Evaluation of the Healthy LifeCheck programme: a vascular risk assessment service for community pharmacies in Leicester city, UK

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ABSTRACT

Background Cardiovascular disease (CVD) is the leading cause of death globally. Vascular risk assessment is recognized as playing a key role in reducing premature CVD-related morbidity and mortality. The current study evaluated the effectiveness of a pharmacy-led risk assessment service in Leicester City, UK.

Methods The vascular risk assessment was offered opportunistically to individuals between 40 and 70 years without any prior diagnosis of CVD on attending their community pharmacist. Individuals were risk stratified using the Framingham score and those classified as high risk were referred to their general practitioner (GP).

Results Overall, 2521 individuals were recruited from 39 pharmacies consisting of 1059 (42%) males, 1696 (67%) South Asians and 199 (7.9%) individuals not registered with a GP. A total of 462 (18%) individuals were referred to primary care and 52.6% of a representative subset were subsequently recorded as having attended an appointment with their GP; diagnoses and treatments commenced were recorded.

Conclusions Cardiovascular risk assessment led by community pharmacies can successfully assess people from large, multi-ethnic UK populations and identify those at high cardiovascular risk or with undiagnosed cardiovascular disease. The service may improve rates of assessments undertaken by individuals who do not access health care through traditional routes.

Keywords health services, population-based and preventative services, public health

Introduction

Cardiovascular disease (CVD) is the leading cause of death globally.1 In 2008 an estimated 17.3 million deaths were attributed to CVD, accounting for 30% of all deaths worldwide. An individual’s risk of CVD comprises both modifiable and non-modifiable risk factors accounting for ~80 and 20% of total risk, respectively.2 Non-modifiable risk factors include age, sex, family history and ethnicity. Modifiable risk factors include smoking status, physical activity, hypertension, hypercholesterolemia and obesity. Early identification of modifiable risk factors coupled with appropriate intervention to reduce risk has been shown to effectively alter both the onset and progression of CVD.1

In addition to the above risk factors, it is well evidenced that those who are socially deprived have an elevated risk of CVD.3–6 For example, in England the incidence of coronary heart disease (CHD) is markedly higher within the most socially deprived group compared with those in the least deprived group. Recent estimates suggest such risk to be elevated by 30 and 50% for men and women, respectively.7
addition, those from specific minority ethnic groups have an increased risk of CVD, including those of Black African, Caribbean and South Asian origin. Of particular importance to this study population, death from CHD is 46 and 51% higher in men and women of South Asian descent when compared with the UK population as a whole.9

The Vascular Health Check programme for England was implemented by the Department of Health following the publication of ‘Putting prevention first. Vascular checks: risk assessment and management’.10 The publication champions a programme of systematic screening for all individuals, aged between 40 and 74 years, in order to identify and quantify CVD risk followed by individually tailored advice and/or intervention to effectively modify risk.10 The Department of Health has suggested that such a strategy of systematic and integrated screening for all cardiovascular disease should deliver the most benefit in terms of vascular outcomes.11,12

In the past, risk screening programmes have been exclusively undertaken within primary care sites.13 It has been suggested that such an approach may widen health inequalities by excluding those who do not routinely access organized health care. Furthermore, there are a number of issues remaining regarding the provision of resources for delivery of such a service exclusively within primary care.11 Subsequently, emphasis has been placed on the importance of a second sector of organizations in delivering a vascular risk assessment service in order to capture such individuals. Although, to date, the evidence for promoting and conducting vascular screening in community pharmacies is limited to a few isolated studies,14,15 the evidence supporting their use for other targeted programmes is strong. Examples include Chlamydia screening,16 targeted smoking cessation services17 and lipid modification.18 The role of community pharmacy in promoting and delivering a vascular risk assessment service is considered in a pharmacy white paper ‘Pharmacy in England. Building on strengths—delivering the future’.19

The current study aimed to evaluate a pharmacy-based vascular risk assessment service within Leicester City, UK in order to evaluate uptake and the service’s ability to identify cardiovascular risk and undiagnosed cardiovascular disease.

