Public Health England

Protecting and improving the nation's health

NHS Health Check programme:
Literature review July 2015 to October 2015

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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

Database	Search strategy
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

	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

PubMed	1. health check* 2. diabetes screen* 3. cardiovascular screen* 4. population screen* 5. risk factor screen*. 6. opportunistic screen* 7. medical check* 8. general check* 9. periodic health exam* 10. annual exam* 11. annual review* 12. NHSHC 13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 Filters: Publication date from 2015/07/01 to 2015/10/12
NHS Evidence	"health check*", limited to last 3 months
Google Scholar	*"nhs health check*" OR cardiovascular "health check**" limited to articles added in the last year, sorted by date, last 110 days
Google	*""nhs health check"* limited to 1st July-12th Oct 2015, first 200 hits, sorted by relevance
Clinical trials.gov and ISRCDN registry	*"health check"*

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

Database	No. of hits	Exclusive
Medline	288	288
Embase	684	561
HMIC	15	15
CINAHL	74	48
Global Health	584	470
PsycInfo	59	54
Cochrane Library	63	62
PubMed*	285	219
TOTAL		**1717**

**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.

Internet sources	No. of hits
NHS Evidence	61
Google Scholar	348
Google	200
Trials registers	101
TOTAL	**710**

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?

Database or internet source

Author	Medline	Embase	HMIC	CINAHL	Global Health	PsycInfo	Cochrane Library	PubMed	NHS Evidence	Google scholar	Google	Trials registers
Carter P								x		x	x	
Chang KC	x	x		x	x			x		x	x	
Forster AS (2015)								x	x	x	x	
Ahmad S								x		x	x	
Usher-Smith JA								x		x	x	
Firth H		x		x	x			x	x	x	x	
Krska J										x	x	
Riley R								x		x	x	
Saramunee K			x	x	x			x	x	x	x	
McGrady MG	x							x		x	x	
Hawkes N								x		x	x	
Coffee S											x	
Forster AS (2014)		x					x	x		x	x	x
Leics City Council											x	
Timmis A											x	x

4. References on the NHS Health Check Programme (15)

Cohort studies

Carter P et al. (2015). *A retrospective evaluation of the NHS Health Check Programme in a multi-ethnic population*. J Public Health. 2015 doi: 10.1093/pubmed/fdv115. First published online: August 27, 2015.

"*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%).16 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%.12,15 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*" p3
View full text

Chang KC et al. (2015). *Coverage of a national cardiovascular risk assessment and management programme (NHS Health Check): Retrospective database study*. Preventive Medicine 78: 1-8.

"*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*" taken from abstract
View abstract
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.

Forster AS et al. (2015). *Do health checks improve risk factor detection in primary care? Matched cohort study using electronic health records*. Journal of Public Health doi: 10.1093/pubmed/fdv119. First published online: September 7, 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

Ahmad S et al. (2015). *Evaluation of reliability and validity of the General Practice Physical Activity Questionnaire (GPPAQ) in 60-74 year old primary care patients*. BMC Fam Pract 16: 113.

"*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

Usher-Smith JA et al. (2015). *Offering statins to a population attending health checks with a 10-year cardiovascular disease risk between 10% and 20*. Int J Clin Pract. Sep 30. doi: 10.1111/ijcp.12742.

"*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

Firth H et al. (2015). *Benefits and barriers to the public health pharmacy: A qualitative exploration of providers and commissioners perceptions of the Healthy Living Pharmacy framework*. Perspectives in Public Health 135(5): 251-256.

"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

Krska J et al. (2015). *Pharmacy Health Checks: Views and experiences of Local Pharmaceutical Committees and pharmacists*. Medway School of Pharmacy, University of Kent, July 2015.

"*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

Riley R et al. (2015). *Experiences of patients and healthcare professionals of NHS cardiovascular health checks: a qualitative study*. J Public Health doi: 10.1093/pubmed/fdv121. First published online: September 25, 2015.

"*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

Saramunee K et al (2015). *General public's views on pharmacy public health services : current situation and opportunities in the future*. Public Health. 2015 Jun;129(6):705-15.

"*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

McGrady MG et al. (2015). *NHS Health Checks in a primary care dental setting - an opportunity for the profession to maximise uptake for public health partners*? Br Dent J 219(3): 107-109.

