in the most deprived communities compared with the least deprived (31). However, its benefits do not end there. It has a central role in supporting healthy ageing and as a prevention programme, crucially, it offers the

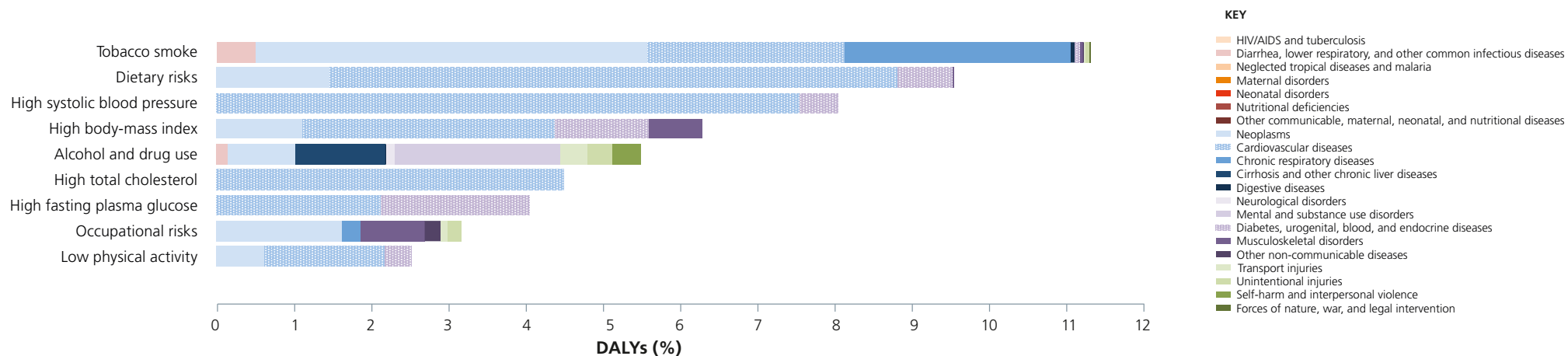


Figure 1: Disability-adjusted life-years (DALYS) attributed to level 2 risk factors in 2015 in England for both sexes combined (32)

opportunity of improving the long-term cardiovascular risk profile of the nation by identifying individuals at low CVD risk and, in line with NICE guidance, with unfavourable individual risk factors.

This offers an opportunity to directly engage people in a conversation about what they can do to keep themselves healthy and well, as well as providing a mechanism to ensure that those who would benefit from local services, for example to help them to lose weight, become more active, drink less or stop smoking, get that help. It is by supporting everyone having a check to reduce or maintain a healthy risk factor profile that the NHS Health Check can help to achieve lifetime gains in cardiovascular health for individuals (33).

More recently, the introduction of the Healthier You: NHS Diabetes Prevention Programme means that NHS Health Checks also provide an established approach for identifying and referring people who are at high risk of diabetes, supporting NHS England’s *Five Year Forward View* commitment to tackle type 2 diabetes.

The programme can also contribute to the early detection of disease and risk factors that require clinical management. Where there is a high level of lifestyle and clinical management the programme not only prevents life-changing events like heart attacks and strokes, but is also cost-effective (33). It provides both a mechanism and a means for delivering the NHS Right Care optimal CVD prevention pathway and CVD prevention outcomes as part of local sustainability and transformation plans.

By promoting healthy ageing and tackling the top seven risk factors for early death and disability, the NHS Health Check provides a cornerstone for the prevention of other diseases that share common risk factors such as dementia, respiratory disease and some types of cancer, extending its benefits across the health and social care system.