Methods

The study was conducted within Leicester City, UK, which had a recorded population of 329,900 at the time of the 2011 census.20 The corresponding local authority area is ranked as the 25th most deprived (out of 326) with 43% of its population living within the most deprived lower super output areas within the country.21 Fifty-two per cent of the population has an ethnic minority background, predominantly of South Asian descent.22

All pharmacies within the Leicester City Primary Care Trust area (77) were invited to take part in the programme, which was branded as ‘Healthy LifeCheck’. Data were collected between 30 January 2008 and 29 July 2009 and recruitment was opportunistic, in that it relied on individuals entering the service through local pharmacies and individual invitations to participate were not sent in a targeted manner. Advertisement was facilitated by posters and leaflets; pharmacies were not prevented from producing their own marketing materials which would be specific to their local communities (i.e. language specific).

The inclusion criteria for participating individuals were those aged between 40 and 70 years, without prior diagnosis of CVD, who were registered with a general practice (GP) within the Leicester city PCT and who had not received a blood pressure or cholesterol test in the previous 12 months.

Risk assessment was facilitated by a software-based risk stratification tool produced by Health Diagnostics, which uses the Framingham risk rating criteria.23 Participants underwent a consultation with the pharmacist, which was software directed and aimed to quantify modifiable and non-modifiable risk factors. Data collected during the session were BMI, waist circumference, blood pressure, total/HDL cholesterol blood glucose concentration, smoking status, age, sex, ethnicity and postcode (for determination of deprivation score). The consultation took ~30 min to complete and utilized near-patient testing devices for capillary blood reading (glucose and cholesterol). Participating individuals were ultimately categorized with a 10-year risk score defined as low (<10%), medium (≥10% <20%) or high risk (≥20%). All participants were provided with verbal and written lifestyle advice, by the pharmacist who had conducted the assessment, in order to modify identified risk. Those classified as high risk were additionally referred to their GP for diagnosis and risk reduction; referral guidelines are given in Table 1. All participants provided written informed consent allowing transfer of data to their GP and anonymized data for service evaluation. Data are given as mean ± standard deviation, unless otherwise stated.

Results

Following initial invitation, a total of 39 out of 77 pharmacies (51%) participated in the programme. Overall, 3125 assessments were conducted between 30 January 2008 and 29 July 2009. The data set was developed by removing all duplicates, recalls and 1-year follow-ups. All those without a CVD risk score recorded, for example if the assessment was
incomplete for any reason, were additionally removed and programme-specific age constraints of 40–70 years were applied yielding a final data set of 2521 individuals (80.7%).

Demographic characteristics of individuals participating in the service are given in Table 2. Forty-two per cent (1059) of individuals were male and the mean age of participants was 50.2 ± 7.4 years. Sixty-seven per cent (n = 1696) of participants were of South Asian origin, 27% (n = 693) White, 2% (n = 46) Black and <1% (n = 10) other ethnicities; the remaining 3% (n = 76) did not have their ethnicity recorded. Participant deprivation, based on IMD scores calculated from individuals’ postcodes, was evenly spread with around 25% per deprivation quartile (relative to Leicester). One-hundred-and-ninety-nine individuals (7.9%) were not registered with a GP practice but were retained within the analysis as they represented a group who do not access health care through standard routes. Furthermore, ~25% of participants reported not visiting their GP in the past year.

A summary of risk factor data are presented in Table 3. Thirteen per cent (n = 323) of individuals were smokers, 5.9% (n = 149) were ex-smokers and smoking status was not recorded for 1.4% (n = 36). The mean blood pressure was 124 ± 17.7/80 ± 11.0 mmHg and mean random blood glucose was 5.5 ± 1.5 mmol/l. The mean BMI was 26.8 ± 4.8 kg/m² (26.4 ± 4.2 and 27.5 ± 5.2 for men and women, respectively). Independent sample t-tests demonstrate that a statistically significant difference in BMI exists between men and women of South Asian ethnicity (P < 0.05). This relationship is not observed between men and women of all other ethnicities (Table 3).

