Opportunistic cardiovascular risk assessments in Islington community pharmacies
A quantitative evaluation

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June 2009
Executive Summary

Background
The premature death rate from circulatory diseases in Islington has decreased over time, but remains higher than the London and England averages. The 2007 Annual Public Health Report (APHR), *Reducing early deaths from cardiovascular disease in Islington* highlighted the gap of up to 50% between recorded and expected disease prevalence in Islington. It recommended improving practice risk and disease registers for patients without disease but who had a 20% or greater risk of cardiovascular disease (CVD) in the next ten years. Based on the recommendations from this report, the CVD local incentive scheme in 2008 focused on a number of key priorities including reducing mortality and morbidity from CVD by increasing case finding and improving disease registers.

In addition, the PCT implemented a six month pilot programme: opportunistic cardiovascular disease (CVD) risk assessment in community pharmacies. All the pharmacies selected (11) for this pilot were located in areas of deprivation, fitting in with the Department of Health’s plans to reduce the health inequalities gap.

In the national context, the Department of Health is introducing vascular screening through the **NHS Health Checks** programme (summarised in appendix 4)

The aim of this pilot was to assess whether pharmacies have a role in offering vascular risk assessments to attract new groups of patients that do not routinely approach general medical services, and whether such a pharmacy service could deliver a service to agreed quality standards and protocols.

Design (please see appendix 1 for patient pathway):
The study had two arms:
1. A questionnaire which assessed the lifestyle of those who agreed to take part and asked a question about the participant’s last visit to their GP.
2. Subgroup of those in the first arm who were eligible and agreed to take part in the CVD risk assessment based on a number of questions, measurements such as height, weight, body mass index, blood pressure and on the spot blood test (near patient testing using Cardiochek® devices) for random glucose. For those identified as being potentially at higher risk, participants were invited to return after 2-3 days for further assessment including on the spot fasting total cholesterol, HDL cholesterol and fasting glucose in (using near patient testing).

A number of outcome measures were evaluated and results are summarised overleaf:

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Summary of results

- There were 1497 participants in the first arm of the study and 901 of these participated in the second arm of the study.
- Of the 901 participants in the second arm, 626 continued to the further assessment stage and 28 to the follow up stage.
- There was a fall in activity over time with over 50% of patients seen in the first 7 weeks for the health questionnaire and initial assessments, and 43% for the further assessment.
- 65% of participants were women and 35% men, which was consistent at all stages of assessment.
- The largest age group in both sexes (about 50%) were aged 40-49 in all assessments.
- Black Caribbean and black African groups were over represented compared to GLA population estimates (black Caribbean 8.6% vs. 6% and black African 6.9% vs. 4.96%).
- 89% of patients had seen their GP in the previous 12 months.
- 14.2% (212/1497) reported eating five or more portions of fresh fruit or vegetables per day.
- 55.2% reported taking at least 30 minutes of moderate physical activity at least three times per week.
- Men were more likely to report drinking more than the recommended daily number of units of alcohol (23.6%, 124/525) than women (12.7%, 1123/972).
- 33% (289/879) reported current smoking but uptake of smoking cessation services was low (13/289) (assessed through smoking cessation database; excludes sales of nicotine replacement products).
- 23% (201/879) were obese, greater than the 16% estimate for Islington adults but referral to exercise on referral (EoR) was low. Aquaterra (the EoR provider) reported that 1 person had been referred as a result of the pharmacy pilot.
- 25% of participants (224/879) had blood pressure of ≥140/90 recorded at the initial assessment stage, although it is not clear how many readings this was based on.
- 10% of participants (87/879) had a low random glucose reading (below 3.9 mmol/l) and 10 people (1%) had a very low random glucose reading (<3 mmol/l)².
- 29% of participants had an elevated random glucose reading (above 5.6mmol/l). However, random glucose is not a good discriminating test.²
- 93% of patients would have been eligible for the next stage of assessment on the basis of risk factors other than elevated random glucose.
- 115/601 (19.1%) were recorded to have elevated fasting glucose (above 5.6mmol/l) and 24 of these (4.0%) above 7.0mmol/l².
- 387/601 (64%) were identified as low CVD risk, 26% as medium risk and 10% as high risk. Men were more likely than women to be scored as at medium or high risk of CVD, although risk equations are weighted to score males higher.³ However the data quality was problematic and the inconsistencies in the risk equation⁴ used by the pharmacists and the value of these are questionable.
- 53/156 eligible patients (34%) had a CVD follow-up assessment, of which two were excluded from analysis.
- At the follow-up stage, 9 patients (17.6%) were identified as of low CVD risk, 34 (66.7%) as medium risk and 8 (15.7%) as high risk.
- The small number of participants completing a follow-up assessment precludes a meaningful evaluation of changes in risk factors 12 weeks or more following assessment and lifestyle advice.

² The normal range for blood glucose is 3.9 to 5.6mmol/l
³ Low risk equates to under 10% risk of a CVD event in the next 10 years, medium risk equates to risk of between 10% and under 20% and high risk equates to a risk of 20% or greater.
⁴ The specified risk equation was the CVD (Framingham) equation (http://cvrisk.mvm.ed.ac.uk/calculator/calc.asp), however a large proportion of risk scores were found to be calculated using the Framingham BNF equation, and a small sample of scores found inconsistencies in gender and smoking status between the data from pharmacists and those used in the risk calculation.
Life style advice
All 11 pharmacies provide smoking cessation services and the service level agreement specified referral to smoking cessation and lifestyle management. Given that smoking cessation is the single most important way to reduce CVD risk, it is very important to note that only 13/289 current smokers engaged with smoking cessation services, although this excludes sales of over the counter products. Of these, 5 had quit, 2 were still smoking and 6 were lost to follow up. Only one referral to exercise on referral has been identified. This also raises the question about the opportunity cost for the pharmacists’ time when resources are directed at cardiovascular risk rather than smoking cessation services. The small number of participants completing a follow-up assessment precludes a meaningful evaluation of changes in risk factors 12 weeks or more following assessment and lifestyle advice.

Validation of elevated results
In early February 2009, 34 practices were sent lists of their patients with elevated blood pressure, fasting glucose and cholesterol ratios and asked if they had received the results, whether patients were known to have had elevated readings previously, whether they would enter the results in the clinical system and whether they had corroborated any results with a laboratory test. Twelve of these practices responded, which related to 61 patients. Practices reported not having seen the results for 33 patients, and five patients were not registered with the practice that was recorded on the pharmacist’s data spreadsheet.

Practices tended to respond with yes/no answers rather than specific numbers, so robust validation of results has not been possible.

Practices reported that 17/30 patients with BP ≥140/90 were known to the practice and a further 2 had lower BP recorded at the practice but no further details were given.

Two elevated fasting glucose results were corroborated by laboratory tests although practices did not specify the exact laboratory result.

It has not been possible to corroborate all the abnormal results with general practices.

In interpreting these results it is important to note a number of limitations

- **Selection bias.** An opportunistic assessment such as this pilot is likely to appeal more to health conscious individuals, so the study population may be more healthy overall than a randomly selected population.
- **Subjectivity.** People tend to under-report socially undesirable behaviours and over-report socially desirable behaviours, which may affect the validity of responses. Definitions used in the pilot are not comparable with those used in national surveys, e.g. the pilot questionnaire stated fresh fruit and vegetable consumption compared to nationally used definitions of fresh, frozen, canned or dried fruit and vegetables.
- **Data error and inaccurate recording.** There were a substantial number of errors in data entry, e.g. glucose and cholesterol results were entered in the wrong column for 98 patients. This was noted as the Cardiochek® device displays two decimal points for glucose and one for cholesterol. These errors were rectified retrospectively and verified by the public health specialist by recalculating the cardiovascular risk score.
- **Lack of consistency in scoring cardiovascular risk.** On recalculating a random sample of 50 scores (5 each from 10 pharmacies5), 28 (56%) were found not to be consistent. 19 were based on a different risk equation (BHF rather than CVD(Framingham), and in one case stroke rather than CVD), 3 men were scored as women and two smokers scored as non-smokers.
- **Communication with GPs.** 34 general practices were contacted to validate elevated results, of which 12 responded (61 patients). Six practices stated that they had not received information on 33 patients from the pharmacists

5 One pharmacy had completed insufficient assessments at this stage
• **Adherence to standards** e.g. 33/601 patients had a random and fasting glucose test on the same day, which is not in keeping with the protocol (patients to be invited 2-3 days later for a fasting glucose). Seven patients who were ineligible because they were under 40 progressed to the initial assessment and four of these progressed to the further assessment. Six patients who received a further assessment were not eligible because they had not met the clinical criteria. It is not clear whether the correct advice on fasting requirements for blood glucose was consistently provided by pharmacists.

• **Quality assurance of the near patient testing** was not robust and therefore the reliability of the blood test results is subject to question. In addition, the near patient testing devices have a wide range when compared to the reference laboratory (±15% for glucose).

• **Training.** The training provided did not assess the competencies at the end of the training.

• There were concerns about the management of patients with abnormal results, for example patients with blood glucose less than 3.0mmol/l.

**Cost**

The PCT has spent £83,893 on the pilot, a figure which excludes the costs of time spent by PCT employees. This does not include the costs of NHS Islington employees’ time on administration, management and evaluation.

For a full cardiovascular risk assessment pharmacists were paid £60 per patient, with an additional £20 for follow up of patients at medium risk.

Appendix 3 details expenditure on the pilot.

**Conclusion**

Pharmacists are important and valued stakeholders working with the PCT on a number of areas. The pharmacy based opportunistic cardiovascular risk assessment pilot aimed to assess whether pharmacies have a role in offering vascular risk assessments to attract new groups of patients that do not routinely approach general medical services, and whether such a pharmacy service could deliver a service to agreed quality standards and protocols.

It was found that 89% of the population assessed in 11 pharmacies in Islington had accessed their GPs with the past 12 months and that the majority of the participants were women. The majority of assessments were undertaken at the beginning of the pilot. In this pilot, men were more likely to have a high risk of CVD, although numbers are small. A number of issues have been raised and discussed above, including quality assurance, inconsistencies in data entry and risk scoring, the uptake of lifestyle interventions, confidence in results and the accuracy of near-patient testing devices.
Opportunistic cardiovascular risk assessments in Islington community pharmacies: a quantitative evaluation

Introduction
The premature death rate from circulatory diseases in Islington has decreased over time, but remains higher than the London and England averages. In 1995-1997 the premature death rate from circulatory diseases in Islington was 180.1 per 100,000 persons, which reduced by 33% to 119.8 per 100,000 persons by 2005-2007. This corresponds to around 140 years of life lost per 10,000 persons. However, the rate in England reduced by 44% from 141.3 per 100,000 persons to 79.1 over the same period, corresponding to around 96 years of life lost per 10,000 persons. The main cause of premature cardiovascular death in men and women in Islington is coronary heart disease followed by stroke.

The 2007 Annual Public Health Report (APHR), Reducing early deaths from cardiovascular disease in Islington highlighted the gap of up to 50% between recorded and expected disease prevalence in Islington, and concluded that one of the ways to achieve an improvement in the rate at which people were dying early from heart disease in Islington would be to improve practice risk registers for patients without disease but who had a 20% or greater risk of cardiovascular disease (CVD) in the next ten years.

Nationally, the Government is introducing vascular checks nationally through the NHS Health Checks programme, summarised in appendix 4.

The changing role of pharmacy
Over the past decade the role of pharmacy has changed. The whole focus for pharmacy is becoming more patient-focused, more about offering advice to patients, and less about dispensing and supply. There is a consensus that greater involvement in health promotion and facilitating lifestyle changes is pivotal to the future role of pharmacy in the community.

Aim
The purpose of this pilot was to assess whether pharmacies have a role in offering vascular risk assessments to attract new groups of patients that do not routinely approach general medical services (general practitioners)

Design:
The pilot was based on a cohort design with two arms:
- The first arm assesses lifestyle of those who agreed to take part and their last GP visit,
- 2nd arm – subgroup of those in the first arm who agreed to take part in the CVD risk assessment.

