

Implementation of NHS Health Checks in general practice: variation in delivery between practices and practitioners

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Aim: To evaluate NHS Health Check implementation in terms of frequency of data recording, advice provided, referrals to community-based lifestyle support services, statin prescribing and new diagnoses, and to assess variation in these aspects between practices and health professionals involved in delivery. **Background:** Most NHS Health Checks are delivered by general practices, but little detail is known about the extent of variation in how they are delivered in different practices and by different health professionals. **Methods:** This was an observational study conducted in a purposively selected sample of 13 practices in Sefton, North West England. Practices used previously recorded information from their clinical management systems to identify patients with cardiovascular disease (CVD) risk $\geq 20\%$, a potentially cost-effective approach. The evaluation was conducted during the first year of delivery in Sefton. Data were extracted from medical records of all patients identified, regardless of Health Check attendance.

Findings: Of the 2892 patients identified by the 13 practices, 1070 had received an NHS Health Check at the time of the study. Of these, only 936 (87.5%) had a recorded CVD risk score, with risk $\geq 20\%$ confirmed in 92.0%. Estimated risk category was correct in 456/677 (67.4%) of patients with estimated and actual risk scores.

Significant variation was found between practices and health professionals in parameters recorded, tests requested, advice given and referrals for lifestyle support. Only 45.3% of patients had body mass index, smoking, alcohol, exercise, blood pressure and cholesterol all recorded.

Lifestyle advice and referral into lifestyle services were documented in 80.6% and 6.4% of attenders, respectively, again with significant variation between practices and professionals. Statin prescribing rose in attenders from 19.6% to 34.6%. A similar proportion of attenders and non-attenders received new diagnoses. **Conclusion:** Effort is required to reduce variation in how practices deliver and follow-up NHS Health Checks, to ensure the consistency of the programme.

Key words: general practice; Health Checks; lifestyle; risk factors; variation

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Introduction

The English NHS Health Check programme, launched in April 2009, is a mandated public health programme, forming a key part of the Department of Health's strategy aimed at preventing cardiovascular

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disease (CVD) (Department of Health, 2013), supported by Public Health England (PHE) (Department of Health and Public Health England, 2013). The majority of NHS Health Checks are delivered by general practices. However, variation has been documented in delivery, both between different areas of the country and between practices (Graley *et al.*, 2011; Artac *et al.*, 2013a; Nicholas *et al.*, 2013). Such variation extends to a range of factors influencing attendance and outcomes of NHS Health Checks, such as tools used to assess CVD risk, preventive services available (Graley *et al.*, 2011), staff training, advice provision (Nicholas *et al.*, 2013), use of publicity materials and methods of invitation (Krska *et al.*, 2015a). Recording of key parameters during NHS Health Checks may also be variable and incomplete (Artac *et al.*, 2013a; 2013b; Baker *et al.*, 2015).

Few studies have included details of the frequency with which lifestyle advice is recorded, with one study indicating it was given to 9.7% of general practice NHS Health Check attenders (Cochrane *et al.*, 2012) and another that advice was given less frequently than desired by guidance (Baker *et al.*, 2015). The extent to which statin prescribing increased following NHS Health Checks ranges from 20.1% to 46.6%, again showing variation between practices (Dalton *et al.*, 2011; Cochrane *et al.*, 2012; Artac *et al.*, 2013a; 2013b), while one study also found no difference in the rate of new diagnoses in patients registered with practices providing NHS Health Checks and those not (Caley *et al.*, 2014).

Ensuring consistency of delivery is one aspect of NHS Health Checks on which PHE wish to focus, with a key question concerning improving implementation of the programme to enable effective case-finding (Waterall *et al.*, 2015). Thus, more detailed studies of the actual implementation are needed to enable improvement, yet only few studies have reported on the completeness of documentation, tests performed, frequency of advice given and referrals made in practices. Moreover, nothing is known about how this differs in relation to which professional conducted the review.