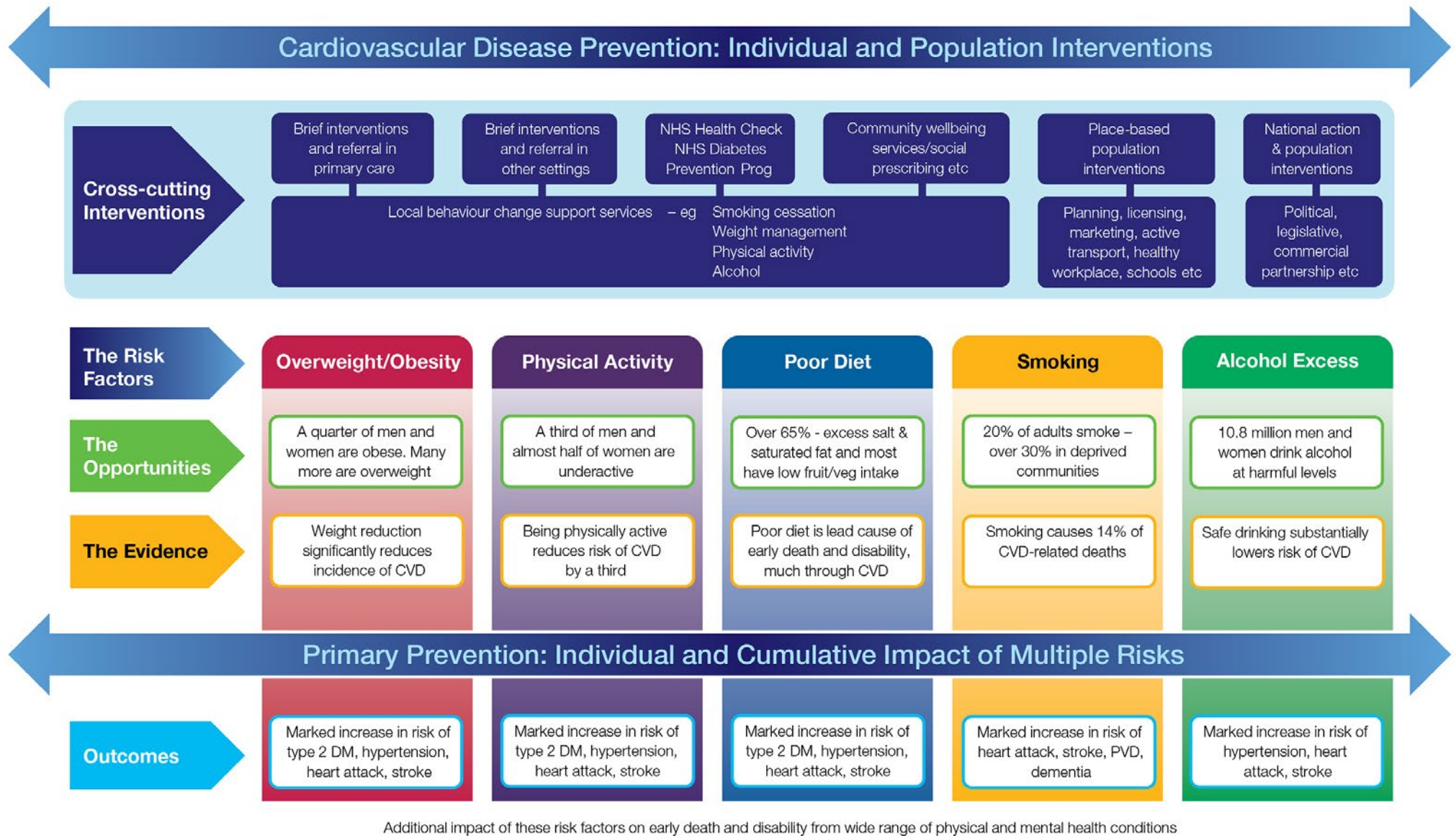


Figure 2: CVD prevention: individual and population interventions

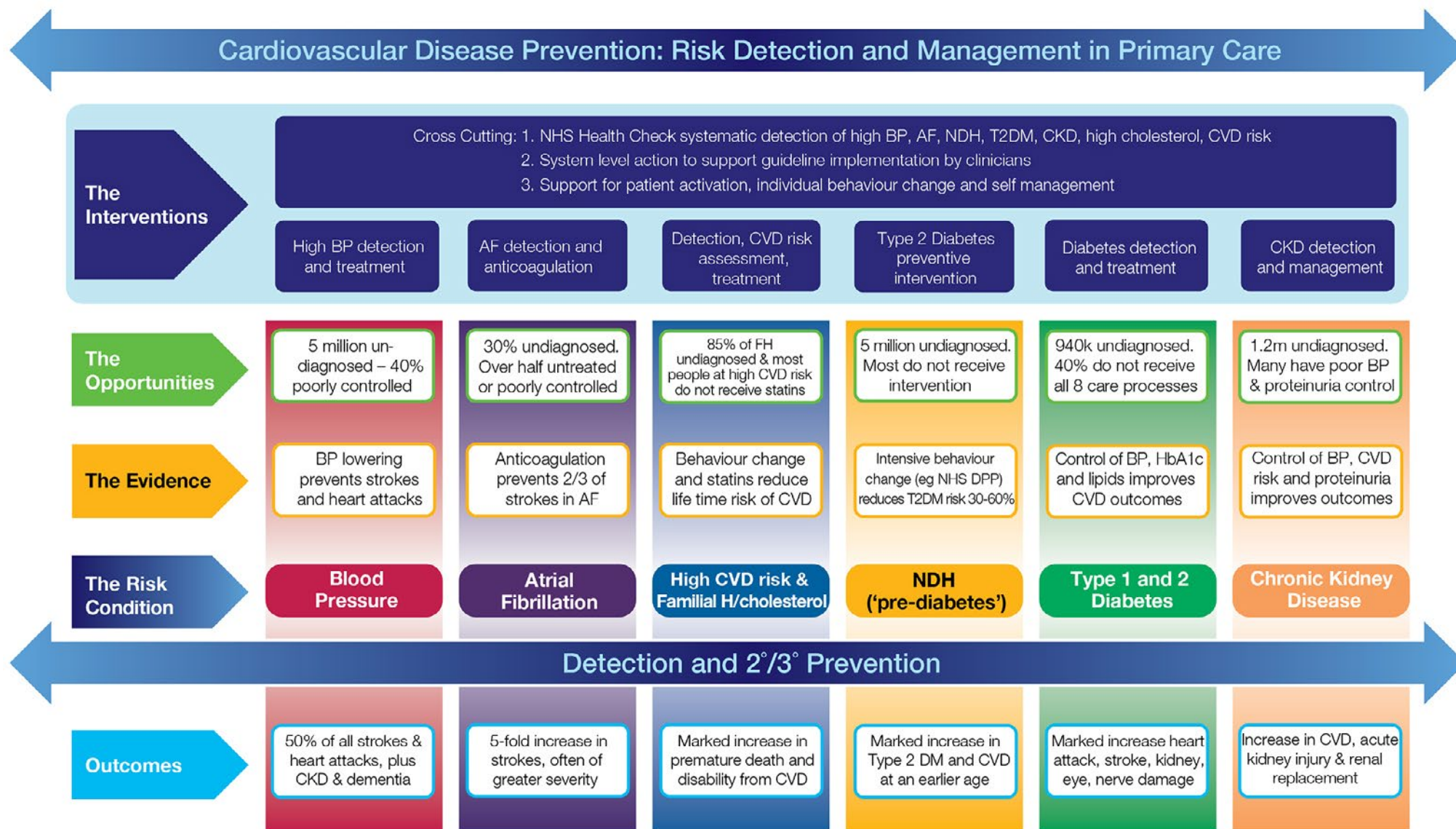


Figure 3: CVD prevention: risk detection and management in primary care

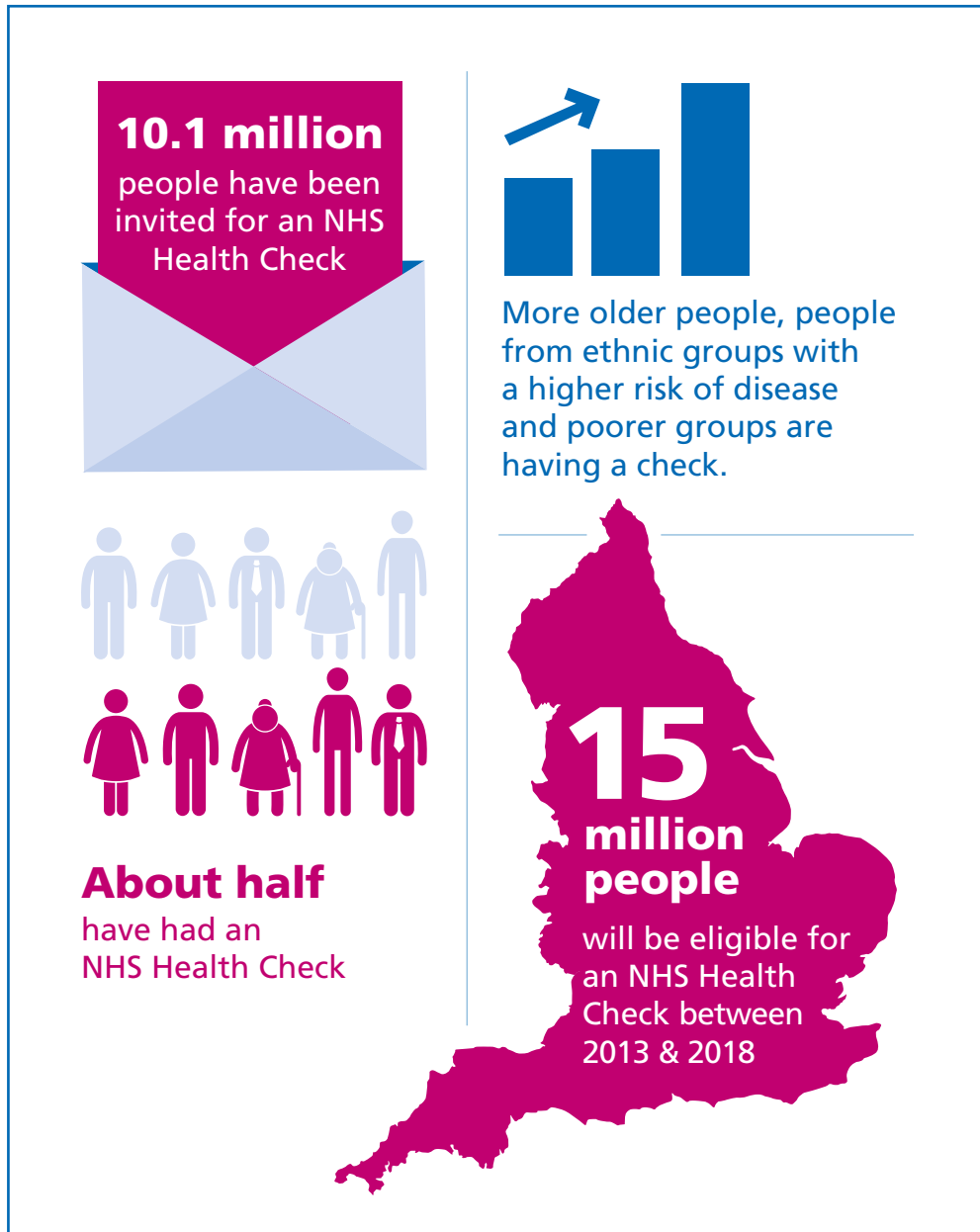


Figure 4: Eligible population, people offered and having a check

NHS Health Check: the latest figures

Between April 2013 and March 2018 more than 15 million people will be eligible for a NHS Health Check. Since April 2013, more than 10.1 million people have been offered a NHS Health Check, which means that in the past three and a half years, 95% of the expected eligible population (from 2013-2018) have been offered a check (34). Over the same period 4.9 million people have had a check (34).

The data shows that take up of the NHS Health Check has continued to improve since 2009, with the national rate currently at 48.4%. However, this national figure is some way off the 75% which was used in the original economic modelling by the Department of Health (33) and masks the considerable variation in delivery activity between local authorities (Figure 5).

