A retrospective evaluation of the NHS Health Check Programme in a multi ethnic population

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Abstract

Background

The NHS Health Check Programme was introduced in 2009 to improve primary prevention of coronary heart disease, stroke, diabetes and chronic kidney disease; however, there has been debate regarding the impact. We present a retrospective evaluation of Leicester City Clinical Commissioning Group.

Methods

Data are reported on diagnosis of type 2 diabetes, hypertension, chronic kidney disease, high risk of type 2 diabetes and high risk of cardiovascular disease. Data on management following the Health Check is also reported.

Results

Over a five year period 53, 799 health checks were performed, 16, 388 (30%) people were diagnosed with at least one condition when diagnosis of being at high risk of cardiovascular disease was defined as ≥20% . This figure increased to 43% when diagnosis of high cardiovascular risk ≥10% was included. Of the 3,063 (5.7%) individuals diagnosed with type 2 diabetes 54 % were prescribed metformin and 26% were referred for structured education. Of the 5,797 (10.8%) individuals diagnosed at high risk of cardiovascular disease (≥20%) 64% were prescribed statins.

Conclusion

A high proportion of new cases of people at risk of cardiovascular disease were identified by the NHS Health Check Programme. Data suggest that this has translated into appropriate preventative measures.

Key words

Cardiovascular disease, cardiovascular risk, NHS Health Checks Programme

Introduction

Vascular disease is increasing globally[1] and is responsible for roughly a third of all deaths in the UK.[2] The NHS Health Check Programme was introduced in 2009 to improve primary prevention of stroke, heart disease, diabetes and kidney disease. The programme screens people aged 40 to 74 years without a history of vascular disease.[3] If an individual is found to be at high risk of vascular disease then they should be given an appropriate intervention to manage their risk, and placed on a disease register for future monitoring. The Department of health have estimated that the NHS Health Check Programme could prevent 1,600 heart attacks and strokes, 4,000 cases of diabetes, and 650 deaths each year.[3] Moreover, at least 20,000 cases of diabetes or kidney disease could be diagnosed earlier, allowing individuals to be better managed and to improve their quality of life.[3]

There has however been recent interest in the effectiveness of the NHS Health Check Programme[4] since a Cochrane report and other studies suggested that general health checks do not result in a reduction in mortality or morbidity.[5, 6] The applicability of these results to the NHS Health Check Programme has been questioned, mainly because it is not a general health check but is instead focussed on vascular checks and subsequent evidence-based interventions.[7,8] Indeed, modelling studies suggest that the programme would lead to the early diagnosis of a substantial number of cases, thereby potentially improving patient health.[9] In addition a recent short report showed the NHS health Checks to be effective in detection of previously undiagnosed disease.[10] Nevertheless, there is a need to evaluate the NHS Health Check Programme in order to provide evidence regarding whether or not it is effective both in terms of increased diagnosis of previously undiagnosed vascular conditions, and in subsequent delivery of appropriate interventions. Currently limited evidence is available to fully evaluate the programme, and a recent call for review of the NHS Health Checks Programme has been placed by MPs.[11] The aim of this study was to evaluate the implementation of The NHS Health Checks Programme; including diagnosis and effective management of people identified at risk of cardiovascular disease. A further aim was to report the prevalence of people identified as high risk of cardiovascular disease using a cut point of greater than 10% as suggested by recently updated NICE guidelines.[12]

Methods

Data extraction

Data from 2009 to 2014 were obtained from the Leicester City Clinical Commissioning Group UK, which includes 65 practices, where both invited and opportunistic screening has taken place. The data collection period for each year is from the 1st April to the 31st March the next year. Data were extracted on 13th March 2014; therefore the data for years 2013-2014 are missing 13 working days. Data files for the five years were merged together by a unique identifier, date of birth, sex and ethnicity, this was to reduce the risk of patients being erroneously merged together. The number of patients for whom this is likely to occur, and thus the adverse effect of this on the data, is likely to be minimal. The data were entered into SystmOne by the GP or Health Care Professional as part of their usual delivery of the Health Check. The required data were then obtained centrally by the Leicester Clinical Commissioning Group using data queries written specifically for this task.

Variables collected and outcomes measured

Variables collected during the Health Check included waist circumference, HbA1c, systolic and diastolic blood pressure, total cholesterol, alcohol intake, ethnicity and physical activity. Variables were recorded using Read Codes; a system of structural encoding of information in medical records widely used by general practitioners in the UK.[13] Ethnicity was categorised as White, Black, South Asian, or Other ethnic group, defined as people identified themselves. Physical activity data were grouped as 'active' or 'inactive' depending on the main level indicated in the Read Code. Similarly, smoking status was grouped as 'Never smoker', 'Ex-smoker', and 'Current smoker' depending on the main level indicated in the Read Code, regardless of the amount smoked. Where an individual had different smoking codes in one year, "Ex-smoker" and "Current smoker" took precedence over "Never smoked", while "Current smoker" took precedence over "Ex-smoker". Ethnicity, activity levels, alcohol intake and smoking status were all based on self-report.