In Sefton, North West England, the approach taken in general practices during 2009/10 was to identify people estimated as having a high CVD risk, since it is potentially more cost-effective than whole population approaches (Chamnan *et al.*, 2010; Schuetz *et al.*, 2013). Practices were asked to

develop registers of patients estimated to fall into the high CVD risk category, using their existing practice clinical systems or specialist software (Oberoi). This required them to conduct searches of previously documented risk factors on the clinical systems and to use imputed adverse estimates for missing data, thus generating a list of people with an estimated high-risk score of $\geq 20\%$ CVD risk. Annual reviews commenced during 2010/11 and included patients with hypertension, as the Quality Outcomes Framework offered no incentive to provide CVD risk assessment for patients already on the hypertension register, as well as those already prescribed statins.

Views of patients, GPs and practice managers on implementation of the programme in Sefton during the first six months of its delivery have been reported elsewhere (Krska *et al.*, 2015a; 2015b). This work aimed to evaluate the implementation in terms of the completeness of data recording, frequency of advice provided, referrals to community-based lifestyle support services, statin prescribing and new diagnoses made, in particular assessing variation both between practices and between health professionals involved in delivering NHS Health Checks.

Methods

Practice selection

All 55 general practices in the area were providing NHS Health Checks. To enable maximum diversity in delivery to be studied, a sample of 25 practices were selected, reflecting divergence in a number of characteristics considered relevant to NHS Health Check processes: proportion of patients estimated to have CVD risk $\geq 20\%$ over 10 years, proportion of these reviewed, geographic location/deprivation, list size/number of GPs and practice nurses, clinical computer system/software used to identify potentially high-risk patients. All were invited to participate and all responded positively, from which 13 practices were purposively selected.

Data collection methods

Data were collected between October 2011 and March 2012 by staff employed by the former Primary Care Trust, with expertise in gathering audit data from medical records. To ensure

Table 1 Characteristics of patients eligible for NHS Health Check, derived from data in medical records (*n* = 2892)

Characteristic/risk factor	Attended (Maximum <i>n</i> = 1070)	Invited but not attended (Maximum <i>n</i> = 953)	Not yet invited (Maximum <i>n</i> = 869)	Total (Maximum <i>n</i> = 2892)	Missing data
Sex (male)	866 (80.9%)	763 (80.1%)	635 (73.1%)	2264 (78.3%)	0
Age over 65 years	793 (74.1%)	539 (56.6%)	676 (77.8%)	2008 (69.4%)	0
Ethnicity (white)	896 (99.1%)	545 (99.0%)	613 (99.2%)	2054 (99.1%)	819 (28.3%)
Family history of CVD	509 (56.7%)	399 (67.4%)	355 (40.8%)	1263 (43.7%)	898 (31.0%)
Smoker	280 (28.1%)	367 (42.9%)	260 (29.9%)	897 (31.1%)	306 (10.6%)
BMI ≥ 25	555 (75.6%)	401 (73.7%)	397 (75.8%)	1353 (76.2%)	1090 (37.7%)
Exercise grading low	210 (19.6%)	138 (14.5%)	205 (23.6%)	553 (19.2%)	1912 (66.1%)
Cholesterol ≥ 5 mmol/L	539 (50.4%)	352 (36.9%)	411 (47.3%)	1302 (45.0%)	987 (34.1%)
Prescribed statin	210 (25.7%)	130 (24.6%)	240 (27.6%)	580 (29.0%)	891 (30.8%)
Hypertension	448 (41.9%)	210 (22.0%)	543 (62.5%)	1201 (41.5%)	0
Deprivation level					
1	155 (14.5%)	138 (14.7%)	145 (16.8%)	438 (15.4%)	43 (1.5%)
2	153 (14.3%)	144 (15.4%)	165 (19.1%)	462 (16.2%)	
3	349 (32.6%)	286 (30.6%)	305 (35.3%)	940 (33.0%)	
4	289 (27.0%)	274 (29.3%)	160 (18.5%)	723 (25.4%)	
5	104 (9.7%)	94 (10.0%)	88 (10.2%)	286 (9.9%)	

CVD = cardiovascular disease; BMI = body mass index.

uniformity in data collection and interpretation, forms were designed iteratively by four staff and six data collectors trained to extract data using a guide. The data collected included disease codes (READ) and free text. After piloting data collection in three practices, data from medical records of all high-risk patients were abstracted onto paper records, then entered into Excel by the trained data collectors. One author (R.D.) assessed the accuracy of data transfer from medical records in 5% of records in all 13 practices and a further check of 5% of data transferred from paper records to Excel was performed by an Information Facilitator manager. Data were then converted into SPSS version 17.0 for analysis and any coding errors rectified.