Intervention:
- First arm: lifestyle questionnaire and GP attendance
- 2nd arm- cardiovascular risk assessment based on a questionnaire, weight, height, waist circumference and blood pressure measurements, and on the spot blood test (near patient testing using Cardiochek® devices) for random glucose and on the spot fasting total cholesterol, HDL cholesterol and glucose in those identified as being potentially at higher risk.

Methodology
Eleven community pharmacies located in the most deprived areas of Islington took part in the pilot, which operated for six months from 11th August 2008 to 28th February 2009. Pharmacists were able to continue to offer 12-week follow-up assessments for eligible patients until 31st May 2009.
The pilot had four patient components:  

- **CVD1:** Health assessment questionnaire for all patients who consented  
- **CVD2:** Initial assessment for patients aged over 40 and registered with an Islington GP  
- **CVD3:** Further assessment for CVD2 patients with at least one risk factor (smoker, family history of premature CVD, BMI $\geq 27$, waist circumference of $\geq 94$ cm for men, or $\geq 80$ cm for women, South Asian ethnicity, blood pressure $\geq 140/90$ mmHg or random blood glucose of $\geq 5.6$ mmol/l)  
- **CVD5:** Follow-up assessment for CVD3 patients with a Framingham CVD risk score of 10% to <20%.  

Pharmacists recorded each stage on a paper based record for each individual patient. CVD1 health assessment questionnaires were anonymous and copies were sent to NHS Islington for analysis. CVD2, CVD3 and CVD5 data were entered onto a spreadsheet which was emailed securely to NHS Islington for analysis each month.

CVD2, 3 and 5 data were analysed using Excel spreadsheets and results that seemed abnormal queried with the pharmacist. The methodology used for each assessment is described in each assessment stage’s chapter.

**Outcome measures:**  
The evaluation aimed to measure a number of outcomes:  

First arm: Age band, gender, lifestyle (smoking status, alcohol consumption, fruit and vegetable consumption and physical activity levels) and general practitioner attendance profile of those patients who accessed the pilot the CVD1 health assessment questionnaire.  

2nd Arm: as for the first arm plus:  
- Age and gender,  
- smoking status,  
- family history of premature cardiovascular disease or premature diabetes  
- weight and height with body mass index calculated, and waist circumference  
- random blood glucose measurements based on near-patient test results  
- the number of patients with elevated blood pressure (≥140 mmHg systolic blood pressure and/or ≥90 mmHg diastolic blood pressure previously unknown to their GP).  

Additionally, for patients progressing to the further assessment stage (CVD3):  
- the number of patients with potential impaired glucose tolerance (IGT), impaired fasting glycaemia (IFG) or diabetes mellitus previously unknown to their GP based on near patient test results  
- the number of patients with a high risk (≥20%) of a cardiovascular event in the next 10 years previously unknown to their GP.  
- The number of patients with elevated test results that were corroborated by general practice (the number of patients identified as positive who were truly positive)  

From the CVD5 follow-up assessment, the additional outcome measures were:  
- reduction in fasting blood glucose levels  
- reduction in total cholesterol levels  
- increase in HDL cholesterol levels  
- reduction in cardiovascular risk score  

**Aim**  
The aim of the pilot was to assess the point of care testing model in community pharmacies to undertake vascular risk assessments for patients that do not routinely approach General Medical Services (general practitioners).

Qualitative aspects of the pilot are evaluated separately in the evaluation undertaken by the School of Pharmacy.  

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CVD1: Health questionnaire

Summary:
- There was a fall in activity over time with 57% of patients seen in the first 7 weeks.
- 65% (972/1497) of participants were women and 35% (525/1497) were men.
- The largest group in both sexes was the 40-49 age group (616/1497).
- Overall, 14.2% (212/1497) reported eating five or more portions of fresh fruit or vegetables.
- 55.2% (827/1497) reported taking at least 30 minutes of moderate physical activity at least three times a week.
- 32.5% (486/1497) reported being current smokers.
- Men (23.6%, 124/525) were more likely than women (12.7%, 123/972) to report drinking more than the recommended daily number of units of alcohol than women.
- 89.2% (1335/1497) had seen their GP within the year prior to their assessment.
- Patients may under-report socially undesirable behaviours and over-report socially desirable behaviours.
- The definitions used in the pilot mean that results are not be comparable with national surveys.

Introduction
The purpose of the CVD1 health assessment questionnaire was to define eligibility for a cardiovascular risk assessment and provide opportunities for first-line tailored lifestyle advice.

Methodology
Pharmacists recorded patients’ gender, age group (Under 39; 40 to 49; 50 to 59 and 60 and over), daily fruit and vegetable consumption (0; 1-2; 3-4; 5 or more portions of fresh fruit or vegetables per day); physical activity (at least 30 minutes of moderate physical activity on 0; 1-2; 3-4 or 5 days per week), whether the patient had been diagnosed with a relevant medical condition, smoking status, consumption of alcohol, whether the patient was registered with an Islington GP and the patients’ last visit to their GP (within the last month, 1-6 months previously, 7-12 months previously or more than 1 year previously).

Copies of CVD1 forms on which these data were recoded were provided to NHS Islington. Data were entered onto a spreadsheet for analysis. All 1,497 CVD1 forms were analysed.
Results

Activity

Figure 1: CVD1 activity by month and pharmacy

Over the six month period of the pilot, 1,497 health assessment questionnaires were carried out to assess lifestyle and offer advice and ascertain registration with and last visit to an Islington GP.

The majority of assessments undertaken in the first month of the pilot and declined in subsequent months (Figure 1). Shortly after the start of the pilot, one pharmacist left the pharmacy but has undertaken some CVD assessments on Saturdays. One pharmacist had low activity in the first month because of leave.

Table 1: CVD activity by month and pharmacy.

<table>
<thead>
<tr>
<th>Pharmacy</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkle</td>
<td>162</td>
<td>11</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>185</td>
</tr>
<tr>
<td>Boots</td>
<td>144</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>182</td>
</tr>
<tr>
<td>Carters</td>
<td>37</td>
<td>55</td>
<td>26</td>
<td>8</td>
<td>10</td>
<td>4</td>
<td>140</td>
</tr>
<tr>
<td>Chemitex</td>
<td>49</td>
<td>24</td>
<td>20</td>
<td>29</td>
<td>4</td>
<td>8</td>
<td>134</td>
</tr>
<tr>
<td>Clockwork</td>
<td>58</td>
<td>29</td>
<td>23</td>
<td>0</td>
<td>3</td>
<td>4</td>
<td>117</td>
</tr>
<tr>
<td>Devs</td>
<td>116</td>
<td>30</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>160</td>
</tr>
<tr>
<td>Essex</td>
<td>69</td>
<td>17</td>
<td>17</td>
<td>14</td>
<td>13</td>
<td>24</td>
<td>154</td>
</tr>
<tr>
<td>Greenlight</td>
<td>36</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>44</td>
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<tr>
<td>JC Wise</td>
<td>147</td>
<td>54</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>208</td>
</tr>
<tr>
<td>Mahesh</td>
<td>30</td>
<td>9</td>
<td>18</td>
<td>15</td>
<td>7</td>
<td>5</td>
<td>84</td>
</tr>
<tr>
<td>Turnbulls</td>
<td>6</td>
<td>38</td>
<td>16</td>
<td>5</td>
<td>14</td>
<td>10</td>
<td>89</td>
</tr>
<tr>
<td>Total</td>
<td>854</td>
<td>274</td>
<td>146</td>
<td>83</td>
<td>55</td>
<td>85</td>
<td>1497</td>
</tr>
</tbody>
</table>

Demographics of those who took part

More women than men took part in a CVD1 health assessment questionnaire in all four age groups. Overall women made up 64.9% of participants compared to 35.1% of men. The largest group in both genders was the 40 to 49 age group, and the smallest group were under-40 in both genders (Figure 2 and Table 2). Under-40 year olds were not eligible for the CVD2 assessment, but were eligible for the CVD1 health assessment which identified overall eligibility.

Table 2: Gender and age of CVD1 participants

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 40</td>
<td>33</td>
<td>70</td>
<td>103</td>
</tr>
<tr>
<td>40 - 49</td>
<td>224</td>
<td>392</td>
<td>616</td>
</tr>
<tr>
<td>50 - 59</td>
<td>136</td>
<td>303</td>
<td>439</td>
</tr>
<tr>
<td>60 and over</td>
<td>131</td>
<td>204</td>
<td>335</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>972</td>
<td>1497</td>
</tr>
</tbody>
</table>
Lifestyle

Interpreting the results

There are a number of limitations with lifestyle data that should be noted. There is a tendency for subjects to over-report socially desirable behaviours such as fruit and vegetable consumption and physical activity, and under-report socially undesirable behaviours such as alcohol consumption and smoking. There are also problems with definition, i.e. how much is a portion of fruit or vegetables, as well as limiting the question to “fresh” therefore excluding canned, dried and frozen fruit and vegetables. *Moderate* physical activity or how much a unit of alcohol is were not explicitly defined, nor when an ex-smoker becomes a non-smoker in terms. Patients may be tempted to under-report existing medical conditions because they want to “know their numbers”. Comparisons with other lifestyle data are further limited because definitions or timescales are often different.

It also needs to be borne in mind that opportunistic programmes such as this pilot tend to appeal to the more health conscious, and results may therefore be skewed by selection bias.

Fruit and vegetable consumption.

Women were slightly more likely than men to report consuming three or more portions of fresh fruit and vegetables per day, although the difference was not tested for significance (Table 3, Figure 3).

Overall, 212 patients completing the CVD1 health assessment questionnaire (14.2%) reported eating five or more portions of fruit and vegetables per day, compared with a synthetic estimate for Islington of 26.9%. Data from the CVD1 health assessment questionnaire is self reported by recall, whereas the data from the synthetic estimate asked respondents if they had consumed 5 or more portions of fruit and vegetables during the previous day. Difference in ages is also noted; the data from the CVD1 questionnaire relates to a generally older population living that is likely to live in the more deprived areas of the borough.

The majority of participants said that they ate either 1 to 2 or 3 to 4 portion of fruit and vegetables per day. 75 participants (5%) said that they ate no fruit or vegetables, whilst the largest group (669 participants, 44.7%) said that they ate 1 to 2 portions per day. 533 participants (35.6%) said that they ate 3 to 4 portions per day, and 212 (14.2%) (Figure 3 and Table 3).

Men were significantly more likely than women to report eating one to two portions per day, (men 50.7%, 95% CI 46.4% - 54.9%; women 41.5% 95% CI 38.4% - 44.6%) and women were significantly more likely than men to report eating five or more portions daily (men 10.9%, 95% CI 8.2% - 13.5%; women 15.9% (95% CI 13.6% - 18.2%). There was no significant difference between the proportions of men and women eating either no fruit and vegetables or those eating three to four portions per day.
Table 3: Reported daily fruit and vegetable consumption

<table>
<thead>
<tr>
<th>Portions of fruit/veg per day</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>37</td>
<td>38</td>
<td>75</td>
</tr>
<tr>
<td>1 - 2</td>
<td>266</td>
<td>403</td>
<td>669</td>
</tr>
<tr>
<td>3 - 4</td>
<td>164</td>
<td>369</td>
<td>533</td>
</tr>
<tr>
<td>5+</td>
<td>57</td>
<td>155</td>
<td>212</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>972</td>
<td>1497</td>
</tr>
</tbody>
</table>

Figure 3: Reported daily fruit and vegetable consumption (n=1,497)

Exercise

Overall, 827 CVD1 participants (55.2%) reported taking part in 30 minute sessions of moderate physical activity at least three times per week, higher than the 20.9% reported in the Sport England Active People Survey 2 (2007/08). Women were more likely to take part in 30 minute sessions of moderate physical activity at least three times per week than men (women 58.2%; 95% CI 55.1% to 61.3%; men 49.7%; 95% CI 45.4% to 54.0%). However, the generally older population self-reporting in the CVD1 health questionnaire compared to the Sport England survey population, and variation in the definition of moderate activity mean that these data cannot be compared reliably.

Figure 4 and Table 4 show participants' self-reported physical activity levels, with little difference between men and women reporting undertaking 30 minutes or more of moderate physical activity (suggested as walking, swimming, running etc) on 1 – 2, 3 – 4 or 5 or more days per week. A much smaller proportion reported undertaking no activity per week.

