NHS Health Check programme: Literature review July 2015 to October 2015
About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. It does this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. PHE is an operationally autonomous executive agency of the Department of Health.

Public Health England
133-155 Waterloo Road
Wellington House
London SE1 8UG
Tel: 020 7654 8000
www.gov.uk/phe
Twitter: @PHE_uk
Facebook: www.facebook.com/PublicHealthEngland

© Crown copyright 2015
You may re-use this information (excluding logos) free of charge in any format or medium, under the terms of the Open Government Licence v2.0. To view this licence, visit OGL or email psi@nationalarchives.gsi.gov.uk. Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned. Any enquiries regarding this publication should be sent to [insert email address].

Published October 2015
PHE publications gateway number:
About Public Health England 2
Contents 3
Acknowledgements 3
A review of NHS Health Check literature 4
References on the NHS Health Check Programme 10
References relating to general health checks 17
References relating to diabetes or cardiovascular screening 29

Acknowledgements

This literature review has been produced by the PHE Knowledge and Library Service with the support of members from the NHS Health Check Expert Scientific and Clinical Advisory Panel
A review of NHS Health Check literature

1. Introduction

The NHS Health Check is a National programme that aims to prevent heart disease, stroke, diabetes and kidney disease, and raise awareness of dementia both across the population and within high risk and vulnerable groups.

A key part of the programme’s governance structure is the expert scientific and clinical advisory group (ESCAP). The ESCAP provides an expert forum for the NHS Health Check policy, acting in an advisory capacity to support successful roll-out, maintenance, evaluation and continued improvement based on emerging and best evidence. In its first meeting ESCAP agreed to progress an initial, broad literature review to identify evidence relevant to the NHS Health Check programme. This remit was later expanded to include identification of evidence on general health checks and diabetes/cardiovascular disease risk screening in the population. The methods and findings of that review are set out here.

2. Methods

Medline, Embase, Health Management Information Consortium (HMIC), Cumulative Index of Nursing and Allied Health Literature (CINAHL), Global Health, PsycInfo, the Cochrane Library, NHS Evidence, Google Scholar, Google, Clinical Trials.gov and ISRCTN registry were searched for references relevant to the NHS Health Check programme and general health checks.

Previous searches had identified references from between January 1996 and July (week 3) 2015. This search identifies references from July (week 1), 2015 to October (week 2). The cut-off date for searches was 13th October, 2015. The search strategies used in the previous (July 2015) update have been adapted slightly for some of the databases to be more sensitive.
Table 1. Search strategies

<table>
<thead>
<tr>
<th>Database</th>
<th>Search strategy</th>
</tr>
</thead>
</table>
| Ovid Medline| 1. health check*.tw.  
2. (diabetes adj3 screen*).tw.  
3. (cardiovascular adj3 screen*).tw.  
4. (population adj2 screen*).tw.  
5. (risk factor adj3 screen*).tw.  
6. (opportunistic adj3 screen*).tw.  
7. medical check*.tw.  
8. general check*.tw.  
9. periodic health exam*.tw.  
10. annual exam*.tw.  
11. annual review*.tw.  
12. NHSHC.tw.  
13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12  
14. limit 13 to ed=20150701-20151009 |

Note: there were no appropriate MeSH

| Ovid Embase | 1. health check*.tw.  
2. (diabetes adj3 screen*).tw.  
3. (cardiovascular adj3 screen*).tw.  
4. (population adj2 screen*).tw.  
5. (risk factor adj3 screen*).tw.  
6. (opportunistic adj3 screen*).tw.  
7. medical check*.tw.  
8. general check*.tw.  
9. periodic health exam*.tw.  
10. annual exam*.tw.  
11. annual review*.tw.  
12. NHSHC.tw.  
13. periodic medical examination/  
14. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13  
15. limit 14 to dd= 20150701-20151009 |

| Ovid HMIC   | 1 "health check**".af.  
2 health checks/  
3 (cardiovascular or vascular or heart or diabetes or stroke).af.  
4 (screen* or risk).af.  
5 3 AND 4  
6 1 OR 2 or 5 |

Note: there were no appropriate MeSH
7 limit 6 to yr="2015"

EBSCO CINAHL
S3 S1 OR S2 Limiters - Published Date: 20150701-20151031
S2 (diabetes N3 screen*) OR (cardiovascular N3 screen*) OR
(population N2 screen*) OR (risk factor N3 screen*) OR (opportunistic
N3 screen*) OR “medical check*” OR “general check*” OR “periodic
health exam*” OR “annual exam*” OR ”annual review*” OR NHSHC
S1 health check*

EBSCO Global Health
S3 S1 OR S2 Limiters - Published Date: 2015-2015
S2 (diabetes N3 screen*) OR (cardiovascular N3 screen*) OR
(population N2 screen*) OR (risk factor N3 screen*) OR (opportunistic
N3 screen*) OR “medical check*” OR “general check*” OR “periodic
health exam*” OR “annual exam*” OR ”annual review*” OR NHSHC
S1 health check*

HDAS PsycInfo
1 "health check**.af.
2 PHYSICAL EXAMINATION/
3 HEALTH SCREENING/
4 "diabetes screen**.af
5 "cardiovascular screen**.af
6 "population screen**.af
7 ("opportunistic* screen**" OR "risk factor screen**).af
8 ("medical check**" OR "general check**" OR "periodic health exam**
OR "annual exam**" OR "annual review**" OR NHSHC).af
9 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8
10 9 [Limit to: Publication Year Current-2015]]

Cochrane Library
(Wiley)
#1 "health check**
#2 (diabetes next/3 screen*) or (cardiovascular next/3 screen*) or
(population next/2 screen*) or (opportunistic next/2 screen*) or ("risk
factor" next/3 screen*) or "medical check**" or "general check**" or
"periodic health exam**" or "annual exam**" or "annual review**" or
NHSHC
#3 #1 or #2 Publication Year from 2015 to 2015
Citation titles and abstracts were then screened in order to determine whether or not they were relevant. Those citations considered relevant were categorised using a draft schema for Publication/Resource Types, and are listed in section 4. Categorisation has been based on information provided by authors or indexers and has not been independently verified. No appraisal of individual resources has been undertaken. A conclusion or key statement is provided, as well as a link to the abstract or full text, if available. If the full text of an article is not freely available online, it may be available via the PHE Knowledge & Library Service or OpenAthens.
3. Results

The number of references identified are shown in table 2 and 2a.

Table 2. Citations published/entered between July 1st 2015 and Oct (week 2) 2015

<table>
<thead>
<tr>
<th>Database</th>
<th>No. of hits</th>
<th>Exclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medline</td>
<td>288</td>
<td>288</td>
</tr>
<tr>
<td>Embase</td>
<td>684</td>
<td>561</td>
</tr>
<tr>
<td>HMIC</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>CINAHL</td>
<td>74</td>
<td>48</td>
</tr>
<tr>
<td>Global Health</td>
<td>584</td>
<td>470</td>
</tr>
<tr>
<td>PsycInfo</td>
<td>59</td>
<td>54</td>
</tr>
<tr>
<td>Cochrane Library</td>
<td>63</td>
<td>62</td>
</tr>
<tr>
<td>PubMed*</td>
<td>285</td>
<td>219</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1717</td>
<td></td>
</tr>
</tbody>
</table>

*PubMed was searched additionally to Ovid Medline as it is updated more regularly.

Table 2a. Citations added to internet sources between July 1st, 2015 and October 12th, 2015

<table>
<thead>
<tr>
<th>Internet sources</th>
<th>No. of hits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHS Evidence</td>
<td>61</td>
</tr>
<tr>
<td>Google Scholar</td>
<td>348</td>
</tr>
<tr>
<td>Google</td>
<td>200</td>
</tr>
<tr>
<td>Trials registers</td>
<td>101</td>
</tr>
<tr>
<td>TOTAL</td>
<td>710</td>
</tr>
</tbody>
</table>

Note: it is not feasible to determine whether these internet hits are exclusive

From these 2427 results, 15 were identified as being relevant to the NHS Health Check programme, 27 to general health checks and 56 to diabetes/cardiovascular risk screening.

Total relevant references = 98
- NHS Health Checks = 15
- general health checks = 27
- diabetes/cardiovascular risk screening = 56
### Table 3: Which sources were the citations relevant to the NHS Check Programme retrieved from?