Data abstracted included: number and mode(s) of invitations, staff providing NHS Health Checks, range of blood tests ordered, recorded findings, documented advice and referrals, CVD risk scores, statin prescriptions and new diagnoses.

Data analysis

Simple frequencies were calculated for all variables. Comparisons between subgroups were assessed using χ^2 tests and paired t-tests were used to compare estimated risk scores with actual scores. Binary logistic regression analysis was performed, including only patients who had received invitations

for the NHS Health Check, to determine factors related to attendance.

Results

Demographic characteristics

Data were extracted from 2892 patient records in the 13 practices, of whom 1201 (41.5%) had a diagnosis of hypertension. Statins were prescribed to 580 patients (20.1%), 414 (71.3%) of whom were hypertensive. Applying current criteria of excluding people with hypertension and those on statins, 1367 of our sample of 2892 patients (47.3%) would now be excluded from the NHS Health Checks programme.

The demographic characteristics and previously documented risk factors of all 2892 patients are shown in Table 1, showing the extent of data missing from records.

Invitations and attendance

Just over two-thirds of the patients (1965; 67.9%), had been invited for an NHS Health Check at the time of data collection; mostly by letters sent from the practices (1819; 92.7%), with most having been sent only one letter (1544; 79.0%). Of those invited, 1012 (51.5%) had attended, 58 others had received an NHS Health Check but with no documented

Table 2 Frequency of blood tests requested and parameters recorded during NHS Health Checks provided by different health professionals and practices

Blood test or other data requested or recorded	Number of patients (%)						Practice range % of attenders (n = 12)
	Total (n = 1066) ^a	Nurse (n = 784)	HCA (n = 153)	GP (n = 62)	Pharm (n = 43)	Multiple (n = 24)	
Cholesterol	981 (91)	719 (92)	143 (93)	59 (95)	42 (98)	18 (75)	62–100
BP measurement	1025 (96)	755 (96)	152 (99)	57 (92)	40 (93)	21 (88)	72–100
Fasting blood glucose ^b	469 (44)	384 (49)	34 (22)	36 (58)	11 (26)	4 (17)	1–97
Serum creatinine and electrolytes ^b	915 (86)	686 (88)	136 (89)	58 (94)	16 (37)	19 (79)	52–100
Liver function tests ^b	870 (82)	641 (82)	139 (91)	56 (90)	16 (37)	18 (75)	20–100
Thyroid function tests ^b	827 (78)	614 (78)	132 (86)	56 (90)	16 (37)	9 (38)	6–99
Full blood count ^b	596 (56)	456 (58)	55 (36)	56 (90)	14 (33)	15 (63)	7–99
BMI measured ^b	1003 (94)	751 (96)	144 (94)	49 (79)	40 (93)	19 (79)	74–100
Smoking status recorded ^b	999 (94)	740 (94)	152 (99)	42 (68)	42 (98)	23 (96)	70–100
Alcohol intake recorded ^b	907 (85)	673 (86)	138 (90)	46 (74)	34 (73)	24 (100)	61–97
Exercise grading recorded ^b	591 (56)	399 (51)	148 (87)	5 (8)	39 (91)	11 (46)	0–100
CVD risk score recorded ^b	936 (88)	670 (77)	145 (95)	62 (95)	41 (95)	20 (83)	59–100

HCA = healthcare assistant; BP = blood pressure; BMI = body mass index; CVD = cardiovascular disease.

^aDetails of Health Check provider missing for four patients.

