Original Article

Title: An evaluation of NHS health checks delivered by paramedics in the community

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Abstract

Background

As community-based healthcare providers, NHS ambulance services may be able to offer easily accessible NHS Health Checks (NHSHCs). There is no previous evidence to indicate if this is feasible or if this approach can identify cases of cardiovascular disease (CVD) risk factors. We report a service evaluation of an ambulance service delivered NHSHC in North East England.

Methods

Mixed methods including data from an NHSHC delivered by paramedics and short telephone interviews with participants failing to follow referral advice.

Results

There were 462 NHSHCs delivered. Most participants were female, 42.2% were in the top two deciles regarding absolute deprivation and 388 had at least one CVD risk factor. There were 29 new prescriptions issued for cardiovascular medications and 13 patients required medicines optimisation. Of the 62 tobacco smokers, 21 accepted a smoking cessation referral and 4 achieved a 28-day quit. Reasons preventing participants seeking further support were poor health literacy, the complexities of life and difficulties obtaining a GP appointment.

Conclusion

A place-based NHSHC delivered by the ambulance service is feasible, appears acceptable to patients and can identify new cases of CVD risk, but some individuals require additional help to engage in effective CVD risk management.

health checks; paramedics; prevention; service evaluation

Introduction

Cardiovascular disease (CVD) causes one in four deaths in England and is a leading cause of morbidity, disability and health inequalities.[1] The National Health Service Health Check (NHSHC) aims to identify CVD risk factors including high blood pressure, high cholesterol, obesity, smoking and excessive alcohol consumption[2,3], and reduce risk through pharmacological and lifestyle modifications.[4] However, there are disparities regarding the uptake of the NHSHC, with individuals with lower socioeconomic status (SES) less likely to respond to the invitation[5,6], whilst those accepting the invitation are more likely to be female and non-smokers[7,8], suggesting those with potentially the most to gain from an NHSHC are less likely to take up the offer.[6] Differences in 'place' characteristics help to explain why there are large and persistent inequalities in health between places. Geographical inequalities are often attributed to the interrelationship between the compositional and contextual aspects of place[9], where the characteristics of individuals (compositional) are influenced by the social, cultural, health and economic characteristics of the area (contextual).[10] Given the limitations of the NHSHC regarding uptake, innovative strategies that acknowledge the role of 'place' and individualism, are warranted.

The Kings Fund[11] and NHS Long Term Plan (2025)[12] advocate the proactive identification of high-risk individuals through innovative methods, to accelerate the prevention and management of CVD risk factors and improve outcomes. NHS ambulance services are at the heart of the urgent and emergency care system in England.[13] In addition to mobile emergency and primary care, they provide a vital interface to other health and social services[14], are recognisable care providers in local communities and may be well positioned to improve access to an NHSHC. This evaluation reports a place-based NHSHC delivered by a regional NHS ambulance service designed to 1) identify new cases of CVD risk, 2) highlight cases of pre-existing CVD risk requiring medicines optimisation, and 3) understand the barriers preventing individuals with CVD risk seeking further management.

Methods

Setting

North East England suffers some of the worst health inequalities in England and during 2015-2017, the rate of premature CVD mortality was the second highest of all English regions and

significantly higher than the national rate.[, 15] Individuals living in North East England arguably have the most to gain from an NHSHC but have lower engagement with the current offer[5], so efforts to broaden the impact of the health check in this geographical location are required to ensure equitable access and increase CVD risk identification.

Design and intervention

The evaluation was conducted between January-September 2024 and consisted of two phases 1) delivery of an NHSHC, and 2) a short telephone interview with participants failing to follow referral advice.

The NHSHC was delivered as outlined by national guidance.[16] Paramedics were trained in the clinical competencies, results interpretation, risk communication and signposting and referral process, in accordance with the NHSHC competencies framework.[16] Paramedics wearing ambulance uniform were situated in community spaces across North East England in locations with low SES.. The offer of an NHSHC was targeted to the places and spaces in which people live, work and socialise and included individuals aged ≥40 years with mental capacity. Those with pre-existing CVD risk factors were eligible as the evaluation was interested in capturing data for individuals requiring medicines optimisation. At the NHSHC participants provided demographic information, completed a health questionnaire and underwent a range of physical measures related to their pulse, blood pressure and body mass index (BMI), as well as providing 25 µL of capillary blood for a random lipid profile.