<table>
<thead>
<tr>
<th>Author</th>
<th>Medline</th>
<th>Embase</th>
<th>HMIC</th>
<th>CINAHL</th>
<th>Global Health</th>
<th>PsycInfo</th>
<th>Cochrane Library</th>
<th>PubMed</th>
<th>NHS Evidence</th>
<th>Google scholar</th>
<th>Google scholar</th>
<th>Trials registers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carter P</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chang KC</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forster AS (2015)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ahmad S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Usher-Smith JA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firth H</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kriska J</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Riley R</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Saramunee K</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>McGrady MG</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hawkes N</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coffee S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forster AS (2014)</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leics City Council</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Timmis A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
4. References on the NHS Health Check Programme (15)

Cohort studies


“This study provides a summary of the NHS Health Check Programme conducted between 2009 and 2014 in a local authority where uptake is well above the national average (23.1% compared with 6.4%). Overall, 30% (n = 16 388) people were diagnosed with at least one condition. This number increases to 43% (n = 23 071) when classifying individuals at high risk of cardiovascular disease using new NICE recommendations of ≥10%. Overall, 5.7% of people were diagnosed with type 2 diabetes, of whom 54% were prescribed metformin and 26% were referred for structured education. Of those diagnosed at high risk of cardiovascular disease (≥20%), 64% were prescribed statin”


“Multilevel logistic regression models were used to assess predictors of Health Check attendance; elevated CVD risk factors and statin prescribing among attendees. Programme coverage was 21.4% over four years, with large variations between practices (0%-72.7%) and regions (9.4%-30.7%). Coverage was higher in older patients (adjusted odds ratio 2.88, 95% confidence interval 2.49-3.31 for patients 70-74 years) and in patients with a family history of premature coronary heart disease (2.37, 2.22-2.53), but lower in Black Africans (0.75, 0.61-0.92) and Chinese (0.68, 0.47-0.96) compared with White British. Coverage was similar in patients living in deprived and affluent areas. Prevalence of high CVD risk (QRISK2 > .20%) among attendees was 4.6%. One third (33.6%) of attendees at high risk were prescribed a statin after Health Checks”

Note: this study was previously reported in a 2014 Conference abstract: Chang K et al (2014). *National coverage of the English NHS Health Check programme.* European J Public Health Vol. 24, Supplement 2, 2014, which was listed in our NHS Health Checks literature review: October 2014 to January 2015.

“This study shows that there are improvements in risk factor recording in primary care for participants who have received an NHS Health Check, when compared with participants who only receive opportunistic screening. We show that this improvement is associated with reduced gender differences in risk factor recording and generally smaller socioeconomic differentials in risk factor recording. This leads to increased detection of elevated risk factor status, with the exception of smoking, revealing greater deprivation inequalities in these measures than are apparent in the absence of a health check…..The major impact of the programme is to lead to substantially increased detection of hypercholesterolaemia, with smaller increases in detection of obesity and hypertension. During a maximum of 4-year follow-up, statin prescribing increased to 11.0% of health check participants compared with 7.6% of controls. This may be interpreted as providing reassurance that the health check programme may not lead to widespread prescribing of lipid-lowering drugs” p6 View full text


“This paper using data from a primary care physical activity trial in 60–74 year olds is the first to provide published validation evidence on GPPAQ, a widely used assessment tool in NHS primary care. The reliability (repeatability) was reasonable with 67 % agreement at 12 months, but the validity was poor, with 19 % sensitivity and 85 % specificity compared to accelerometry. Overall screening performance was not improved by adding brisk walking to the GPPAQ score. Our findings support the retraction of GPPAQ from the GP hypertension QOF and question its continued use in NHS health checks in this age group. Rapid technological advances in PA measurement, including the use of smartphone applications and cheap accelerometers, are likely to provide more robust measures of PA in primary care, rather than relying on short but invalid questionnaires” p8 View full text


“We invited all patients who had attended an NHS Health Check at the practice, had a QRisk(R) score between 10% and 20%, and were not prescribed statins to attend
designated clinics in the practice to discuss starting statins. We reviewed the medical records to identify those who had attended the clinics and those who had chosen to start a statin……Of 410 patients invited, 100 (24.4%) patients attended the designated clinics and 45 (11%) chose to start a statin. Those who chose to start a statin were older and with a higher QRisk(R) than those who did not. Among those who attended, individuals who started a statin had a higher QRisk(R) than those who did not and were more likely to be current or ex-smokers…..The proportion choosing to start a statin was substantially lower than previously estimated" taken from abstract
View abstract

Qualitative research


“There were many aspects of the HLP framework that the service providers were positive about, namely, workforce development, engagement (particularly with the smoking cessation service) and as a motivation for pharmacy teams. However, there were areas of concern about low awareness among pharmacy users, the time involved in delivery, as well as financial considerations. These were exemplified by the health checks element. Commissioners also expressed concerns about health checks as well as a lack of cohesion between commissioners and service providers and a poor understanding of the broader framework” taken from the abstract
View abstract


“Although pharmacies seem to be an ideal location for providing this national service [NHS Health Checks], with potential for reaching a different population from those seen in general practice, the opportunity to do so seems to be underutilised (62% of LPC respondents said the service was not commissioned locally). Where it is commissioned there is considerable variation, particularly in training provision, fees, promotional methods and support provided, although uniformity of this national service is desirable4. Pharmacists do not appear to receive direct feedback from practices, after referring patients to them, but based on patient feedback or prescriptions, indicate positive outcomes have been achieved”
View full text

“Patients were motivated to attend an NHS Health Check due to their health beliefs, the perceived value of the programme, family history of cardiovascular and other diseases and expectations of receiving a general health assessment. HCPs [healthcare professionals] raised concerns about the potential for inequity in uptake and the effectiveness of the programme. Patients indicated that they do not always feel well informed about the implications of their results and did not always receive detailed and personalized lifestyle information or advice to accompany these results. This was supported by HCPs who had concerns about the skill set of some HCPs to communicate risk and lifestyle information effectively. The reported experiences of some patients highlight that some individuals who were given a high QRisk2 score had not fully understood its significance. Perceived benefits of the check included reassurance, relief and reinforcement of healthy lifestyles with some patients making positive lifestyle changes. Some patients identified psychosocial barriers to lifestyle change or experienced anxiety from unexpected results or whilst waiting follow-up tests” p7

View full text


“Almost all respondents in this study were pharmacy users, but their experience of individual pharmacy public health services was low, with only 10% or fewer of respondents having actually used any of these services. However there was an overall willingness to use these services with specific disease-related health checks being regarded more positively than services focussing on lifestyle. Frequent pharmacy users, females and those in better health were most likely to use any service, but specific services were viewed as acceptable by respondents with particular characteristics, behaviours and conditions” p713

View abstract

**Case studies**


“A service specification was drawn up setting out responsibilities and accountability, the competencies to be achieved by dental care professionals (DCPs) delivering the
NHS Health Check. A training programme was devised, tailored to meet the skill set of DCPs. It was recognised they would need complementary knowledge to deliver the check offer effectively. The training days consisted of:

• A full day session on cardiovascular risk assessment and theory
• Motivational interviewing – theory and application
• Training on practical POCT [point of care testing] training

Dental teams reported that there was added value from taking part in the project as the training received, within the NHS Health Check programme, enhanced the delivery of health promotion messages from DBOH within dental care delivery. The motivational interviewing was highlighted as a significant tool that had benefited the dental team. There were perceived benefits from the community delivery model, strengthening the relationship between the dental practice the community and patients. There were, however, significant barriers to implementation……


“Azhar Farooqi, co-chair of the Leicester City clinical commissioning group (CCG), told the London meeting that Health Checks, as originally conceived, did not work. The CCG redesigned the scheme, abandoned postal invitations altogether, and relied instead on opportunistic screening. GPs were given computer based templates to ensure that they did the right checks and followed an appropriate management plan for people who were found to need drugs or lifestyle changes. The checks were encouraged by making them a local enhanced service where practices could choose how to implement them, aided by the templates. More importantly, the scheme added a second phase covering the future management of newly identified patients.

Before the changes, said Farooqi, only 7500 checks were provided each year, but in the first year of the new scheme this rose to 24,000, and that figure has been maintained. So far the checks have identified more than 3000 cases of diabetes, nearly 10,000 cases of hypertension, more than 800 patients with chronic kidney disease, and almost 6000 with a cardiovascular risk factor of over 20%. The Leicester CCG scored more highly than any other group in the country in the implementation of the scheme”


“In October 2014, Birmingham and Solihull Mental Health Foundation Trust (BSMHFT) began a pilot project that aimed to provide an NHS Health Check to adults using secondary care community mental health services. The pilot used a
band 4 health instructor in community health centres, an environment in which mental health service users are already accessing care. Co-locating the service made it easier for service users to get appointments and more likely for them to engage with their physical health care. The pilot has now been running for eight months and 185 people have received an NHS Health Check.”

**Ongoing research**

Forster AS et al. (2014). *Enhanced invitation methods to increase uptake of NHS health checks: Study protocol for a randomized controlled trial*. Trials 15(1).

“The project is a three-arm randomized controlled trial to test the hypothesis that enhanced invitation methods, using the Question-Behaviour Effect (QBE), will increase uptake of NHS Health Checks compared with a standard invitation. Participants comprise individuals eligible for an NHS Health Check registered in two London boroughs. Participants are randomized into one of three arms. Group A receives the standard NHS Health Check invitation letter, information sheet, and reminder letter at 12 weeks for nonattenders. Group B receives a QBE questionnaire 1 week before receiving the standard invitation, information sheet, and reminder letter where appropriate. Group C is the same as Group B, but participants are offered a 5 retail voucher if they return the questionnaire.....The research will provide evidence on whether asking individuals to complete a preliminary questionnaire, by using the QBE, is effective in increasing uptake of Health Checks and whether an incentive alters questionnaire return rates as well as uptake of Health Checks” taken from abstract

Leicester City Council (2015). *Consumer insight work into Health Check Programme*.

