Cross-sectional review of the response and treatment uptake from the NHS Health Checks programme in Stoke on Trent

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ABSTRACT

Background As part of national policy to manage the increasing burden of chronic diseases, the Department of Health in England has launched the NHS Health Checks programme, which aims to reduce the burden of the major vascular diseases on the health service.

Methods A cross-sectional review of response, attendance and treatment uptake over the first year of the programme in Stoke on Trent was carried out. Patients aged between 32 and 74 years and estimated to be at ≥20% risk of developing cardiovascular disease were identified from electronic medical records. Multi-level regression modelling was used to evaluate the influence of individual- and practice-level factors on health check outcomes.

Results Overall 63.3% of patients responded, 43.7% attended and 29.8% took up a treatment following their health check invitation. The response was higher for older age and more affluent areas; attendance and treatment uptake were higher for males and older age. Variance between practices was significant ($P < 0.001$) for response (13.4%), attendance (12.7%) and uptake (23%).

Conclusions The attendance rate of 43.7% following invitation to a health check was considerably lower than the benchmark of 75%. The lack of public interest and the prevalence of significant comorbidity are challenges to this national policy innovation.

Keywords chronic disease management, general practice, multi-level modelling, policy implementation, prevention, screening uptake, vascular disease risk

Introduction

Of the 57 million global deaths in 2008, 63% were attributed to chronic diseases.[1] The growing global burden of chronic diseases has prompted calls for this challenge to be given a higher priority and for greater emphasis to be placed on controlling well-recognized lifestyle-related risk factors.[1,2]

As part of a more concerted, multi-sectoral shift in policy, the Department of Health in England introduced the NHS Health Checks programme in 2009. This 'at-risk' population-based approach is a vascular risk assessment programme for all adults aged 40–74 years in England and is designed to reduce the incidence of major vascular disease events.[3] The programme is delivered through primary care

and involves: initial invitation by letter, systematic screening, measurement of cardiovascular disease (CVD) risk factors, generation of global risk estimates, risk communication and lifestyle counselling. As well as managing individual risk factors, such as smoking or hypertension, the programme

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recommends that individuals with $\geq 20\%$ risk of developing CVD in the next 10 years are offered lipid-lowering medication, irrespective of lipid levels.[4]

The economic modelling on which this policy is based assumes that a benchmark uptake of 75% will be achieved, similar to that of the national breast screening programme. However, this assumption is not based on sound research, and there is evidence from other UK-based screening programmes that the benchmark of 75% may be at the optimistic upper end of what is achievable.[5] Uptake has been shown to vary depending on individual characteristics such as gender, age and ethnicity but also through higher level factors such as area of residence or practice size.[6] Clearly, there is a need for more research into the factors affecting both the population response to invitations to attend such health checks and the uptake of treatments offered as a consequence of screening.

The aim of this study was to examine the response to an invitation to attend for an NHS Health Check in a mainly deprived industrial city in the West Midlands region of England. Our primary focus was to consider whether individual characteristics or practice characteristics might influence the decision to attend a vascular risk health check or to take up treatments offered to confirmed high-risk patients. An additional objective at this fledgling stage of national policy implementation was to gain a greater insight into other factors that might affect individual patients' ability to take up the services offered.

Methods

NHS Health Checks in Stoke on Trent

Stoke on Trent has a predominantly socio-economically deprived population of 2 78 253 patients registered across 57 general practices. The NHS Health Checks programme is mainly delivered through primary care by practice nurses supported by specially trained project support workers and is funded by a Local Enhanced Service agreement whereby practices receive a per capita payment (of the order £15–20 depending on the level of service provided) for each patient screened. Patients who were free of established vascular disease but estimated to be at $\geq 20\%$ risk of a CVD event in the next 10 years were invited for screening in the first year of the programme. Each general practice was provided with a list of patients to be invited in year1. This list was obtained from electronic practice records using the most recent data available on individual patients. Due to the high demand of this new service, recruitment of practices was staggered on an area-by-area basis, starting with the areas considered to be in greatest need. In recognition of the

above-average burden of CVD and the below-average life expectancy in Stoke on Trent,[7] the local implementation went beyond the Department of Health guidelines by including patients aged between 32 and 74 years as well as additional health checks (details of the lifestyle support package (Primary Prevention Toolkit) are available at http://www.stokepct.nhs.uk/publication/list/Other_Publications). We report here on health checks initiated in general practices over the first 6 months of the programme (August 2009–January 2010).