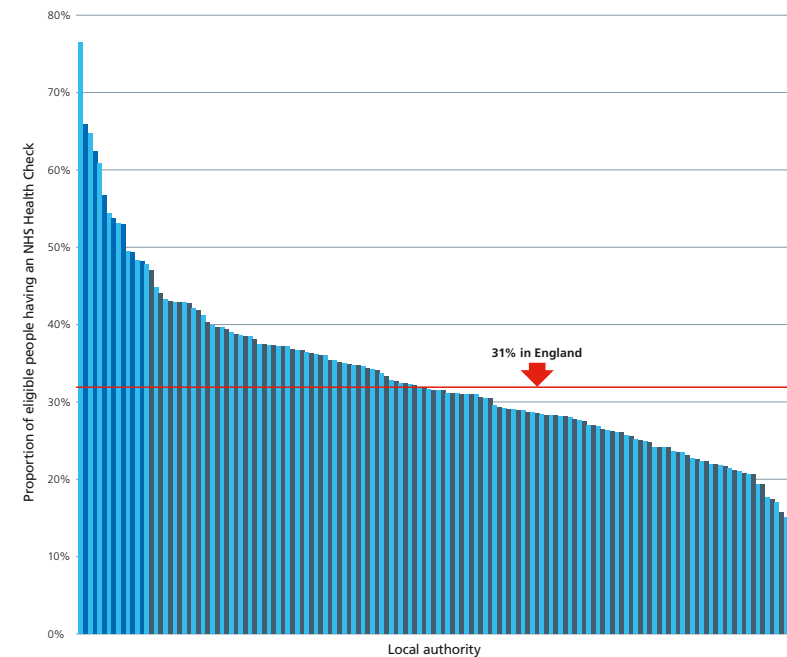


Figure 5: People having an NHS Health Check between April 2013 and September 2016 (in % of eligible people)

NHS Health Check programme: rapid evidence synthesis 2016

Led by members of the Primary Care Unit, University of Cambridge and supported by RAND Europe, the evidence synthesis sought to answer the six questions below:

1. Who is and who is not having an NHS Health Check?
2. What are the factors that increase take-up among the population and sub-groups?
3. Why do people not take up an offer of an NHS Health Check?
4. How is primary care managing people identified as being at risk of CVD or with abnormal risk factor results?
5. What are patients' experiences of having an NHS Health Check?
6. What is the effect of the NHS Health Check on disease detection, changing behaviours, referrals to local risk management services, reductions in individual risk factor prevalence, reducing CVD risk and on statin and antihypertensive prescribing?

The synthesis identified a total of 68 papers that addressed at least one of these questions. The studies identified were of mixed quality. Among the quantitative studies 15 were considered as high, 21 as medium and 11 as low quality. Among the qualitative studies 18 were considered as high, 10 as medium and 4 as low quality. Findings from the study have been published in full (35) and are summarised in the following section.

Key findings

1. Who is having a check?

So far, national studies, which evaluate the programme from 2009 until 2013, show that a greater number of women and people from the poorest communities have had an NHS Health Check compared to men or people from the most affluent communities.

In terms of coverage, (the proportion of eligible people having a check), the synthesis showed that studies consistently report higher coverage among older people, individuals from the poorest communities, and people with a family history of coronary heart disease. Additionally, the national studies also show greater coverage among Bangladeshi, Caribbean and Indian ethnic groups than among white individuals and lower coverage among Chinese groups. This demonstrates that NHS Health Checks are reaching people with the greatest risk of CVD.

Interestingly, it seems that coverage is also generally higher in women, unless a targeted approach to prioritise people at higher CVD risk is used. Additionally, there is some indication that coverage is higher among non-smokers, which suggests that local decisions on how the programme is implemented may have a crucial role to play in influencing who has a check.

However, the authors highlight that comparisons drawn between coverage reported by different published studies are limited by two key issues. Firstly, researchers have used different definitions when counting a person as having had an NHS Health Check. Secondly, they have used different definitions of the eligible population to calculate coverage.

The setting in which NHS Health Checks are delivered seems to influence who attends, and so is linked to the characteristics of people who have had a check so far. Getting the right setting can really support the success

of a local approach targeting particular sub-groups. For example, checks delivered in community venues such as sports clubs or places of worship may attract more men. One study reported greater coverage among young people when checks were delivered in community settings compared to general practice. However, the number of studies is small and only one has directly compared different settings. This highlights the need for additional research to understand, with greater confidence, the characteristics of people having checks across a range of settings.

2. What are the factors that increase take-up?

PHE defines 'take-up' as the proportion of people having a check out of those who were invited.

Despite identifying 11 papers that explore this aspect of the programme, the synthesis recognises that these studies are limited by small sample sizes, data from specific geographical areas in England, the representativeness of the data and differences in recruitment strategies. As a result, the findings on take-up rates vary greatly, making it difficult to draw meaningful conclusions on the factors that can increase take-up.

Nevertheless, there is consistent evidence showings that older people and some evidence that people from affluent communities are more likely to take up an invitation for an NHS Health Check. Interestingly, there seems to be a relationship between age and gender. Findings suggest that the likelihood of taking up this offer may be higher among younger women and older men. There is an absence of high-quality evidence on take-up among ethnic groups.

The evidence on the effect of different invitation methods is limited, but while the number of studies is small, they seem to suggest that invitation methods can influence take-up.

A simplified invitation letter including a prominent statement of action – 'you are due to attend your NHS Health Check' – has been reported to increase take-up by about 3-4%, which if achieved nationally would substantially increase the number of people having a check each year.

Approaches that use text message prompts and reminders, a face-to-face invitation, community ambassadors or a telephone invite may also have the potential to increase take-up. However, this evidence is limited to one or two studies, so further research is needed to understand the true impact of these approaches on take up among eligible people and specific socio-demographic groups.

Opportunistic invitations to an NHS Health Check are commonly used and seem to be an effective way of recruiting people. However, the synthesis highlights that in general practice an unexpected invitation can leave people feeling corralled and confused. Ensuring that patients have adequate time and information to make an informed decision about participation is essential.