The evaluation used the PocDoc Lipid test[17] which integrates the results of a 6-marker lipid panel into QRISK®3[18], providing the participants risk of a CVD event in the next 10 years and their healthy heart age. PocDoc has an indication of use for a UKCA approved IVD device and is used in other NHS settings. The accuracy and precision of PocDoc falls within international limits recommended by the National Cholesterol Education Program (NCEP)[19] and to venous blood reference lab measurement methods[17]. The lipid profile and QRISK®3 were available in seven minutes. Participants confirmed their tobacco smoking status and alcohol consumption. Current smokers received a brief verbal intervention highlighting the benefits of quitting, an offer of support from their local NHS stop smoking service (SSS) and a free prescription of nicotine replacement therapy.

Individuals wishing to make a quit attempt received a direct referral. Participants requiring support to reduce their alcohol consumption were provided with verbal support and takeaway literature.

Participant follow-up and CVD risk management

The evaluation used the clinical management criteria outlined in the NHSHC best practice guidance[16] to determine when additional clinical assessment and follow-up were required. Individuals with any CVD risk factor received verbal advice regarding lifestyle modifications and advised to seek further support from their GP or pharmacy if indicated. Individuals with a new irregular pulse received a 12-lead electrocardiogram to confirm atrial fibrillation. Participants requiring hospital treatment were conveyed to the emergency department by the research team. All participants received a written copy of their NHSHC results and the GP of all participants, irrespective of the need for follow-up, were informed of the results by email. Participants failing to seek further support were contacted by the research team to participate in a short interview to understand the barriers preventing them from doing so. Individuals with no CVD risk factors exited the evaluation following completion of the NHSHC.

Data sources and analysis

Suitable locations to deliver the NHSHC and participant SES were identified using the English Indices of Multiple Deprivation (IMD) (2019).[20] The IMD ranks each postcode by deprivation. Outcomes were collected from participants GPs at 60-days and from the SSS teams at 28-days[21], a key outcome in smoking cessation. Quantitative analysis was performed using JASP 0.19.3 with frequencies presented as number (percentage) and scale values summarised as mean and standard deviation. Differences in scale variables were investigated using the Welch corrected independent t-test and associations using the chi-squared test. An alpha level of .05 was used throughout.

Telephone interviews were designed to provide exploratory qualitative insights into the barriers preventing participants seeking further support. Interviews were brief and not audio recorded as we anticipated these would be ad hoc and it would be difficult to contact participants to arrange formal interviews. Telephone interviews were undertaken by KC and were steered by a short topic guide. Fieldnotes and researcher reflections were recorded in a research diary.

Data were analysed by KC and ML and followed a descriptive content analytic approach based upon fieldnotes.[22] Analysis began by reading each participant's interview, augmented with extracts from the research diary, enabling the researchers to become immersed in the data. This was followed by reducing the data to a set of meaning units, which were then abstracted and labelled with a code. The various codes were sorted into categories to reveal the manifest content.[23] The underlying meaning, the latent content of the categories, were then formulated into themes.[24] . Throughout data analysis reflexivity was employed, allowing the researchers to acknowledge personal assumptions, biases, and preconceptions, safeguarding transparency and rigor.[22]

Ethics

Ethics approval was received from Hampshire B Research Ethics Committee [**23/SC/0382**] and the Health Research Authority. All participants provided written informed consent prior to participation.

Results

There were 462 NHSHC's undertaken in this evaluation (62.9% female, mean age 60.4 years (SD 11.8)). Most participants were white British (91.5%) and 42.2% were in the top two deciles regarding absolute deprivation. Most participants (n=388 (83.9%)) had at least one modifiable CVD risk factor. The attendees at the NHSHC's delivered in social spaces and places were more likely to be older women, whilst men of working age and individuals from Black and Asian ethnic minority groups (BAME) were reached through a targeted offer in the workplace and community/religious spaces, respectively. Participant flow through the project grouped by outcome is shown in Figure 1.

CVD risk factors

From those participants referred for further support (n=182), there were 29 new prescriptions issued for cardiovascular medications (antihypertensive medications and statins) and 13 patients received medicines optimisation. These individuals were from areas with the highest levels of social deprivation and had the worst underlying cardiovascular risk (higher BMI, QRISK®3 and heart age). A summary of all outcomes is shown in Table 1.

Pulse

There were 15 cases of irregular pulses identified which included premature ventricular contractions and sinus arrythmia. All of these participants were advised follow-up with the GP was required and all but one attended for review. All cases self-resolved at follow-up and no new prescriptions for cardiovascular medications were required.

