Health Equity Audit

NHS Health Checks in Nottingham City

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Health Equity Audit

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1. Background

What is a health equity audit?

A systematic assessment of the relationship between distribution of resources for health and inequalities in health.

Health inequalities - differences in health experiences and outcomes between population groups – are to some extent inevitable. Inequities are seen to exist where such inequality results from or is increased by the way that health resources are used. Put more simply, inequality is a measure of differences in resources and outcomes, whereas equity considers whether such differences are fair.

There is a strong connection to the public sector equality duty, which sets out a legal responsibility for public authorities to take account of 'protected characteristics' (age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex and sexual orientation), such that they eliminate unlawful discrimination, advance equality of opportunity and foster good relations. The advancement of equality of opportunity is of particular relevance with respect to a health equity audit. According to some political or sociological perspectives inequalities in outcomes may be regarded as equitable provided they do not result from inequality of opportunity.

NHS health checks background

The instruction to NHS bodies to offer health checks came in 2009, and was phased in via PCTs. Since April 2013 it has been the responsibility of local government to commission health checks for its local population.

The aim of health checks is to prevent heart disease, stroke, diabetes and kidney disease through offering a 'midlife MOT' to anyone without a pre-existing condition aged 40-74. Everyone eligible should be invited for a health check every five years – 20% of the relevant population should therefore be invited each year.

Pre-existing conditions that are excluded from the programme are coronary heart disease, chronic kidney disease, diabetes, hypertension, atrial fibrillation, transient ischaemic attack, hypercholesterolaemia, heart failure, peripheral arterial disease and stroke. In addition, people who are prescribed statins are also excluded, as are any people who have previously been identified as having a 20% or higher risk of developing cardiovascular disease over the next ten years.

Everyone attending for a health check has key risk factors measured through standardised tests. These include family history of illness, smoking, alcohol consumption, physical activity, body mass index (BMI), blood pressure and cholesterol. Values for BMI, blood pressure, cholesterol and AUDIT (alcohol use disorders identification test) should be fed back to the person having the check along with their calculated risk of cardiovascular disease over the next ten years (e.g. the output from the NICE-recommended QRISK®2 risk engine).

The preventive component of the health check programme derives from lifestyle advice offered to attendees, referrals to specific support for behaviour change, such as smoking cessation or weight management, and the offer of specific clinical support or follow-up arising from identification of specific levels of risk or new diagnoses of conditions.

The effectiveness of general health checks in reducing morbidity and mortality has been challenged by a review of the evidence(Braillon et al., 2015), but remains supported by the UK government, and is a statutory duty of local government.

Nottingham background

In Nottingham City, a targeted version of this programme has been running since 2008, which was extended to all patients within the eligible population as directed by the national programme in April 2012. GPs (currently 61 practices in Nottingham city) are the principal providers and are commissioned to identify, prioritise and invite their eligible population for NHS Health Checks, as well as deliver the Health Check itself. There has also been some limited alternative provision through local pharmacies, although this has not proved to be particularly successful and has recently been phased out.

According to nationally published data (from http://www.healthcheck.nhs.uk) in 2013/14 the eligible population in Nottingham city was 73,583, of whom 12,636 were offered a health check during the year, which equates to 17.17% of the eligible population, compared to 18.42% across all of England in the same period. The number of appointments received in Nottingham in 2013/14 was reported by healthcheck.nhs.uk as 6,295, representing 8.55% of the eligible population, which compares with 9.03% nationally (England).

Nottingham has a significantly higher mortality rate from cardiovascular disease than the England average, which is a significant contributor to the lower life expectancy in the city compared with the England average (Nottingham City JSNA). The lower uptake in Nottingham than in England can therefore be seen as having the potential to widen this geographical inequality. Whilst a lower uptake might be anticipated in an urban context characterised by high levels of deprivation, a recent national study of the NHS Health Check programme perhaps surprisingly found no difference in coverage between deprived and affluent areas of the country (Chang et al., 2015).