“Leicester City Council wishes to commission consumer insight work, including focus groups, into attitudes towards, and barriers in uptake for, the health check programme. Additionally we wish to explore whether there a preferred model in delivering and accessing the NHS Health Checks”

“The investigators will design a template within the primary care electronic health record (EMIS) that draws on Health Check data to provide a contemporary "risk report". Included in the report will be clear description of life-time cardiovascular risks, the factors driving those risks and how risk might be reduced through life-style and risk factor modification. The investigators will evaluate the benefits of providing patients with a risk report qualitatively by patient and clinician interviews. Quantitative analysis of the benefit of the risk report will be provided by a non-randomised comparative trial. First, a group of patients undergoing a conventional Health Check will be recalled after three months for a second Health Check, allowing measurement of the change in “Heart Age” - a convenient index of life-time cardiovascular risk. Following introduction of the risk report the investigators will recall a further group of patients for a second Health Check, allowing measurement of the change in “Heart Age”. The effect of the risk report will be determined by comparing the change in Heart Age between the two groups of patients”
References relating to general health checks (27)

Evidence summaries


“Healthcare providers increasingly offer screening tests as individual out-of-pocket health services (Individuelle Gesundheits-Leistungen, IGeL) to patients without providing comprehensive information about the benefits and harms which would be necessary to enable informed decision-making. The article describes the current evidence and the methodological issues in the benefit assessment of general health checks in order to encourage a critical discussion on screening tests” taken from abstract
View abstract. Note: this article is in German but has an English abstract


“The aim of PHEs [periodic health examinations] is to identify risk factors and early signs of disease, but also to prevent future illness by early intervention. Therefore, each PHE should include counselling, immunisation and physical examination according to the patient's age and gender. However, deciding whether to screen a patient and choosing the most appropriate screening method can be challenging for general practitioners…..The aim of this review is to provide an updated statement of recommendations regarding preventive care measures based mostly on the guidelines derived from the USPSTF and the Swiss Medical Board” taken from abstract
View full text

Health Technology Assessments (HTA)


“In this advisory report, the Health Council of the Netherlands’ Committee on Population Screening highlights the benefits and risks of health checks and makes recommendations concerning the associated protective role of the government……The Minister of Health, Welfare and Sport wants to maximize people’s freedom to choose whether or not to undergo a health check. She has
asked the Health Council about the required conditions. What criteria must health checks meet and what requirements should the government impose to protect people against the risks involved in tests of this kind?” taken from summary

View executive summary

Trials


“A Randomized Control Trial implemented a Diabetes Risk-Assessment tool (based on the CANRISK tool) delivered by web and paper interfaces…..The intervention group accessed the diabetes risk-assessment online; the control group completed it on paper…..Overall response rate was 17%; 73 % completed paper risk-assessments and 27 % completed online assessments……Online completers had higher BMIs (p=0.04), were less physically active (p=0.09), had a previous high blood sugar (p<0.001), poorer self-reported health-status (p=0.003) and a higher risk of diabetes (p=0.02). In this population T2DM risk assessment by invitation did not result in a large response rate, especially online”

View abstract

Cohort studies

Albright K et al. (2015). Health promotion text messaging preferences and acceptability among the medically underserved. Health Promotion Practice 16(4): 523.

“The Colorado Healthy Heart Solutions program uses community health workers to provide health promotion and navigation services for participants in medically underserved, predominantly rural areas who are at risk for developing cardiovascular disease. A text messaging program designed to increase participant engagement and adherence to lifestyle changes was pilot tested with English- and Spanish-speaking participants…..Participants reported a preference for concise messages received once daily and for positive messages suggesting specific actions that could be feasibly accomplished within the course of the day. Participants also consistently reported the desire for clarity in message delivery and content, indicating that the source of the messages should be easy to recognize, messages should state clearly when participants were expected to respond to the messages, and any responses should be acknowledged” taken from abstract

View abstract

“Higher level of neighborhood social capital was associated with higher probability of participating in the health check phase of a population-based lifestyle intervention. Most of the association between neighborhood social capital and participation in preventive health checks can be explained by differences in individual socioeconomic position and level of neighborhood deprivation. Nonetheless, there seems to be some residual association between social capital and health check participation, suggesting that activating social relations in the community may be an avenue for boosting participation rates in population-based health checks” taken from abstract

View full text


“Total response was as high as 70% among our underserved populations using a funnelled invitation design. Of the responders, 62% participated in the HRA [health risk assessment]. Postal response was 41%, of whom 66% participated. Telephone response was 46% among postal non-responders, of whom 59% participated in the HRA. A face-to-face invitation barely increased response and HRA participation rates. Of the high-risk individuals, 59% participated in the PC [prevention consultations], irrespective of invitation step….Underserved populations can be reached by a low-cost culturally adapted postal approach with a reminder and follow-up telephone calls. The actual cost-effectiveness of this approach needs to be studied” p9

View full text


“To study first cardiovascular events (myocardial infarction, stroke, or cardiovascular death), during two decades after the implementation of a cardiovascular prevention program among those who participated (intervention group) compared with a matched population selected from the greater Stockholm area……The incidence of first cardiovascular event was lower in the intervention group (men 17.1%, women 9.2%) compared to the matched controls (men 18.0%, women 10.3%). The relative
risk (95% confidence interval) was 0.90 (0.83-0.97), 0.92 (0.83-1.03) and 0.87 (0.78-0.98) in all subjects, in men and in women in the intervention group compared to the matched controls…..” taken from abstract
No freely available online abstract or full text


“This study [rates and predictors of adherence amongst patients with cardiovascular disease (CVD) and those at high multifactorial risk (HRI) attending an innovative programme integrating primary and secondary prevention] demonstrated relatively high rates of uptake and adherence for both HRI and CVD patients. The high uptake rates for HRI are particularly promising given that these individuals are asymptomatic. The findings suggest that beliefs about treatment are predictors of adherence for both populations. Older age also predicted adherence for HRI but not for the CVD patients…..These findings could be used to guide research examining whether interventions targeting beliefs about treatment in turn enhance retention rates to primary and secondary prevention programmes” p649
View full text

Cross-sectional studies


Samples of construction workers and the general working population in the Netherlands completed a survey about preventive health checks in the occupational setting…..A total of 482 (27%) of construction workers and 738 (65%) employees from the general population responded…..We identified three constructs related to perceived benefits and drawbacks [of health checks]: self-control over health, disturbance and negative emotion and lack of autonomy. Participants rated 'self-control over health' as the highest potential benefit (mean = 3.40; SD = 0.69), and 'your employer interfering in your personal life' as the most important potential drawback (mean = 3.27; SD = 1.00)
View abstract


“Between April and June 2013, a total of 12,000 households were contacted, and
10,735 participants completed the survey (response rate of 89.4%). Among participants, 2542 (22.9%), representing more than 2.7 million Saudis aged 15 years or older, received a PHE [periodic health examination] during the past 2 years. Moreover, 7463 (73.5%) participants, representing 9.1 million Saudis, visited a healthcare setting in the past 2 years due to illness or injury. The likelihood of receiving a PHE in the past 2 years increased with age, education, being married, consumption of five servings of fruits and vegetables per day, diagnoses of prediabetes, diabetes, or hypercholesterolemia, and a visit to a healthcare setting within the last 2 years due to an illness or an injury.” taken from abstract


“In conclusion, this cross-sectional study revealed that BMI [body mass index] >25 and WC [waist circumference] >85 cm for men, and BMI >27.5 and WC >95 cm for women were significantly associated with low %VC [vital capacity] (<80) among Japanese participants”


“Consecutive patients attending a participating general practice clinic were invited to participate in a cross-sectional touchscreen survey assessing lifestyle risk factors in 2010-11. The GP of each consenting patient completed a corresponding survey assessing the patient's risk factors…..Data from 51 GPs and 564 patients were analysed. Patients without a history of stroke or heart disease reported significantly higher rates of smoking (12 per cent) and risky alcohol consumption (56 per cent) than patients with a history of stroke or heart disease (6 per cent and 36 per cent, respectively). Low sensitivity of GP detection of risk factors was found for all risk factors for all patients. Patients with a history of stroke or heart disease have a significantly higher mean proportion of risk factors detected by their GP compared to patients without a history of stroke or heart disease (P = 0.00)……Given low sensitivity and specificity of GP detection of risk factors among patients, alternate methods of identification are needed” taken from abstract

“Overall, the findings of this study suggest that population groups with a higher risk of adverse health, such as the socioeconomically disadvantaged, smokers, and physically inactive people, are less likely to attend health checks than their counterparts with a more favourable risk factor profile. Therefore, those who potentially could benefit most from secondary prevention measures appear to be particularly difficult to engage with medical health checks offered in the primary care setting. This should be taken into more account when designing and implementing secondary prevention programmes at the population level” p10


“A cross-sectional study was conducted of 1256 subjects (840 males and 416 females) aged 26-89 years, who were individuals undergoing intensive health checkup. The three components of MetS examined were high blood pressure, glucose intolerance and dyslipidemia…..The mean values of the WC [Waist circumference] and VAT [visceral abdominal fat] thickness were significantly higher in the subject group positive for each of the metabolic syndrome components than in the subject group that was negative for all the components (p<0.001)……This survey presented an advantage of WC over VAT thickness as an obesity index for identifying all the three components of metabolic syndrome, although sex differences in the study outcomes were found” taken from abstract