^bP < 0.001 difference between professionals (χ^2).

invitation, hence these Checks, 5.4% of the total, were assumed to be opportunistic. Therefore, at the time of data collection, 1070 (37.5%) of the estimated high-risk population in these 13 practices had received an NHS Health Check, ranging from none to 78.4% between practices, reflecting the deliberate diverse practice selection.

Logistic regression analysis, including only the patients invited, indicated that those aged 65 or over (OR = 1.927; 95% CI: 1.484–2.502), those with cholesterol level above 5 mmol/L (OR = 1.394; 95% CI: 1.094–1.778) and those with hypertension (OR = 1.521; 95% CI: 1.176–1.966) were more likely to attend, whereas smokers were less likely to do so (OR = 0.554; 95% CI: 0.420–0.730). If patients with pre-existing hypertension are excluded from the analysis, only gender and smoking status affected attendance. There were no differences in attendance dependent on deprivation status.

Completeness of review processes

A range of health professionals were involved in delivering NHS Health Checks (Table 2). Most were conducted by a nurse (784; 73.5%) or healthcare assistant (HCA) (153; 14.3%). GPs conducted few Health Checks overall (5.8%), and in six practices GPs conducted none of the Checks,

while in two practices, pharmacists conducted some of the Health Checks.

There were significant differences between both health professionals and individual practices in the range of data gathered/recorded during the NHS Health Check (Table 2). Requests for blood tests were less frequently recorded following reviews conducted by practice-based pharmacists than reviews conducted by other health professionals, but lifestyle data were recorded more frequently. Reviews conducted by GPs had exercise and smoking status recorded infrequently, but requests for blood tests were more frequent. Nurses and GPs recorded exercise grading less frequently than HCAs or pharmacists. Fewer than half the patients reviewed (525; 49.1%) had four lifestyle risk factors recorded [smoking status, body mass index (BMI), alcohol and exercise], with three recorded in a further 389 (36.4%) patients. Only 485 (45.3%) patients had four lifestyle measures plus blood pressure (BP) and cholesterol recorded.

The range of blood test results recorded also varied, some patients not having all the standard tests required while others had additional tests. Fasting blood glucose (FBG) was required at the time only for patients with $BMI \geq 25$ or hypertension, but was recorded for 77.2% of patients with $BMI < 25$, 38.3% of patients with normal BP and 37.9% with no pre-existing hypertension. Serum

Table 3 Frequency of lifestyle advice and referrals documented during NHS Health Checks ($n = 1070$)

Lifestyle risk factor	Number (proportion of total)		Of those with lifestyle risk	
	With lifestyle factor	Receiving advice	Proportion receiving advice	Number (proportion) referred
Overweight/obese	753 (70.4%)	682 (63.7%)	85.2%	28 (3.7%)
Exercise low	334 (31.4%)	381 (35.6%)	86.7%	23 (6.9%)
Smoking	238 (22.2%)	238 (22.2%)	88.7%	19 (7.9%)
High alcohol use	189 (17.7%)	340 (31.8%)	92.9%	3 (1.6%)

creatinine was measured in 86% of patients, although required only for patients with raised BP. Although not a requirement, liver function, thyroid function and full blood count were performed for 82%, 78% and 56% of patients, respectively.

The proportion of patients for whom a CVD risk score was recorded within two months of receiving the NHS Health Check was 87.5% overall (936), ranging from 59% to 100%, only three of the 13 practices achieving the latter. Recording of a CVD risk score was not dependent on the number of parameters recorded, which was 5.19 ± 0.98 in patients with a risk score and 5.21 ± 1.25 in those without. Patients seen by nurses or by a combination of professionals were most likely to have no risk score recorded.

Confirmation of CVD risk estimates

Lifestyle risk factors obtained at the NHS Health Check compared favourably to previous data used to estimate risk, although data were missing for many patients. Smoking status was correctly recorded in 787/922 (85.4%), BMI category was confirmed in 534/645 (83.0%) and exercise grading in 181/245 (73.9%). Estimated CVD risk scores, calculated using practice or specialist software before the NHS Health Check, could only be compared with actual scores in 677 (63.3%) of the 1070 patients, because of the frequent failure to document a risk score following the NHS Health Check. Mean actual risk score was significantly higher (27.6 ± 8.1) than mean estimated score (26.3 ± 6.3) ($P < 0.001$). In 456/677 patients (67.4%), estimated risk category was correct, actual risk score was lower in 99 (14.6%) and higher in 122 (18.0%).