There was no statistically significant difference between the proportion of men and women in any of the four categories.

Table 4: Reported weekly exercise

<table>
<thead>
<tr>
<th>Number of 30 minute sessions/week</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>83</td>
<td>121</td>
<td>204</td>
</tr>
<tr>
<td>1 - 2</td>
<td>178</td>
<td>283</td>
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<td>3 - 4</td>
<td>129</td>
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<td>5+</td>
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<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>972</td>
<td>1497</td>
</tr>
</tbody>
</table>

Figure 4: Reported weekly exercise (n=1,497)

Smoking

The proportion of participants who reported that they were current smokers was 32.5% (486 patients). This is a higher proportion than the 27.5% synthetic estimate for Islington. It is important
to note that pharmacies taking part in the pilot are based in areas of high deprivation which contributes to the higher prevalence of smoking. The synthetic estimate is derived from data from adults aged 16 and over whereas the data in Table 5 and Figure 5 is derived from a generally older population, therefore direct comparison is not possible.

Women were more likely than men to report their smoking status as “non-smoker” (women 60.9%, 95% CI 57.8% to 64.0%; men 53.3% 95% CI 49.0% to 57.6%), but there was no statistically significant difference between men and women in the “smoker” or “ex-smoker” categories. Early versions of the CVD1 questionnaire did not have the “ex-smoker” option, and so it is unclear how many non-smokers would have described themselves as ex-smokers had they been given the option. It is not clear when pharmacists began to use the newer versions of the questionnaire. This may have affected the statistical significance of the difference between men and women non-smokers.

Table 5: Self reported smoking status

<table>
<thead>
<tr>
<th>Smoking status</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current smoker</td>
<td>193</td>
<td>293</td>
<td>486</td>
</tr>
<tr>
<td>Non smoker</td>
<td>280</td>
<td>592</td>
<td>872</td>
</tr>
<tr>
<td>Ex-smoker</td>
<td>52</td>
<td>83</td>
<td>135</td>
</tr>
<tr>
<td>Missing</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>972</td>
<td>1497</td>
</tr>
</tbody>
</table>

Figure 5: Self reported smoking status (n=1,497)

Alcohol consumption

Patients completing the CVD1 health assessment questionnaire were asked “Do you consume more than the recommended amount of alcohol?” The recommended amounts for alcohol were defined as 3 units per day for men and 2 units for women, in line with Department of Health guidance. Surveys on alcohol consumption are often problematic: people tend to under-report the amount of alcohol they drink, and whilst many people are aware of the term “unit if alcohol”, the number of units contained in a drink is often underestimated.

Men were more likely than women to report that they exceeded the recommended daily amount of alcohol (men 23.6%, 95% CI 20.0% to 27.3%; women 12.7%, 95% CI 10.6% to 14.7%, Table 6, Figure 6).

Data can not be compared to synthetic estimates for binge drinking because of differences in populations and differences between the question on the CVD1 questionnaire and the definition used in the synthetic estimate (where respondents were asked if they had consumed 8 or more units of alcohol (men) or 6 or more units of alcohol (women) on their heaviest drinking day in the past week).
Table 6: Self reported alcohol consumption

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 3 units (men) or 2 units (women)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>124</td>
<td>123</td>
<td>247</td>
</tr>
<tr>
<td>No</td>
<td>398</td>
<td>847</td>
<td>1245</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>972</td>
<td>1497</td>
</tr>
</tbody>
</table>

Figure 6: Self reported alcohol consumption (n=1,497)

Existing health conditions
304 patients (20.3%) reported that they had a pre-existing condition (high cholesterol, high blood pressure, diabetes / high blood sugar, any sort of heart problems e.g. angina, heart attack, stroke, kidney problems or liver problems). This question on the health assessment questionnaire had the highest proportion of missing values (50, or 3.3%), but it is not clear whether these were unknown by the patient, or not disclosed because it would exclude the patient from further assessment.

GP registration and last visit to the GP.
The majority of the patients were registered with an Islington GP (1,414 or 94.5%). However, the available data does not distinguish between patients who are not registered with any GP and patients who are registered with a GP outside of Islington.

Where patients were not registered with any GP, pharmacists reported anecdotally that they would use their local knowledge to signpost the patient to a practice rather than referring to the Patient Advice and Liaison Service. Where patients were registered with GP outside of Islington they were informed that they should speak to their own GP regarding cardiovascular assessment.

Patients were asked when they last visited their GP. The largest group had seen their GP in the last month (528; 37.8%), followed by those seeing their GP between 1 and 6 months ago.

At total of 1,335 patients (89.2%) had seen their GP within the previous 12 months. 157 patients had not seen their GP in the last year – 63 of these were men (Table 7, Figure 7).

There was no difference between men and women in when they last visited their GP at the 95% significance level (Figure 7).
Patients aged 40 and over and registered with an Islington GP were eligible to go on to an initial assessment (CVD2).

**Missing data**

In total there were 85 missing answers from nearly 13,500 questions (0.6%). It is not clear whether missing answers are due to their answer not being recorded, the patient not wishing to answer that particular question, or the patient was unable to answer. Whilst the latter may be more likely for some questions, e.g. patients may not be familiar with how much alcohol a unit contains, it is less likely for others such as smoking status.

**Cost**

The CVD1 was an initial assessment designed to determine individual patients’ eligibility for further assessment, therefore no questionnaires were undertaken outside of the criteria set out in the protocol.

The cost of the CVD1 component of the pilot was £7,485 based the £5 fee paid to the pharmacists for each completed questionnaire. The cost does not include a proportion of the costs associated with training the pharmacists, administration by NHS Islington or evaluation.

**Discussion**

Uptake of CVD1 health assessment questionnaires peaked in the first month, although this included the period between the start of the pilot on 11th August 2008 and the end of the first full month in September 2008.

The proportion of women accessing the scheme was much higher than men, with the greatest participation by both men and women in the 40-49 year old age group. The pilot attracted interest from a larger proportion of people who ate fewer portions of fruit and vegetables, although there was little difference in participants’ physical activity levels. A greater proportion of smokers than synthetic estimates suggest might be because the pilot pharmacies were located in areas of greater social deprivation where residents may be more likely to smoke. Men were more likely to report drinking more than the recommended number of alcohol units. However, differences in how this question was asked locally and in national surveys, and the subjective nature of such questions, make it hard to interpret this result within the context of national data.

Patients were more likely to have visited their GP in the six months prior to their assessment than over six months previously, but there was no difference between those who had visited their GP in the month previous to the assessment or between one and six months previously. There are many reasons why visits to the GP and pharmacy are linked, and that data suggest that to reach those

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 month</td>
<td>216</td>
<td>410</td>
<td>626</td>
</tr>
<tr>
<td>1 - 6 months</td>
<td>184</td>
<td>377</td>
<td>561</td>
</tr>
<tr>
<td>7 - 12 months</td>
<td>61</td>
<td>87</td>
<td>148</td>
</tr>
<tr>
<td>Within the last 12 months</td>
<td>461</td>
<td>874</td>
<td>1335</td>
</tr>
<tr>
<td>12 months +</td>
<td>63</td>
<td>94</td>
<td>157</td>
</tr>
<tr>
<td>Missing</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>525</td>
<td>972</td>
<td>1497</td>
</tr>
</tbody>
</table>
people that have no contact with health services other venues in the community may need to be considered.

The CVD1 health assessment questionnaire has a number of subjective questions that should be defined clearly:

- The size of a portion of fruit of vegetables should be simply defined, with an explanation that fresh, frozen, canned and dried forms all count.
- Moderate exercise should be defined as “making you feel slightly out of breath. You should feel slightly worn out, but not to the point where it's unbearable” with examples of activities.
- The definition of units of alcohol should be explained in clear easy to understand terms, for example ½ pint of ordinary beer, a small glass of wine, etc.
- The term “ex-smoker” needs to be defined, to distinguish someone who may have given up smoking many years ago but who might consider themselves an ex-smoker, with an appropriate evidence based cut off point for inclusion as a smoker or non-smoker. This would improve calculating CVD risk at the CVD3 and 5 stages.

Although in percentage terms the number of missing answers was small, the service level agreement should specify that all questions have been answered before offering the next stage of the assessment. This will ensure more complete data capture and reduce the potential for patients that are ineligible to proceed to further stages of assessment. The requirement for data to be submitted on time should also be strengthened in the service level agreement.

It is not unusual for some changes to be necessary during the initial stages of a pilot project as issues arrive, although these should be minimised by rigorous planning. However, such issues highlight the need for robust communication to ensure swift implementation of and necessary changes. Robust communication should also ensure that questions or concerns from pharmacists are addressed at an early stage.
CVD2: Initial Assessment

Summary

- 54% of activity occurred in the first 7 weeks before falling rapidly.
- 66% of participants (579/879) were women and 34% men (300/879)
- Black Caribbean and Black African groups were over-represented compared to GLA population estimates, while white and Bangladeshi groups were under-represented.
- 89% (786/879) had seen their GP in the year prior to the assessment
- 33% (289/879) were current smokers, but uptake of smoking cessation services was low (4.5% of current smokers, 13/289).
- 23% of participants (201/879) were obese, greater than the 16% estimate for Islington adults, but referral to Exercise on Referral was very low.
- 25% of participants (224/879) had blood pressure of ≥140/90 recorded at the pharmacy, although practices reported that many patients' elevated blood pressure was already known to the practice.
- 10% of participants (87/879) had a random glucose reading below the normal range of 3.9 to 5.6mmol/l
- 29% of participants (255/879) had a random glucose reading above the normal range of 3.9 to 5.6mmol/l
- In 97% of cases, a random glucose test was not necessary (873 tests).

Introduction

The CVD2 initial assessment consisted of pharmacists measuring patients' height and weight, waist circumference and blood pressure and taking a random blood glucose test using a finger prick sample analysed with a Cardiochek® near patient testing device.

Methodology

The pharmacist calculated the patients' body mass index from weight and height measurements, and all data from the CVD2 assessments were entered by the pharmacists onto a paper record. The patient signed confirming consent to blood tests being taken and to personal information being shared. Pharmacists also entered this data onto a spreadsheet that also recorded results from the subsequent CVD3 and CVD5 assessments.

Pharmacists were required to submit their spreadsheets securely using NHS net to NHS Islington, where the data were cleaned and analysed. Where queries about the data arose, pharmacists were contacted in order to resolve the query.

The data were analysed for each component of the assessment and confidence intervals for proportions applied in order to measure the significance of any differences between groups at the 95% level.
Results

Activity

Figure 8: CVD2 activity by month and pharmacy

Table 8: CVD2 activity by month and pharmacy

<table>
<thead>
<tr>
<th>Pharmacy</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkle</td>
<td>110</td>
<td>11</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>132</td>
</tr>
<tr>
<td>Boots</td>
<td>69</td>
<td>12</td>
<td>9</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>105</td>
</tr>
<tr>
<td>Carters</td>
<td>33</td>
<td>46</td>
<td>15</td>
<td>9</td>
<td>2</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>Chemitex</td>
<td>28</td>
<td>17</td>
<td>8</td>
<td>12</td>
<td>2</td>
<td>5</td>
<td>72</td>
</tr>
<tr>
<td>Clockwork</td>
<td>35</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>57</td>
</tr>
<tr>
<td>Devs</td>
<td>64</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>79</td>
</tr>
<tr>
<td>Essex</td>
<td>56</td>
<td>14</td>
<td>17</td>
<td>11</td>
<td>14</td>
<td>26</td>
<td>138</td>
</tr>
<tr>
<td>Greenlight</td>
<td>13</td>
<td>6</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>JC Wise</td>
<td>67</td>
<td>14</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>Mahesh</td>
<td>14</td>
<td>5</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>36</td>
</tr>
<tr>
<td>Turnbulls</td>
<td>3</td>
<td>22</td>
<td>12</td>
<td>7</td>
<td>7</td>
<td>58</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>492</td>
<td>167</td>
<td>87</td>
<td>53</td>
<td>44</td>
<td>58</td>
<td>901</td>
</tr>
</tbody>
</table>

Of the 1497 patients who completed a CVD1 health assessment questionnaire, 103 (6.9%) were not eligible to progress to the CVD2 stage because they were under 40 years old, although 22 had a CVD2 assessment and were subsequently excluded from analysis. A further 79 (5.3%) were not registered with an Islington GP. A total of 436 (29.1% of those eligible) were lost to follow-up. 901 patients (68.5%) had a CVD2 assessment, including 22 who were excluded from analysis because they were under 40 years old. 879 eligible patients were included in the analysis. The reason why a high proportion of patients dropped out is not clear, although it is possible that they were discouraged because of the blood test.

