May 2016

NHS Health Check: national evaluation findings and their implications

Background

Despite dramatic recent reductions in mortality rates, cardiovascular disease remains the most important cause of premature mortality in the UK as it does in many other countries.[1] Vascular disease also causes a wide range of ill health including chronic kidney disease, stroke and dementia. For this reason health authorities and governments around the world are committing to strategies to reduce the impact of cardiovascular disease which include primary and secondary prevention.

There is international consensus, supported by evidence reviews from NICE[2,3] in the UK and by WHO[4] internationally, that risk assessment and risk management programmes are important components of an effective population-level cardiovascular disease strategy. A number of countries are implementing such programmes with varying designs and coverage partly determined by the available resources. The NHS Health Check Programme is probably the largest and most ambitious of these programmes but is by no means unique in its objectives.

The aims of these programmes are therefore widely accepted but real uncertainty remains about their design and likely effectiveness in practice. Pioneers in primary care such as Julian Tudor Hart have shown the effectiveness of case-finding for prevention in defined populations especially where the benefit of intervention is clear cut such as for hypertension.[5] Geoffrey Rose, the epidemiologist, has also eloquently described the advantages and disadvantages of identifying people at higher risk and offering them interventions aimed at reducing their risk. He concluded that such programmes can be beneficial for individuals but the potential impact on the total burden of disease in the population is often disappointing.[6]

The uncertainty is compounded because existing empirical evidence is relatively scarce and less useful than one might expect. It takes time to accumulate sufficent data on the outcomes of these programmes by which time the context has often changed materially from that in which the original studies were done. Such changes include development of novel risk assessment and communication approaches, new pharmacological interventions such as statins, and profound long-term trends in the underlying epidemiology of risks and diseases. It is essential therefore that contemporary risk assessment and management programmes are evaluated and justified (or not) in their own period and context and against current policy aims.

New evidence

Earlier this month the Canadian Medical Association Journal published a paper called *Impact of the National Health Service Health Check on cardiovascular disease risk: a difference-in-differences matching analysis*. The study was undertaken by a research group led from Imperial College London and is one of two early projects – the other led by Queen Mary University of London - funded by the Department of Health to evaluate the NHS Health Check programme. It is an important contribution

to the literature in this area. The following notes provide an initial assessment of the paper and its findings in the context of other recently published studies.

This paper on impact adds to the results of two earlier publications[7,8] describing take-up, demographic characteristics, prevalence of cardiovascular disease, new co-morbidity and treatment among people having a check between 2009/10 and 2012/13. Both had reported that: coverage of the programme was low in the first four years; take up of checks was equitable across socio-economic groups; and take up was higher among people over 60 years. Among high-risk ethnic groups take up was similar, the highest attendance was reported in south Asian and lowest among black African groups.

The Imperial College study is based on data from the Clinical Practice Research Datalink covering the period from April 2009 to March 2013. The database provides access to high quality general practice data from about 7% of UK practices[9]. The use of these data to evaluate the impact of the NHS Health Check programme is challenging and it is important to appreciate the methods used to interpret the results.

The first issue was that in this period specific codes indicating that a patient had completed a check were rarely used. To address this the researchers assumed that patients had attended a check if there were measures of blood pressure, cholesterol, BMI and smoking recorded within a six month window. Although it was shown that patients known to have had a check would be picked up in this way we do not know how many of the patients had in fact completed a check.

Secondly, impact was assessed using changes in modelled cardiovascular risk based on the available general practice data indicating risk. However, the frequent absence of follow-up data on primary care systems meant that the researchers often had to estimate values for blood pressure, BMI, total and HDL cholesterol. In general the use of imputed follow-up data means that the results, although unbiased, may be more conservative as effect sizes will tend to be reduced because of random miss-classifications in both groups arising from the need to estimate values.

Thirdly, the period of follow-up was a median of two years from the assumed date of a check. Although some impacts would be expected in this period, for example the prescribing of a statin, it may not be long enough to assess the effect of a lifestyle intervention programme even if regular follow-up measurements were available.

New findings

The new study shows that attendees had significantly higher cardiovascular risk, average systolic blood pressure, diastolic blood pressure, body mass index (BMI) and total cholesterol compared with non-attendees. Significantly higher rates of diagnosis for chronic kidney disease (CKD), familial hypercholesterolemia, hypertension, peripheral vascular disease and type 2 diabetes were also reported. The programme is not therefore attracting the “worried well” as had been feared but is in fact being taken up by those at somewhat higher than average risk.

There was a detectable absolute reduction in modelled cardiovascular risk in patients identified as having had a check (6.7% to 6.2%) but this was a small change and was also true to a lesser extent in those deemed not to have had a check (5.1% to 4.9%). However, NHS Health Check attendance was associated with significant decreases in blood pressure, BMI and total cholesterol which persisted after matching. There was no significant change in smoking rates.

The study demonstrated significant increases in prescribing of statins and anti-hypertensive medication attributed to attendance at a check. However, even in patients at high risk (>20% 10-year cardiovascular risk) only 40% were on statins and 23% on antihypertensive medication.

Discussion

This study confirms some things that are already known about the performance of the NHS Health Check programme. Take-up was slow from 2009 to 2013 and very variable around the country due to variable and uncertain programme management and local implementation. Routinely published data shows that there have been steady increases in take up which has now reached 49%,[10] more than double that reported by this study. Previous research studies have also reported that take up has been broadly equitable with respect to deprivation, sex and ethnic group, but with less equity by age (greater take up in older ages).