The mean waist circumference was 91.3 ± 14.6 (92.5 ± 14.5 and 88.2 ± 14.3 for men and women, respectively). Mean blood cholesterol concentrations were 5.0 ± 1.2 and 1.14 ± 0.45 mmol/l for total and HDL cholesterol, respectively. The mean 10-year CVD risk was 12.7 ± 10.9%.

Individuals were categorized as low (n = 1300, 51%), medium (n = 759, 30%) or high risk (n = 462, 18%) relating to (<10%), (≥10% <20%) or (≥20%) total CVD risk, respectively.

A total of 462 (18%) individuals were eligible for referral to general practice either on the basis of total CVD risk stratification or on the outcome of individual component tests. In order to assess the effectiveness of the referral process, a representative subset (41.3% male, 66.5% South Asian) of participants accounting for 906 (36%) participants,

### Table 1 GP referral criteria

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Criteria</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVD risk score</td>
<td>≥20%</td>
<td>Routine referral&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>BMI</td>
<td>≥30</td>
<td>Lifestyle advice provided</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>≥200/110 mmHg</td>
<td>Repeat reading a minimum of 1 h later, if ≥200/110 mmHg then immediate referral&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>≥160/110 mmHg</td>
<td>Three repeat readings on separate days, if third reading ≥160/100 mmHg then routine referral</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>≥7.0 mmol/l (not fasting)</td>
<td>Arrange fasting reading, if ≥7.0 mmol/l then arrange repeat fasting reading 8 weeks later. If third reading ≥7 mmol/l then routine referral</td>
</tr>
<tr>
<td>Total cholesterol: HDL ratio</td>
<td>≥6.0</td>
<td>Routine referral</td>
</tr>
<tr>
<td>Glucose</td>
<td>≥7.0 mmol/l (not fasting)</td>
<td>Arrange fasting reading, if ≥7.0 mmol/l then routine referral and if ketones present then immediate referral</td>
</tr>
<tr>
<td></td>
<td>≥11.1 mmol/l</td>
<td>Routine referral and if ketones present then immediate referral</td>
</tr>
</tbody>
</table>

<sup>a</sup>Routine referral; patient advised to visit GP within 14 days.

<sup>b</sup>Immediate referral; patient advised to visit GP or out of hours service that day.

### Table 2 A summary of demographic factors for individuals accessing the risk assessment service

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>50.2 ± 7.4 years</td>
</tr>
<tr>
<td>Mean age (males)</td>
<td>50.3 ± 7.4 years</td>
</tr>
<tr>
<td>Mean age (females)</td>
<td>50.1 ± 7.3 years</td>
</tr>
<tr>
<td>Male</td>
<td>1059 (42%)</td>
</tr>
<tr>
<td>Female</td>
<td>1462 (58%)</td>
</tr>
<tr>
<td>South Asian</td>
<td>1696 (67%)</td>
</tr>
<tr>
<td>White</td>
<td>693 (27%)</td>
</tr>
<tr>
<td>Black</td>
<td>46 (2%)</td>
</tr>
<tr>
<td>Other ethnicity</td>
<td>10 (&lt;1%)</td>
</tr>
<tr>
<td>Ethnicity not reported</td>
<td>76 (3%)</td>
</tr>
<tr>
<td>IMD deprivation quartile 1 (most deprived)</td>
<td>557 (22.1%)</td>
</tr>
<tr>
<td>IMD deprivation quartile 2</td>
<td>584 (23.2%)</td>
</tr>
<tr>
<td>IMD deprivation quartile 3</td>
<td>596 (23.6%)</td>
</tr>
<tr>
<td>IMD deprivation quartile 4 (least deprived)</td>
<td>568 (22.5%)</td>
</tr>
<tr>
<td>Postcode not available</td>
<td>216 (8.6%)</td>
</tr>
<tr>
<td>Not registered with a GP</td>
<td>199 (8%)</td>
</tr>
</tbody>
</table>
was selected for follow-up. These individuals represented all of those registered with the 10 GP practices with the most referrals from the service. Within this subset, 97 (10.7%) individuals were classified as high risk of whom 51 (52.6%) subsequently visited their GP as a result of referral from community pharmacies (number screened = 1141), while Peterson et al. ran a cardiovascular risk screening program in Australian community pharmacies (number screened = 655). In contrast to the current study, Horgan et al. specifically targeted pharmacies in or near to areas of high deprivation and Peterson et al. included individuals of a much wider age range (between 30 and 90 years). It is well evidenced that men do not access health care to the same extent as women. The current study was more successful at recruiting males than the program undertaken by Peterson et al. but less successful than the Birmingham community service (42, 29 and 32% males). Despite a growing interest and recognized need for community pharmacy-based cardiovascular risk assessment, there are but a few examples to date. Horgan et al. successfully identified high-risk individuals by providing a ‘Heart MOT’ service in community pharmacies in Birmingham, UK (number screened = 1141), while Peterson et al. ran a cardiovascular risk screening program in Australian community pharmacies (number screened = 655). In contrast to the current study, Horgan et al. specifically targeted pharmacies in or near to areas of high deprivation and Peterson et al. included individuals of a much wider age range (between 30 and 90 years). It is well evidenced that men do not access health care to the same extent as women. The current study was more successful at recruiting males than the program undertaken by Peterson et al. but less successful than the Birmingham community service (42, 29 and 32% males).
60% males recruited, respectively). It is difficult to conclude whether this is due to differences between the three services offered per se or due to demographic and cultural differences between the three populations.