Selection of patients and data

Patients selected from 37 out of 57 general practices in Stoke on Trent were able to participate in the first year of the programme, representing 118 710 patients in the age range of interest from a total practice population of 219 554 patients. Dedicated software, Oberoi Clinical Observations (Oberoi Consulting, Derby, UK), was used to stratify practice lists by estimated 10-year CVD risk using the Joint British Societies 2 risk score,[8] which was recommended at the time of conducting this research. Patients free of established vascular disease and having a CVD risk of $\geq 20\%$ over the next 10 years were considered eligible to be invited for a health check. Each practice was provided with a list of those patients to be invited.

Practice nurses or project support workers in each practice went through their list, systematically contacting patients, until all eligible patients had been invited. Up to three reminder letters were sent before a non-response was recorded. As far as feasible, the following data were recorded for each patient: age, gender, CVD risk, response to the invitation, reason for non-response, attendance at the health check, reason for non-attendance, uptake of treatment(s) offered, reason for non-uptake and details of the treatment taken up. The practice population size, number of patients in the target age range and socio-economic status (using the Index of Multiple Deprivation (IMD) 2010[9] GP Practice scores, GP Practice IMD 2010 scores were provided by the West Midlands Public Health Observatory on behalf of the Department of Health.) were also recorded for each practice.

Statistical analysis

The non-categorical predictor variables such as age, CVD risk, practice population and IMD 2010 score were recoded into appropriate categorical variables as detailed in Table 1. We cross-tabulated our primary outcome variables, response, attendance and uptake of treatment, by each predictor variable and used two-tailed z-tests (with the Bonferroni

Table 1 Summary of response, attendance and uptake of treatment by category

	Invited		Responded		Attended		Uptake of treatment	
	N	%	N	%	N	%	N	%
Gender								
0 Male	8521	81.3	5332	62.6	3829	44.9[↑]	2663	31.3[↑]
1 Female	1962	18.7	1302	66.4[↑]	751	38.3	464	23.6
Age group								
1 ≥ 30 AND <55	2140	20.4	973	45.5	610	28.5[↓]	349	16.3[↓]
2 ≥ 55 AND <65	4528	43.2	2763	61.0	1995	44.1	1350	29.8
3 ≥ 65	3815	36.4	2898	76.0[↑]	1975	51.8[↑]	1428	37.4[↑]
Risk category								
1 ≥ 15 AND <25	4637	44.2	2794	60.3[↓]	1993	43.0	1252	27.0[↓]
2 ≥ 25 AND <35	4325	41.3	2766	64.0	1873	43.3	1323	30.6
3 ≥ 35	1521	14.5	1074	70.6[↑]	714	46.9[↑]	552	36.3[↑]
Practice size								
1 < 3500	1758	16.8	1137	64.7	771	43.9	559	31.8[↑]
2 ≥ 3500 AND <7000	4073	38.9	2587	63.5	1774	43.6	1311	32.2[↑]
3 ≥ 7000	4652	44.4	2910	62.6	2035	43.7	1257	27.0[↓]
Deprivation tertile[a]								
1 Deprived	7702	73.5	4762	61.8[↓]	3283	42.6[↓]	2272	29.5
2 Intermediate	1439	13.7	932	64.8	647	45.0	434	30.2
3 More affluent	1342	12.8	940	70.0[↑]	650	48.4[↑]	421	31.4
Overall	10 483	100	6634	63.3	4580	43.7	3127	29.8

[a]Deprivation tertile based on Index of Multiple Deprivation–2010.

[↓]Significantly less likely, $P < 0.05$ (with Bonferroni adjustment).

[↑]Significantly more likely, $P < 0.05$ (with Bonferroni adjustment).

adjustment) to test for significant differences in proportions between sub-categories.