“The incidence of diabetes mellitus and related risk factors in the health check-up were investigated in order to provide a reference for clinical prevention. FPG, OGTT 2h, SBP, DBP, BMI, TC, LDL-C, HDL-C and TG were assessed in 500 patients who participated in health examination. The relative risk factors of diabetes were analysed by logistic analysis method…..Logistic analysis results showed that blood pressure, dyslipidaemia and BMI were positively correlated with the incidence of diabetes (P<0.05). It is concluded that high blood pressure and cholesterol, overweight and obesity would be the risk factors of diabetes which should be taken
into serious consideration” taken from abstract
Note: this article is in Chinese but has an English abstract (not freely available online)


“A cross-sectional survey was carried out in all active and retired petrochemical employees (8,186) aged 40 years or older. Each participant has received a full medical check-up annually at least 5 years, including a face-to-face questionnaire interview and measurement of fasting blood glucose (FBG) and lipids…..A total of 7,532 attended for screening. The overall prevalence of diabetes was 10.1%, 10.7% in male and 9.0% in female (P=0.021). The overall prevalence of prediabetes was 15.7% according to ADA criteria (16.5% in male vs. 14.2% in female, P=0.009); and the prevalence of prediabetes was only 1.8% in both sex according to WHO/IDF criteria. Among all participants with diabetes, 83.6% were aware of the diagnosis, 63.0% were receiving treatment, and 66.4% had FBG controlled…..Annual health check-up can improve the awareness, treatment, and control of diabetes among middle-aged population” taken from abstract
No freely available online abstract or full text


“Type A behavior pattern (TABP) is a purported psychosocial factor related to CHD. While several prior investigations have examined the relationship between TABP and CHD alone, the current study aims to assess the association between TABP and CVD using a more comprehensive definition including both CHD and stroke. Methods: We retrospectively examined cross-sectional data from 54721 individuals aged 40 to 74 years old, who visited our facility in Tokyo between 2009 and 2013 for an annual health check. TABP was evaluated with validated scale for Japanese TABP. Both TABP and CVD were assessed via a standardized and self-reported questionnaire…..The mean age of the study population was 52 years old and 26102 subjects (47.7%) were male. A total of 1185 subjects (2.2%) had history of CVD; 614 for CHD, 599 for stroke, and 28 for both. A total of 7495 (13.7%) subjects were categorized as Typical TABP. Bivariate analysis of the association between TABP and CVD showed 237 (3.2%) subjects in the Typical TABP group reported CVD event compared to 948 (2.0%) in the others (p < 0.01)…..Typical TABP was
significantly associated with CVD, conferring an approximately 30% increased risk. TABP would be helpful for risk assessment of CVD and stroke” taken from abstract
No freely available online abstract or full text


“A multi-country cross-sectional study was conducted in six countries of EMR [Eastern Mediterranean Region], from September 2014 to March 2015. Family Physicians who were currently practicing in different countries of EMR were invited to participate in the study through email. A pre-tested structured questionnaire was used for data collection. Data was entered and analyzed on SPSS 19 and logistic regression analysis was performed. A total of 100 physicians’ data was included in the final analysis. The majority were female physicians (76%): 63% were 25 to 35 years of age. Approximately 53% of Family physicians always recommend periodic screening and health checks to their patients. The common screening question asked to patients in medical history was related to their blood pressure (86%). Almost all (99%) of the Family physicians believe they should conduct periodic health checks” taken from abstract
View full text

Service evaluation


“In summary, screening increases health care costs on average and does not improve health. This empirical evidence corroborates the most recent screening literature that, in contrast to earlier studies, is more skeptical about the overall cost effectiveness of health screening. To Austrian health policy-makers we would recommend to abolish the program [a mass screening program launched in 1974 where every Austrian adult is invited to undergo a general health examination that aims to detect cardiovascular diseases] in its current form or to revise it. In particular, we suggest to focus on younger insurants (about sixty years of age or younger), since we found comparably small short-run cost increases for this group that can be overcompensated by cost savings in the medium run” p18 of report
View abstract. A full text report (discussion paper no. 6310) with the same title, authors and abstract is available, published in Jan 2012.

“Low-paid local government employees from socially and economically deprived areas in North-East England were invited to attend a free health check….Participants were invited to repeat screening approximately 9 months later. 635 (20% response rate) employees in the target age group (>40 years) attended the first check. Most health risk markers improved in those (N=427) attending both health checks, as did the mean CVD risk score (t=2.86, p=0.004)……This workplace programme had a positive impact on cardiovascular health, but attendance rates were low” taken from abstract
View abstract


“Between April 2011 and March 2013, all healthy residents in 6 Local Health Authorities of Regione Veneto aged 45-59 years were invited to join a cardiovascular disease prevention programme. Parameters such as blood pressure (BP), glycemia, waist circumference and body mass index were collected and recorded. Participants also received counseling, informational materials on lifestyle and were invited to individual or group health promotion initiatives in relation to personal risk factors. RESULTS: Among the invited, 60.84%(10,346/17,004) adhered. Subjects without risks factors were 23.95%. Subjects with lifestyle risk factors but normal BP and glycemia were 56.59%, while those with altered values for BP and glycemia were 13.9%.....The results confirm that a preventive programme based on the citizens active call by the Department of prevention could be an effective tool to identify asymptomatic individuals with unknown hypertension and/or hyperglycaemia and to offer lifestyle interventions to lower the risk of cardiovascular diseases” taken from abstract
View abstract. Note: this article is in Italian but has an English abstract.

Qualitative research


“This mixed-methods study of CVD risk factor assessment in people with psoriasis in UK primary care highlights important gaps in current practices around CVD risk screening. In particular, it demonstrates that CVD risk screening appears to be
limited to a data collection activity rather than viewed as one component of a broader intervention strategy to reduce CVD risk. There was little evidence that opportunities for effective risk communication between patients and practitioners in consultations were recognized and acted upon by the practitioners conducting risk assessments. This study goes some way to offering a potential explanation for the debated ineffectiveness of national health check programmes and may explain Krogsbøll and colleagues’ findings that health checks can lead to an increased number of new diagnoses and pharmacological interventions while failing to reduce morbidity. Our study shows that despite significant levels of risk factors identified in study participants at risk assessment (between one-third and half classified as obese, with very high waist circumference and raised BP that would warrant further investigation and almost one-fifth smoking and drinking over the recommended amounts), opportunities to support patients to understand CVD risk and/or identify risk reduction strategies may often be overlooked in consultations. A key explanatory factor was that practitioners’ confidence to deliver personalized lifestyle behaviour change support was low” p12
View abstract


“The VIP [Vasterbotten Intervention Programme] offers all citizens aged 40, 50 and 60 in Vasterbotten County an individual health check-up followed by a health-promoting dialogue with a specialist PHN [primary healthcare nurse]. Inconsistencies in previous reports of the effects of lifestyle counselling and health promotion suggest that it is important to study dialogues about health and lifestyle to understand health-promoting strategies and to highlight aspects important to improving their effects. In 2010, we conducted in-depth interviews with ten experienced PHNs working with the VIP at eight healthcare centres in Vasterbotten County, Sweden. Qualitative content analysis was used to illuminate the nurses’ strategies in health-promoting dialogues……The PHNs used various strategies in dialogues about health and lifestyle that fell under the five themes ‘Guiding patients vs. pressuring them; Adjusting to patients vs. directing the conversation; Inspiring confidence vs. instilling fear; Motivating and supporting patients vs. demanding responsibility; and lastly, Introducing emotionally charged subjects or avoiding them’. The results of this study may add knowledge about the difficulties and opportunities in health counselling” taken from abstract
View abstract
Modelling studies


“From prior research the authors hypothesized that people with higher life satisfaction would be more proactive in taking care of their health, hence more likely to use preventive health care services. Multiple logistic regression models were used to examine the association between life satisfaction and preventive services. Participants were drawn from the Health and Retirement Study, a prospective and nationally representative panel study of adults (age >50). Participants’ use of preventive services was collected over 2 years of follow-up. In models adjusting for sociodemographic factors, each standard deviation increase in life satisfaction was associated with a higher likelihood that people would obtain a cholesterol test. Further, women with higher life satisfaction were more likely to obtain a mammogram–x-ray or pap smear and also regularly check their breasts for lumps, whereas men were more likely to obtain a prostate exam. Higher life satisfaction was associated with higher use of several preventive services”

View abstract

Diagnosis test studies


“This study was conducted in 179 participants of an age-related medical checkup program, of whom 72% were female and median age was 65.9 years. SAF [Skin autofluorescence] and several atherosclerosis-related clinical parameters were assessed, including urinary albumin-to-creatinine ratio (UACR) and brachial ankle pulse wave velocity (baPWV)….. SAF significantly correlated with age (r=0.462, P < 0.001), UACR (r=0.391, P<0.001), baPWV (r=0.265, P=0.021), and Hba1c (r=0.222, P=0.049)….. SAF is a useful marker for screening CVD in healthy people. We recommend that SAF and UACR examination are included in routine medical check-ups” taken from abstract

View abstract

Ongoing research


“An open-label, household-cluster, randomized controlled trial with a two-group parallel design is used. The trial is embedded in a population-based health promotion program, "Check your Health Preventive Program", in which all 30-49
year-old citizens in a Danish municipality are offered a preventive health check. In each arm of the trial, 750 citizens will be recruited (1,500 in total). The primary outcome is cardiorespiratory fitness level assessed by submaximal cycle ergometer testing after one year. An intermediate outcome is the percentage of participants increasing motivation for physical activity behaviour change between baseline and two-weeks follow-up assessed using the Transtheoretical Model's stages of change” taken from abstract
References relating to diabetes and cardiovascular risk screening (56)