Increasing uptake in Nottingham such that it exceeds the national average may be one way of reducing the health inequality due to CVD between Nottingham and England. However, a local intra-city analysis of inequality within Nottingham itself is also important, in order to ensure that there is not a local unintended effect of prioritising the worried well over the sick and needy, and increasing health inequality within the city, even if the overall effect is to decrease inequality at the national level.

Previous work

This equity audit builds on a recent research project to analyse data across Nottingham City and Nottinghamshire County using similar equality dimensions (Burn, 2014). The key findings of that research were: 1) the invited population was significantly different from the uninvited and that this appeared to show that CVD risk was being used as a means of prioritising invitations; 2) with respect to uptake, those with higher CVD risk, particularly as represented by age, deprivation and smoking status, were less likely to take up their invitation.

Part of the purpose of this equity audit is therefore to act as a check against this previous research, and to establish whether the effects seen across the whole of the county are also evident (or different) within only the city area.

Similar work has been done elsewhere, including an observational 3-year study in three boroughs in East London (Robson et al., 2015). This study found no under-representation by minority ethnic groups or by quintiles of deprivation. Of the three PCTs studied, the two adopting a risk-stratified approach to issuing invitations appeared to be more successful in achieving attendance from those at high-CVD risk.

More recently, a national study used the CPRD database to examine health check coverage, and found no differences between deprived and affluent parts of England or between men and women (Chang et al., 2015). Although the sample size for this study was very large, there were some limitations arising from data quality concerns – because of incomplete and inconsistent recording and coding of health checks, the study could only look at coverage, not at uptake, and had to use measurement of four risk factors (blood pressure, body mass index, cholesterol ratio, smoking status) within a six-month window as a proxy for a health check having taken place.

The locally collected performance data used as the basis of this equity audit potentially enables a more representative and nuanced analysis to be conducted at the local level, and for both invitation and uptake to be considered.

Aims and objectives

Analyse invitation rates and uptake rates by sex, deprivation quintile, smoking status, age, CVD risk score, and ethnicity, and to perform a statistical test on associations observed.

To further analyse the association between ethnic status and propensity to be invited and to attend for a health check, by considering all major ONS ethnic groupings and adjusting associations for influence of other predictors and characteristics.

Draw conclusions about equitability of health check programme in Nottingham and make recommendations for improved performance and equity.

2. Methods

Data Sources used:

1. Nottingham GP practice health check monitoring data held by 'The Computer Room' (TCR Nottingham Ltd.)
2. Indices of multiple deprivation (ONS)

Data was extracted from TCR Nottingham's database on 23rd June 2015, following extensive discussion with the data custodian.

The data consisted of 54 fields, which are set out and described in Appendix 1. The records included in the extract were for all patients who were eligible for a health at the time of the extract, or who had received a health check within the last five years (89636 records) – these might include cases who had since become ineligible for a further check as a result of a diagnosis or statin prescription or being identified as high risk. The reason for including the latter was in order not to exclude successful outcomes of the health check process, and to provide the most representative denominator for calculating proportions for invitations and assessments.

Following extensive discussion with the data custodian, a number of important assumptions were made in respect of pre-processing the data prior to analysis. Perhaps the most important of these was how to determine whether an invitation had been issued or not. A large number of records where a date for an assessment was filled in did not have a date entered in any of the fields where an invitation could be recorded (e.g. by letter, phone call or verbally). In this cases, all such patients were deemed to have had an

invitation of some sort, even if this were actually an informal verbal invitation immediately prior to carrying out an opportunistic health check. All cases where any invitation date was completed were also deemed to have received an invitation, with the earliest date in the last five years being used as the official invitation date. Any cases with an invitation date but no assessment date were deemed not to have attended for a health check by the reference date and assumed not to have attended by the data extraction date. Despite the fact that the intention of the programme is to provide a health check to every eligible person once in every five years, the reality is that there are patients in this five year dataset who have not received an invitation or a health check.