**What this study adds**

This study demonstrates feasibility for a cardiovascular risk screening programme led by community pharmacies. Moreover, to our knowledge, this is the first study of its kind in the UK to evaluate action taken by GPs as a result of referral from such a service. The pilot was successful at engaging individuals considered to be a part of ‘hard-to-reach’ groups. Individuals from a minority ethnic background, particularly those with poor English, experience difficulty in accessing health care.28 Despite this, the current study demonstrates the suitability of a pharmacy-led system in including those from a minority ethnic background; perhaps due to the extent to which pharmacies are integrated within local communities and their ability to provide information in a number of languages and formats. Overall, the service was equally accessed by individuals from each deprivation quartile, demonstrating its success in targeting those of a deprived background. Of particular interest, is the appreciable number of individuals accessing the service who were either not registered with a general practitioner (GP) or who had not accessed primary health care in over a year. Such individuals represent a key group to target as they are either unable or unlikely to attend for routine screening. Moreover, it is plausible that targeting such individuals may reduce health inequalities by identifying high cardiovascular risk or cardiovascular disease which would otherwise remain undiagnosed.

A pharmacy-based service of this kind may be particularly suitable at engaging individuals who do not routinely access health care from their GP, perhaps because they do not consider themselves to be ‘unwell’ or ‘at risk’. Pharmacists may recruit individuals to such a service who have presented opportunistically while attending for other pharmacy services and such a service may result in a ‘word of mouth’ type popularity, especially in close communities. Screening in this manner might also be attractive to individuals as it may be seen as an additional source of free health care perhaps even with a sense of novelty attached to it. The length of time made available to individuals by pharmacists during, and with a sense of novelty attached to it. The length of time seen as an additional source of portunistically while attending for other pharmacy services and such a service may result in a ‘word of mouth’ type popularity, especially in close communities. Screening in this manner might also be attractive to individuals as it may be seen as an additional source of free health care perhaps even with a sense of novelty attached to it. The length of time made available to individuals by pharmacists during, and with a sense of novelty attached to it. The length of time seen as an additional source of

**Limitations of this study**

Although the current study successfully recruited an appreciable number of individuals who were not registered with a GP, these individuals were not contacted for the collection of follow-up data after the pharmacy consultation. Future work including the collection of follow-up data from unregistered individuals would be particularly informative as it would allow the evaluation of any action taken as a result of the outcome of the vascular risk assessment. It would be particularly useful to assess if pharmacy-based vascular risk assessment not only attracts unregistered clients but also if it leads to a positive action being taken, such as subsequent registration with a GP or lifestyle change.