To evaluate potential effects of the higher level predictors of practice size and the degree of deprivation on our outcome measures, we developed a multi-level non-linear regression model using the Bernoulli model approach proposed by Raudenbush and Bhumirat.[10] This model is described in detail by Raudenbush and Bryk in their book on hierarchical linear models.[11] Individual-level predictors included in the model were gender, age group and CVD risk category. Ethnicity was considered as another relevant categorical variable but was not included here. Ethnic diversity is not widespread in Stoke on Trent and the numbers in ethnic groups other than white British included in the sample were small and sparsely distributed between practices. Weights were applied at the practice level through a variable representing the number of people in each practice register in the age range of interest. Predictor variables were included in the models if they reduce the value of the likelihood function. The population average model with robust standard errors was used to interpret effects. A level 2 (practice level) variance component was included in all the models to estimate the amount of variance in the outcome measures attributable to practice-level factors. Odds ratios (and 95% confidence intervals) were calculated for each categorical variable included in the models. Multi-level regression analyses were carried-out using HLM version 6.08 (Scientific Software International, Lincolnwood, IL, USA).

Ethical approval

The research, of which this study is a part, was approved by the South Birmingham Research Ethics Committee, West Midlands Region of England.

Results

Variation in response, attendance and uptake by category

In the 37 practices, 10 483 patients in the age range 32–74 years and with estimated CVD risk of ≥20% were invited for the health check in the period reviewed. It should be noted that our sample included just 28 patients (0.3%) who

were aged <40 years. Thus percentages reported in tables are effectively the same as those we would have obtained if we had followed the national guidelines for the age range. Table 1 shows the distribution of those who responded, those who attended a health check and those who took up a treatment offered following the health check among the categories of predictor variables. Overall, 63.3% of those invited to a health check responded, 43.7% attended a health check and 29.8% took up a treatment.

Looking at unadjusted comparisons of proportions by category, the following observations may be made: females were more likely to respond to the invitation to a health check but males were more likely to attend and to take up a treatment offered; the oldest age group were more likely to respond, to attend and to take up treatment while the youngest age group were less likely to attend and to take up treatment; the highest risk category were more likely to respond, to attend and to take up treatment whereas the youngest age group were less likely to respond and to take up treatment; patients in the largest practices were less likely to take up treatment; patients from practices in more affluent areas were more likely to respond and to attend a health check whereas patients from practices in deprived areas were less likely to respond and to attend a health check, though there were no differences in the likelihood of taking up treatment.

Reasons for non-response, non-attendance and non-uptake of treatments

The reasons given, if available, for non-response, non-attendance and non-uptake of treatment are summarized in Table 2.

Of the 36.7% of the patients invited who did not respond, 28.8% were recorded as genuine non-responders but a further 8% could be attributed to an administrative error. An additional 19.6% of patients did not attend a health check. The presence of a significant comorbidity, at 13.5%, was the dominant factor here but the range of other debilitating life circumstances was also important, accounting for 6% of non-attendance. Comorbidities recorded included: cerebrovascular disease, chronic obstructive pulmonary disease, cancer, chronic kidney disease, diabetes, cardiology, cardiovascular disease, disabled, in nursing home, mental health or behavioural problems, has carers or has carer responsibilities, liver disease, orthopaedic problems, Parkinson's disease, receiving palliative care, rheumatoid arthritis, awaiting or recently had major surgery. Comorbidity (4%) was also a significant restricting factor with regard to the uptake of treatments offered, while 5% of patients had

Table 2 Reasons recorded for non-response, non-attendance and non-uptake of treatment

	N	%
Reason for non-response		
Deceased	54	0.5
Left practice	194	1.9
Missing	460	4.4
No address	3	<0.1
No NHS number	41	0.4
No response	3018	28.8
Not found	53	0.5
Wrong address	26	0.2
Total	3849	36.7
Reason for non-attendance		
Aged ≥ 75	95	0.9
Alcohol	24	0.2
Comorbidity	1416	13.5
Declined health check	244	2.3
DNA	66	0.6
Drugs	4	<0.1
Homeless	1	<0.1
Housebound	13	0.1
In-patient	3	<0.1
Injury	2	<0.1
Learning difficulties	13	0.1
Leave for now	22	0.2
Mental health	115	1.1
Nursing home	18	0.2
Prison	1	<0.1
Too ill	17	0.2
Total	2054	19.6
Reason for non-uptake		
Already doing enough	11	0.1
Already seen	529	5
Bereaved	1	<0.1
Comorbidity	421	4
Family reasons	3	<0.1
Lifestyle support then changed mind	3	<0.1
No NHS no.	6	0.1
Risk < 20%	465	4.4
Unsuitable	13	0.1
Work	1	<0.1
Total	1453	13.9

already been seen and 4.4% did not have a CVD risk of ≥20% when screened at the practice.