The lower super output area (LSOA) for each patient record identifies a small geographical area (around 1,500 population) within which the patient's home address is located. These areas are used by the ONS for small area demographic analysis, including its indices of multiple deprivation (IMD). The IMD uses 38 indicators of different dimensions of deprivation to compare each of the 32,482 LSOAs in England and produce a deprivation score and ranking. For this equity audit the LSOA code for each patient was matched to the ONS dataset and the deprivation score was assumed to represent that person's deprivation level. This is essential for the purposes of analysing equity with respect to socio-economic position, but as a proxy method is inevitably prone to some error and residual confounding.

Fields to be included in the analysis were processed to produce binary, categorical and numerical and date fields, which were imported into Stata Version 12 for analysis. These imported fields are listed in Appendix 2.

Analysis of the data consisted of some broad descriptive analysis, calculation of odds ratios for odds of being invited and for odds of receiving a health check along with p-values for such odds ratios, and logistic regression analysis for invites and assessments to produce ratios comparing ethnic groups with the white British reference group, also with p-values to identify statistical significance.

3.0 Findings

Characteristics

The characteristics of the 89,636 patients included in the analysis are set out below.

A total of 52,205 patients received invitations to a health check, representing 58% of the eligible population. Of these 32,297 people had received a health check (62% of those invited and 36% of the eligible population).

Table 1. Characteristics of eligible population.

Characteristic	Number	%age of eligible pop	% invited	% assessed	ratio assessed to invited
male	43581	49%	63%	37%	0.58
female	46055	51%	54%	35%	0.66
deprivation quintile 1	41444	47%	60%	34%	0.58
deprivation quintile 2	19867	23%	54%	34%	0.63
deprivation quintile 3	11614	13%	56%	36%	0.65
deprivation quintile 4	7891	9%	62%	41%	0.66
deprivation quintile 5	6771	8%	71%	51%	0.71
current smoker	24227	27%	60%	30%	0.50
non-smoker	65409	73%	58%	38%	0.66
40-44	20883	23%	36%	17%	0.46
45-49	19135	21%	50%	26%	0.53
50-54	16537	18%	58%	34%	0.58
55-59	11817	13%	66%	40%	0.61
60-64	8528	10%	75%	51%	0.68
65-69	6744	8%	84%	63%	0.75
70+	5992	7%	93%	80%	0.87
CVD risk <=5%	47827	53%	44%	24%	0.54
CVD risk >5% <=10%	20039	22%	64%	37%	0.58
CVD risk >10% <=20%	15562	17%	81%	55%	0.68
CVD risk >20%	6208	7%	94%	82%	0.87
White British	49514	55%	66%	46%	0.69
Any Other Ethnicity	23295	26%	55%	35%	0.65
Ethnicity not known	16827	19%	39%	7%	0.19

Stata Analysis

Sex

Men were more likely to be invited, with an odds ratio by univariate analysis (OR) of 1.13 (p<0.0001). Despite this, men were less likely to be assessed: OR 0.90

Deprivation

Less deprived patients were more likely to be invited (p<0.0001). Those from the 5th IMD quintile were almost twice as likely to have had an assessment compared to 1st quintile: univariate OR 1.98 (p<0.0001).

Smoking

Smokers were more likely to be invited, with OR 1**.08** (p<0.0001), but less likely to be assessed: OR **0.69** (p<0.0001).

Age

Older patients are more likely to be invited and to have received a health check, with the likelihood of being assessed increasing by 9% per year of age (OR 1.09).

Calculated CVD risk score

The likelihood of being invited increases 16% with each additional percentage point of risk of heart disease over next 10 years (QRISK®2 score), OR 1.16 (P<0.0001), while the OR for being assessed is 1.12 (p<0.0001).

Ethnicity

Those with an ethnicity other than White British were less likely to be invited: univariate OR 0.62 (p<0.0001), and less likely to be assessed: univariate OR 0.64 (p<0.0001).

This association appears to be independently significant, with an adjusted OR for being invited of 0.84 (adjusted for age, sex, calculated risk score, smoker), and an adjusted OR for being assessed of 0.88 (adjusted for age, sex, calculated risk score, smoker), meaning that non-White British are more than 10% less likely both to be invited for and to attend for a health check.