Blood pressure

There were 134 participants who received a provisional diagnosis of hypertension (>140/90), mean (SD) systolic/diastolic blood pressure was 158 (18) / 100 (8) mmHg. Of these 65 (48.5%) received lifestyle advice from the GP, 8 (6.0%) required no intervention as their hypertension had resolved, 9 (6.7%) required medicines optimisation, 16 (11.9%) new prescriptions were issued for antihypertension medications, whilst 17 (12.7%) were uncontactable and 18 (13.4%) declined any intervention.

Cholesterol

There were 60 participants identified with non-HDL >4mmol/L, 8 of whom were already using statin therapy and the remainder untreated. Of these, 3 (5.0%) participants required medicines optimisation and 15 (25.0%) received a new prescription of statin therapy. The remainder received lifestyle advice or did not require further treatment, whilst 21 (35%) were uncontactable or declined any intervention. In addition, there were 26 participants identified with a non-HDL between 2.5mmol/L - 4.0 mmol/L who were already using statin therapy, 1 participant received medicines optimisation, and 2 participants received new prescriptions for alternatives to statins.

BMI

Of the 320 participants identified with BMI of ≥26, 62.5% were female (mean (SD) BMI 32.1(5.1) range 26 – 55). Many participants with raised BMI also had other CVD risk factors and all received advice regarding lifestyle modifications from the research team. Of these, 83 (26.0%) received further lifestyle advice from their GP and 141 (44.1%) required no further intervention. A further 10 (3.1%) required medicines optimisation, 24 (7.5%) were prescribed new antihypertensive medications or statins, 29 (9.1%) were uncontactable and 31 (9.7%) had forgotten.

Tobacco smoking

Smoking status was collected for all participants. Of the 62 participants who were current smokers, 21 accepted a referral to their local SSS. There were no statistically significant differences between those accepting or declining a referral with regard age, gender, ethnicity, IMD, pack years or CVD risk factors. There were four participants who achieved a 28-day quit, the remainder reconsidered their initial decision to make a quit attempt..

Alcohol consumption

All participants self-reported their alcohol consumption. There were 429 participants who abstained from alcohol, 17 reported safe levels of alcohol consumption, whilst 15 reported alcohol consumption in excess of recommendations and accepted onward advice. There was one participant who admitted excessive alcohol consumption who declined any advice regarding behaviour modification. Those agreeing to lifestyle advice were significantly younger ($p=0.01$) and had a reduced QRISK®3 ($p<0.01$) compared to those with safe levels of alcohol consumption.

QRISK®3

For those with a QRISK®3 calculated (n=406), 151 (37.2%) had an estimated risk of ≥10%. Of these, 55.6% were female, 97% were white British and the median IMD was 3. There were 29 (18.5%) participants who required new prescriptions: 14 required antihypertensive medication, 11 participants required medication for hypercholesterolaemia and 4 required medications for both. There were 13 participants who required medicines optimisation.

Heart age

Heart age was calculated for 407 participants, biological age mean (SD) 62.2 (11.13) years compared to a chronological age mean (SD) of 58.9 (11.1) years for this group. The mean (SD) difference was +3.3 (6.1), [95% CI +2.7 to +3.9] years, indicating the underlying cardiovascular health of most participants was poor.

Overview of telephone interviews

Of the 75 participants failing to seek further support, 45 (57%) participated in a short telephone interview. All those interviewed could remember their participation in the NHSHC and being advised further support was necessary. All participants indicated they were theoretically motivated to improve their cardiovascular health, and some had made lifestyle modifications to achieve this. Amongst this group of participants there was a general lack of understanding regarding the adverse outcomes associated with uncontrolled CVD risk factors, compounded by the fact all participants were asymptomatic. Several participants reported they had been too busy to seek further support, highlighting that preventative health often takes second place to the complexities of life. Participants also reported problems accessing GP appointments but did not understand they could also visit their local pharmacy for support (Table 2).