"*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……"
View full text

Hawkes N. (2015). *GPs must redesign Health Check programme if they want it to work*. BMJ 351: h3888.

"*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*"
View full text

Coffee S (2015). *Engaging Mental Health Service Users in Solihull with the NHS Health Check programme: a community pilot project.* NHS Improving Quality, July 2015.
"*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" p1
View full text

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 12weeks for nonattenders. Group B receives a QBE questionnaire 1week 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
View full text

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*"
View details

Timmis A (2015). *Enhancing Diagnosis and Prevention of Cardiovascular Disease in Newham by Integrated Use of Electronic Health Records*. Queen Mary University of London, August 2015.

"*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*"
View details

References relating to general health checks (27)

Evidence summaries

Eikermann M. (2015). *General health checks and individual out-of-pocket health services*. Internist (Berl) 56(10): 1134-1139.

"*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

Virgini V et al. (2015). Check-up examination: recommendations in adults. Swiss Medical Weekly 145: w14075.

"*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)

Health Council of the Netherlands (2015). *Checking checked: appropriate use of health checks.* The Hague: Health Council of the Netherlands, 2015; publication no. 2015/05. ISBN 978-94-6281-037-2.

"*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

Agarwal G (2012). *Uptake of online versus paper-based diabetes risk screening assessment in a large primary care setting*. Canadian Journal of Diabetes Volume 36, Issue 5, Supplement, Page S2.

"*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

Bender AM et al. (2015). *Neighborhood social capital is associated with participation in health checks of a general population: a multilevel analysis of a population-based lifestyle intervention - the Inter99 study*. BMC Public Health 15(694): 22 July 2015.

"*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

Groenenberg I et al. (2015). *Response and participation of underserved populations after a three-step invitation strategy for a cardiometabolic health check*. BMC Public Health 15(854). Published: 3 September 2015.

"*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

Journath G et al. (2015). *Long-term effects of a cardiovascular prevention program in primary health care in Sweden*. European Heart Journal 36: 1201. Conference: European Society of Cardiology, ESC Congress 2015, London. Conference Start: 20150829 Conference End: 20150902. Date of Publication: 01 Aug 2015.

"*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

Murray KA et al. (2014). *Comparison of uptake and predictors of adherence in primary and secondary prevention of cardiovascular disease in a community-based cardiovascular prevention programme (MyAction Westminster*). Journal of Public Health 36(4): 644-650.

“*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

Damman OC et al. (2015). *Employees are ambivalent about health checks in the occupational setting.* Occup Med (Lond) 65(6): 451-458.

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

El Bcheraoui C et al. (2015). *Low uptake of periodic health examinations in the Kingdom of Saudi Arabia, 2013*. J Family Med Prim Care 4(3): 342-346.

“*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
View full text

Goto Y et al. (2015). *Body mass index and waist circumference are independent risk factors for low vital capacity among Japanese participants of a health checkup: a single-institution cross-sectional study*. Environmental Health and Preventive Medicine 20(2): 108-115.

"*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*"
View abstract

Grady A et al. *GP detection of health risk factors among general practice patients at risk of primary and secondary stroke*. Fam Pract. 2015 Jun;32(3):336-42

"*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
View abstract

Hoebel J et al. (2014). *Determinants of health check attendance in adults: findings from the cross-sectional German Health Update (GEDA) study*. BMC Public Health 14: 913.

"*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
View full text

Kawada T et al. (2015). *Waist circumference, visceral abdominal fat thickness and three components of metabolic syndrome*. Diabetes Metab Syndr. Sep 8. pii: S1871-4021(15)00080-6.

"*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
View abstract

Liu M et al. (2015). *Diabetes prevalence and associated risk factors analysis with the results of health physical examination*. Progress in Modern Biomedicine 15(11): 2095-2097.

"*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)

Mao Y and Mai Y (2015). *Annual health check-up improves awareness, treatment, and control of diabetes.* Diabetes 64: A685-A686. Conference: 75th Scientific Sessions of the American Diabetes Association, Boston, United States. Date of Publication: June 2015.