**Systematic reviews**


“Ninety-two percent of the included CPGs [clinical practice guidelines] (43/47) referred to older adults to some extent, but the specific issues important in deciding about primary cardiovascular disease (CVD) prevention in older patients were mostly not adequately addressed. There was very limited discussion of frail older people and older people with comorbidities, a group for whom management is particularly challenging due to potential drug-drug and disease-drug interactions and competing health priorities. Only 55 % of the CPGs discussed available evidence for primary CVD prevention in older people and knowledge gaps. Potential benefits (in terms of morbidity, mortality and improved cognition) were discussed more extensively than harms (e.g. risk of hypotension with blood pressure medication), especially for hypertension medication and lifestyle recommendations. This is an important finding as even though older peoples’ preferences to take medication for primary CVD prevention vary widely they are relatively insensitive to its benefit but highly sensitive to its adverse effects, suggesting that clinical CPGs need to place emphasis on both benefits and harms, especially for older people.…..Evidence for lifestyle management in older adults was brief in most CPGs, with generally no information provided on the specific benefits or effects on CVD or other outcomes for older people, the amount of lifestyle change needed to benefit, or differences between age groups” p10

View full text


“We found no trials that investigated dipstick screening versus no dipstick screening, and therefore the benefits and harms remain unknown. Because there are potential harms related to dipstick screening, and since any screening program entails financial and opportunity costs, the findings of our review justify the use of dipstick screening in non-pregnant persons only in the context of a study setting” taken from Author’s conclusions

View full text

“PURPOSE: To update the 2008 U.S. Preventive Services Task Force review on diabetes screening in adults……Screening for diabetes did not improve mortality rates after 10 years of follow-up. More evidence is needed to determine the effectiveness of treatments for screen-detected diabetes” taken from abstract

See also this EBM commentary on the above:
“A particular strength of this study is the emphasis on the importance of the seven clinical key questions and the rigorous methodology. However, there is potential for publication and selection bias, and the possibility that the search may have missed relevant studies”
No freely available online abstract or full text


“Due to the limited evidence currently available, we can draw no conclusions as to the effectiveness of multiple risk factor interventions on combined CVD [cardiovascular disease] events and mortality. There is some evidence that multiple risk factor interventions may lower blood pressure levels, body mass index and waist circumference in populations in LMIC [low- and middle-income countries] settings at high risk of hypertension and diabetes. There was considerable heterogeneity between the trials, the trials were small, and at some risk of bias. Larger studies with longer follow-up periods are required to confirm whether multiple risk factor interventions lead to reduced CVD events and mortality in LMIC settings” taken from Author’s conclusions


“This paper reviews the association between body mass index (BMI) and diabetes in Asian Americans and illustrates that Asian Americans have a higher prevalence of type 2 diabetes at relatively lower BMI cut points than whites. Given that established
BMI cut points indicating elevated diabetes risk are inappropriate for Asian Americans, establishing a specific BMI cut point to identify Asian Americans with or at risk for future diabetes would be beneficial to the potential health of millions of Asian American individuals” taken from abstract

Evidence summaries


“There is insufficient evidence from currently available systematic reviews to confirm a beneficial effect of blanket screening for hypertension and/or diabetes compared with other types of screening methods in low- and middle-income settings. Scarce resources are being mobilised to implement a mass screening intervention for diabetes and hypertension without adequate evidence of its effects. A systematic review is needed to consider the outcomes of clinical effectiveness, cost-effectiveness and impact on the healthcare system overall of screening strategies, especially in lower- and middle-income settings such as exist in SA. Robust evaluation of these outcomes would then be necessary to inform secondary prevention strategies” p101-102


“This paper contributes by analysing the long-term impact of a single round of population-based screening on three key outcomes: (1) cardiovascular morbidity - which modelling data suggests could be reduced by screening; (2) self-rated health - an independent predictor of morbidity and mortality and (3) health-related behaviour……..Analyses found no significant differences at 7 years between the screening and control groups in the proportion reporting cardiovascular disease, hypertension, or prescription of antihypertensives or glucose-lowering medication; self-rated health (Short Form-8); health utility (EuroQol-5D); current smoking status, alcohol consumption, physical activity, dietary patterns; or patterns of health service use. No significant differences were found for any health-related behaviour between attenders who screened negative and non-screening controls, and between screening attenders and non-attenders……..This study provides no evidence for a change in practice; the findings confirm the position that population-level screening for T2DM has no adverse impact. Rather, concerning the question of population-level benefits, the authors add their support to the call for further research into the cost-effectiveness of such screening” p135
No freely available online abstract or full text available.

**Health Technology Assessments (HTA)**


“Screening for diabetes forms part of this assessment [NHS Health Checks], but alternative blood tests are available, in particular measurement of glycated haemoglobin (HbA1c) or fasting plasma glucose (FPG)……This report uses information on the number of individuals who would be identified with diabetes or at risk of diabetes and the costs of the blood tests, and, using computer modelling, produces estimates of the lifetime costs and health impact of using a HbA1c test compared with a FPG test. The results suggest that, in most cases, a HbA1c test is likely to be more cost-effective than a FPG test. This conclusion may be reversed in some localities where the excess number of individuals detected with raised glucose using a FPG test relative to a HbA1c test would be greater than in the LEADER (Leicester Ethnic Atherosclerosis and Diabetes Risk) cohort, but this would be dependent on the uptake of HbA1c testing compared with uptake of FPG testing”

View full text

**Trials**


“Participants were 45,618 men and 8,092 women aged 15-84 years who received periodic health checkups in 9 companies in Japan. Clustering of cardiometabolic risk factors was defined by the existence of 2 or more of high blood pressure, hyperglycemia, and dyslipidemia. In both men and women, unadjusted area under the curve (AUC) of the receiver-operating characteristic curve for WHtR [waist-to-height] in detecting the clustering of cardiometabolic risk factors was significantly higher than that for either BMI [body mass index] or WC [waist circumference]; the AUCs for WHtR, BMI, and WC, respectively, were 0.734, 0.705, and 0.717 in men and 0.782, 0.762, and 0.755 in women. After adjustment for age, however, such differences were not observed.....The screening performance of WHtR for detecting the clustering cardiometabolic risk factors was not superior to that of BMI” taken from abstract

View full text

“This study has provided some useful information which would be of interest to policy makers as well. First, 45% of screening yield in intervention arm was attributable to mobile reminder. In other words, during routine opportunistic screening if we identify 10 cases with diabetes among 100 screened; then introduction of mobile reminders would identify 8 additional cases with diabetes. Eleven persons will have to be screened using RBG, followed by mobile reminder for follow-up (if eligible) and administration of definitive tests, to diagnose one case with diabetes mellitus. Considering this, the intervention appears to be cost-effective on face value; however, a systematic economic analysis needs to be carried out before coming to this conclusion. Second, alternate modes of mobile reminder delivery may be tried” p642
View abstract


“In conclusion, promotion of intensive multifactorial treatment compared to routine care for people with screen-detected Type 2 diabetes does not appear to be cost-effective in the ADDITION-UK study. However, the intervention has the potential to be cost-effective if it can be delivered for approximately £630 per patient rather than £981. Such savings may be plausible through adaptation of pre-developed materials and economies of scale in delivery” p917
View full text

Cohort studies


“Each site recruited at least ten to 15 community health workers based on usual site-specific norms for required levels of education and language competency……These workers were trained to calculate an absolute cardiovascular disease risk score with a previously validated simple, non-invasive screening indicator. Community health workers who successfully finished the training screened community residents aged 35-74 years without a previous diagnosis of hypertension, diabetes, or heart disease.
Health professionals independently generated a second risk score with the same instrument and the two sets of scores were compared for agreement. Across all sites, 4383 community members were approached for participation and 4049 completed screening. The mean level of agreement between the two sets of risk scores was 96.8% (weighted $k=0.948$, 95% CI 0.936-0.961) and community health workers showed that 263 (6%) of 4049 people had a 5-year cardiovascular disease risk of greater than 20%. Health workers without formal professional training can be adequately trained to effectively screen for, and identify, people at high risk of cardiovascular disease. Taken from abstract


“In 2001-2006, a pragmatic screening program for diabetes in Danish general practices identified 22,726 persons at high risk of diabetes based on the Danish diabetes risk score but without clinical diabetes (WHO 1999) on subsequent measures of glucose. Persons were categorized into 6 groups of increasing diabetes risk and followed for incident diabetes in the Danish National Diabetes Register until December 2012. During 10 years of follow-up, 1,041 persons were diagnosed with diabetes. Compared to persons with high estimated diabetes risk but normal glucose regulation, the lower estimated diabetes risk groups had a 55% and 39% lower diabetes incidence, whereas persons with impaired glucose regulation had a markedly higher diabetes incidence. In the presence of diabetes risk factors, persons who progress further in a stepwise diabetes screening program are at increased risk of future diabetes. In addition to impaired glucose regulation, clinicians should pay attention to persons with screen-detected high estimated diabetes risk, even when glucose regulation is normal.” Taken from abstract