The synthesis also revealed an absence of evidence on take-up across different delivery settings. However, qualitative research indicates that being able to access a check at a convenient time and in a familiar location can increase people's willingness to take up the offer of a check. In particular, it seems that some people consider pharmacies, community settings or workplaces as being more convenient to access than general practice. Others, however, report anxieties about the competence of staff, privacy and confidentiality of having an NHS Health Check in these locations.

Finally, for some participants, receiving a letter to attend a check at their general practice has a considerable bearing on whether or not they accept, as a 'sense of duty' towards their practice means they will comply with what the practice is asking of them. These findings suggest that a one size fits all delivery model may limit the programme's reach and that careful consideration must be given to the needs and preferences of the local population in order to maximise take-up.

3. Why do people not take up the offer of an NHS Health Check?

The findings from the synthesis highlight six major reasons why a person does not take up the offer of an NHS Health Check:

- **Lack of awareness or knowledge:** they do not know what it is, whether it is free or its relevance.
- **Competing priorities:** not having the time to go.
- **Misunderstanding the purpose:** a lack of recognition that the programme is preventative combined with the view that they do not want to burden the NHS when they feel healthy and well.
- **Aversion to preventative medicine:** some people are not interested, actively do not want to know or are afraid they might receive bad health news. Others do not want to be told off or given lifestyle advice.
- **Convenience:** not being able to get an appointment at a time or on a day that suits them at their GP practice, particularly among people working office hours.
- **Quality:** concerns regarding the competence, privacy and confidentiality of checks that are delivered in pharmacies.

These findings highlight the need for further action to address the lack of awareness and knowledge about the programme as well as addressing underlying aversion to preventative medicine. Improving convenience of access and reassuring people of the high quality of checks delivered by pharmacists may also help dispel the fears that stop people from attending.

4. Management of people with high risk of CVD or abnormal risk factors

The synthesis shows that there is variation in how patients identified as high risk are followed up. This can range from recalling all patients for a follow-up appointment to having a high risk register or no follow-up at

all. It seems that the majority of patients are getting lifestyle advice but this is not always by NHS Health Check practitioners. This variation reflects the flexibility to tailor follow-up to the needs of the local population. Ensuring that checks include appropriate lifestyle and clinical management is essential in maximising the programme's effectiveness.

5. Experiences of an NHS Health Check

Patients' perspectives

Evidence consistently shows that, across a range of delivery settings, most people are highly satisfied, had a positive experience and would recommend having an NHS Health Check to others. Despite this, a common expectation among patients was that the check would be more comprehensive. This theme of unmet expectations seems consistent with other findings that general awareness and knowledge of the programme is poor.

Crucially, the synthesis found that a large number of participants across many studies could not recall, were confused by or had incorrectly understood their CVD risk score. This lack of understanding led to anxiety among people with low CVD risk and false reassurance among some people with a high CVD risk. Consistent with NICE guidance on behaviour change (36), in itself, knowing your CVD risk was not reported as being sufficient information to motivate lifestyle change.

Across the studies, patients consistently identify having an NHS Health Check as a wake-up call. Shining a light on health issues that people were unaware of, yet are able to prevent, was felt to be beneficial and for some, this and lifestyle advice was sufficient to motivate lifestyle changes. However, for others, generic advice that was not tailored to them led to uncertainty and confusion on which lifestyle changes to make.

Where patients had undertaken a check in a community setting, evidence suggests that it was unclear what should happen after the check – specifically whether they should contact the GP or if their GP would contact them.

Professionals' perspectives

Achieving maximum benefit from the programme relies on 'buy-in' from health care professionals, without which patients at risk of CVD or with abnormal risk factors are unlikely to be identified or managed appropriately. While the majority of health care professionals agree that the programme is beneficial in detecting disease earlier and providing time to discuss health and lifestyle, doubts about inequality of take-up, longer-term benefits and cost-effectiveness have been voiced.

Structural challenges have also been identified, including identifying and inviting eligible people, heavy workloads, inadequate funding and training, which can influence implementation of the programme in general practice and pharmacies. Where checks are delivered in community settings, implementation challenges centre on access to adequate venues, providing a private space to conduct checks and issues with equipment and internet connectivity. Health care professionals also report feeling that many patients are resistant to lifestyle change, and finding it difficult to raise issues of behaviour change with them, as well as a lack of well-funded community services to support lifestyle change, in particular weight management and drinking.

6. The impact of the NHS Health Check programme so far

The evidence synthesis shows that although the impact of the NHS Health Check has been examined in 18 studies, none were randomised controlled trials and only five included an appropriate comparison group.

Evidence shows that the detection of disease is significantly more frequent among NHS Health Check attendees compared to non-attendees for:

- Chronic kidney disease.
- Familial hypercholesterolemia.
- Hypertension.

- Peripheral vascular disease.
- Type 2 diabetes.

A small but significant decrease in stroke was also reported in one study, showing promising signs that the programme may already be having an impact on prevention.

However, there is a marked absence of research on the impact of NHS Health Checks on lifestyle behaviours. One study found that there was no significant change in the prevalence of smoking two years after having an NHS Health Check. It seems that there is considerably more to be done to understand the impact of the programme on lifestyle.

Currently, available evidence suggests that rates of referrals to services that will help people to reduce their cardiovascular risk are mixed. However, this available evidence is of limited quality and does not directly compare referral rates among people having an NHS Health Check to standard care. Understanding whether people are benefiting from these interventions is important and, in part, relies on health care professionals systematically recording referral information in patient records.