Discussion

Main findings of the service evaluation

In this place-based NHSHC most participants had at least one modifiable CVD risk factor and almost half were in the top 2 deciles of absolute deprivation. This alternative approach to the NHSHC may broaden the reach of CVD screening, whilst acknowledging challenges remain regarding certain groups, such as working men and BAME groups.[25]

There were 29 participants who received new prescriptions for antihypertensive medications or statins and 13 required medicines optimisation, highlighting the considerable potential to identify CVD risk factors in underserved communities and reduce CVD risk. Most participants accepting the offer of an NHSHC in this evaluation were older, female[26,27] and white British, partly explained by how and when the offer of the health check was made, which tended to be midweek and during working hours. However, a targeted approach towards male dominated workplaces and social environments such as sporting events, and community/religious spaces for BAME groups, appeared to increase access to a health check. This evaluation suggests individuals with low SES are invested in their cardiovascular health and they possess a desire to be aware of their CVD risk, but that they also hold misunderstandings regarding CVD risk factors.

That 75 participants failed to seek further support for their CVD risk highlights that for many, concern with preventative health is transient. Of these, 33 (44%) were uncontactable by the research team and had no accurate telephone number recorded on the NHS Spine. It is possible this is because of digital inequality, where participants who are financially vulnerable suffer from data poverty and digital exclusion.

What is already known on this topic?

The reach of the NHSHC has to date been equivocal, with studies showing both a positive[28] and negative[25] effect on uptake rates. Furthermore, concerns have been raised that the programme reaches the worried well. Consequently, there have been several local evaluations of the NHSHC in various settings aimed at improving uptake, including general practice[29], community pharmacy[30] and NHS outreach teams.[31] Previous research suggests that lack of understanding regarding the purpose of the NHSHC[32] and the importance of managing CVD risk[33] lie behind the reticence to participate. NHS ambulance services often reach different people than those targeted by primary care[34] and who may not usually engage with the traditional NHSHC offer. In addition, paramedics are familiar to patients in primary care[35] and evidence suggests they are highly satisfied when treated by a paramedic in this setting.[36]

Low health literacy is known to be a barrier to CVD prevention.[37] It is suggested literacy, language and education intersect, and are associated with inequality and disadvantage[38], which can be difficult for many individuals to overcome. However, low health literacy is modifiable, and CVD preventative health messaging could focus more on the health benefits of making lifestyle changes to reduce CVD risk factors, and the adverse outcomes associated with failing to do so.

Individuals with low SES suffer from digital exclusion[39], defined as the lack of digital access, use, confidence or skills.[40] North East England has the greatest numbers of those who are digitally excluded.[41] This, in addition to an over reliance on flexible pay monthly contracts and data plans[42] means individuals with low SES are unable to pursue appointments in primary care or take advantage of health prevention opportunities, often sent to individuals by text or email.

Whilst the accuracy and precision of PocDoc falls within international limits recommended by NCEP[19], more broadly, there are limitations in deriving QRISK®3 using point-of-care (POC) lipid screening which uses non-fasting capillary blood. Evidence suggests POC devices vary significantly regarding performance, bias and precision[43,44], reducing their appropriateness for use in the NHSHC programme.

What this evaluation adds

To our knowledge this is the first evaluation in the UK to report an NHSHC delivered by an NHS ambulance service. The cardiovascular health of participants was generally poor. Individuals with different characteristics engaged with the NHSHC in different ways and required different approaches to ensure equitable access. Engagement in the NHSHC offered by paramedics was high, but compliance with follow-up advice less so. Both individual and healthcare system factors appear to prevent individuals from seeking further support, leaving them vulnerable to increased CVD risk. The evaluation highlights that delivery of the NHSHC by paramedics is feasible and acceptable to the public. In addition, this approach can identify undiagnosed cases of CVD risk as well as those requiring medicines optimisation.

Strengths and limitations

This evaluation provides a unique perspective of the NHSHC and opportunities to identify new cases of CVD risk factors, as well as existing, poorly managed cases. The evaluation provides valuable insights into some of the barriers preventing individuals seeking further support required to reduce their CVD risk. We did not collect data regarding the number of health checks offered, the number of individuals declining an offer, or their reasons for doing so.

Follow-up interviews were brief, and it was not possible to explore fully participants' attitudes and health behaviours towards their CVD risk. Opportunities exist to explore these further with more in-depth qualitative inquiry. We were unable to explain the barriers preventing participant's seeking further support for those who were uncontactable, increasing the risk of attrition bias. It is possible these individuals may have revealed different reasons behind their behaviours and attitudes towards their cardiovascular health. Efforts to better understand these individuals is important so all populations can benefit from CVD screening. This evaluation was conducted in one area of England, limiting the generalisability of findings.

There are additional costs associated with paramedics delivering NHSHCs and this requires consideration to ensure sustainable delivery of the NHSHC programme using this approach.