"*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 middleaged population*" taken from abstract
No freely available online abstract or full text

Tanigawa T et al. (2015). *Type A behavior pattern as risk factor of cardiovascular disease.* Psychotherapy and Psychosomatics 84: 71. Conference: 23rd World Congress on Psychosomatic Medicine, Glasgow, United Kingdom. Date of Publication: August 2015.

"*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

Qidwai W et al. (2015). *Health Promotion, Disease Prevention and Periodic Health Checks: Perceptions and Practice among Family Physicians in Eastern Mediterranean Region*. Middle East Journal of Family Medicine Vol 13 issue 5 July-August 2015.

"*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

Hackl F et al. (2015). *The effectiveness of health screening*. Health Economics 24(8): 913.

"*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 costsavings 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.

Abbas SZ et al. (2015). *The effectiveness of using the workplace to identify and address modifiable health risk factors in deprived populations*. Occupational and Environmental Medicine 72(9): 664-669.

"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

Pellizzari B et al. (2014). *Cardiovascular screening*. Epidemiologia e Prevenzione 38(6 Suppl 2): 73-77.

"*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

Nelson PA et al. (2015). '*I should have taken that further'–missed opportunities during cardiovascular risk assessment in patients with psoriasis in UK primary care settings: a mixed-methods study*. Health Expectations. 2015 Sep 4. doi: 10.1111/hex.12404.

"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

Hornsten A et al. (2014). *Strategies in health-promoting dialogues-primary healthcare nurses' perspectives-a qualitative study*. Scandinavian Journal of Caring Sciences 28(2): 235-244.

"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

Kim S et al. (2015). *Life satisfaction and use of preventive health care services*. Health Psychology 34(7): 779.

"*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

Igase M et al. (2015). *Skin autofluorescence examination as a diagnostic tool in medical check-ups.* Atherosclerosis 241 (1): e223.

"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

Hoj K et al. (2014). *Effect of including fitness testing in preventive health checks on cardiorespiratory fitness and motivation: study protocol of a randomized controlled trial*. BMC Public Health 14: 1057. TRIAL REGISTRATION: ClinicalTrials.gov Identifier: NCT02224248. Registered 8 August 2014.

"*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

View full details

References relating to diabetes and cardiovascular risk screening (56)

Systematic reviews

Jansen J et al. (2015). *Systematic review of clinical practice guidelines recommendations about primary cardiovascular disease prevention for older adults*. BMC Family Practice 16(1): 104.

"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

Krogsbøll LT et al. (2015). *Screening with urinary dipsticks for reducing morbidity and mortality*. Cochrane Database of Systematic Reviews DOI: 10.1002/14651858.CD010007.pub2.

"*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

Selph S et al. (2015). *Screening for type 2 diabetes mellitus: a systematic review for the U.S. Preventive Services Task Force*. Annals of Internal Medicine 162(11): 765-776.

"*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
View full text

See also this EBM commentary on the above:
Yoon U (2015). *Type 2 diabetes mellitus screening has no effect on mortality*. Evidence-Based Medicine 20(4): 136.
"*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

Uthman Olalekan A et al. (2015). *Multiple risk factor interventions for primary prevention of cardiovascular disease in low- and middle-income countries*. Cochrane Database of Systematic Reviews DOI: 10.1002/14651858.CD011163.pub2.

"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
View full text

Topic overviews

Hsu WC et al. (2015). *BMI cut points to identify at-risk Asian Americans for type 2 diabetes screening.* Diabetes Care 38(1): 150-158.

"*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
View abstract

Evidence summaries

Durao S et al. (2015). *Evidence insufficient to confirm the value of population screening for diabetes and hypertension in low- and-middle-income settings*. South African Medical Journal. S Afr Med J 105(2): 98-102.

"*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
View full text

Eborall HC (2015). *Long term impact of screening for type 2 diabetes mellitus - a commentary on new evidence*. Evidence Based Medicine 20(4): 135.

"*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
View full text

Tanner M (2015). *Review: Type 2 diabetes screening does not reduce mortality, but treating dysglycemia delays onset of diabetes*. Annals of Internal Medicine 163(6): JC2.
No freely available online abstract or full text available.