The proportion of individuals accessing the service who would have also responded to an invitation for routine screening at their GP practice is unknown. The collection of such information in future work would be of particular use as it would allow the number of individuals who would not have undertaken a vascular risk assessment through traditional routes to be determined and for marketing materials to be refined at targeting this group.

Cardiovascular risk was derived by the use of the Framingham equation; subsequently limitations associated with its use also apply to this study. Namely, risk tends to be under-estimated in high-risk populations such as the socially deprived and risk in the UK as a whole is over-estimated.29 Obviously, high-risk groups (such as the socially deprived) are important to target in any risk screening service. Subsequently any such service should attempt to optimize the opportunity given when individuals from such groups present for screening. The present study provided written and verbal information regarding risk factors, the concept that risk changes over time and therefore the importance of repeat screening. Therefore, although the risk of members of high-risk groups may be under-estimated, such services can also be used to enter individuals into a process of risk awareness and repeated screening.

The mean BMI of participants was found to be higher for female participants (26.4 ± 4.2 and 27.5 ± 5.2 for men and women, respectively). On closer analysis, there was a statistically significant difference in BMI between South Asian men and women; however, this was not the case for men and women of all other recorded ethnicities. Considering that the majority of the non-South Asian population in this study was recorded as White British, this finding is consistent with the published literature.30–33 The reason for this difference is unclear but may be due to cultural gender differences. It is also possible that men and women presented with different motivating factors, i.e. excess weight for women.

Twenty-three individuals attended their GP practice following the assessment despite being classified as low or medium cardiovascular risk and despite not reaching any of the referral criteria. Although these were not false positives,
this may indicate that the amount or quality of information given to those with low or medium risk was not sufficient in some instances. It is possible that pharmacists focused on providing information to those found to be high risk and, to some extent, neglected those who did not warrant a referral. It is also possible that some pharmacists did not fully understand the referral criteria and referred individuals to their GPs without there being a valid reason.

One of the inclusion criteria for individuals entering into the study was ‘registered with a general practice (GP) within the Leicester city PCT’. The rationale for this criterion was that it would facilitate the follow-up phase of the study in that referral actions, diagnoses and treatments initiated after the assessment could be determined. This does however have the undesirable effect of excluding some of the most disadvantaged individuals from the study, consequently such a service as routine practice might be expected to have increased uptake from such individuals.

Out of 77 pharmacies within the Leicester City area, a total of 39 (51%) agreed to participate in the study. It is therefore possible that the study sample is not representative of all of the pharmacies within the study area. This may well explain the higher than population proportion of South Asian participants in this study or this observation may be attributable to other factors. It is possible that such a service is more accessible and culturally compatible to South Asian communities as it may be considered less formal than a GP appointment and there may be a wider scope for overcoming language barriers.

There was a large range in the number of assessments undertaken by each participating pharmacy (median number of cases per pharmacy 38, range 0–210) with seven pharmacies conducting no assessments. The reason for this is unclear but factors may include those relating to the local population of specific pharmacies or to the pharmacies per se.

Although 30.4% of those followed up were found to have contravened the inclusion criteria by having blood pressure or cholesterol measurements within the previous 12-month period, over one-third of these were subsequently identified as being at high cardiovascular risk. This finding highlights the necessity for a comprehensive risk assessment service as opposed to isolated measurements.

Future work in this area should aim to evaluate the reasons why individual pharmacies decline the invitation to participate in the programme. This information will be especially useful in informing the design and setup of future programmes for wider rollout. Widening the eligibility criteria to also include those who are not registered with a GP could potentially motivate some of the most disadvantaged individuals to seek access to health care and reduce health inequalities. Future work including the postal follow-up of participants to assess to what extent lifestyle modification has occurred, as a result of the programme, would be particularly informative.

In summary, cardiovascular risk assessment can be feasibly undertaken in community pharmacies and can successfully identify individuals at high cardiovascular risk and with undiagnosed cardiovascular disease. Such a programme is inclusive of individuals who do not access health care through conventional routes.

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