Research using national data and comparing NHS Health Check attendees with matched non-attendees reports favourable changes among people having a check on:

- Blood pressure.
- Body mass index.
- Modelled CVD risk.

A high level of missing data was an issue for this study. Other studies have, similarly, reported significant reductions in blood pressure, cholesterol, obesity and CVD risk but are further limited by the absence of a comparator group. As a result, the size of the programme's effect on

CVD reduction remains unclear with estimates of 250 – 500 heart attacks and strokes prevented each year, assuming that 1.2 million people have a check annually (6).

There is good evidence that statin prescribing rates are significantly higher – by around 3-4% – among people having an NHS Health Check compared to non-attendees. Similar trends have been reported for antihypertensives, although the increase in prescribing is not as high. Despite being higher in attendees, overall prescribing rates vary, and improving this provides an opportunity to increase the effectiveness of the programme significantly.

Cost-effectiveness

The synthesis identified three studies that explore the cost-effectiveness of the NHS Health Check programme. All demonstrate that targeting the most deprived groups or people with the greatest CVD risk increases the cost-effectiveness of the programme. However, the level of cost-effectiveness reported in these studies differs between them and from that published in the original Department of Health economic modelling (33). This disparity arises because of differences in the underlying assumptions of the models. For example, the impact of lifestyle services is excluded or it is assumed that only people at high risk of CVD receive an intervention or different data sources are used to inform assumptions on prescribing rates. As a result, there remains a clear need to understand the cost-effectiveness of the programme, both if it is delivered as fully intended and as it is currently implemented.

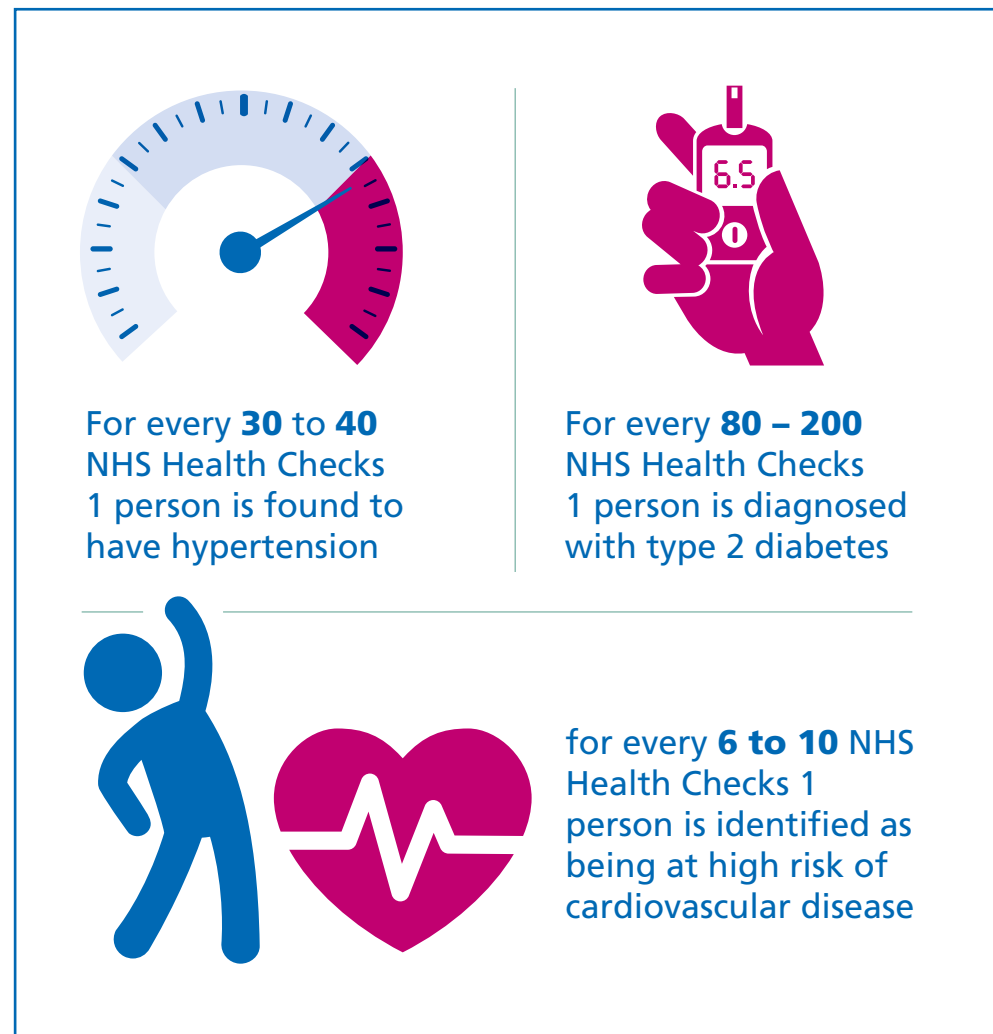


Figure 6: Number of NHS Health Checks needed to detect a case of hypertension, type 2 diabetes and high risk of CVD

Moving forward: ESCAP's recommendations for action

1. NHS Health Check coverage

Nationally, we know that NHS Health Checks are reaching people with the greatest risk of CVD: older people, individuals from the poorest communities, south Asian ethnic groups and people with a family history of heart disease. This finding contradicts results from national screening programmes that generally show a socio-economic gradient in coverage, with the most affluent most likely to come for screening (37-40).