Health Technology Assessments (HTA)

Gillett M et al. (2015). *The cost-effectiveness of testing strategies for type 2 diabetes: a modelling study.* Health Technology Assessment vol 19 issue 33 May 2015.

"*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*" pxix
View full text

Trials

Hori A et al. (2014). *Comparison of body mass index, waist circumference, and waist-to-height ratio for predicting the clustering of cardiometabolic risk factors by age in Japanese workers-Japan Epidemiology Collaboration on Occupational Health study.* Circulation Journal 78(5): 1160-1168.

*"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

Kumar S et al. (2015). *Effect of mobile reminders on screening yield during opportunistic screening for type 2 diabetes mellitus in a primary health care setting: A randomized trial*. Preventive Medicine Reports 2: 640-644.

"*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

Tao L et al. (2015). *Cost-effectiveness of intensive multifactorial treatment compared with routine care for individuals with screen detected Type 2 diabetes: Analysis of the ADDITION-UK cluster-randomized controlled trial*. Diabetic Medicine 32(7): 907-919.

"*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

Gaziano TA et al. (2015). *An assessment of community health workers' ability to screen for cardiovascular disease risk with a simple, non-invasive risk assessment instrument in Bangladesh, Guatemala, Mexico, and South Africa: an observational study*. Lancet Global Health 3(9): e556-e563.

"*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 κ=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
View full text

Johansen NB et al. (2015). *10-Year diabetes incidence among individuals participating in a diabetes screening program: The addition-DK study*. Diabetes 64: A401. 75th Scientific Sessions of the American Diabetes Association Boston, MA United States.

"*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

Lee H et al. (2015). *Association of cardiovascular health screening with mortality, clinical outcomes, and health care cost: a nationwide cohort study*. Preventive Medicine 70: 19-25.

"Cohort study of a 3% random sample of all Korea National Health Insurance members 40years 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

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
View abstract

Móczár C and Rurik I (2015). *Comparison of cardiovascular risk screening methods and mortality data among Hungarian primary care population: preliminary results of the first government-financed managed care program*. Slovenian Journal of Public Health 54(3): 154-160.

"*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
View abstract

Prestgaard E et al. (2015). *Long-term predictors of stroke in middle-aged, healthy norwegian men. Results from oslo ischaemia study (OIS*). Journal of Hypertension 33: e318. 25th European Meeting on Hypertension and Cardiovascular Protection, ESH 2015 Milan Italy.

"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

Reid RJ et al. (2015). *Relationship between cardiovascular risk and lipid testing in one health care system: a retrospective cohort study*. BMC Health Services Research 15: 281.

"*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

Robbins CL et al. (2015). *Outcomes of cardiovascular disease risk factor screening and referrals in a family planning clinic*. Journal of Women's Health 24(2): 131-137.

"*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

Simmons RK et al. (2014). *Variation in prescribing of lipid-lowering medication in primary care is associated with incidence of cardiovascular disease and all-cause mortality in people with screen-detected diabetes: findings from the ADDITION-Denmark trial*. Diabetic Medicine 31(12): 1577-1585.

"*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

Chilelli NC et al. (2014). *Screening with HbA1c identifies only one in two individuals with diagnosis of prediabetes at oral glucose tolerance test: findings in a real-world Caucasian population*. Acta Diabetologica 51(5): 875-882.

"*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

Szymanska-Garbacz E et al. (2015). *Poor performance of risk factors-driven screening for prediabetes*. Diabetes 64: A405. 75th Scientific Sessions of the American Diabetes Association Boston, MA United States.

"*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

Sinnott M et al. (2015). *Fasting plasma glucose as initial screening for diabetes and prediabetes in Irish adults: the diabetes mellitus and vascular health initiative (DMVhi).* PLoS ONE 10(4): e0122704-e0122704.

"*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
View full text

Zhang Y et al. (2015). *Impact of a diabetes screening program on a rural Chinese population: a 3-year follow-up study*. BMC Public Health 15: 198.

"*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
View full text

Cross-sectional studies

Araneta MRG et al. (2015). *Optimum BMI cut points to screen Asian Americans for type 2 diabetes*. Diabetes Care 38(5): 814-820.

"*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
View abstract

Genco RJ et al. (2014). *Screening for diabetes mellitus in dental practices: a field trial.* Journal of the American Dental Association 145(1): 57-64.