No freely available online abstract or full text


“Cohort study of a 3% random sample of all Korea National Health Insurance members 40 years of age or older and free of CVD or CVD-related health conditions was conducted. A total 443,337 study participants were followed-up from January 1, 2005 through December 31, 2010. In primary analysis, the hazard ratios for CVD mortality, all-cause mortality, incident composite CVD events, myocardial infarction, cerebral infarction, and cerebral hemorrhage comparing participants who attended a
NHS Health Check programme: literature review

Screening exam during 2003-2004 compared to those who did not were 0.58 (95% CI: 0.53-0.63), 0.62 (95% CI: 0.60-0.64), 0.82 (95% CI: 0.78-0.85), 0.84 (95% CI: 0.75-0.93), 0.84 (95% CI: 0.79-0.89), and 0.73 (95% CI: 0.67-0.80), respectively. Screening attenders had higher rates of newly diagnosed hypertension, diabetes mellitus, and dyslipidemia, lower inpatient days of stay and cost, and lower outpatient cost compared to non-attenders taken from abstract


“4,462 patients of 40 primary care practices were screened on the basis of SCORE risk assessment. The results of the screening were compared on the basis of two groups of patients, namely: those who had been pre-screened (pre-screening method) for known risk factors in their medical history (smoking, BMI, age, family cardiovascular history), and those randomly screened. The authors also compared the mortality data of participating primary care practices with the regional and national data…..The average score was significantly higher in the pre-screened group of patients, regardless of whether the risk factors were considered one by one or in combination. Mortality was significantly lower in the participating primary practices than had been expected on the basis of the national mortality data. Conclusion. This government-financed program was a big step forward to establish a proper screening method within Hungarian primary care. Performing cardiovascular screening of a selected target group is presumably more appropriate than screening within a randomly selected population” taken from abstract


“From 1972 to 1975, 2014 healthy Norwegian men aged 40-59 years underwent cardiovascular screening including a symptom-limited bicycle exercise test. Stroke was documented by scrutiny of medical records in all Norwegian hospitals……During a median of 30 years of follow-up, 276 men (13.7%) had a stroke……Age, systolic blood pressure, maximal systolic blood pressure during exercise and PQ interval were significant predictors of stroke during 35 year’s follow-up of middle-aged healthy men” taken from abstract

View abstract

“Based on USPSTF [US Preventive Services Taskforce] lipid screening recommendations, this study documents substantial over-testing among individuals with low CVD risk and under-testing among individuals with moderate to high-risk not already on statins. Opportunity exists to better focus lipid screening efforts appropriate to CVD risk” taken from abstract

View full text


“Female patients at a North Carolina Title X clinic were screened for CVD risk factors (n=462) and 167/462 (36.1%) were rescreened one year later. Clinical staff made protocol-driven referrals for women identified with newly diagnosed CVD risk factors……The majority of women in need of referrals for CVD risk factors received them. Few women completed referrals. Future research should examine barriers and facilitators of referral care among low-income women” taken from abstract

View abstract


“We found a wide variation between practices in the prescription of lipid-lowering treatment among individuals with screen-detected diabetes and demonstrated a significant association between the frequency of lipid-lowering treatment and CVD and all-cause mortality – both being favourably influenced by more frequent treatment. More work is needed to improve understanding of the factors underlying practice variation in prescribing in order to encourage GPs to offer lipid-lowering treatment and other preventive interventions to this high-risk group. These results lend support to the benefits of treatment early in the course of the disease” p1583-1584

View full text

“A total of 501 consecutive subjects were screened for pre-diabetic conditions with OGTT [oral glucose tolerance test] with 75 g of glucose. Testing for HbA1c, lipid profile and fasting insulin levels was also performed…….Screening with HbA1c identified 53.4 % of the 193 patients with IFG and/or IGT diagnosed at OGTT….IFCC-aligned HbA1c assay proved scarcely effective in detecting IFG and/or IGT in a large Caucasian population, identifying only half of the patients with abnormal OGTT. Moreover, adding HbA1c screening to OGTT may be of little benefit in identifying subjects with a worse metabolic profile” taken from abstract View abstract


“We conducted a study aiming at assessing the use of risk factors-based screening for impaired fasting glucose (IFG). 5,276 diabetes free individuals (2,963 women; 56%), aged 45-55 years, who had at least one risk factor for diabetes development took part in a nationwide diabetes screening programme….. Sedentary lifestyle, family history of diabetes and newly diagnosed hypertension were similarly prevalent in both studied groups, however even when differences in prevalence of other risk factors reached statistical significance, the actual difference was relatively small….. In conclusion, prediabetes screening programmes conducted in high risk populations should not be risk factors driven; particularly they must not be based on family history of diabetes or sedentary lifestyle as these factors are equally often present in persons with prediabetes as well as normal fasting glucose” taken from abstract No freely available online abstract or full text


“The data from DMVhi suggests that unselected screening in this population results in a rate of undiagnosed type 2 diabetes and prediabetes which is higher than previous unselected populations in Europe and similar to rates seen in Irish populations selected based on risk factors for diabetes. This may be consistent with a higher rate of undiagnosed type 2 diabetes and prediabetes in the Irish population than was previously considered. Rates of type 2 diabetes and prediabetes in easily identifiable groups, such as older males, are significantly higher and suggest that
targeted screening of high risk groups might be desirable. Given the gender differences in prevalence of type 2 diabetes and prediabetes seen in data from this and other cohorts (more common in males), and the data that more women than men are missed when screening using fasting plasma glucose, a screening paradigm using age and gender specific criteria could be considered."
p10


“This population-based diabetes screening program generated long-term positive changes toward a healthy lifestyle as measured by physical activity and vegetable intake for all the participants without adverse effects on the HRQoL and depression”
taken from abstract

**Cross-sectional studies**


“We consolidated data from 1,663 participants, ages ≥45 years, without a prior diabetes diagnosis, from population- and community-based studies…… Clinical measures included a 2-h 75-g oral glucose tolerance test, BMI, and glycosylated hemoglobin (HbA1c)…… Mean age was 59.7 years, mean BMI was 25.4 kg/m2, 58% were women, and type 2 diabetes prevalence (American Diabetes Association 2010 criteria) was 16.9%. At BMI≥25 kg/m2, sensitivity (63.7%), specificity (52.8%), and Youden index (0.16) values were low; limiting screening to BMI≥25 kg/m2 would miss 36% of Asian Americans with type 2 diabetes. For screening purposes, higher sensitivity is desirable to minimize missing cases, especially if the diagnostic test is relatively simple and inexpensive. At BMI≥23 kg/m2, sensitivity (84.7%) was high in the total sample and by sex and Asian-American subgroup and would miss only 15% of Asian Americans with diabetes”
taken from abstract


“Dental patients 45 years and older who were not aware of their diabetic status underwent evaluation for diabetes risk with an American Diabetes Association Diabetes Risk Test and with hemoglobin (Hb) A1c measurement. Participants with an HbA1c level of 5.7 percent or greater were referred to their physicians for diagnosis……Of the 1,022 patients screened, 416 (40.7 percent) had an HbA1c blood
level of 5.7 percent or greater and were referred for diagnosis. The HbA1c and the American Diabetes Association Diabetes Risk Test were correlated (P < .001). Of the 416 participants who were referred, 35.1 percent received a diagnosis from their physicians within one year; 78.8 percent of these patients were seen in the community health center and 21.4 percent were seen in private dental offices. The diagnoses were diabetes (12.3 percent of patients), high risk of developing diabetes (that is, prediabetes) (23.3 percent) and no diabetes (64.4 percent)” taken from abstract


“A pooled cross-sectional analysis of adults from two cycles (2007-2008, 2009-2010) of the National Health and Nutrition Examination Survey was conducted. Those with prediabetes were identified by excluding people with self-reported diabetes and then screening for hemoglobin A1c values between 5.7% and 6.4%. This group was then divided based on self-reported prediabetes…..Of those meeting the defined criteria for prediabetes (n=2,694), only 11.8% (n=288) were aware of their status. Prediabetes-aware individuals had higher odds of engagement in the combination of moderate physical activity plus BMI-appropriate weight management (AOR=1.5, 95% CI=1.1, 2.0), and the combination of at least 150 minutes/week of moderate activity and 7% weight loss in the past year (AOR=2.4, 95% CI=1.1, 5.6)……Increasing patients’ awareness of prediabetes could result in increased performance of exercise and weight management behaviors and, most importantly, decreased risk of future diabetes” taken from abstract


“A 5-point Likert scale (1=very important/willing, 5=very unimportant/unwilling) survey was mailed to a nationwide sample of primary care physicians in the United States…..Of 1,508 respondents, the majority felt it was valuable for dentists to conduct screening for cardiovascular disease (61 percent), hypertension (77 percent), diabetes mellitus (71 percent), and HIV infection (64 percent). Respondents were willing to discuss results with the dentist (76 percent), accept patient referrals (89 percent), and felt it was unimportant that the medical referral came from a dentist rather than a physician (52 percent). The most important consideration was patient willingness (mean rank 2.55), and the least important was duplication of roles (mean rank 3.52)……Primary care physicians considered chairside medical screening in a dental setting to be valuable and worthwhile” taken from abstract