Treatments taken up

The recorded treatments taken up following the health check are listed in Table 3. The dominant treatments taken

Table 3 Treatments recorded following the health check

Treatment	N	%
Accepted then declined lifestyle support	3	<0.1
Lifestyle support	1015	9.7
Fibrates	34	0.3
Usual care	279	2.7
Statins	1796	17.1
Total	3127	29.8

up were the prescription of statins (17.1%) and enhanced lifestyle support (9.7%).

Multi-level modelling of predictors of response, attendance and uptake

The comparisons implicit in Table 1 are unadjusted in the sense that they do not take account of any other potentially explanatory factors in their calculation. Multi-level modelling allowed us to construct explanatory models of response, attendance and uptake of treatment accounting simultaneously for multiple individual-level factors and practice-level factors. Table 4 summarizes the results from these models.

With respect to response, older age and greater affluence were confirmed as predictors of increased likelihood to respond, with odds ratios (ORs) of 1.92 (P < 0.001) and 1.17 (P < 0.05), respectively. Male gender and older age were confirmed as predictors of increased likelihood to attend a health check, OR = 0.7 (P < 0.001) (males coded as 0, females as 1) and 1.64 (P < 0.001), respectively. Furthermore, a trend towards decreased likelihood of attendance for higher risk patients, OR = 0.9 (P < 0.1) was noted. Male gender and older age were confirmed as predictors of increased likelihood to take up treatment, OR = 0.66 (P < 0.001) and 1.65 (P < 0.001), respectively. Finally, the variance between practices was significant (P < 0.001), 13.4, 12.7 and 23% for response, attendance and uptake, respectively.

Importantly, the following differences indicated by the χ-tests as highlighted in Table 1 were not confirmed in multi-level models: response by gender; response, attendance and uptake by the risk category; response, attendance and uptake by the practice size and attendance by the deprivation tertile.

Discussion

Main findings

The effective uptake of the NHS Health Checks service (attendance in the context of this paper) was 43.7% and

Table 4 Summary of multi-level analysis of individual- and practice-level predictors of response, attendance and uptake of treatment

Outcome	Predictor	Odds ratios[a]	95% CI	Variance component
Response	Gender	1.09	(0.92,1.29)	0.134*
	Age group	1.92	(1.77,2.08)*	
	Risk category	1.04	(0.93,1.17)	
	Practice size	0.96	(0.83,1.12)	
	Deprivation tertile	1.17	(1.02,1.35)**	
Attendance	Gender	0.70	(0.58,0.84)*	0.127*
	Age group	1.64	(1.51,1.77)*	
	Risk category	0.90	(0.80,1.02)***	
	Practice size	1.03	(0.88,1.20)	
	Deprivation tertile	1.12	(0.96,1.30)	
Uptake	Gender	0.66	(0.55,0.80)*	0.23*
	Age group	1.65	(1.53,1.77)*	
	Risk category	1.03	(0.94,1.14)	
	Practice size	0.89	(0.76,1.05)	
	Deprivation tertile	0.94	(0.79,1.11)	

Gender: Males coded 0, Females one; CI – confidence interval.
[a]Change in odds of the outcome for a one unit increase (next category higher) in the explanatory variable *P < 0.001; **P < 0.05; ***P < 0.1.

considerably below the national benchmark of 75%. Around 29% of eligible patients seem to be not at all interested in the service, having not responded after three invitation letters and a further 8% were lost to follow-up through various administrative errors. An additional 19.6% of patients were unable to attend a health check, mainly because of significant morbidity (13.5%) or debilitating life circumstances (2.2). Furthermore, another 13.9% of patients did not take up treatment for a variety of reasons, leaving just 29.8% of patients who started a treatment as a result of their health check. On the basis of this evidence, it is unlikely that the benchmark uptake of 75% is achievable in this population.