Results of Health Checks

Risk scores were <20% in only 86/1070 patients (8.0%), 531 (49.6%) had a score between 20% and 30%, 220 (20.6%) between 30% and 40% and 99 (9.3%) >40%.

Of the 982 patients having a recorded cholesterol level, the level was >5 mmol/L in 716 (72.9%) and above 7.5 mmol/L in 43 (4.4%), BP >140/90 mmHg was found in 456/1026 (44.7%) and raised FBG in 55/469 (11.7%). Few underwent further testing: repeat BP was measured in 248 patients, repeat fasting glucose in 20 and oral glucose tolerance test in three. Lifestyle risk factors recorded are shown in Table 3.

Lifestyle advice and referrals provided

In total, 862/1070 patients reviewed (80.6%) received advice on at least one lifestyle issue, but only 68 (6.4%) had a documented referral (Table 3). Data on sign-posting and self-referral were not available in any records. Dietary advice was most frequently offered, all advice being appropriately targeted (Table 3).

Significant differences were found in the frequency of advice and referrals between health professionals and practices (Table 4). Most referrals were offered by HCAs [33 (45%) of the 73] in 14% of the reviews they conducted, while both nurses and GPs made referrals in only 5% of their reviews and pharmacists in 2%. One practice provided exercise advice to 63% of attenders, another gave advice on alcohol to 64%, while one practice made most of the exercise referrals (21/23) and six of the 19 smoking cessation referrals.

Immediate outcomes

Of the 1070 patients who attended an NHS Health Check, 210 (19.6%) were already receiving

Table 4 Frequency of lifestyle advice documented by different health professionals and practices

Advice provided	Number (%) of attenders given advice						Practice range % (n = 12)
	Total (n = 1066) ^a	Nurse (n = 784)	HCA (n = 153)	GP (n = 62)	Pharm (n = 43)	Multiple (n = 24)	
Diet advice ^b	682 (63.7)	26 (42)	520 (66)	111 (73)	9 (21)	16 (66)	50–76
Exercise advice ^b	381 (35.6)	5 (9)	265 (34)	93 (61)	5 (12)	13 (54)	3–65
Smoking advice	238 (22.2)	8 (13)	177 (23)	29 (19)	9 (21)	15 (62.5)	13–41
Alcohol advice ^b	340 (31.8)	19 (31)	264 (34)	46 (30)	2 (5)	9 (37.5)	10–63

HCA = healthcare assistant.

^aDetails of Health Check provider missing for four patients.

^bP<0.001 difference between professionals (χ^2).

a statin. Statins were newly prescribed to only 160 patients, increasing the rate in attenders to 34.6%. Among the 160, 63 had pre-existing hypertension. More patients receiving an NHS Health Check from a GP were prescribed a statin (65.5%) than those seen by nurses (31.4%), HCAs (15.1%) or pharmacists (22.0%). A total of 40 new diagnoses were recorded following NHS Health Checks: hypertension (24) diabetes (nine), ischaemic heart disease (two), chronic kidney disease (five). There was no statistically significant difference in the proportion of patients receiving a new diagnosis among attenders (3.7%) or non-attenders (89/1822; 4.9%) ($P = 0.088$).

Discussion

This study of the practical implementation of NHS Health Checks found significant variation between both practices and practitioners in the parameters measured and recorded, advice given, statin prescribing and referrals provided. A large amount of data was missing from the records used to identify people with high potential risk, but recorded data were mostly accurate. Of those whose estimated risk could be confirmed, just over two-thirds were correct, indicating that the estimation methods applied were also accurate. Many patients still had incomplete records following the NHS Health Check, although this did not affect recording of CVD risk scores. Additional tests were frequent, potentially increasing costs, perhaps due to practices taking the opportunity offered by the NHS Health Check. Lifestyle advice was provided to the majority (80.6%), but documented referrals for support with changing lifestyle were infrequent