Analysis by all the different ethnic groups is possible, albeit with some quite small numbers for some groups. Such analysis carries the risk of attributing meaning to chance variations, but Table 2 shows the individual odds ratios and highlights those with a p-value that suggests the association may be significant.

For example, the Pakistani group appears to be under-represented when compared to White British both with respect to invitations and attendances for a health check, and with a p-value of less than 0.001.

Table 2. Ethnic groups compared to White British.

	Invited		Assessed	
Ethnicity	**Odds Ratio**	**p-value**	**Odds Ratio**	**p-value**
White Irish	0.79	0.014	0.71	0.000
Any Other White	0.61	0.000	0.50	0.000
Mixed White/Black Caribbean	1.17	0.041	1.56	0.000
Mixed White/Black African	0.89	0.333	1.37	0.014
Mixed White/Asian	0.99	0.949	1.23	0.207
Any Other Mixed	0.77	0.017	0.85	0.176
Indian	1.14	0.013	1.19	0.001
Pakistani	0.59	0.000	0.62	0.000
Bangladeshi	0.98	0.922	1.02	0.922
Any Other Asian	0.72	0.000	0.83	0.010
Caribbean	1.24	0.000	1.65	0.000
African	0.94	0.163	1.06	0.252
Any Other Black	0.85	0.033	0.96	0.647
Chinese	0.81	0.020	0.95	0.562
Any Other Ethnicity	1.12	0.003	1.13	0.002
not known	0.42	0.000	0.10	0.000

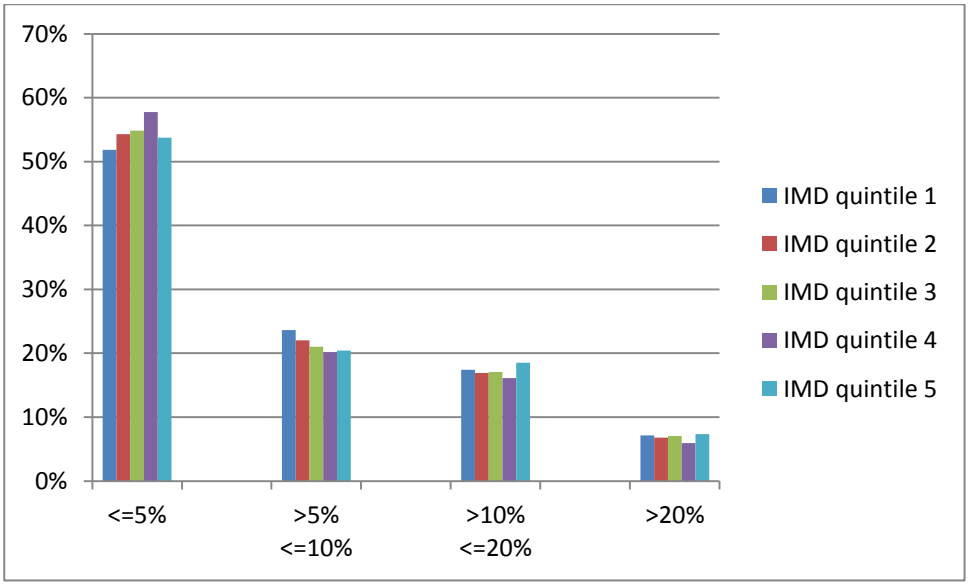
All odds ratios adjusted for smoker, sex, age, calculated risk and IMD quintile

4.0 Conclusions and recommendations

It appears that a risk stratified approach is being adopted with respect to invitations issued for health checks, and that this is being successful with respect to the take-up of the service by patients with a higher calculated risk score. Despite this, there is evidence that the reach of the service is inequitably distributed with respect to other characteristics, and that in some cases this may be attributable to invitation strategy as well as patient propensity to take up the service.