Height, weight, waist circumference and body mass index values more than four standard deviations from the mean were removed as these values were likely to be erroneous. Where body mass index was missing, it was calculated as weight (kg) / height $(m)^2$ if these were available. Comorbidity data were obtained and assigned point scores as per the Charlson Comorbidity Index and combined to calculate this index.[14] Patients were assumed to have a condition if they had at least one Read Code for that condition, otherwise they were assumed not to have it.

Outcome data of the Health Checks available included diagnosis and follow-up treatment. Diagnoses were available for type 2 diabetes, hypertension, chronic kidney disease, being at high risk of type 2 diabetes (defined as a Read Code for "prediabetes"), and cardiovascular disease risk score. Participants were characterised as having high cardiovascular risk score of greater than 20%, additional analysis was undertaken defining high cardiovascular disease risk of greater than 10%, to reflect the new guidelines.[15] If people had at least one Read Code for a diagnosis then they were assumed to have had that condition, otherwise they were assumed not to have had it. Follow-up treatment was defined as whether the patient was prescribed statins or metformin or referred to structured education following the Health Check . Data on follow-up treatments were obtained from Read Codes, if people had at least one Read Code for a treatment then they were assumed to have had it, otherwise they were assumed not to have had it. We used Read Codes (primary care data) as we were interested in the number of diagnoses occurring due to the Health Check Programme. This study is considered a Service Evaluation and therefore ethical approval was not required.

Statistical analysis

Summary measures are presented using mean (standard deviation) or median (interquartile range) for continuous variables and count (percentage) for categorical variables. Means were compared between groups using analysis of variance and percentages were compared between groups using chi-squared tests. Tests for trend over categorical variables were performed using linear regression analyses for continuous outcomes and logistic regression analyses for binary outcomes, with the categorical variable treated as a continuous variable.

We used our prevalence estimates to approximate the number of new cases of type 2 diabetes, being at high risk of type 2 diabetes , hypertension, chronic kidney disease and being at high risk of cardiovascular disease that would be diagnosed each year by the NHS Health Checks Programme, assuming 1) that the screening uptake was 23.1%, (i.e. 693,000 people screened each year; uptake as seen in the Group reported here[16] and 2) that the uptake was 6.4% (i.e. 192,000 people screened each year; the average uptake across UK authorities).[16] We repeated this analysis using both categories of being diagnosed at high risk of cardiovascular disease (≥20% and ≥10%). We standardised our estimates to the ethnic, age and sex distribution of England and Wales (population estimates for the whole of the UK were not available).[17] We did this by estimating the expected number of people who would be screened in each ethnic, 5-year age, and sex group, and then used

the disease prevalence within the respective group to estimate the number of expected cases within that group.

Results

Invalid Health Check criteria

Of the 57,182 original records, data from 1,000 (1.7%) were for people younger than age 40 years and 1,945 (3.4%) were for people older than 74 years, these individuals were therefore ineligible for the Health Check. People who had a history of vascular disease or who had previously been diagnosed with diabetes are also ineligible for the Health Check. A total of 407 (0.7%) people were ineligible due to previous history of myocardial infarction, 658 (1.1%) cerebrovascular disease, 218 (0.4%) peripheral vascular disease, and 135 (0.2%) due to type 1 diabetes mellitus. Those with ineligible Health Checks data were removed from the dataset and were not included in any of the analyses detailed.

Number of Health Checks performed

The total number of Health Checks performed over the five year period was 53, 799. This number increased substantially over time from the initial pilot year (2009-2010, n= 395) to 19,578 in 2013-2014, and appears to now be at a stable level with a similar number of Checks performed in 2012-2013 and 2013-2014. Of those attending, 24,652 (45.8%) were of White ethnicity and 20,033 (37.2%) were South Asian.

Health Check measures

Table 1 shows the mean values of the biomedical measures for the overall population (N=53,799) and by key demographics. Data on lifestyle measures showed overall 24.1% (n=12,728) individuals were classed as current smokers and 54.2% (n=28,581) as ex-smokers. The median (Interquartile range) number of alcohol units consumed per week was 6.0 units (IQR: 2,14). The percentage of individuals who consumed above the recommended limit (>21 units for men; > 14 units for women) on a weekly basis was 16.2% (n= 3492). Men ($P < 0.001$, men=19.1%, women 11.9%), and people of White ethnicity ($P < 0.001$, white = 18.4%, South Asian = 10.6%, Black=8.0%, Other= 8.7%), were most likely to consume over the recommended weekly alcohol limit.