One explanation for this finding may be that local areas have utilised the flexibility afforded to them in delivery to prioritise reaching people at high risk. As the QRisk2 10-year CVD risk score is heavily driven by age, the prioritisation of invitations to high risk people would go some way to explain why greater numbers of older people might have had a check. However, as there is considerable variation across England in how the programme is delivered it is difficult to draw firm conclusions on why the programme is successful at reversing the 'inverse care law'.

Going forward, it is essential that tackling health inequality remains at the heart of the programme. Understanding whether these findings remain using data from 2013 to the present and developing a better understanding of other sub groups that are known to experience higher levels of ill health (i.e. carers, people with mental illness etc.) will be crucial.

Recommendation: It is essential that future studies are undertaken using current data, that they adopt a standard definition of coverage and analyse data across a range of socio-demographic groups, particularly those who are more susceptible to ill health.

Recommendation: Invitations for an NHS Health Check should be prioritised to people with the greatest health need.

2. Take-up

Take-up by sociodemographic groups

Consistent with evidence on current coverage it seems that older people are more likely to take up the offer of a check when they are invited. As there are significant potential health benefits of having a check for younger adults age 40 upward, it is unclear why take-up is lower in younger people. This is likely to be multi-factorial and the synthesis has highlighted a number of reasons that people might decline an invitation.

Interestingly, there seems to be some evidence that people from more affluent communities are more likely to take up an NHS Health Check invite, even though coverage shows that more people from deprived communities are likely to have had a check. So we must not become complacent. It is essential that we continue to put health inequalities at the heart of the programme and improve our understanding of the recruitment approaches and delivery models that will support those people with the greatest health need to accept an invitation.

This picture is further complicated by the finding that women may be less likely and men are more likely to take up the offer of a check with increasing age. It is possible that this may be a reflection of employment status. Data shows that more men of working age are employed full time which may make it harder for them to access NHS Health Checks delivered in general practice during the working day (42). Certainly research shows that the greatest differences in access to general practice services are seen between men and women aged 16 to 60 (43).

So more research is needed to develop our understanding of why specific sub-groups are more likely to attend an NHS Health Check than others, and how we can encourage, for example, younger men to have a check. To facilitate, more must be done to routinely collect and analyse information on invitees across a range of socio-demographic groups.

Recommendation: Further national research on the socio-demographic characteristics of people taking up the offer of a check is needed and will be dependent on the routine collection of data on invitees within patient records.

Recommendation: Tackling health inequalities by adopting recruitment and delivery approaches that encourage those with the greatest health need to attend a NHS Health Check must remain at the heart of the programme.

Recruitment approaches

Small study sizes, the representativeness of data and differences in recruitment strategies make it difficult to draw meaningful conclusions on the factors that can increase take-up. Despite these limitations, consistent with studies on cervical screening (44), it seems that there the invitation letter does have a role to play in influencing take-up and that, if an action-oriented letter was used systematically across England it could substantially increase the number of people having a check each year. While opportunistic invitation methods do seem to be an effective way of

recruiting people to an NHS Health Check, an unexpected invite can put people on the spot and leave them feeling corralled into having a check. Interestingly, for some people, there is considerable benefit to receiving an invitation for a check from their GP.

Recommendation: All organisations using a letter to invite people for their NHS Health Check should use PHE's new evidence-informed national invitation letter template.

Recommendation: Where opportunistic invitations are used, patients should have adequate time and information to make an informed decision about whether or not to participate.

Delivery settings

It seems that a 'one size' delivery model is unlikely to fit all. Inconvenience is identified as a key barrier to taking up an offer of an NHS Health Check. For some people, pharmacies, community settings and workplaces are considered to be more convenient, while others may be concerned about the quality of checks delivered in these settings. Generally, there is an absence of evidence showing the extent to which settings actually affect take-up among different socio-demographic groups.

Recommendation: National research comparing take-up across different delivery settings is needed.

Recommendation: The needs and preferences of the local population must be considered when designing local delivery models, addressing concerns and promoting benefits such as convenience.

Other barriers

Lack of awareness or knowledge, competing priorities, misunderstanding the purpose and aversion to preventative medicine are other reasons for a person not having an NHS Health Check.

Recommendation: Use evidence-informed marketing and communication campaigns to improve awareness, with tailored messaging to communicate the relevance of having a check to different socio-demographic groups.

3. Patients' perspectives

Communicating CVD risk

It seems that some people are confused by or incorrectly understand their 10-year CVD risk score and are not motivated to make lifestyle changes on the basis of this score alone. Visual aids are available to help professionals explain CVD risk score, and the NHS Heart Age calculator provides a new way to simply communicate risk. However, we need to understand whether communicating heart age rather than a CVD risk score leads to improved understanding and what effect it has on behaviour.

Recommendation: NHS Health Check providers need to take time and use new communication tools to help people better understand their CVD risk score during a check.

Recommendation: Research is needed to understand whether different communication approaches e.g. heart age help people to understand their risk of future ill health and how this impacts on behaviour change.

Supporting behaviour change

Although research shows that people are confused by their CVD risk score it seems that, for many, the NHS Health Check is considered a wake-up call and provides a prime opportunity to motivate people to make changes. However, the evidence shows that provision of generic lifestyle advice can leave some people feeling confused and uncertain of what to do next.

Recommendation: When delivering NHS Health Checks practitioners should adopt a tailored, patient-centred approach that supports people to make lifestyle changes.

Recommendation: Practitioners delivering the NHS Health Check should be offered support and training to develop behaviour change competencies.