View abstract

“Cross-sectional study in primary care settings in the three east London CCGs (Newham, City and Hackney, and Tower Hamlets)…..Data were extracted from electronic health records of 930 000 patients registered with 137 of 141 general practices for a year ending 1 April 2014…..Of 341 099 patients aged 30-74 years, excluding those with CVD or diabetes, 22 393 were prescribed statins and had a 10-year CVD risk recorded. Of these, 9828 (43.9%) had a CVD risk ≥20%, 7121 (31.8%) had a CVD risk of 10-19%, and 5444 (24.3%) had a CVD risk <10%. Statins were prescribed to 9828/19 755 (49.7%) of those at ≥20% CVD risk, to 7121/37 111 (19.2%) of those with CVD risk 10-19%, and to 5444/146 676 (3.7%) of those with CVD risk <10%. Statin prescription below the 20% CVD risk threshold targeted individuals in the 10-19% risk band in association with hypertension, high serum cholesterol, positive family history, older age, and south Asian ethnicity…..This study confirms continuing undertreatment of patients at highest CVD risk (≥20%). GPs prescribed statins to only one-fifth of those in the 10-19% risk band usually in association with known major risk factors. Only 3.7% of individuals below 10% were prescribed statins” taken from abstract
View abstract


“In a cross sectional study, 287 clients aged between 30-75 years without previously diagnosed CVD, diabetes or recent health check-up for blood glucose and lipid profile were screened…..Measurement of all major cardiovascular risk factors (BP, lipid profile, blood glucose), exercise habits, existing medical conditions and medications, family history, was performed by the investigator (student pharmacist)…..Data from 287 participants were analyzed: 200 (69.7%) male; 52 (18%) smoker, 134 (47%) had a family history of CVD, 187 (65%) had little or no regular exercise, 201 (70%) were overweight or obese, and 140 (49%) had raised waist circumference. Of them, 146 (50%) of the participants were referred for due to high Framingham score or at least one abnormal test…..Approximately half of the the individuals who received the follow up recommendation had made an appointment with their physician (54%). Overall, 15.9% of the individuals had received medications and 15.9% received appropriate advice for modifying their risk factors from their physician” taken from abstract
No freely available online abstract or full text

“This was a Cross-sectional survey…..Non-pregnant adults (≥21 years) without diabetes or prediabetes who participated in the National Health and Nutrition Examination Survey (NHANES) in 2005-2012 (n=17,572) were included in the study. "Screening-recommended" participants, classified by ADA criteria, included (1) adults ≥45 years and (2) “high-risk” adults <45 years. "Screening-not-recommended" participants were adults <45 years who did not meet criteria…..Diabetes screening status was obtained by self-report. We used calibrated HbA1c and/or fasting glucose levels to define undiagnosed diabetes and prediabetes…..Seventy-six percent of the study population (approximately 136 million US adults) met ADA criteria. Among them, less than half (46.2%) reported screening; undiagnosed diabetes affected 3.7% (5 million individuals), and undiagnosed prediabetes affected 36.3% (49 million people.) African Americans were more likely to report screening, both among adults ≥45 years and among "high risk" younger adults (OR 1.27 and 1.36, respectively.) Hispanic participants were also more likely to report screening (OR 1.31 for older adults, 1.42 for younger adults.) The screening rate among "screening-not-recommended" adults was 29.6%; the prevalence of diabetes and prediabetes were 0.4 and 10.2%, respectively” taken from abstract

View abstract


“A cross-sectional study with nationally representative samples of 25490 subjects aged ≥ 20 years from the KHNANES 2008 to 2011, which applied a complex, multistage, probability proportional to size sampling design. Subjects were categorized as having normal glucose (n = 16880), impaired fasting glucose (n = 5771), undiagnosed diabetes (n = 713), or diagnosed diabetes (n = 2126)……… People with undiagnosed diabetes have a higher predicted risk for cardiovascular disease compared to those with diagnosed diabetes. Intensive screening for diabetes in younger adults should be stressed in public healthcare to reduce the burden of modifiable cardiometabolic risk among individuals with undiagnosed diabetes” taken from abstract

View abstract

“Over 230,000 screening records for individuals who had undergone carotid artery stenosis (CAD), abdominal aortic aneurysm (AAA), or peripheral artery disease (PAD) screening were reviewed. Participants were stratified based on self-reported risk factors as having no risk factors, one risk factor, or two or more risk factors. Self-reported risk factors were also compared with results of screening for blood pressure, blood glucose, and lipid level status.....Abnormal findings of CAS, AAA, and PAD were all uncovered in individuals who self-reported as having no traditional risk factors. These abnormal findings included those defined as severe. The review of self-reported risk factors for accuracy demonstrated varying levels of inaccuracies in both under and over-reporting of risk factors......Community-based cardiovascular screening may result in the identification of cardiovascular disease in individuals with no established risk factors” taken from abstract

View full text


“Our screening campaign found a significant decrease of the 10-year risk of cardiovascular disease, measured by Framingham or SCORE methods. These results suggest that community prevention programs may improve the control of CVRFs with a potential impact of prognosis in a general population” taken from abstract

No freely available online abstract or full text


“Our estimates suggest that just 1 year of routine opportunistic hypertension screening during formal visits to medical-care providers could yield significant increases in hypertension awareness among seniors in the developing world. We also show that eliminating missed opportunities for hypertension screening in medical settings would not necessarily exacerbate existing socioeconomic differences in hypertension awareness, despite requiring at least occasional contact with a formal health-care provider for obtaining a hypertension diagnosis. Thus,
routine opportunistic screening for hypertension in formal medical settings may provide a simple but reliable way to increase hypertension awareness" taken from abstract
View full text


“We hypothesized that an embedded clinical decision support system (CDSS) within the Electronic Health Record (EHR) would facilitate identification of patients with prediabetes. 20 primary care practices within MedStar Health were randomized by cluster to usual care (no CDSS), CDSS following ADA guidelines for prediabetes/diabetes screening, or CDSS following the U.S. Preventive Service Task Force guidelines for a pilot period of 2 months.....CDSS following either guideline resulted in higher screening of patients at risk and prediabetes identification compared to usual care.....Embedding CDSS within EHR workflow to enhance identification of patients at high risk of diabetes is feasible and effective, and may allow for greater diabetes prevention efforts within primary care"
No freely available online abstract or full text


“Blood donation campaigns which involved the public community between January 2013 and June 2013 were included in this study. Donors above 30-years-old, not known to have diabetes, consented for diabetes screening.....Blood donors are expected to be healthy volunteers. The diabetes prevalence among blood donors (5.0%) is considered low if compared with the prevalence in the whole population (20.8%). However, the number is largely comparable to the prevalence of undiagnosed diabetes in the country (10.1%). Routine diabetes screening during blood donation campaign should be implemented to safeguard donors’ health and serve as a public health initiative to improve community health” taken from abstract
View full text


“In summary, our study demonstrates the simultaneous testing model, combining a simple diabetes risk score with the HbA1c test to significantly improve the sensitivity in detecting undiagnosed diabetes and pre-diabetes, including isolated IGT. This
model is a simple, practical and reliable tool in opportunistic diabetes screening in the U.S. population. Further study is warranted to evaluate the cost effectiveness of this screening model" p12

View full text

Qualitative research


“This paper adds to the literature concerning how the scope of medical surveillance and management is expanded in an ever-increasing range of health-related phenomena by employing the concept of risk.....the degree to which risk is discussed explicitly in medical contexts depends on a number of variables, such as the perceived cause (genetics or lifestyle), and how imminently the adverse event is likely to affect the patient’s life. In the case of prediabetes, the significance of high HbA1c levels promotes an obligation to act immediately to prevent development of full-blown diabetes.....Thus, it constitutes a strategy for disciplinary power to monitor and govern individuals with the aim of achieving behavioural modification.....This study has shown that, whereas epidemiology speaks of the risk of diabetes as a measured property of a group of people, some HCPs [health care professionals] speak of the risk of diabetes as a specific property of the prediabetic. By elevating prediabetes to a disease category, new expectations and obligations are created concerning who bears responsibility for health maintenance. The aim is to ensure prediabetics see their lifestyle as problematic from a medical point of view” p578

View abstract


“Two themes emerged from the data: a threatening risk perception and a rejected risk perception. The threatening risk perception occurred when the risk was unexpected by the participant, but became internalized through the screening procedure. The threatening perception also involved a commitment to increase physical activity to prevent diabetes. However, short-term anxiety and subsequently emerging hopelessness were also part of this perception. The rejected risk perception involved indifference and scepticism regarding the risk. Here, physical activity behaviour and cognitions appeared to remain unchanged. Rejection also involved difficulties in accepting one’s high-risk identity. The rejecting group lacked motivation for increased physical activity, while the other group showed determination regarding increased physical activity, often leading to success” View abstract

“Focus groups were conducted with physicians working in community health centers (puskesmas) in Indonesia to explore physicians’ practices with regard to stroke risk screening and patient education to reduce stroke risk. Physicians perceive that patients commonly have misconceptions about their stroke risk factors, indicating a need for patient education. Screening and education practices vary considerably among Indonesian primary care physicians, suggesting a need for physicians to improve their patient education and counseling practices. Physicians reported lack of time during appointments, as well as their perceptions of patients’ reluctance to modify their behaviors and patients’ low level of education as barriers to patient education for stroke prevention” taken from abstract

View abstract


“The results of the national postal survey suggested that community pharmacists in NZ are currently involved in CVD prevention strategies, although most are related to screening patients for the presence of risk factors with minimal involvement in CVD absolute risk assessment or management. The research into the views of key stakeholders, in an effort to understand this poor uptake of pharmacists in CVD prevention strategies, revealed that time, remuneration and perceived lack of adequate training on the part of pharmacists were significant barriers. Despite these barriers, the three key stakeholders indicated that further involvement of community pharmacists in CVD risk reduction strategies would result in increased and wider access to cardiovascular primary health care services” taken from abstract

View full text

**Service evaluation**


“During 25 months of implementing the intervention [nurse facilitated, smartphone-based decision-support], trained nurses carried out opportunistic screening of 23,542 patients, using DSS [decision support system software], at the out-patient department of five CHCs [Community Health Centres]. A total of 1,727 subjects were
identified with diabetes, of which 525 (30%) subjects were newly detected during screening. Using DSS generated management plan, nurses facilitated diabetes care with the concurrence of doctors. In this group, 635 subjects attained one year follow-up and the mean reduction in fasting blood sugar level observed was 2.38 mmol/l.