Conflicts of interests

None declared.

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Authors' contributions

KC conceptualised and designed the service evaluation, collected and analysed study data and wrote the manuscript. JR designed the data analysis plan, conducted data analysis and provided critical review of the manuscript. MJ, EB, ML, SH and GS collected data and provided critical review of the manuscript.

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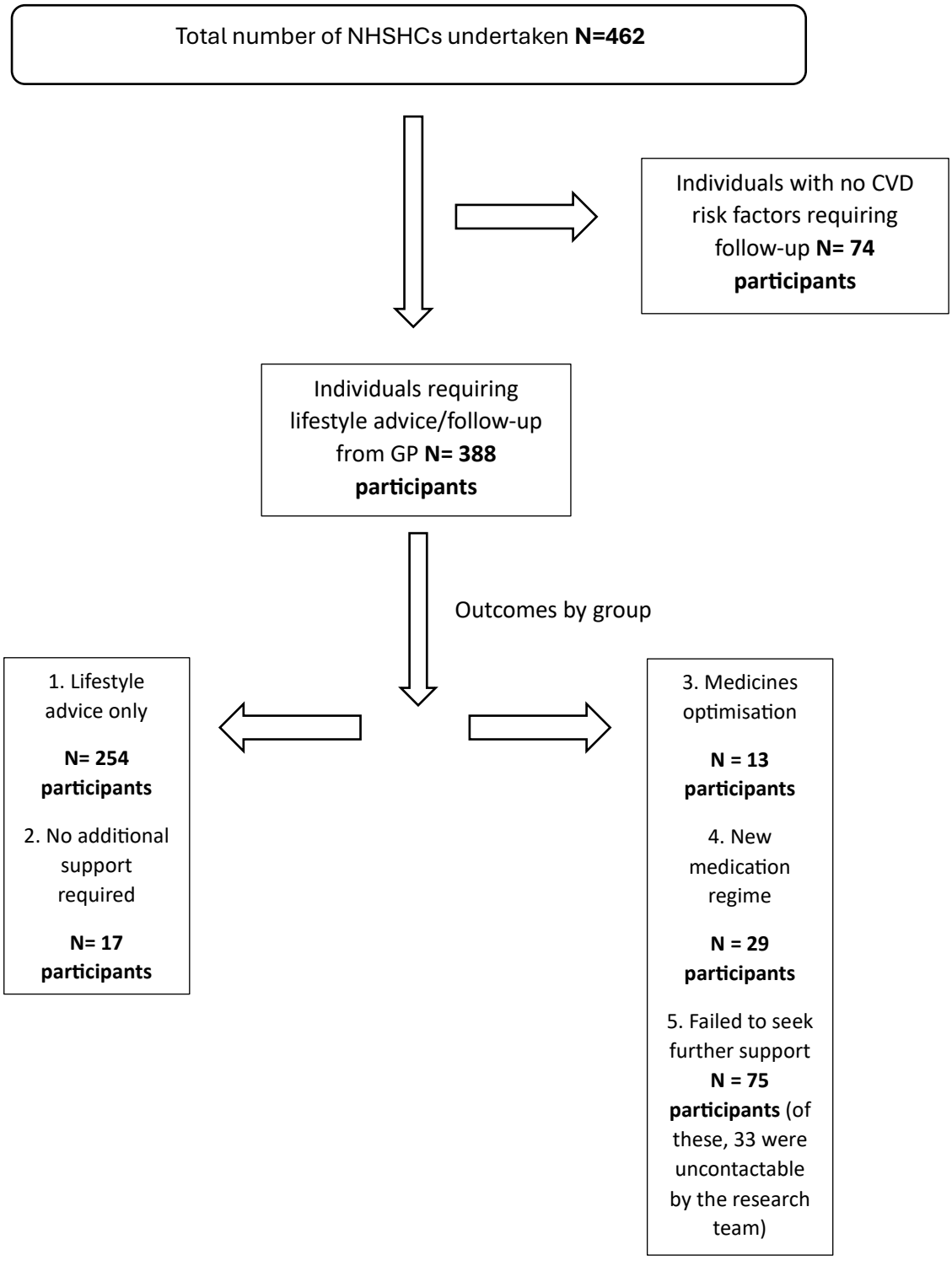

Figure. 1. Participant flow through the service evaluation

Alt text: a chart showing participant flow through the service evaluation with associated outcomes.