Diagnosis, co-morbidities and treatments

Table 2 shows the number and percentage of people identified with cardiovascular disease risk by key demographics. Overall 16, 388 (30%) of people were diagnosed with at least one condition when using ≥20% cardiovascular risk, however this number increased to 23,071 (43%) when using the ≥10% cardiovascular risk data. Figure 1 shows the inter-relationship between the conditions of interest, detected vascular risk and comorbidities (for both high risk of cardiovascular disease as ≥10% and ≥20%); those with chronic kidney disease were most likely to have at least one comorbidity. Table 3. shows the number of people receiving follow-up treatment. For those diagnosed with type 2 diabetes 53.9 % were prescribed Metformin and 25.8% for Structured Diabetes Education. For those identified at high risk of cardiovascular disease (≥20%) 64.2% were prescribed Statins.

Discussion

Main finding

This study provides a summary of the NHS Health Checks conducted between 2009 and 2014 in a local authority where uptake is well above the national average (23.1% compared to 6.4%).[16] Overall 30% (n=16,388) people were diagnosed with at least one condition. This number increases to 43% (n= 23,071) when classifying individuals as high risk of cardiovascular disease risk using new NICE recommendations of ≥10%.[12, 15] Overall 5.7% of people were diagnosed with type 2 diabetes, of whom 54% were prescribed metformin and 26% were referred for structured education. Of those diagnosed at high risk of cardiovascular disease (≥20%) 64% were prescribed a statin.

What is already known on this topic

The demographic cover of the Health Checks in this Clinical Commissioning Group is generally excellent, and is representative of the local population.[16] As is generally observed in clinical practice, women were more likely to attend than men. The ethnic distribution of those attending reflects that of this Clinical Commissioning Group reasonably well.[18] Since the monitoring of ethnicity is vital to ensure equitable coverage of the Health Check Programme, ethnicity recording should potentially be a national quality criterion.

Generally, the average biomedical measurements observed in the Leicester City Health Checks population were similar to national averages based on the 2011 Health Survey for England data; the average BMI reported nationally was 27 kg/m^2 in both men and women[19] compared with 27 kg/m^2

for men and 28 kg/m^2 for women in the Leicester City Health Checks population. Total cholesterol averages were also similar in Leicester City to national averages (men: 5.1 mmol/l nationally, 5.1 mmol/l locally; women: 5.2 mmol/l nationally, 5.3 mmol/l locally).[20] Leicester City averages were very slightly higher than national ones for HbA1c (men: 5.7% nationally, 5.9% locally; women 5.7% nationally; 5.8% locally),[21] and blood pressure (men: 129/73 mmHg nationally, 130/79 mmHg locally; women: 122/72 mmHg nationally, 126/77 mmHg locally).[22]

Approximately one in three (30%) of those who have a Health Check were diagnosed with at least one of type 2 diabetes, being at high risk of type 2 diabetes, chronic kidney disease, hypertension or being at high risk cardiovascular disease. This figure increases to approximately two in five (43%) if identifying individuals as being at high cardiovascular risk using ≥10%. Of those undergoing a Health Check 5.7% were diagnosed with type 2 diabetes, this is somewhat higher than in other Health Check evaluation studies[23] and may be representative of the local population. Although disease prevalence was higher among people at high cardiovascular disease risk than among those at low risk, many conditions were diagnosed in those who are considered at low cardiovascular disease risk, suggesting that screening should occur regardless of this risk.

The percentage of people receiving adequate treatment following diagnosis could be improved upon, however these figures tended to be higher than those observed elsewhere in the country. For example, the percentage referred to structured education for type 2 diabetes was 26%, but this is much higher than national referral rates, which indicated that only 6% of people with established type 2 diabetes were offered education and only 1.6% of those were recorded as attending.[24] Likewise, 64% of those found to be at high cardiovascular disease risk (≥20%) were prescribed statins, which is higher than analogous figures reported in Hammersmith and Fulham (53%).[25] Indeed prescription of 64% is far higher than that reported recently in a population Clinical Practice Research Datalink study where only 18% and 16% of men and women with cardiovascular risk >20% were prescribed statins.[26] Furthermore, data on statins maybe an underestimate, the number of people who declined treatment was not recorded when the Health Checks Programme began. The importance of prescribing statins to those at high cardiovascular disease risk to prevent cardiovascular disease is emphasised in recent guidelines published by the American College of Cardiology-American Heart Association Task Force on Practice Guidelines, although these guidelines also highlight the importance of discussions between the clinician and patient prior to initiating cardio-protective statin treatment.[27]

What this study adds

Data presented in this report reflects a high performing authority which works closely with general practices, stakeholders and patient representatives within it. Reflecting a successful commitment to training for its partners, and as such shows how Vascular Health Checks can be successfully implemented.