The mPower Heart project demonstrated that a nurse-facilitated, DSS enabled intervention is feasible and acceptable at primary care setting in India” taken from abstract

No freely available online abstract or full text


“As the prevalence of prediabetes continues to grow in Canada, so too must the number of targeted prevention strategies aimed at helping people improve their lifestyle through the inclusion of regular PA. Access to healthcare and allied health professionals typically is limited to brief appointments with primary care physicians or nurse practitioners, who often have inadequate education pertaining to specific PA recommendations for persons at high risk for developing a chronic disease. Detection of prediabetes is the first step toward diabetes prevention and by advancing the role of QEPs and other non-health-related community workers, the capacity to provide screening opportunities and PA interventions at the community level would be enhanced. Findings from the PRE-PAID project emphasize the need for effective community partnership and help to inform further community-based PA intervention programs targeting people with prediabetes, especially those from high-risk ethnicities, living in communities known to possess higher rates of diabetes prevalence” p419

View abstract


“The present study piloted a screening protocol for type 2 diabetes using HbA1c capillary measurement, which to our knowledge, has never been designed nor tested in the community pharmacy setting. Piloting innovations in real scenarios is important as it allows optimization (redesign based on strengths and issues) before further evaluation (assessing clinical, economic and humanistic outcomes) and implementation…..Regarding the strengths of the protocol, pharmacists’ adherence to the first two steps of the protocol was remarkably high. The relative simplicity and short time they involve, may explain this high adherence. The adherence to the protocol diminished in the next step, where only 62.2% of the subjects who should
have visited their GP, completed the “referral” step. Based pharmacists opinions and available evidence, this lack of adherence may be explained by communication barriers with both patients and physicians” e51-52

<table>
<thead>
<tr>
<th>Modelling studies</th>
</tr>
</thead>
</table>

“In this analysis we sought to determine the health and economic impacts of shifting this [Cardiovascular Disease] screening to community health workers equipped with either a paper-based or a mobile phone-based screening tool. We found that screening by community health workers was very cost-effective or even cost-saving in all three countries, compared to the usual clinic-based screening. The mobile application emerged as the most cost-effective strategy because it could save more lives than the paper tool at minimal extra cost. Our modeling indicated that screening by community health workers, combined with improved treatment rates, would increase the number of deaths averted from 15,000 to 110,000, compared to standard care” taken from abstract


“Current individual and population screening methods rely on laboratory detection of hyperglycemia, which can be burdensome and costly, and fail to capture all those at risk. We therefore developed the HealthImpactTM model to prospectively identify patients at risk for diabetes using only administrative data. HealthImpact was developed and internally validated in a population of commercially insured adults, age >18 years, using administrative data from Optum Labs Data Warehouse (OLDW); n=473049 in training dataset and n=776074 in the internal validation dataset. We then externally validated HealthImpact in 2000000 non-diabetic adults in OLDW followed prospectively for 3 years. HealthImpact, scored on a linear scale 0-100, includes 47 demographic, medical, and medication variables obtained from administrative data…..HealthImpact performed comparable to invasive glycosylated hemoglobin, glucose, and glucose tolerance testing in predicting incident diabetes. HealthImpact is an efficient and effective method of risk stratification for incident diabetes that does not rely on patient-provided information or lab tests…..”

No freely available online abstract or full text

“Both local and international data were applied in the model in order to derive lifetime costs and outcomes resulting from the early treatment of diabetes and hypertension. The results indicate that the current screening option (where people who are overweight, obese or aged 40 years or older who visit primary care facilities are screened for diabetes and hypertension) represents good value for money compared to 'no screening'. The study findings also indicate that expanding opportunistic screening (70% coverage of the target population) to universal screening (where 100% of the target population are screened), is likely to be even more cost-effective. From the sensitivity analysis, the value of the screening options remains the same when disease prevalence varies. Therefore, applying this model to other healthcare settings is warranted, since disease prevalence is one of the major factors in affecting the cost-effectiveness results of screening programs” taken from abstract

Diagnostic test studies


“In this study we applied the tone-entropy algorithm for analysis of heart rate variability obtained from 20 minute ECG recordings and compared the outcome with the Framingham risk stratification. Our results indicate a good agreement between the T-E algorithm and the Framingham risk equation suggesting that this algorithm may be of use for initial screening of cardiovascular risk as it is noninvasive, economical and easy to use in clinical practice” taken from abstract


“There is considerable variation among CVD risk calculators in the relative risk increase for each specific risk factor. The highest average relative risk increase for a calculator was 3.4–18.2 higher than the lowest average relative risk increase, depending on risk factor. Some calculators more often produce higher relative risk changes (e.g. PROCAM) while others more often produce lower relative risk changes [e.g. Edinburgh (ASSIGN)]. However, there was also similarity among some of the calculators. Although consistency could occur among calculators derived from
Different databases, 10-year CVD Framingham calculators appeared to have the most consistent relative risk increases. Researchers and clinicians should not assume risk differences from reductions in risk factors are reliable or consistent from one calculator to the next. p7


“Combining adiposity variables did not improve discrimination beyond multivariable models with WC [waist circumference] alone......WC was the best predictors and to some extent WHR [waist-height-ratio] of prevalent SDM [screen-detected diabetes] in this population, while BMI [body mass index] and WHR [waist-hip-ratio] were less effective" taken from abstract


“200 German subjects at risk for diabetes (mean age 56+/−14 years, BMI 28.4+/−5.4kg/m2) were measured for anthropometric data on inflammatory parameters, including high sensitivity C reactive protein (hs-CRP). The subjects also underwent an oral glucose tolerance test with measurements of plasma glucose, insulin, proinsulin, C-peptide and free fatty acids during 2h following glucose challenge..... a significant difference was observed between OGTT-1h (p=0.004), AUC glucose (p=0.011), AUC C-peptide (p<0.001), HOMA-IR (p=0.009), Matsuda (p=0.002), SI (p<0.001) and hs-CRP (p=0.025) after adjustment for age. Among the 54 subjects with impaired fasting glucose or impaired glucose tolerance according to WHO classification, 37 had a moderate risk and 15 a high risk according to the EZSCAN risk model classification. Among the 12 subjects with newly diagnosed diabetes, 2 had a moderate risk and 10 a high risk according to the risk model classification...... These results, in accordance with a previous study performed in India, show that EZSCAN could be developed as a screening tool for diabetes risk, and could help to improve diabetes screening strategies” taken from abstract

View full text

“In the Japanese population, optimal HbA1c cutoffs for diagnosing diabetes and prediabetes were 6.0% (sensitivity 83.7%, specificity 87.6%) and 5.7% (sensitivity 60.6%, specificity 72.1%). For the identification of diabetes, HbA1c has optimal sensitivity and specificity to be considered as a mass screening tool. On the other hand, for the identification of prediabetes, HbA1c may be inadequate as a screening tool because of its high false-negative results” taken from conclusion

View full text


“Saliva glucose (SG) has long been considered a possible surrogate for blood glucose (BG) screening or monitoring in diabetes mellitus (DM), though limited sensitivities of reported assays have so far prevented this option. We present a novel, rapid response, colorimetric, single-use, cost-effective Glucose PopTest (GPT) with sufficient readability, sensitivity, and specificity to accurately reflect BG levels in diabetic and non-diabetic individuals. Two devices were evaluated: GPT-1 (detecting down to 0.7 mg/dL SG) and a further optimized GPT-2 (detecting down to 0.25 mg/dL SG)……The Glucose PopTest sensitively and specifically measures SG confirming its viability for population screening for DM and possibly for pre-diabetes” taken from abstract

View conference abstract


“In 2013 and 2014, we performed hemoglobin A1c (HbA1c) tests on dried blood samples of gingival crevicular blood and compared these with paired “gold-standard” HbA1c tests with dried finger-stick blood samples in New York City dental clinic patients. We examined differences in sociodemographics and diabetes-related risk and health care characteristics for 3 groups of at-risk patients. Results. About half of the study sample had elevated HbA1c values in the combined prediabetes and diabetes ranges, with approximately one fourth of those in the diabetes range. With a correlation of 0.991 between gingival crevicular and finger-stick blood HbA1c, measures of concurrence between the tests were extremely high for both elevated HbA1c and diabetes-range HbA1c levels. Persons already diagnosed with diabetes
and undiagnosed persons aged 45 years or older could especially benefit from HbA1c testing at dental visits” taken from abstract
View abstract