Between 11th August 2008 and 28th February 2009, 901 patients consented to and received a CVD2 assessment. Of these, twenty two people were excluded from analysis because they were under 40 years old (seven) or over 74 years old (fifteen).

Activity peaked in the first week of September, shortly after the pilot started. Activity then declined steadily to November before levelling off, with particularly low activity during the Christmas period (Figure 9).

Figure 9: Frequency histogram of CVD2 assessments, 11th August 2008 to 28th February 2009. (n=879)
There were 879 participants aged between 40 and 74 at the CVD2 assessment, 300 men (34%) and 579 women (66%). The mean age of both groups was similar (51.9 years for men and 51.2 years for women). The proportion of men compared to women in each five year age band was similar (Figure 10 and Table 9).

**Figure 10: distribution of age and gender of CVD2 participants (n=879)**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Percentage of men / women</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-44</td>
<td>15% / 21%</td>
</tr>
<tr>
<td>45-49</td>
<td>12% / 20%</td>
</tr>
<tr>
<td>50-54</td>
<td>10% / 12%</td>
</tr>
<tr>
<td>55-59</td>
<td>9% / 11%</td>
</tr>
<tr>
<td>60-64</td>
<td>7% / 8%</td>
</tr>
<tr>
<td>65-69</td>
<td>5% / 6%</td>
</tr>
<tr>
<td>70-74</td>
<td>3% / 2%</td>
</tr>
</tbody>
</table>

**Table 9: distribution of age and gender of CVD2 participants (n=873)**

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-44</td>
<td>69</td>
<td>152</td>
<td>221</td>
</tr>
<tr>
<td>45-49</td>
<td>78</td>
<td>134</td>
<td>212</td>
</tr>
<tr>
<td>50-54</td>
<td>46</td>
<td>100</td>
<td>146</td>
</tr>
<tr>
<td>55-59</td>
<td>39</td>
<td>84</td>
<td>123</td>
</tr>
<tr>
<td>60-64</td>
<td>34</td>
<td>64</td>
<td>98</td>
</tr>
<tr>
<td>65-69</td>
<td>28</td>
<td>34</td>
<td>62</td>
</tr>
<tr>
<td>70-74</td>
<td>6</td>
<td>11</td>
<td>17</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>579</td>
<td>879</td>
</tr>
</tbody>
</table>

**Ethnicity**

Patients were asked to self report their ethnicity, which 874 of the 879 participants did. Data were missing for five patients but it is not known whether these patients declined to state their ethnicity or whether it was not recorded on the spreadsheet.

Non-white ethnic groups made up 29.7% (95% CI 26.7% to 32.7%) of the pilot population, more than the GLA (2007) projection for Islington of 23.0% (95% CI 22.7% to 23.4%). White groups were made up 70.3 (95% CI 67.3% to 73.3%) of the pilot population, compared with the GLA (2007) projection (76.9%, 95% CI 76.6% to 77.3%).

Figure 11 shows that Black Caribbean, Black African, and Other ethnic groups were over-represented compared to 2007 Greater London Authority projects, and Bangladeshi groups under-represented. White groups are not shown on Figure 11.

**Data sharing between pharmacies and practices**

Patients were required to be registered with an Islington GP in order to be eligible for a cardiovascular risk assessment because the pharmacists were required to copy results to the patients’ GPs. Patients needed to consent to sharing their results to be eligible. This was to be able to alert the GP to any measurements or results that may need further investigation.

In February 2009 all practices were sent details of their patients with results that indicated blood pressure over 140/90 mmHg, fasting blood glucose of over 5.6 mmol/l or a total cholesterol to HDL...
ratio of more than 6. Of the 38 Islington practices, 12 responded (32%) and commented on their findings for 61 patients. Of these, a small number of patients (five, 8%) were not registered with the practice that was recorded on the data spreadsheet.

At the time of response from practices, of the 61 patients with results requiring further investigation, practices had received details of 33 patients from pharmacies (54%). It is not clear whether the reason was that letters had not reached practices at all or whether the letters had not reached the attention of the GP. One practice reported that the patient told the GP verbally that a raised blood pressure measurement had been taken at the pharmacy. This underlines the importance of providing the patient with a copy of their test results and cardiovascular risk score with supporting information.

It was unclear from the documentation whether pharmacists were required to provide patients with copies of their results to share with their GP. Anecdotally, pharmacists reported that providing this information enabled the patient to reflect on the consultation at a later time at home. During the pilot, pharmacists were contacted to clarify that patients should be given a copy of their results.

This strongly suggests that the transfer of patients’ results between pharmacists and practices is not sufficiently robust.

### Patients last visit to their GP.

Patients’ most recent visit to their GP was recorded with the CVD2 assessment data. Patients were not asked at the time of the assessment at the pharmacy if the GP had discussed or assessed vascular risk at the patient’s last visit, although this was asked of a small sample of patients in the qualitative evaluation.  

The majority (786 of 879 patients, 89.4%) had visited their GP within the previous year, with a significant proportion (694 of 879 patients, 79.0%) having seen their GP within the six months prior to their assessment (Figure 12 and Table 10).

#### Table 10: Patients’ last visit to their GP

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 month</td>
<td>107</td>
<td>236</td>
<td>343</td>
</tr>
<tr>
<td>1-6 months</td>
<td>121</td>
<td>230</td>
<td>351</td>
</tr>
<tr>
<td>7-12 months</td>
<td>32</td>
<td>60</td>
<td>92</td>
</tr>
<tr>
<td>Within the last year</td>
<td>260</td>
<td>526</td>
<td>786</td>
</tr>
<tr>
<td>&gt; 1 year</td>
<td>37</td>
<td>45</td>
<td>82</td>
</tr>
<tr>
<td>Missing</td>
<td>3</td>
<td>8</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>579</td>
<td>879</td>
</tr>
</tbody>
</table>

#### Figure 12: Patients’ last visit to their GP (n=879)

![Figure 12: Patients’ last visit to their GP](image)

#### Smoking status

289 of the 879 participants accessing the CVD2 assessment were current smokers, which at 33% is slightly higher than the synthetic estimate of the proportion of people who smoke in Islington (27.5%). There was no difference in the proportion of men who were current smokers compared to women. The criterion for describing a person as an “ex-smoker”, i.e. the length of time since quitting, is not clear.
Pharmacists reported anecdotally that the on-line CVD risk calculator’s ability to demonstrate the difference in risk between smokers and non-smokers was a useful tool when discussing smoking cessation. However, comparison of data with smoking cessation services shows that between 1st September and 31st December 2008, 13 patients out of 289 current smokers had planned a quit date. Six were lost to follow-up, five had quit smoking and two were still smoking.

**Body mass index and waist circumference**

Pharmacists measured patients’ weight and height and calculated body mass index (BMI) using the formula weight (kg) / height (m) squared. Pharmacists also measured patients’ waist circumference. It is not clear whether weight, height and waist circumference was consistently measured, for example with normal clothing, without shoes, and the correct part of the waist to measure.

A higher proportion of participants had a body mass index of 30 or greater (201 patients, 23%) compared to estimates for Islington (16%)\(^6\). A greater proportion of women were obese compared to men (24% vs. 20%) but this difference was not significant at the 95% level. A small proportion (8 patients, 1.4%) of women were underweight based on a BMI of <18.5. (Figure 14 and Table 12) It was not clear if appropriate advice for underweight patients was provided by pharmacists.
Central obesity is linked to a higher risk of type 2 diabetes and coronary heart disease.\textsuperscript{10}

419 of the 579 women (72.4%, 95\% CI 68.7\% to 76.0\%) and 153 of the 300 men (51.0\%, 95\% CI 45.3\% to 56.7\%) taking part in the CVD2 assessment were centrally obese, and women were significantly more likely to be centrally obese than men. The average BMI for a woman with central obesity was 28.5 and the average BMI for a man with central obesity was 29.72 women (82\%) with an ideal weight of BMI of between 18.5 and 25 had central obesity, compared to 11 men (3.7\%).

Four people were referred to Exercise on Referral directly by pharmacies, and all from the same pharmacy. Only one person took up the scheme. The referral process was described by the exercise on referral provider as complex and some pharmacists may have referred patients via their GP.

Six of the twelve practices that responded to a questionnaire on how they interpreted the results from pharmacies reported that they would enter height and weight data. However, early versions of the letter templates advising GPs of patients’ results only recorded body mass index. This was not useful to GPs as clinical systems can only calculate BMI from weight and height. The letter templates were revised in November to provide more detailed information to GPs.

**Blood pressure**

Pharmacists measured patients’ blood pressure, recording both systolic and diastolic pressure. Pharmacists reported taking up to three measurements with around 20 minute intervals if blood pressure appeared high, but standard procedures appear not to have been documented.

A higher proportion of men (44, 14.7\% 95\% CI 10.7\% to 18.7\%) compared to women (41, 7.1\% 95\% CI 5.0\% to 9.2\%) had elevated measurements for both systolic and diastolic blood pressure, and this was significant at the 95\% level. There was no significant difference between the proportions of men compared to women with either elevated systolic or diastolic blood pressure but not both. (Figure 16 and Table 14).
All practices were sent a list of their patients with blood pressure greater than or equal to 140/90mmHg in February 2009, and asked whether the patient had had high blood pressure recorded at the practice, and whether they would enter blood pressure readings on their clinical systems.

Twelve of 35 practices replied, with nine entering or intending to enter blood pressure readings supplied by pharmacists. Most practices did not provide information on the number of patients whose blood pressure was known or otherwise. In most cases practices indicated that patients’ blood pressure was already known to the practice, and in two cases patients had normal blood pressure recorded at the practice.

**Random Blood Glucose**

Patients’ random blood glucose was taken using a finger-prick blood sample analysed by the Cardiochek® near patient testing device.

Of the 873 patients who had a CVD2 assessment, nine had values for random glucose missing.

A random glucose reading of ≥5.6mmol/l was one of the criteria for eligibility for a CVD3 further assessment. Of the 864 patients that received a random glucose test, 27 (15 men and 12 women) were eligible for a CVD3 assessment solely on the basis that their random glucose was greater than or equal to 5.6mmol/l. Therefore, 837 random glucose tests (97%) were taken unnecessarily because patients were eligible because of other factors.

The financial cost of the 837 tests, based on test strips at 41 pence each and pipettes at 18.5 pence each, was £500 inclusive of VAT. Where patients met no other eligibility criteria to progress to the CVD3 assessment, 21 had a random glucose level of ≥5.6mmol/l (average 6.3mmol/l, range 5.6 to 8.1) of which five had a resulting fasting glucose of ≥5.6mmol/l at the CVD3 stage.

87 patients (10%) had a random blood glucose reading below the normal range of 3.9 to 5.6mmol/l, of which 10 (1.1%) had a very low reading of less than 3.0mmol/l.