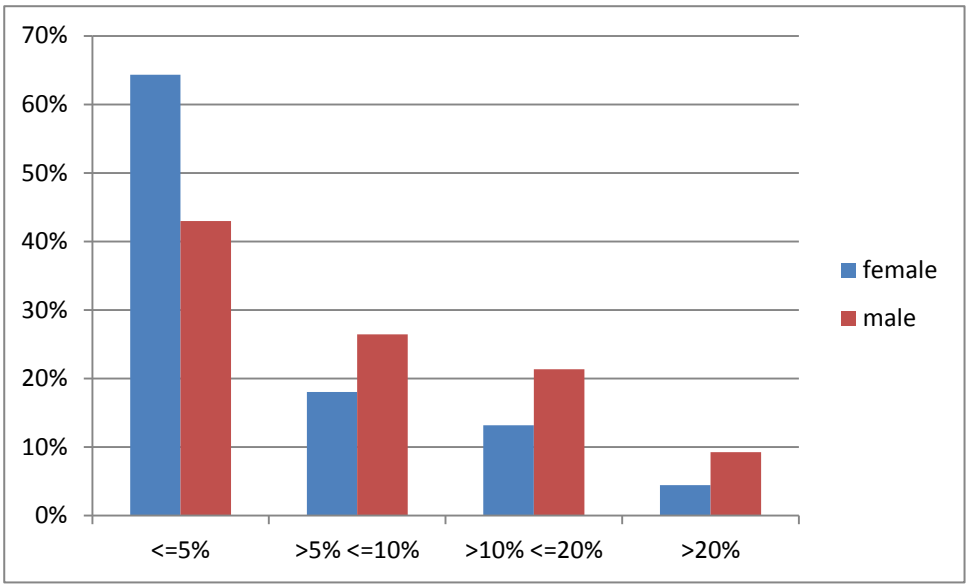
The distribution of calculated risk scores is very similar across each IMD quintile (see chart below). This should result in a generally similar proportion of invitations within each quintile, but invitations tend to be overrepresented amongst less deprived patients, and uptake is certainly greater amongst the least deprived patients. This might suggest that despite the use of a risk stratified approach, there may be some effect of socio-economic bias in invitation strategy, and a greater propensity for those in the more affluent areas to respond.

Figure 1. Distribution of calculated risk scores within IMD quintiles (proportions of eligible population within each quintile)



Men are 13% more likely to be invited for a health check than women, which seems to reflect the CVD risk profile of men compared to women (chart below). However, men are 10% less likely to take up a health check. Men are generally known to be more reticent in their use of health services, and found to be less likely to seek disease screening services (Doward, 2012).

Figure 2. Distribution of calculated risk scores by sex of eligible patient



The position is similar for current smokers, who are more likely to be invited, reflecting their higher risk profile, but less likely to be assessed. Some of this is likely to be explained by the fact that more men are current smokers, but may also reflect a greater reluctance to seek medical help amongst smokers generally (Chen et al., 2012).

With respect to ethnicity, there is inequity between White British and aggregated other ethnicities for probability of being invited and attending. When disaggregated to individual ethnic groups, there is some considerable variation in this respect, with some ethnicities appearing to be significantly better than White British and some significantly worse. With respect to the latter, the underrepresentation within the Pakistani community may be worthy of further investigation.

Overall, the findings of this audit appear to confirm some of those of a previous study looking at Nottingham and Nottinghamshire data, with respect to deprivation and smoking status, and to the extent that a risk-based invitation strategy has been adopted.

It is acknowledged that there are published critiques of the effectiveness and value of the NHS Health Check programme, but those are not considered by this audit, which is only concerned with how any benefit that does accrue from the programme is distributed through the population with respect to need, and to consider whether this might be contributing to an increase in health inequality. Furthermore, with respect to the current ambitions for a more integrated person-centred healthcare system partly articulated through an ambition to make every contact count, the health check programme offers an opportunity to reach people who might otherwise not come into contact with health professionals. This is an opportunity which ought to be maximised, offering the potential to provide advice and exert some influence towards healthier lifestyle choices.

The programme is in principle a universal service, with the aim being to reach 100% of the eligible population every five years. Achieving 100% uptake would obviously ensure that the programme is delivered equitably. In reality such a position is unattainable, and the current performance target is set at 60%. It seems likely that the lower the proportion of uptake that is achieved, the greater the likelihood for perverse outcomes in terms of equity of access to the service. One approach might therefore be to seek a higher overall target for uptake. An alternative strategy might be to incentivise uptake within specific groups identified as deficient. In particular, it might be that greater uptake from men and from smokers

could be sort by setting differential uptake targets for those groups. In addition, the apparent underrepresentation from the Pakistani community warrants further attention, particularly in light of the higher risk of diabetes associated with people of South Asian origin.