(6.4%). Although the majority of attenders (87.5%) had CVD risk scores of $\geq 20\%$, few were initiated on statins. The rate of new diagnoses was not higher in Health Check attenders compared with those not attending or not invited who also had high estimated CVD risk. The lack of relevant data available for estimating CVD risk is recognised in the economic modelling for the NHS Health Checks programme (Department of Health, 2008) and poor recording following NHS Health Checks has been found (Artac *et al.*, 2013a; 2013b; Baker *et al.*, 2015). In contrast to other areas where practices were provided with lists of individuals potentially at high risk (Cochrane *et al.*, 2012), the practices in our study primarily used searches designed to run on their own clinical systems to estimate CVD risk. The estimates of CVD risk achieved were better than in a study that used only specialist software (Dalton *et al.*, 2011).

The variations between different health professionals providing NHS Health Checks, as well as between practices confirm the need for commissioners to ensure consistency in content of the check, data gathering and recording. Extra tests potentially add to NHS Health Check costs, but are arguably justifiable. Indeed qualitative work has noted that practices were taking advantage of patients attending to add additional elements, including pulse, thyroid and other tests (Research Works, 2013). However, both failure to obtain or record all the necessary data for estimation of CVD risk, and to record the calculated risk score following the NHS Health Check are of concern. Incomplete data recording has been found in other studies (Artac *et al.*, 2013a, 2013b; Baker *et al.*, 2015), but failure to record CVD risk score has not been reported previously. Since this evaluation

took place, PHE has issued both guidance on standards for delivery and a competency framework to support improvements in consistency (Public Health England, 2014; Public Health England and Skills for Health, 2015).

This study found a relatively small increase in statin prescribing following the NHS Health Check compared with rates found elsewhere (Dalton *et al.*, 2011; Cochrane *et al.*, 2012; Artac *et al.*, 2013a; 2013b). This may have arisen because of delivery of NHS Health Checks by a range of staff who were not qualified to prescribe statins, combined with poor internal practice referral systems. Moreover, recorded new diagnoses within two months of the NHS Health Check were few in number and the diagnosis rate did not differ from that found in the remaining patients registered with the same practices who were eligible for an NHS Health Check and estimated to be at high CVD risk. This too could be related to poor internal systems for referral and recall, but more in-depth study would be required to assess the reasons for these findings. Previous work has suggested that new diagnoses may be increased following cardiovascular screening (Lambert *et al.*, 2012), while a more recent study contradicting this finding (Caley *et al.*, 2014) was criticised for being under-powered (Waterall *et al.*, 2015).

Strengths and limitations

Our study focused on implementation and we used a deliberate sampling strategy, which included practices known to have provided few NHS Health Checks. This meant that only 37.5% of patients considered eligible according to the local inclusion criteria, which included hypertension, had received a NHS Health Check at the time of the study. However, it did ensure that different clinical computer systems, methods of call and recall and different health professionals could be studied. It also enabled a comparison of new diagnoses in attenders and non-attenders in the same practices, although the overall number of patients included was relatively low, thus findings must be viewed with caution. We did not collect data on offers or refusals of statins, measures of glycaemia other than FBG or results of follow-up tests. As we were seeking to determine how different practices implemented the service, to inform local learning and improvement, the evaluation did not attempt to determine longer-term

outcomes. This evaluation was undertaken during the first years of implementation of the NHS Health Check and may not reflect current practice; moreover, the population studied does not reflect current inclusion criteria for the NHS Health Check. Following this evaluation, data were fed back to individual practices and measures taken to improve consistency of delivery, including revision of the template used for recording data.

Conclusion

Variation in the way practice staff deliver and record data for NHS Health Checks and their follow-up actions, including advice, referral and statin prescribing, are concerning for this costly national programme. More consistent training of those carrying out the Checks and improvement in recording of data and outputs are needed to help improve consistency of delivery and enable future rigorous evaluation of the programme.

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Conflicts of Interest

None.

Ethical Standards

The study was approved by Liverpool John Moores University Research Ethics Committee and Sefton Primary Care Trust.

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