Outcomes					
	Lifestyle advice only	No additional support required	Medicines optimisation	New prescriptions	Failed to seek further support/ uncontactable**
N	254	17	13	29	75
Age (SD) in years	60.4 (11.3)	64.6 (15.4)	67.1 (10.8)	65.1 (10.0)	60.0 (12.8)
Gender M:F	90:164	9:8	1:12	14:15	33:42
Ethnicity	WB 95%	WB 88%	WB 100%	WB 90%	WB 92%
Median IMD	4.0	2.5	4.0	2.5	2.0
Smoking% (current/never/previous)	12/58/30	0/64/36	0/85/15	7/52/41	27/40/33
Pulse (SD) beats per minute	75.5 (13.2)	70.4 (8.5)	77.7 (7.0)	75.1 (13.4)	77.0 (12.3)
Systolic (SD) blood pressure	142.7 (28.6)	127.6 (9.7)	162.2 (25.1)	154.8 (25.3)	146.7 (16.9)
Diastolic (SD) blood pressure	86.4 (10.8)	78.5 (9.0)	93.2 (12.6)	93.5 (12.8)	89.7 (11.4)
Total (SD) cholesterol	4.6 (1.1)	4.3 (10.9)	5.4 (1.1)	5.7 (1.1)	5.2 (1.2)
Non-HDL (SD)	3.4 (0.6)	3.2 (0.5)	3.7 (0.7)	4.2 (0.8)	3.7 (0.8)
BMI (SD)	30.9 (5.8)	25.7 (5.4)	31.3 (6.5)	30.0 (5.3)	30.3 (5.9)
QRISK®3 (SD)	10.4 (9.9)	14.6 (15.7)	15.7 (10.2)	16.7 (10.2)	10.5 (9.8)
Heart age (SD)	62.5 (11.5)	63.4 (12.7)	72.2 (9.7)	70.1 (9.8)	63.0 (11.7)
Heart age (SD) difference*	+3.3 (6.1)	+0.3 (4.9)	+5.2 (5.8)	+5.5 (5.4)	+5.3 (5.8)

Table 1. Descriptive statistics by outcome

SD, standard deviation; IMD, indices of multiple deprivation; BMI, body mass index; *- indicates heart age older than chronological age; ** of the 75 participants failing to follow referral advice, 33 were uncontactable by the research team

Alt text: a table showing the five outcomes from the service evaluation – lifestyle advice only, no additional support required, medicines optimisation, new prescriptions and failed to seek further support - with results by group.

I did start treatment with the stop smoking service but I told the advisor at my follow-up appointment that I had still been smoking, and after discussion I decided that now is not the right time for me to stop. So I was discharged from the service" (56 year old female, long term sick, blood pressure 130/82, non-HDL 2.5 mmol/L, current smoker, pack years 38)
"*I haven't seen my Doctor about my cholesterol as I have been unable to get an appointment. My surgery hasn't been in contact with me about this either. Actually, I had a letter in the post about taking part in another research study, a bit like a health check. I think I'll take part in that and I might get some help with my cholesterol"* (59 year old female, unemployed, blood pressure 123/84, non-HDL 4.5 mmol/L, non-smoker)
"*No, I haven't seen my Doctor about my cholesterol. It wasn't that high anyway*" (49 year old female, employed, blood pressure 135/83, non-HDL 4.8, declined referral to SSS)
"*My Doctor got in touch after you contacted them and asked me to take my blood pressure for a week. But I forgot, I have so much going on*" (63 year old male, retired, blood pressure 160/94, non-HDL 3.7 mmol/L, previous smoker)
"*I know I was advised to see my Doctor about my blood pressure. I forgot as I have been too busy. I have made some lifestyle changes though, I eat better and I have been going to the gym*" (50 year old male, employed, blood pressure 145/98, non-HDL 5 mmol/L, previous smoker)
"*No, I haven't seen my GP about my blood pressure as I forgot. I don't have any symptoms anyway and I feel fine!"* (43 year old male, employed, blood pressure 148/96, non-HDL 3.8 mmol/L, previous smoker)
"*I have been to my GP for a chest infection but I didn't mention my blood pressure. Actually, my Doctor did note that I had hypertension but this was put down to my infection so nothing further was done*" (68 year old male, retired, blood pressure 157/94, non-HDL <2.5 mmol/L, non-smoker)

Table 2. Participant interviews describing why they failed to seek further support

Alt text: a table showing extracts from interviews describing reasons why participants had failed to follow advice to seek further support.