Older patients and patients from more affluent areas were more likely to respond to the invitation to a health check. This is a potentially worrying finding because a poorer response from people from less affluent areas (the majority in Stoke on Trent) could widen health inequalities. Males and older age groups were more likely to attend for a health check and to take up subsequent treatment.

What is already known on this topic

As long ago as the early 1990s, in two landmark studies of the time, recruitment to screening programmes was reported to be as high as 73 and 82.3%, respectively.[12,13] In contrast, another study from the same period[14] reported recruitment to be 43.6%, similar to that found here. More recent research would seem to favour a lower level of recruitment as being more realistic than those seen in the British Family Heart Study[12] and the OXCHECK[13] trial. Richardson et al.[15] reported recruitment to be 29% (though only patients in the age range 45–64 were targeted); Lambert et al.[16] reported recruitment of 24.3% for men aged over 40 years living in inner-city Birmingham; Lawlor et al.[17] and Patel et al.[18] reported recruitment of 60% in the British Women's Heart and Health study, though this included older women aged 62–83 from 23 towns and covered the years from 1998 to 2001.

The OXCHECK researchers[13] and Lambert et al.[16] examined factors that might affect response to an invitation to attend for a health check but did not specifically follow-up non-attenders as was done in our study. A number of individual-level variables have been demonstrated to be linked to the likelihood of responding to an invitation to attend for a health check, including gender, ethnicity, marital status, occupation, relative affluence, smoking status, alcohol use, diet, regularity of visiting the practice and readiness to change behaviour. Incentives to general practice, e.g. through a Locally Enhanced Service arrangement have also been shown to improve response rate.[16]

What this study adds

The recognition of the role of comorbidity and other debilitating conditions as limiting factors for attendance at a health check is an important new finding from this research. Almost 20% of the population invited did not attend a health check and almost two-thirds of these were because of a significant comorbidity, predominantly diabetes as well as cancer and mental health problems.

In examining predictors of the likelihood of attending a health check, it is advisable to include as many relevant variables as possible, including potential practice-level determinants. A number of significant differences between categories when examining factors individually were not confirmed in multivariate, multi-level models.

No response at all was received from over a third of patients identified from current practice lists as potentially being at increased CVD risk. Whilst 8% was either administrative errors or patients still in the system who should have been removed, this still leaves almost 30% of the 'at-risk' population who appear to have no interest in having a health check and presumably, in changing their behaviour or taking action to reduce known risk factors. This suggests a need to change public perceptions and attitudes towards taking responsibility to improve health. With respect to CVD risk as studied here, this is particularly the case for women, younger people and those living in deprived areas. Social marketing is a promising approach that could be used to achieve such change in public awareness and attitudes. The approach has already been advocated for use in pharmacy[19] and has shown promise with respect to CVD risk awareness and reduction in the Russian Federation[20] and in the United States.[21]

Limitations

Although we have endeavoured to follow-up all 10 483 patients on the practice lists as fully as possible, we acknowledge that there are some missing and some unexplained data that need to be considered alongside our interpretation of the findings. For example, we have no detailed information for the 3018 patients who failed to respond after three letters. We have assumed, since we have no information to indicate otherwise, that the invitation letters have been received and simply ignored, indicating no interest in a health check to assess CVD risk. Also, we did not have information on the outcome for the 529 patients who had already been seen prior to receiving their invitation letter.

On a similar theme, we did not have any information on other treatments that the patients may have been receiving prior to attending their health check or other treatments that may have been taken up after the health check or other services that these patients may have been referred onto. Thus our consideration of treatments here is limited to those discussed up to and including the final health check visit.

Data were included from just 37 practices. This relatively small number of level 2 units limits the power to detect effects in multi-level regression models and the number of variables that can be considered at the practice level. Thus, it is possible that some weak effects may have been missed.

Conclusions

Attendance following an invitation to a health check linked to the risk of major vascular disease was considerably lower than the national benchmark. The poor overall public response and the presence of high levels of comorbidity in Stoke on Trent pose significant challenges to the success of NHS Health Checks locally.

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