Clinical management

Evidence shows that people who have NHS Health Checks in a community setting can often be left confused about what happens next, for example whether their GP will follow up with them or if they should contact their GP.

Recommendation: There must be a clear pathway for managing people identified as high risk or with abnormal risk factors through an NHS Health Check delivered in the community, and next steps need to be clearly explained to the patient.

4. Professionals' perspectives

Many health care professionals agree that the programme is beneficial in detecting disease earlier and providing time to discuss health and lifestyle. Despite this doubt remains and a reticence to act can be compounded by, structural challenges such as workload, IT, funding and training. Additionally, health care professionals report feeling that many patients are resistant to making lifestyle changes, making it difficult to raise the issue of behaviour change with them.

Maximising the impact of the programme depends on engagement from professionals. Their support is vital to ensure that the programme is implemented as intended and in translating new research findings into practice.

Recommendation: Health care professionals need adequate time and resources to ensure they can deliver the NHS Health Check to a high standard.

5. The programme's impact

Clinical follow-up and management

Research shows that clinical follow-up is, at best, variable. While many patients are getting lifestyle advice, this is not always tailored to the individual and can be deprioritised altogether for others. Studies providing evidence of referrals to local services that help people to reduce their CVD risk are of a poor quality and do not compare rates to those in standard care.

There is good evidence that statin prescribing rates are significantly higher among people identified as at risk of CVD after having an NHS Health Check. The evidence on antihypertensive prescribing trends is similar, albeit smaller. However, the overall rates of prescribing for both remain low. The fact that the majority of people at high risk of CVD are not receiving a statin, as recommended by NICE (26), may be a consequence of prevalent clinical and public attitudes to the prescribing of statins. While this is not an issue specific to the NHS Health Check programme it does impact on the size of the programme's preventative impact.

Recommendation: Everyone having an NHS Health Check should benefit from tailored lifestyle advice and access to local services, such as stop smoking services, and/or clinical management to help them reduce their CVD risk.

Recommendation: National research is needed to understand referral rates to lifestyle services compared to standard care.

Recommendation: Statin and antihypertensives should be prescribed to patients in line with NICE guidance, and general practice should be incentivised to prescribe them in addition to lifestyle advice where appropriate.

Recommendation: The NHS RightCare CVD Prevention Optimal Value Pathway should be used to optimise clinical management of high cardiovascular disease risk conditions such as raised cholesterol and hypertension.

Behaviour change

There is a marked absence of research on the impact of the programme on lifestyle behaviours.

Recommendation: National research is needed to understand the effect of the programme on lifestyle behaviours across socio-demographic groups.

Disease detection and prevention

Compared to standard care, the detection of chronic kidney disease, familial hypercholesterolemia, hypertension, peripheral vascular disease and type 2 diabetes is significantly more frequent among people who have had an NHS Health Check. This is promising evidence as it confirms that the programme is the objective of detecting disease earlier.

However, issues such as missing data, the absence of comparator groups, studies only using regional or local data and only using data up until 2013 highlight the need for further better-quality research.

Data on the impact of the programme in reducing CVD risk and individual risk factors is limited, with only one national study comparing the results in attendees to non-attendees. Nevertheless, the results show reductions, albeit small, among people having an NHS Health Check in modelled CVD risk, blood pressure, body mass index and stroke compared to standard care.

What is less clear is the size of the effect the programme has on preventing heart attacks and strokes. Estimates so far range from preventing 250 – 500 events each year assuming that 1.2 million checks are completed.

With over 90% of NHS Health Checks delivered in primary care there is a unique and important opportunity to draw on national data, recorded as part of a check, to improve existing knowledge of the programme's impact both nationally and at a local level. This level of intelligence will help to draw out variations in impact and implementation of the programme and could prove vital in helping commissioners make crucial decisions about how the programme should be delivered in the future.

The collection of other data sets through the National Institute for Cardiovascular Outcomes Research and cancer registries offers further potential. Linking this data would produce a world-leading research database that would not only significantly enhance knowledge on the impact of the programme through 'real world' research but improve our epidemiological understanding.

Recommendation: National research, using the most recent data, is needed to understand the true levels of disease detection, clinical and patient actions as a result of the check and health impact of the programme among NHS Health Check attendees compared to standard care.

Recommendation: A national NHS Health Check database, which can link to health outcome data sets, is needed in order to evaluate the programme's long-term impact both nationally and locally.

Cost-effectiveness

Modelling indicates that targeting people at greatest risk of CVD is cost-effective. However, models developed to estimate the impact of the programme draw on different assumptions and some do not provide a true reflection of an NHS Health Check as they consider clinical management but not lifestyle. Subsequently these models do not provide a complete picture of the programme's impact.

Recommendation: A model that fully reflects the real life NHS Health Check intervention and draws on current evidence to estimate its current impact should be developed.

6. Research

This is the first time that such a comprehensive evidence synthesis has been undertaken on the NHS Health Check programme. These early findings from an evidence base that is growing and maturing are encouraging and highlight opportunities for improving current implementation.

As has been made clear by several of the previous recommendations, studies are limited by missing data, the absence of comparator groups, samples that are not nationally representative as well as a complete absence of research on some areas of the programme. As such, there is insufficient evidence of a suitable quality to make a judgement on the extent of the programme's effectiveness or cost-effectiveness.

Recommendation: New studies on the NHS Health Check programme which explore the effectiveness and cost-effectiveness of the programme must be undertaken to a high standard of quality.

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Contacts and acknowledgments

Contact

Katherine Thompson

Katherine.thompson@phe.gov.uk

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