255 patients (29.0%) had a reading of over 5.6mmol/l. Of these, 66 (7.5%) had a reading of 7.0mmol/l or more. These were compared to fasting blood glucose measurements taken at the CVD3 further assessment stage.
Figure 17: Random glucose frequency, mmol/l. (n=870)

Table 15 Random blood glucose frequency

<table>
<thead>
<tr>
<th>Random glucose mmol/l</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1.0</td>
<td>0</td>
</tr>
<tr>
<td>1.0 to 1.9</td>
<td>2</td>
</tr>
<tr>
<td>2.0 to 2.9</td>
<td>8</td>
</tr>
<tr>
<td>3.0 to 3.9</td>
<td>77</td>
</tr>
<tr>
<td>4.0 to 4.9</td>
<td>347</td>
</tr>
<tr>
<td>5.0 to 5.9</td>
<td>255</td>
</tr>
<tr>
<td>6.0 to 6.9</td>
<td>115</td>
</tr>
<tr>
<td>7.0 to 7.9</td>
<td>40</td>
</tr>
<tr>
<td>8.0 to 8.9</td>
<td>10</td>
</tr>
<tr>
<td>9.0 to 9.9</td>
<td>10</td>
</tr>
<tr>
<td>10.0-11.0</td>
<td>1</td>
</tr>
<tr>
<td>11.1+</td>
<td>5</td>
</tr>
<tr>
<td>Missing</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>879</td>
</tr>
</tbody>
</table>

Recorded variation in glucose samples may result from natural day to day variation in patients, imprecision in the analysis of the blood, or variation in the way a procedure is carried out. Data entry errors may also explain variation from the normal range. Although the training slides describe variation in cholesterol testing, no documentation was located that advised pharmacists of variation in other analytes or normal ranges within which most samples should fall. The training slide included advice to retest if in doubt, although no advice on appropriate management of low results was found.

**Costs**

The cost of providing 901 CVD2 assessments, based on the cost of the test strips, pipettes and the fee to the pharmacist, was £32,073. This would have reduced to £31,290 if ineligible patients had been excluded. If random glucose testing had been provided only to those patients not meeting any other criteria for progressing to the CVD3 test, the cost would have reduced by £500 inclusive of VAT.

The costs do not include set-up costs, the cost of training pharmacists, administration by NHS Islington or evaluation. Pharmacists were paid a one-off fee of £500 for entering all data from CVD2, 3 and 5 onto spreadsheets and a proportion of this cost is not included above.

**Discussion**

The CVD2 initial assessment was a filter for the more comprehensive CVD3 further assessment (see section below) after patients had met the basic criteria from the CVD1 initial health assessment.

The CVD2 assessment comprised of questions and measurements, and a finger-prick blood sample to analyse random blood glucose. However only three percent of patients were eligible for a CVD3 assessment solely on the basis of the random blood glucose test, meaning 837 random glucose tests could have been avoided in patients who would have been eligible on other criteria. It is not clear whether the inclusion of a blood test contributed to the large proportion of patients that were eligible for the CVD2 assessment but did not take it up.

The transfer of patients’ results between pharmacists and practices was not sufficiently robust, with a sample of 12 practices having only received data on 33 out of 61 patients requiring further investigation by their GP.
Patients needed to be registered with a GP, although of the small sample of 61 patients on which GPs provided information, five (8%) were not registered at the practice at which they stated they were. Possible reasons for this include patients forgetting which GP they are registered with, particularly if they have changed GP recently, stating a different GP because they are not sure or do not want their results to reach their own GP, or stating that they are registered when not because they want to know their numbers.

Uptake for exercise on referral was very low, which is likely to have been compounded by the complexity of referral to the service and long waiting lists. Ease of access and the capacity of services will need to be considered as the Department of Health’s Health Check (vascular checks for over-40s) is rolled out.

All the pharmacies taking part in the pilot provide smoking cessation services and are therefore in a very good position to encourage patients to stop smoking. Pharmacists described the usefulness of describing an individual’s increased cardiovascular risk associated with smoking using the graph displayed on the risk calculator, although this does not appear to have had a great impact as a motivator as the number of current smokers accessing smoking cessation services was low. The purpose of the CVD2 assessment was to determine eligibility for the CVD3 assessment based on risk factors. The CVD3 assessment involved calculating a risk score, which is not possible for over-75 year olds. Therefore, the protocol should have clarified at CVD1 stage that over-75s were not eligible and should be referred to their GP.

Appropriate advice for underweight patients (with a BMI of 18.5 or less) should be documented and included in pharmacists’ training.

Documentation should include standard procedures for measuring height, weight, waist circumference or blood pressure, included repeated measures where appropriate.

Random glucose should only be tested if a patient has no other risk factor that would qualify them for eligibility to the CVD3 stage in order to avoid unnecessary testing. This would be a more efficient use of resources and may encourage patients who are put off by blood tests to progress to the CVD2 stage.

Reference or normal ranges should be provided, with advice on re-resting and referral of patients whose results are not within normal ranges included in the protocol.
CVD3: Further Assessment

Summary

- Although activity peaked in the first 7 weeks (43% of assessments), the decline in activity was less marked than previous assessment stages.
- 66% of participants (396 / 601) were women and 34% men (205 / 601) – consistent with previous assessment stages.
- The quality assurance for the near patient testing devices used in the pilot was not robust.
- 33 patients had a random and fasting glucose test on the same day, suggesting the random glucose tests were unnecessary.
- 26 / 601 (4.3%) below the normal fasting glucose range of 3.9-5.6mmol/l, with a lack of clarity on management of low results.
- 115 / 601 (19.1%) of fasting glucose readings above 5.6mmol/l.
- Two high results were corroborated by subsequent laboratory test, and two results markedly lower.
- 387 / 601 (64.4%) low CVD risk, 156 / 601 (26.0%) medium risk and 58 / 601 (9.7%) high risk – but inconsistency in the risk equation used.
- Men were significantly more likely to be scored as medium or high risk.
- Data quality was problematic.

Introduction

Patients were eligible for a CVD3 further assessment if they met any of the following criteria:

- BMI ≥ 27
- Waist circumference ≥ 80cm if Female or ≥ 94cm if M,
- Current or recent smoker (< 5 years)
- South Asian ethnic origin
- Family history of CVD or diabetes in a first degree male relative under 55 years old or a first degree female relative under 65 years old
- Random blood glucose above 5.6 mmol/L
- Systolic blood pressure of ≥ 140mmHg or Diastolic blood pressure ≥ 90mmHg

Methodology

Data from CVD3 assessments were entered by the pharmacists onto a paper record which the patient signed after consenting to blood tests being taken and to personal information being shared. Pharmacists also entered this data onto a spreadsheet that also recorded results from the subsequent CVD3 and CVD5 assessments.

Pharmacists were required to submit their spreadsheets securely using NHS net to NHS Islington, where the data were cleaned and analysed. Where queries about the data arose, pharmacists were contacted in order to resolve the query.

The data were analysed for each component of the assessment and confidence intervals for proportions applied in order to measure the significance of any differences between groups at the 95% level.
Results

Activity

Figure 18: CVD3 activity by pharmacy

Table 16: CVD3 activity by pharmacy

<table>
<thead>
<tr>
<th>Pharmacy</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Jan</th>
<th>Feb</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkle</td>
<td>62</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>79</td>
</tr>
<tr>
<td>Boots</td>
<td>30</td>
<td>21</td>
<td>8</td>
<td>8</td>
<td>3</td>
<td>3</td>
<td>73</td>
</tr>
<tr>
<td>Carters</td>
<td>29</td>
<td>31</td>
<td>19</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>93</td>
</tr>
<tr>
<td>Chemitex</td>
<td>16</td>
<td>10</td>
<td>8</td>
<td>6</td>
<td>3</td>
<td>5</td>
<td>48</td>
</tr>
<tr>
<td>Clockwork</td>
<td>21</td>
<td>9</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>40</td>
</tr>
<tr>
<td>Devs</td>
<td>46</td>
<td>6</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>56</td>
</tr>
<tr>
<td>Essex</td>
<td>23</td>
<td>14</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>38</td>
<td>104</td>
</tr>
<tr>
<td>Greenlight</td>
<td>9</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>21</td>
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<tr>
<td>JC Wise</td>
<td>24</td>
<td>21</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td>Mahesh</td>
<td>8</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>22</td>
</tr>
<tr>
<td>Turnbulls</td>
<td>0</td>
<td>12</td>
<td>7</td>
<td>6</td>
<td>8</td>
<td>4</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>268</td>
<td>141</td>
<td>73</td>
<td>39</td>
<td>39</td>
<td>66</td>
<td>626</td>
</tr>
</tbody>
</table>

Between 11th August 2008 and 28th February 2009, 626 patients consented to and received a CVD3 assessment. Of these, eighteen people were excluded from analysis because they were under 40 years old (four) or over 75 years old (fourteen). A further six patients were ineligible because they did not meet any of the criteria above and were excluded from analysis. One patient did not receive a risk score because blood pressure had not been measured at the CVD2 stage. Therefore, of the 626 patients who received a CVD3 assessment, 601 are included in the analysis.

Figure 19 shows that activity did not peak as dramatically at the start as the CVD2 assessments, but was much lower during the second half of the six-month pilot.

Figure 19: Frequency histogram of CVD3 assessments (n=601) compared to CVD2 assessments (n=879) 11th August 2008 to 28th February 2009.

205 of the 6001 patients were men (34%) and 396 (66%) women. This was similar to the distribution of men and women seen in the CVD2 assessments. The mean age of both groups was similar (52.3 years for men and 51.3 years for women, range 40 to 74). The proportions of men and women in each five year age band were broadly similar (Figure 20 and Table 17).
Figure 20: Distribution of age and gender of CVD3 participants (n=601)

The age and gender distribution is shown in Figure 20, which shows that there was no significant difference in the proportion of men in each age group compared to women and that there was a gradual decline in participation according to age. This may be due to the large proportion of CVD3 participants that met at least one of the criteria in CVD2 and the proximity of the two assessments, which makes access relatively easy.

The mean time between CVD2 and CVD3 assessments was 10 days (range 0 days to 174 days, mode 1 day, Figure 21 and Table 18)

Figure 21: Time between CVD2 and CVD3 assessments (n=601)

The longer period between some patients’ assessments may be due to pharmacists’ persistence in chasing up patients towards the end of the 6 month pilot. 34 patients (5.7%) had a CVD3 on the same day as the CVD2 assessment. The CVD3 assessment requires fasting total cholesterol, fasting HDL and fasting glucose, which would be possible if the patient had effectively been fasting at the time of the CVD2 assessment. This is discussed further below.

Fasting blood glucose

Patients had a 40µl finger-prick fasting blood sample taken during the CVD3 assessment, which was analysed using a Cardiochek® near patient testing device for glucose, total cholesterol and HDL cholesterol.

Table 17: distribution of age and gender of CVD3 participants

<table>
<thead>
<tr>
<th>Age</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-44</td>
<td>44</td>
<td>101</td>
<td>145</td>
</tr>
<tr>
<td>45-49</td>
<td>52</td>
<td>96</td>
<td>148</td>
</tr>
<tr>
<td>50-54</td>
<td>32</td>
<td>67</td>
<td>99</td>
</tr>
<tr>
<td>55-59</td>
<td>26</td>
<td>56</td>
<td>82</td>
</tr>
<tr>
<td>60-64</td>
<td>24</td>
<td>44</td>
<td>68</td>
</tr>
<tr>
<td>65-69</td>
<td>22</td>
<td>24</td>
<td>46</td>
</tr>
<tr>
<td>70-74</td>
<td>5</td>
<td>8</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>205</td>
<td>396</td>
<td>601</td>
</tr>
</tbody>
</table>

Table 18: Time between CVD2 and CVD3 assessments

<table>
<thead>
<tr>
<th>Days between tests</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same day</td>
<td>34</td>
</tr>
<tr>
<td>Next day</td>
<td>124</td>
</tr>
<tr>
<td>2 days</td>
<td>67</td>
</tr>
<tr>
<td>3 days</td>
<td>56</td>
</tr>
<tr>
<td>4 days</td>
<td>39</td>
</tr>
<tr>
<td>5 days</td>
<td>35</td>
</tr>
<tr>
<td>6 days</td>
<td>24</td>
</tr>
<tr>
<td>7 days</td>
<td>45</td>
</tr>
<tr>
<td>8 days</td>
<td>20</td>
</tr>
<tr>
<td>9 days</td>
<td>19</td>
</tr>
<tr>
<td>10 days</td>
<td>10</td>
</tr>
<tr>
<td>10 to 14 days</td>
<td>35</td>
</tr>
<tr>
<td>14 to 28 days</td>
<td>48</td>
</tr>
<tr>
<td>28 to 90 days</td>
<td>32</td>
</tr>
<tr>
<td>Over 90 days</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>601</td>
</tr>
</tbody>
</table>
The distribution of fasting glucose tests tended more towards the normal range of 3.9 to 5.6 mmol/l than the random glucose tests taken in the CVD2 assessment (Figure 22).