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Appendix 1 – extracted fields

Practice_Id	Identifier for GP practice
Ref_Date	Date of upload to database
reference	reference number for patient
REGISTERED_DATE	date registered with GP
LSOA	code reference for Lower Super Output Area of residence
Ethnic_Group	code for ONS ethnic group
Latest_Current_Smoker	entry in field implies current smoker (at reference date)
Latest_Smoking_Status	code for smoking status
Latest_First_Letter	Date of invitation letter
Latest_First_Letter_Alternative	dates of other invitation letters sent
Latest_Second_Letter	dates of other invitation letters sent
Latest_Second_Letter_Alternative	dates of other invitation letters sent
Latest_Third_Letter	dates of other invitation letters sent
Latest_Third_Letter_Alternative	dates of other invitation letters sent
Latest_Verbal_Invitation	date for verbal invitation given
Latest_Telephone_Invitation	date for invitation made by phone
cvdRiskAssessmentDeclined_DATE	date if assessment declined
latest_bmi_date	date BMI last measured
latest_bmi_value	latest BMI
latest_total_chol_date	date cholesterol last measured
total_cholesterol_value	latest cholesterol measure
latest_bp_date	date blood pressure last taken
systolic	latest systolic pressure
diastolic	latest diastolic pressure
family_history_of_chdDATE	date family history of CHD recorded
recorded_score_date	date CVD risk score recorded
recorded_score	latest CVD risk score
High_Risk_Marker	date patient flagged as high risk
assessed_date	date patient assessed (NHS health check)
Last5_True_HC_DATE_1	
Last5_True_HC_DATE_2	
Last5_True_HC_DATE_3	
Last5_True_HC_DATE_4	
Last5_True_HC_DATE_5	
Last5_Apparent_HC_DATE_1	
Last5_Apparent_HC_DATE_2	
Last5_Apparent_HC_DATE_3	
Last5_Apparent_HC_DATE_4	
Name	
Last5_Apparent_HC_DATE_5	
calculated_score_at_ref_date	CVD risk score automatically computed
Previous_Score	previous score if recorded
age_at_ref_date	age (at reference date)
Age_At_HealthCheck	age (at date of health check)
Sex_MF	male or female

earliest_Diabetes	date of diagnosis for diabetes
earliest_Hypertension	date of diagnosis for hypertension
earliest_CVD	date of diagnosis for CVD
earliest_AF	date of diagnosis for atrial fibrillation
earliest_Heart_Failure	date of diagnosis for heart failure
earliest_PVD	date of diagnosis for PVD
earliest_Familial_Hypercholesterolaemia	date of diagnosis for familial hypercholesterolaemia
latest_CKD	date recorded as chronic kidney disease patient
earliest_Statin_in_6m	date prescribed statin

Appendix 2 – fields imported for Stata analysis

sex	binary field
any_invite	binary field
UID	unique identifier
invite_date	date field - date of first invite
HC_date	date field - date of health check
eth_code	integer - ONS ethnic group code
IMD_score	numeric - IMD score of LSOA
IMD_rank	integer - IMD ranking of LSOA
IMD_decile	integer - IMD quintile 1 to 10
IMD_quintile	integer - IMD quintile 1 to 5
invited	binary field - invited for health check
assessed	binary field - received health check
smoker	binary field - current or not
Family_CHD	binary field - family history of CHD
high_risk	binary field - high risk flag
diagnosis	binary field - diagnosed condition (y/n)
bmi	numeric - BMI
chol	numeric - cholesterol value
bp_sys	numeric - systolic blood pressure
bp_dia	numeric - diastolic blood pressure
calc_risk	numeric - calculated CVD risk
rec_risk	numeric - recorded CVD risk
age	integer - age at reference date