We also know that the programme is quite good at identifying patients at high risk. The Queen Mary University paper reported that for every 27 checks one person was newly diagnosed with hypertension, for every 110 checks one person was newly diagnosed with type 2 diabetes and for every 265 checks one person was newly identified with CKD.[8]

The two main studies differ in their methods[i], and their estimates of cardiovascular disease events avoided as a result of the NHS Health Check are not therefore directly comparable. However, assuming 1.2 million people have a check each year the Imperial study estimates 251 cardiovascular events would be avoided each year compared to 500 in the Queen Mary study. These benefits don't take account of other benefits such as kidney disease, dementia, or cancers avoided as a result of reductions in the relevant risk factors.

The discussion section of the report of the Imperial study takes a very negative stance which is not in our view entirely justified.

- The authors highlight the fact that the reported change in risk is small but give little attention to reasons that their study design might tend to underestimate overall benefit.
- They criticise the programme for falling short of "performance targets" and cite poor initial planning and lack of public and clinical engagement as a cause.

[i] Unlike the Imperial study the Queen Mary study did not match attendees with non-attendees and so improvements in those who did not have the health check are not accounted for in this study.

They do not mention that routinely published data shows[10] that take up has already more than doubled, from 21% to 49%, since the period covered by their study, presumably due to better planning and engagement.

- They state that the programme needs to achieve 75% coverage to be cost effective. The purpose of the original economic modelling was to establish whether a programme would be cost effective and the optimal starting age and frequency of testing. An overall take up of 75% was assumed but the sensitivity analysis did not vary on the basis of take up but on adherence to follow-up lifestyle and clinical management services. The cost per QALY for delivering the programme to 40 – 74 year olds every five years, assuming a 75% take up was estimated at £2458[11]. This is considerably below the NICE threshold so, in other words, highly cost-effective. The modelling does not provide cost effectiveness estimates for the programme at different levels of take up nor does not conclude that at a 50% take up the programme would not be cost effective.
- The fact that only 40% of high risk patients are receiving statins is largely a consequence of prevalent clinical and public attitudes to the prescribing of statins and is not an issue specific to the NHS Health Check programme, although it does affect its impact.
- The authors state that "public health agencies opted to roll out the programme nationally". The implementation of the NHS Health Check is a statutory obligation on all local authorities, this decision was taken by parliament.
- The study was limited by poor coding of NHS Health Check attendance. This has been addressed through the publication of a clinical data set by the information standards board in 2011.

In summary, this study presents some interesting new data. It confirms that the programme has been implemented equitably and is identifying substantial numbers of patients at high risk of cardiovascular disease. Uptake was low during this period but we know it has since improved albeit not to the level originally intended.

The study reports only a small observable reduction in risk attributable to attendance at a NHS Health Check. We believe the study design, poor implementation of clinical interventions e.g. statins and poor co-ordination of individual care e.g. access to lifestyle interventions contribute to this underestimation. So improving primary care action on prevention will be important not only for NHS Health Checks but any cardiovascular risk assessment and management strategy.

This study was based on data from a period before the programme was fully implemented and before adequate data collection was in place to monitor the programme. Problems with informatics mean that there is currently no confirmed viable means of extracting the required data from all general practice systems for the purpose of monitoring the programme. Nevertheless, we strongly agree that it is essential to build on this study to evaluate impact using more recent and complete data. We also agree that it is important to undertake a series of research studies on implementation to establish best practice and improve performance of the programme further. Finally there is value to repeating the cost effectiveness modelling now that the actual and potential performance of the programme is known with more certainty.

Published on behalf of the NHS Health Check Expert Scientific and Clinical Advisory Panel
Professor John Newton, Chief Knowledge Officer, Public Health England
Katherine Thompson, Deputy national lead, NHS Health Check and blood pressure programme

---

[1] Newton J N, et al. Changes in health in England, with analysis by English regions and areas of deprivation, 1990 – 2013: a systematic analysis for the Global Burden of Disease Study 2013. *The Lancet.* 2015. Available from http://dx.doi.org/10.1016/S0140-6736(15)00195-6

[2] National Institute for Health and Care Excellence. (2010) cardiovascular disease prevention public health guideline. [Online] www.nice.org.uk/guidance/ph25/resources/cardiovascular-disease-prevention-1996238687173

[3] National Institute for Health and Care Excellence. (2015) Cardiovascular disease: risk assessment and reduction, including lipid modificiation. [Online]

[4] World Health Organisation (2010). Package of Essential Noncommunicable (PEN) disease interventions for primary health care in low-resource settings. Geneva. [Online] www.nice.org.uk/guidance/cg181/chapter/1-Recommendations www.who.int/nmh/publications/essential_ncd_interventions_lr_settings.pdf

[5] Hart.T.J et al. (1991) Twenty five years of case finding and audit in a socially deprived community. British Medical Journal. 302:1509 -13

[6] Rose,J (1981) Strategy of prevention: lessons from cardiovascular disease. British Medical Journal 282: 1847 - 51

[7] Chang, K.C, et al. (2015) Coverage of a national cardiovascular risk assessment and management programme (NHS Health Check): Retrospective database study. Preventative Medicine. [Online] http://dx.doi.org/10.1016/j.ypmed.2015.05.022

[8] Robson, J. et al. (2016) The NHS Health Check in England: an evaluation of the first 4 years. British Medical Journal Open . [Online] 6:e008840. doi:10.1136/bmjopen-2015-008840

[9] Clinical Practice Research Datalink. London (UK): The Clinical Practice Research Datalink Group; 2015.[Online] www.cprd.com/

[10] Public Health Outcomes Framework (2016) NHS Health Check profile. [Online] http://fingertips.phe.org.uk/profile/nhs-health-check-detailed

[11] Department of Health (2008) Economic Modelling for Vascular Checks [Online] www.healthcheck.nhs.uk/document.php?o=225