Figure 22: Fasting glucose frequency, mmol/l (n=601) compared to random glucose frequency (n=870)

Three patients had a very low random glucose reading of less than 3.0mmol/l and a further 23 below normal range, indicating potential hypoglycaemia. Pharmacists were trained to inform patients’ GPs if their fasting glucose reading was above 5.6mmol/l, but were not advised about the management of patients whose reading was below 3.9mmol/l. As a precaution, GPs were contacted by the Primary Care Trust where patients’ fasting glucose readings were below the normal range.

Fasting glucose readings of greater than 5.6mmol/l were recorded for 115 patients, and greater than 7.0mmol/l were recorded for 24 patients. Some of these patients had previously had high glucose recorded by their GP, although three instances of very high fasting glucose were corroborated by pharmacists’ reporting that patients had returned with prescriptions. In one case the patient had been previously diagnosed but had stopped medication. The qualitative evaluation\(^5\) reports more fully on this aspect. One practice reported that a high reading had been corroborated by further tests.

34 patients had a fasting blood glucose measurement on the same day as their random blood glucose. Seven of these patients had their random glucose entry annotated as “fasting”. It is not clear whether one sample for both random and fasting glucose was taken for patients who had both tests on the same day. However, the need for two samples, or even the need for both random and fasting tests to be analysed has to be questioned. Only one of these 34 patients had just the fasting glucose test performed.

The average difference between readings for the 34 patients (fasting blood glucose minus random blood glucose) was a reduction of 0.35mmol/l (range -3.5mmol to +0.4mmol), i.e. the fasting glucose reading was generally lower than the random glucose reading. Twelve patients had no difference between the random and fasting glucose test. This suggests that variation was a result of imprecision in the analysis by the near patient testing device, a difference between the samples due to the way the blood was taken, or a difference in time between when the tests were taken.

Some pharmacists reported that fasting glucose readings were higher than random glucose for the same patient. Figure 23 shows the variation between random and fasting glucose (calculated by subtracting random glucose from the same patient’s fasting glucose reading. Positive figures to the right of the graph represent patients where fasting glucose readings were higher than random glucose).

This was investigated further with advice sought from a clinical biochemist and the manufacturer. The manufacturer tested three lots from the same batches as supplied to NHS Islington, and confirmed that they were performing as expected. The manufacturer described an acceptable
range of ±15% from a reference laboratory, which may account for some variances from the normal range. Advice from a clinical biochemist was that if patients had been undertaking energetic activity before random test then the result could be unusually low. The clinical biochemist also questioned the need for random glucose testing in a pilot with wide-ranging criteria for fasting tests (see CVD2 section).

**Accuracy of the test**

**Figure 23:** Variance between fasting and random glucose readings in the same patients. (N=595)

The manufacturer noted that a large number of fasting glucose readings were recorded to 2 decimal places, whilst the Cardiochek® device only provides to 1 decimal place. On investigation it was found that the fasting glucose and total cholesterol data were transposed in some pharmacists’ spreadsheets, affecting 98 results (11.5%). The order in which the data was entered onto the spreadsheet was different from the order they were recorded on the pharmacists’ paper records. A sample was checked by recalculating the patients’ risk scores which incorporates total cholesterol but not glucose, and where results showed this error pharmacists were asked to check their data against their paper records. One pharmacist’s device had been set to mg/dL and the pharmacist had converted the reading to mmol/l.

During the pilot, two pharmacists noted unusual readings from their machines, and the distributor was asked to investigate. On both occasions the machines were replaced. One batch was withdrawn, affecting one pharmacy, although the subsequent tests showed the batch to be performing as expected.

**Total and HDL Cholesterol**

Fasting total and HDL cholesterol were measured in order to calculate the patients risk score for CVD. Pharmacists were not advised of any action to take if a patient’s total cholesterol was high or if their total to HDL cholesterol ratio was high.

The biochemistry service at the Whittington does not quote a reference range (which would be the mean ±2 standard deviations for a normal population) but stated that a reading of less than 2mmol/l would be unusual.¹¹ Two patients had a reading of less than 2mmol/l.

In the UK around two out of every three adults have a total cholesterol level of 5.0mmol/l or more.¹² In the pharmacy CVD pilot 245 of 601 people (41%) had a total cholesterol level of 5.0mmol/l or more, less than the national average. However, the results are not strictly comparable because the national averages are based on venous samples whilst the pharmacy data are based on near patient testing samples.

The distribution of fasting total cholesterol readings is shown in Figure 24 and Table 19.
The total cholesterol to HDL ratio was not calculated by the pharmacists, although it is used in the calculation of the risk of cardiovascular disease. The ratios were calculated from readings for the evaluation. 58 of 601 patients (9.7%) had a total cholesterol to HDL ratio of 6 or more. Of these, 15 had a calculated CVD risk score of >20%, 30 had a calculated CVD risk of >10% to 20% and 13 a calculated CVD risk of 10% or less.

Figure 25 shows that men were more likely to have a total cholesterol to HDL ratio of 5 to 6mmol/l and above 7.0mmol/l, but less likely

GP interpretation of blood tests
GPs were sent details of patients with a fasting glucose reading of ≥6.1mmol/l and asked if those patients had elevated results recorded previously in the practice within the last 15 months, whether pharmacists’ results would be entered into the clinical record and whether any elevated results had been corroborated by subsequent laboratory tests. Five of the 12 practices that responded said that elevated glucose results were known for some patients, but didn’t specify how many. Six practices had or would enter pharmacists’ results in the clinical record. One elevated result had been corroborated by a laboratory test, two patients had lower levels of fasting glucose following a laboratory test and one practice had arranged for laboratory tests for one patient.
Cardiovascular risk scores
Pharmacists calculated patients’ risk of a cardiovascular event in the next 10 years using the University of Edinburgh online calculator. 13 This online calculator has a number of options for different risk scoring algorithms, including CVD (BNF); CVD (ASSIGN); and CVD (Framingham). Whilst the slides from the training session indicate the use of the Framingham algorithm, no further references to Framingham were found in the documentation.

A random sample of 5 patients from each pharmacy was selected and the risk score recalculated, and it was found that a number of the scores correlated with the Framingham score and others correlated with the BNF score. Other discrepancies include over-75 year olds being scored as a 75 year old (these were not removed from the analysis), one patient receiving a risk score for stroke rather than cardiovascular disease, one patient’s score being for a female instead of a male, and a number of scores that could not be corroborated with any of the algorithms used on the University of Edinburgh site. In total, 28 of the 50 scores checked (56%) did not correlate with the Framingham CVD score based on data provided by pharmacist. Compared with recalculated scores, pharmacists’ scores were 6.1 percentage points (range of variation 0.9 to 29.1 percentage points) below the Framingham CVD risk scores.

Figure 26 provides a broad picture of cardiovascular risk in three broad bands: under-10% risk, 10% to under-20% risk and 20% or greater risk. However, these data are unreliable due to the

Figure 26: Patients’ CVD Risk Scores (n=601)

Table 21: Patients’ CVD Risk Scores

<table>
<thead>
<tr>
<th>CVD Risk score</th>
<th>Men</th>
<th>Women</th>
<th>All</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10%</td>
<td>76</td>
<td>311</td>
<td>387</td>
</tr>
<tr>
<td>10% to &lt;20%</td>
<td>81</td>
<td>75</td>
<td>156</td>
</tr>
<tr>
<td>≥20%</td>
<td>48</td>
<td>10</td>
<td>58</td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>396</td>
<td>601</td>
</tr>
</tbody>
</table>

Costs
The cost of providing 623 CVD3 assessments was £15,207, which includes the fee payable to the pharmacist and the cost of the pipettes and test strips for glucose, total cholesterol and HDL cholesterol. This would have reduced by £537 to £14,670 if only those patients that were eligible had received the assessment.

The costs above do not include set up costs, training, administration by NHS Islington or evaluation, or the pharmacists’ fees for data entry.

Discussion
Four percent of patients (25 of 623) received a CVD3 evaluation despite being ineligible.

Thirty-four patients had a random blood test on the same day as the CVD2 assessment. Whilst patients may have presented for their CVD2 assessment without having eaten or drank, it is not clear that this is always the case. Seven patients who had a random glucose test and a fasting glucose test on the same day had their random glucose entry annotated as “fasting”. One additional patient had their CVD2 and CVD3 assessments on the same day where the pharmacist had not taken a random test.
No information in the documentation on advice to patients on fasting was found, and so the potential for patients to have eaten or drank before a fasting test is present. It is not known whether pharmacists questioned patients with high blood glucose measurements on when they last ate, and repeating the test if necessary.

A small number of patients had very low fasting glucose measurements recorded, and around five per cent had a reading below the normal range of 3.9 to 5.6 mmol/l. The course to follow for patients with low fasting glucose readings was not explained to pharmacists during training.

Data entry to the spreadsheets was problematic. The order in which fasting glucose and total cholesterol was recorded on the pharmacists’ paper records was different to the order on the spreadsheets, and this took the most time in checking and cleaning.

The quality assurance for the near patient testing devices used in the pilot was not robust enough. Whilst pharmacists reported that internal quality assurance was undertaken weekly, expert advice stated that this should be done daily with periodic external quality assurance. On two occasions pharmacists reported abnormal readings from their devices, and on both occasions the distributor investigated and replaced the devices.

The test strips used appear to have performed to the manufacturer’s expectations, with one batch having been investigated thoroughly by the manufacturer. However, the acceptable range of results compared to laboratory standards as provided by the manufacturer allowed a wide margin of error (total cholesterol ±10%; HDL ±12% and glucose ±15% from the reference laboratory).14

Patients who had high total cholesterol were offered dietary advice, but no instructions to refer patients with very high cholesterol were found in the documentation. Pharmacists did not calculate the total cholesterol to HDL ratio for patients.

The sensitivity and specificity and true and false positives and negatives with near patient testing was impossible to establish because of lack of access to full results. Whilst there were a small number of cases confirmed by GPs, some practices reported that pharmacy results were often higher than results recorded in general practice.

Different patients’ risk of cardiovascular disease was calculated using different risk algorithms, with the two most common being CVD (Framingham) and CVD (BNF), and one patient scored for risk of stroke. However, the standard letters to GPs informing them of patients’ results noted clearly that the scores were based on the Framingham CVD equation. The underlying factors were no clear instructions and a web-based calculator that allowed various options. Some patients risk scores were incorrectly calculated, for example one male was scored as a female, and smoker scored as a non-smoker. Seven patients had their age reduced to 75 in order to calculate a risk score.

The protocol for inclusion set a lower age limit of 40 years, although no upper limit was set. However, the Framingham algorithm has an upper-age limit of 75 years for reliable risk estimates therefore the pilot should have an upper age limit of 75.

Although it is recognised that patients may pressure the pharmacist to undertake an assessment so that they are aware of their “numbers”, adherence to eligibility needs to be improved particularly where no reliable risk score can be calculated because of age.

Total cholesterol and HDL cholesterol levels were measured in the assessment and used in the calculation of risk, although there no documentation was found on communicating the meaning of high or low cholesterol or HDL, or advice on improving levels.

Data transfer was complicated, with pharmacists entering data onto a paper form and then onto a spreadsheet. Additionally, the order in which test results were entered onto the spreadsheet were different with smoking status and family history transposed and fasting blood glucose listed after...
total and HDL cholesterol on the paper form and before on the spreadsheet. This led to errors in data which were time consuming to identify and rectify. Direct electronic recording of patient results would eliminate these types of error.

Descriptions of normal ranges of glucose, cholesterol and HDL were not found in the documentation, and there was a lack of documentation or training on what advice or instructions to give, particularly for levels below the normal range.