We additionally conducted modelling on extrapolated data to estimate potential numbers which could be identified across England and Wales. Assuming three million people per year are eligible for the health checks; if 693,000 people are screened each year (23.1% uptake, as seen in this local authority[16]) then it is estimated that each year 25,745 people would be diagnosed with type 2 diabetes, 29,077 at high risk of type 2 diabetes, 133,016 with hypertension, 12,742 with chronic kidney disease, and 211,283 and 76,326 with high cardiovascular disease risk of ≥10% and ≥20% respectively. An estimated 200,956 people each year would be diagnosed with at least one of these conditions and this would increase to 289,926 in line with updated NICE guidelines defining high risk of cardiovascular disease as ≥10%. If 192,000 people are screened each year (6.4% uptake, as is the national average across all local authorites[16]) then it is estimated that each year 7,133 people would be diagnosed with type 2 diabetes, 8,056 at high risk of type 2 diabetes, 36,853 with hypertension, 3,530 with chronic kidney disease, and 58, 537 and 21,147 with high risk of cardiovascular disease of ≥10% and ≥20% respectively. An estimated 55,679 people each year would be diagnosed with at least one of these conditions increasing to 80,326 when lowering the threshold for high risk of cardiovascular disease from ≥20% to ≥10%. Although placing an initial burden on the health care system, over time this is likely to result in a substantial reduction in cardiovascular events, which is expected to outweigh the increase in cost associated with the initial increase in preventative care. Importantly, future research must be conducted to evaluate if implementation of interventions leads to improved outcomes for patients.

Limitations of this study

This study reports data from a large multi-ethnic population, and demonstrates good update across different ethnic groups. We believe this is the first detailed evaluation of a large Clinical Commissioning Group which also provides estimated case data. It is the first study to report data using new NICE recommendations of using ≥10% as being at high risk of cardiovascular disease. Leicester City Clinical Commissioning Group was listed as the best performing local authority nationally in 2013[16] this analysis supports this finding with body mass index and blood pressure being recoded for 96.8% and 98% respectively for those whom NHS Health Check data was recorded.

Completeness of data for HbA1c, waist circumference, alcohol intake and reported physical activity varied across localities, which we acknowledge as a limitation of the evaluation; however, this is a limitation shared by most studies which use data primarily collected for other purposes". We report prevalence of people identified with type 2 diabetes, at high risk of type 2 diabetes, hypertension, at risk of cardiovascular disease and chronic kidney disease. Furthermore, data on the interventions implemented is also reported and discussed. We acknowledge that a limitation of this study is that Leicester may not be representative of all other Clinical Commissioning Groups. We reported data on people having a cardiovascular disease risk of greater than 10%, however this is a recent recommendation from NICE[12] and therefore statin prescribing does not reflect current recommendations.

A small proportion of attendees (<2% in 2013-2014) were given a Health Check despite not meeting the eligibility criteria; this figure is relatively similar to that seen in other evaluation studies.[28] It is notable that the proportion of ineligible Health Checks performed decreased substantially over time. A template for entering the Health Checks data was introduced half way through the implementation process which is likely to explain this reduction, at least in part. Therefore, it may be helpful to have the use of a data entry template as a quality criterion nationally.

Conclusion

There has been growing debate regarding the NHS Health Checks Programme, this study shows that a high number of people at risk of cardiovascular disease have been identified in Leicester City due to the NHS Health Check Programme. To some extent, this has translated into appropriate preventative measures for vascular disease being put into place, but there are areas where further improvements could be made for the Clinical Commissioning Group, and by focussing on these it is more likely that the NHS Health Check Programme will impact positively on patients' health outcomes.

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Competing interests

DHB, NBA, DR, NJ, AF, IB, have no competing interests to declare. MJD has received funds for research, honoraria for speaking at meetings and has served on Advisory boards for Lily, Sanofi Aventis, MSD and Novo Nordisk, Janssen, Astra Zeneca and Boehringer Ingelheim. KK has received funds for research, honoraria for speaking at meetings and has served on Advisory boards for Astra Zeneca, GSK, Lily, Novartis, Pfizer, Servier, Sanofi Aventis, MSD and Novo Nordisk. PC, MJD, KK are co-authors on, Updated: The Handbook for Vascular Risk Assessment, Risk Reduction and Risk Management 2012; http://www.screening.nhs.uk/publications

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