During the pilot and the evaluation the quality assurance aspects of near-patient testing devices were raised. No documentation regarding the recommended regularity of either internal or external quality assurance was located. Quality assurance instructions should be a mandatory requirement recorded in the service level agreement.
CVD5: Follow-up Assessment

Summary

- 53/156 eligible patients (34%) received a follow-up assessment.
- One patient excluded from analysis due to a diagnosis of diabetes, and one patient excluded from analysis because the pharmacist could not obtain a blood sample.
- 24/51 patients were male (47%) and 27/51 female (53%)
- 19 patients scored with BNF equation rather than Framingham CVD, two smokers’ scores as non-smokers and two risk scores not consistent with Framingham CVD but reason unknown.
- 9 patients (17.6%) had a risk score of <10%, 34 (66.7%) had a risk score of 10% to <20% and 8 (15.7%) had a risk score of ≥20%
- 12 patients’ risk scores increased and 39 patients’ risk scores decreased
- The average change in risk score was –3.1 percentage points (range –13.2 to +17.9 percentage points)
- The average time between CVD3 and CVD5 assessments was 20 weeks and 3 days (range 11 weeks and 2 days to 39 weeks 0 days)

Introduction

Patients who had a risk score of 10 to 20% following their CVD3 assessment were given lifestyle advice and asked to return for a CVD5 follow-up assessment after 12 weeks. During the assessment, patients had their blood pressure taken and a finger-prick fasting blood sample taken which was analysed for glucose, total cholesterol and HDL cholesterol on a Cardiochek® near patient testing device. The pharmacist calculated the patients’ risk score using the University of Edinburgh cardiovascular risk calculator.  

Methodology

As with the CVD2 and CVD3 data, data for CVD5 were entered onto a paper record and transcribed to a spreadsheet by the pharmacist. Pharmacists submitted their data securely beach month to NHS Islington.

Of the 156 patients with a CVD risk score of between 10% and under-20% (i.e. those who were eligible for a CVD5 follow-up assessment), 103 had not attended at the end of May 2009. The cardiovascular risk scores from both the CVD3 and CVD5 assessments were recalculated for all 51 eligible patients that had progressed to a CVD5 assessment in order to compare risk scores for both assessments using the same Framingham CVD algorithm. One patient was identified as having being diagnosed with diabetes by a GP following the CVD3 assessment, and was excluded from analysis. The pharmacist was unable to obtain a blood sample from one patient and this patient was excluded from analysis.
Results

Activity

Figure 27: CVD5 activity by pharmacy (n=51)

Table 22: CVD5 activity by pharmacy

Table 23 shows that 27 women and 24 men had a CVD5 assessment. Figure 28 shows the proportion of men and the proportion of women in each 5-year age group. As the number of patients who had a CVD5 follow-up assessment is small, results are analysed together.

The mean age of patients who had a CVD5 assessment was 58.7 years (range 40 to 74 years). This was approximately 6 years older than the average ages for CVD2 and CVD3.

Table 23: Age and gender of CVD5 participants
Figure 29 shows the time between CVD3 and CVD5 assessments. The mean time between assessments was 20 weeks and 3 days, with a range of 11 weeks and 2 days to 39 weeks and 0 days. The reason for a large proportion of CVD 5 assessments taking place 16 weeks or more after the CVD3 assessment may reflect more active follow-up of eligible patients as the first stage of the pilot ends.

**Blood pressure**

The average systolic blood pressure reading for patients that had a CVD5 follow-up assessment was 131mmHg at the CVD3 stage (range 99 to 155mmHg) which fell slightly to 128mmHg (range 92 to 168mmHg) at the CVD5 stage. 35 patients saw a fall in their systolic blood pressure and 16 saw a rise. The average change in systolic blood pressure was −2.6 mmHg (range −35mmHg to +41mmHg).

For diastolic blood pressure, the average at CVD3 stage was 82mmHg (range 59 to 100mmHg) which fell slightly to 81mmHg (range 57 to 99mmHg). 28 patients had a fall in diastolic blood pressure recorded, 17 had an increase and 6 had no change. The average change was -1.9mmHg (range -20 to +28mmHg).

Figure 30 shows the proportion of patients whose blood pressure rose or fell at the CVD assessment as a percentage of blood pressure (mmHg) at the CVD3 assessment in 5% bandings. The chart shows that the number of patients whose blood pressure fell was similar to those whose blood pressure rose. The number of patients is too small to calculate reliable significance intervals. Table 24 shows the number of patients in each banding.

At the CVD5 stage, five patients had a systolic blood pressure reading of 140mmHg or more, three had a diastolic blood pressure reading of 90mmHg or more and three had both systolic blood pressure of 140mmHg or more and diastolic blood pressure of 90mmHg or more.
Fasting Blood Glucose

Patients’ fasting blood glucose measurements at the CVD5 stage were compared with those taken at the CVD3 stage.

At the CVD3 stage the average fasting blood glucose reading was 4.8mmol/l (range 2.8 to 7.7mmol/l), falling marginally to 4.7mmol/l (range 3.0 to 6.4mmol/l) at the CVD5 stage. The average change in fasting blood glucose was -0.1mmol/l (range –2.1 to +1.6mmol/l). Fasting blood glucose readings fell for 23 patients, rose for 20 patients and remained constant for 8 patients. The number of patients is too small to calculate whether the small overall fall in blood glucose is statistically significant.

At the CVD5 stage seven patients had a low fasting blood glucose reading of less than 3.9mmol/l and two had a high reading of over 6.0mmol/l.

Total cholesterol and HDL cholesterol

Patients’ average total cholesterol at the CVD3 stage was 4.79mmol/l (range 2.59 to 7.48mmol/l) which fell marginally to 4.60mmol/l (range 2.59 to 7.41mmol/l) at the CVD5 stage. The average change in individuals’ readings was –0.18mmol/l (range –1.73 to +3.09mmol/l). At the CVD3 stage 23 patients had a total cholesterol level of greater than 5.0mmol/l, falling to 16 at the CVD5 stage.16

Patients’ average HDL cholesterol at the CVD3 stage was 1.05mmol/l (range 0.50 to 2.15mmol/l), which rose fractionally to 1.10mmol/l (range 0.43 to 2.53mmol/l) at the CVD5 stage. The average change in individuals’ readings was +0.06mmol/l (range -0.43 to +1.13mmol/l). At the CVD3 stage 15 patients had an HDL cholesterol level of 1.2mmol/l or greater, which rose to 20 at the CVD5 stage.17

At the CVD3 stage the average total cholesterol to HDL ratio was 4.85 (range 2.67 to 8.56). 21 patients had a ratio of greater than 4.5 or less18. At the CVD5 stage the average ratio had reduced to 4.41 (range 2.42 to 7.93), with 29 patients having a ratio of 4.5 or less. On an individual basis, 32 patients’ decreased their total cholesterol to HDL ratio, 18 increased their ratio and one saw no change.

Figure 31: Percentage changes in total and HDL cholesterol from level at CVD3 stage. (n=51)

Table 25 Percentage change in total cholesterol and HDL from level at CVD stage, number of patients

<table>
<thead>
<tr>
<th>Change</th>
<th>Total Cholesterol</th>
<th>HDL</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;-20%</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>-20% to &lt;-15%</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>-15% to &lt;-10%</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>-10% to &lt;-5%</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>-5% to &lt;0%</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>0%</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>&gt;0% to 5%</td>
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<td>5</td>
</tr>
<tr>
<td>&gt;5% to 10%</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>&gt;10% to 15%</td>
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<tr>
<td>&gt;15% to 20%</td>
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</tr>
<tr>
<td>&gt;20%</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>51</td>
</tr>
</tbody>
</table>

It should be noted that a reduction in total cholesterol is desirable although for HDL cholesterol an increase is desirable.
Cardiovascular risk scores
As at the CVD3 stage, pharmacists calculated patients’ risk of a cardiovascular event in the next 10 years using the University of Edinburgh online calculator. 19

For patients who had a CVD5 assessment, both their CVD3 and CVD5 scores were recalculated from the data supplied by pharmacists using the same online calculator. A number of discrepancies were found. 19 patients had their risk calculated using the CVD(BNF) algorithm at both assessments, and one had their risk calculated using BNF at one assessment and Framingham the other. two patients had their risk calculated using BNF at one assessment, but the risk score for the second assessment could not be matched. Two patients who were recorded as current smokers had their scores calculated as non-smokers.

The original CVD risk scores and recalculated Framingham CVD risk scores are shown in Figure 32 and Figure 33. These charts show that in general the risk scores recalculated using the data provided by pharmacists is higher than those calculated by pharmacists and provided to patients and general practitioners.

The average increase in CVD risk scores at the CVD3 assessment after recalculation was 1.6 percentage points (i.e. a 10% risk would increase on average to a 11.6% risk). The range was 0 percentage points to +11.9 percentage points. Estimated risk increased for 26 patients following recalculation and remained the same for 25 patients. Four patients’ risk banding increased from medium (10% to <20% risk) to high (≥20% risk) after recalculation.

At the CVD5 assessment the average increase in CVD risk scores after recalculation was 1 percentage points (range –5 to +7.9 percentage points). Estimated risk increased for 22 patients, remained the same for 28 patients and decreased for one patient. Seven patients’ estimated risk increased from low (<10%) to medium (10% to <20%) and one from medium to high risk.

The recalculated CVD risk scores were used in the analysis for comparing changes in patients’ estimated risk of a CVD event in the next 10 years. This ensures a consistent approach to calculating risk for all patients and allows comparison on a like for like basis.

Figure 34 and Table 26 show that, compared on a like for like basis, there was a small change towards lower estimated risk scores at the CVD5 assessment compared with estimated risk the CVD3 assessment.
Overall, 39 patients had a reduction in risk and nine had an increase in risk. The average change was –2.2 percentage points (range –13.2 to +17.9). Two large changes in risk at either end of the range do not appear to have a large impact on the overall change, and may balance each other’s effect on the overall change. If these large changes are excluded from analysis, the average change would be –2.38 percentage points (range –8.6 to +4.9 percentage points).

**Discussion**

The overall change in patients’ CVD risk factors between the CVD3 and CVD5 assessments is mixed, although it should be noted that at 51 patients, numbers are small and the average duration between the assessments was relatively short (20 weeks and 3 days). There may also be a delay between assessment and patients’ adopting lifestyle changes. As numbers are small and changes are marginal, no statistical significance can be attributed to them.

An area of concern at both the CVD3 and CVD5 stage is the variation in how CVD risk scores were calculated, with different algorithms used for different patients and in two cases a different algorithm for each of the two assessments. Other areas of concern are two patients listed as current smokers scored as non-smokers. In the majority of cases where the risk score was not calculated using the Framingham CVD algorithm, the patient and the patients’ GP were given a risk score that was lower than it should have been. Although there is variation between CVD risk algorithms, and the risk score is an estimate, the letters to GPs clearly stated that the Framingham CVD score had been used.

Patients’ risk of cardiovascular disease needs to be measured consistently with an accurate result calculated with a standard algorithm with advice and management based on that result. This may require the purchase of bespoke software or the use of a different online calculator which provides only one agreed and validated algorithm.
Conclusion

Overview of activity

Initial high demand, followed by lower activity is likely to be due to pharmacies having a relatively fixed customer base, particularly among health conscious customers who may be more likely to participate. Low levels of marketing of the scheme may have also contributed to declining recruitment as the pilot progressed.

Data from the CVD1 health assessment questionnaire shows a high level of interest in the pilot with an opportunity to provide tailored first-line advice at this stage of the assessment, although its impact cannot be measured.

A high proportion of patients had seen their GP in the preceding month or proceeding six months. Although this suggests that the pilot was not reaching its intended target of people who engaged least with their GP, the data cannot reveal whether or not cardiovascular risk as discussed or assessed at their visit to the GP.

The CVD2 initial assessment was effectively an assessment to identify patients with sufficient risk factors to proceed to the CVD3 further assessment. The inclusion of the random glucose test at the CVD2 stage was unnecessary for the vast majority of patients and the blood test involved may be the reason that a high proportion of eligible patients did not take up the CVD2 assessment.

The CVD3 assessment identified a relatively large proportion of men with a medium CVD risk score of 10% to under-20%, and a large proportion of men with a high risk score of 20% or greater, although a large proportion of the risk scores calculated were erroneous.

The low proportion of CVD5 follow-up assessments compared to eligibility underlines the difficulty in recalling patients, and low numbers at this stage make meaningful analysis of changes in patients’ risk factors not possible. However, there was a broad range of improvement and deterioration in patients’ risk factors when CVD3 and CVD5 data were compared.

Protocol design

There was no guidance for pharmacists on excluding over-75s, for whom a valid risk score cannot be calculated, nor guidance on excluding patients from the CVD5 assessment who had been diagnosed with a relevant condition subsequent to their CVD3 which would affect the reliability of their risk score.

There was also no written guidance on how many times a blood pressure should be repeated, or the standard procedures for measuring height, weight and waist circumference (e.g. with normal indoor clothing), variances in which would affect results. For blood tests, guidance on results that were below a normal range and management of such patients was not given, nor guidance on what instructions the pharmacist should give to the patient in order to obtain a fasting blood sample.

Written guidance on quality assurance measures was not provided. Without evidence of daily internal quality checks the reliability of results is unknown, and this is compounded by an absence of external quality assurance testing.

Validity and reliability

The data from the pilot revealed a number of sources of measurement errors which resulted in a reduction in the validity and reliability of the results.

The headline measure – the cardiovascular risk score – was found to be erroneous in a number of aspects, including the use of different algorithms to calculate scores and erroneous data enter. The use of different algorithms is likely to be due to a lack of clarity on which score to use and the choice of an online calculator that offered a range of different algorithms.
Data from the manufacturer showed that blood tests analysed by the near patient testing device had an expected range of ±15% from the reference laboratory for glucose, ±10% for total cholesterol and ±12% for HDL cholesterol. It was not possible to compare the results from near-patient testing with laboratory results, although during the evaluation it became clear that more rigorous quality assurance is essential, with daily internal testing and periodic external testing. However, it is likely that general practitioners will continue to be adverse to entering third party data into clinical records and [duplication or real case finding?]

**Sensitivity and specificity**

The measure of sensitivity and specificity, i.e. the number of positive results that were truly positive and the number of negative results that were truly negative cannot be calculated because there was no access to results which may have corroborated the near-patient tests. Similarly, it is not possible to calculate the number of false positives results or false negatives.

**Data entry and submission**

Data entry was and submission was challenging throughout the pilot. There were a number of instances where dates were entered erroneously or in a text rather than date format, percentages being displayed in different formats, and text being appended to numerical data which made analysis difficult. Late submission of data by some pharmacies was also an issue.

Data analysis found that some data was entered into the wrong column on the spreadsheet, particularly fasting glucose and cholesterol. While care was taken to identify all instances of this occurring, it is possible that the final data analysed continues to be erroneous for a small number of patients. The underlying factor in this error was that the order in which results were input to the spreadsheet was different to that on the paper records.

A sample of cardiovascular risk scores checked by recalculating using the original data showed that on in a small number of cases current smokers were scored as non-smokers, men were scored as women and in one case the patient scored for risk of a stroke only.

Some practices reported that they had not received the results of the pharmacist’s assessment for some patients, although it is possible that the letter did reach the practice but had not been acted upon. However, this highlights the importance of providing the patient with a written copy of their results.

**Limitations due to subject characteristics**

The subjective nature of the questions and peoples’ propensity to over-report socially desirable behaviours and under-report socially undesirable papers places limitations on the interpretation of the data.

The phrasing of some of the questions in the CVD1 health assessment questionnaire was subjective and meant that the data could not be compared to national surveys. There was no documented guidance on explaining to a patient what a portion of fruit or vegetables was, and the inclusion criteria was limited to fresh fruit and vegetables, with canned, frozen and dried excluded despite counting towards “5 a day”, which may have led to patients underestimating their intake. Similarly for physical activity, guidance on what “moderate” exercise involves was limited. More information on what a unit of alcohol would have improved the reliability of this aspect. Omitting guidance on when an “ex-smoker” becomes a non-smoker in terms of cardiovascular risk is likely to have had an impact on some ex-smokers’ cardiovascular risk score.

There will inevitably be short-term variability in biological characteristics, for example a patients’ random glucose level will naturally fluctuate to a small extent, and there is also a potential measurement error due to small variations in the way a pharmacist carries out the procedure (intra-observer variation) and small variations between the way that different pharmacists carry out the same procedure (inter-observer variation). These variations are additional to the variation in the analysis described above and compounded by deficiency in quality assurance measures.
Near patient testing

It is clear that there were a number of limitations imposed by near-patient testing, some of which are specific to the device used and some to near patient testing in general.

The wide expected range of blood test results compared to laboratory analysis was compounded by a lack of rigorous quality assurance system, although it is acknowledged that the distributor responded quickly on the few occasions when problems were reported. More rigorous training of pharmacists on the interpretation of results and when to repeat results may have mitigated some of the inconsistencies found.

General practitioners were averse to entering third party data onto their clinical records, and would therefore repeat tests for patients with suspected elevated blood readings. This inevitably suggests duplication of work and potentially increased stress and anxiety for the patients. However, in the context of case finding this needs to be balanced against the potential for patients to remain undetected and undiagnosed, and against the potential for false negatives which would incorrectly advise the patient that their results were normal rather than elevated.

Training and support

The evaluation suggests that training and support, including written materials, was inadequate and the quality of training provided to pharmacists was not assured. It is reasonable to assume that inconsistency in the use of risk scoring algorithms and uncertainty over the potential implications of very low blood test readings would have been mitigated had training and support been more robust.
Recommendations

Whilst there are a number of issues raised in this quantitative evaluation, a more robust approach to delivering cardiovascular assessments in community settings, including pharmacies, is essential to inform future practice.

1. That the infrastructure to provide cardiovascular assessment is developed, centred on primary care.
2. That the purpose of community based cardiovascular risk assessment is clarified and communicated clearly.
3. The protocol is redesigned to include more robust guidance on exclusions, standard procedures, repeat measurements and quality assurance.
4. The initial health assessment questionnaire is reviewed to reduce subjectivity and align with national surveys.
5. The random glucose test is omitted for patients that are eligible for further assessment on the basis of other criteria.
6. The choice of near-patient testing device is reviewed, focusing on accuracy and the ability to download data electronically.
7. Robust quality assurance is implemented, including regular internal and external testing of near patient testing devices and mechanisms to evaluate false positives and false negatives.
8. Quality assured training and support is implemented for pharmacists.
9. Measures to reduce data entry errors are implemented.
10. Secure methods of communicating patient results between pharmacists and general practice are implemented.
Appendix 1: The Patient Pathway

Patient walks into pharmacy and fills out the Health Assessment Form

Patient is over 40 AND is registered with an Islington GP

Explain the pilot to the patient and if they would like to take part; invite back for Cardiovascular Risk assessment

Fill out assessment form CVD2 with patient, and obtain consent to take blood and share information

Measure patient’s Weight, Height, Waist circumference, Calculate BMI, Blood Pressure and take random Blood Glucose

NO need for Further Assessment

Eligible patients to proceed to “Further assessment” if
- BMI ≥ 27
- Waist circumference ≥ 80cm if F, ≥ 94cm if M, ≥ 90cm if S. Asian male
- Current or recent smoker (< 5 years)
- South Asian ethnic origin
- Family history of early onset (premature) CVD or diabetes (m < 55yrs), f < 65yrs)
- Random blood glucose above 5.6 mmol/L
- BP ≥ 140/ ≥ 90 mmHg

NEED for Further Assessment

Ask Patient to return after 2-3 days for fasting glucose and cholesterol and calculate CVD risk

If CVD risk LOW < 9%

Offer basic 1st line advice on healthy eating, physical activity, sign-post to stop smoking service or other services as appropriate

If CVD risk MEDIUM 10-19%

Offer 1st line advice on healthy eating, ways to lose weight, sign-post to stop smoking services, advise GP AND ask patient to come back in 12 weeks for reassessment

If CVD risk HIGH > 20%

Fill out GP referral letter and ask patient to make an appointment with their GP

If Fasting Blood glucose > 5.6 mmol/l offer dietary advice and refer to GP
Appendix 2: Patient Flowchart

CVD 1 Health Assessment Questionnaire
1497 patients

Lost to follow-up = 436
Ineligible for CVD2
<40 years old = 103
Not registered with an Islington GP = 79

CVD 2 Initial Assessment
901

Excluded from analysis
<40 years old = 7*
>75 years old = 15

CVD2 Analysed
879

Lost to follow-up = 225
Excluded from analysis
Did not meet CVD3 criteria = 56

CVD 3 Further Assessment
626

Excluded from analysis
<40 years old = 4*
>75 years old = 14*
Did not meet CVD3 criteria = 6*
Not scored = 1

CVD 3 Analysed
601

Risk <10% 387
Risk 10 to <20% 156
Risk ≥20% 58

Eligible for CVD 5 Further assessment
156

Lost to follow-up = 103
Excluded from analysis
Diagnosis of diabetes = 1
Unable to obtain blood = 1

CVD 5 Analysed
51

Risk <10% 9
Risk 10 to <20% 34
Risk ≥20% 8

* These patients were ineligible but continued to receive assessments
## Appendix 3: Summary of expenditure

The summary below shows expenditure on the pharmacy CVD pilot excluding costs relating to NHS Islington employees’ time for administration and quantitative evaluation.

<table>
<thead>
<tr>
<th>Summary of expenditure</th>
<th>£</th>
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<tbody>
<tr>
<td>Equipment</td>
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<td>Training</td>
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<tr>
<td>Locum fees</td>
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<tr>
<td>Pharmacy support</td>
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<td>Advertising</td>
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<table>
<thead>
<tr>
<th>Assessments</th>
<th>Cost per test</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD1 health questionnaire</td>
<td>7,485</td>
</tr>
<tr>
<td></td>
<td>5.00</td>
</tr>
<tr>
<td>CVD2 initial assessment</td>
<td>32,073</td>
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<td>35.60</td>
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<td>CVD3 further assessment</td>
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<td>CVD5 follow-up assessment</td>
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<tr>
<td></td>
<td>24.41</td>
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</table>

| Evaluation | 7,638 |
| Unused stock | 367 |

Total 83,893

Pharmacists were paid as follows:

- £225 Full locum cover, to attend full day pilot training
- £100 for set up costs, to purchase rubber/latex gloves, sterile wipes and lancets.
- £500 for all data entry and sharing required
- £5 per completed Health Assessment from (CVD1)
- £35 per part-completed (1st visit)
- £20 per completed (2nd visit —“further assessment”) CVD3
- £20 for each client attending the 12-week re-testing assessment (3rd visit),
Appendix 4: NHS Health Checks

Figure 1. Diagrammatic overview of the vascular risk assessment and management programme

References

2 The Information Centre for health and social care. Compendium of Clinical and Health Indicators / Clinical and Health Outcomes Knowledge Base. http://nww.nchod.nhs.uk/NCHOD/compendium.nsf/($All)/64D9E59ED8F16F1C80257564001C3E40/$File/06B_107DR_07_V1.xls?OpenElement
4 The CVD4 component was a payment to pharmacists for data entry onto a spreadsheet.
8 See NWPHO/John Moores University “Local Alcohol Profiles for England http://www.nwph.net/alcohol/lape/
9 Health in Islington: the facts. 2008 update
11 Email communication from Whittington Biochemistry Service, 26th Feb 2009
12 http://www.patient.co.uk/showdoc/23068704/ accessed 7th May 2009
13 http://cvrisk.mvm.ed.ac.uk/calculator/calc.asp
14 Communication from PTS Inc. 20th January 2009
15 http://cvrisk.mvm.ed.ac.uk/calculator/calc.asp
16 Total cholesterol of 5.0mmol/l or less is regarded as desirable. Source: http://www.patient.co.uk/showdoc/23068704/ accessed 1/4/09
17 HDL cholesterol of 1.2 mmol/l or less is regarded as desirable. Source: http://www.patient.co.uk/showdoc/23068704/ accessed 1/4/09
18 A total cholesterol to HDL ratio TC/HDL ratio of 4.5 or less is regarded as desirable. Source: http://www.patient.co.uk/showdoc/23068704/ accessed 1/4/09
19 http://cvrisk.mvm.ed.ac.uk/calculator/calc.asp