"*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
View abstract

Gopalan A et al. (2015). *Awareness of prediabetes and engagement in diabetes risk-reducing behaviors.* American Journal of Preventive Medicine 49(4): 512-519.

"*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
View abstract

Greenberg BL et al. (2015). *Physicians' attitudes toward medical screening in a dental setting*. Journal of Public Health Dentistry 75(3): 225-233.

"*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

Homer K et al. (2015). *Statin prescribing for primary prevention of cardiovascular disease: a cross-sectional, observational study*. Br J Gen Pract 65(637): e538-e544.

"*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

Jahangard-Rafsanjani Z et al. (2015). *A community pharmacy-based cardiovascular risk screening service implemented in a resource-limited country*. European Heart Journal 36: 472-473. European Society of Cardiology, ESC Congress 2015 London United Kingdom.

"*In a cross sectional study, 287 clients aged between 30-75 years without previousely 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 littile 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

Kiefer MM et al. (2015). *National patterns in diabetes screening: data from the National Health and Nutrition Examination Survey (NHANES) 2005-2012*. Journal of General Internal Medicine 30(5): 612-618.

"*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

Lee YH et al. (2015). *Undiagnosed diabetes is prevalent in younger adults and associated with a higher risk cardiometabolic profile compared to diagnosed diabetes*. American Heart Journal 170(4): 760-769.

"*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

Weisman SM et al. (2015). *Community-based cardiovascular screening: detection of disease in individuals with no self-reported risk factors*. Open Journal of Preventive Medicine 5(2): 78-83.

"*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

Mansencal N et al. (2015). *Changes in the Framingham 10-year risk of cardiovascular disease and the European 10-year risk of fatal cardiovascular disease in a large untreated urban population*. European Heart Journal 36: 1042.

"*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

Maurer J and Ramos A (2015). *One-year routine opportunistic screening for hypertension in formal medical settings and potential improvements in hypertension awareness among older persons in developing countries: evidence from the study on global ageing and adult health (SAGE).* American Journal of Epidemiology 181(3): 180-184.

"*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

Peng H et al. (2015). *Clinical decision support to enhance prediabetes screening in primary care.* Diabetes 64: A408-A409. 75th Scientific Sessions of the American Diabetes Association Boston, MA United States.

"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

Samad NA et al. (2015). *Routine diabetes screening in blood donation campaigns*. Malaysian Journal of Pathology 37(2): 137-140.

"*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

Zhang Y et al. (2015). *A novel testing model for opportunistic screening of pre-diabetes and diabetes among U.S. adults*. PLoS ONE 10(3): e0120382-e0120382.

"*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

Hindhede AL and Aagaard-Hansen J (2015). *Risk, the prediabetes diagnosis and preventive strategies: critical insights from a qualitative study*. Critical Public Health 25(5): 569-581.

"*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

Vahasarja K et al. (2015). *'I saw what the future direction would be...': experiences of diabetes risk and physical activity after diabetes screening*. British Journal of Health Psychology 20(1): 172-193.

"*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

Williams PA et al. (2015). *Understanding physicians' perceived barriers to screening and patient education to reduce stroke risk in community health centers in Indonesia*. Journal of Communication in Healthcare 8(2): 143-150.

"*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

Zolezzi M (2013). *Evaluation of patient-centred services by community pharmacists in New Zealand: Focus on cardiovascular disease risk assessment*. phD thesis, The University of Auckland, December 10 2013.

"*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

Jindal D et al. (2015). *Development and pilot testing of a nurse-facilitated intervention for screening and management of diabetes in primary care settings in india: The mpower heart project*. Diabetes 64: A356. 75th Scientific Sessions of the American Diabetes Association Boston, MA United States. Date of Publication: June 2015.

*"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

Rowan CP et al. (2013). *The Prediabetes Detection and Physical Activity Intervention Delivery (PRE-PAID) program*. Canadian Journal of Diabetes 37(6): 415-419.

"*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

Fikri-Benbrahim N et al. (2015). *Assessment of a screening protocol for type 2 diabetes in community pharmacy*. *The DiabNow Study*. Diabetes Research and Clinical Practice 108(3): e49-e52.

"*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
View abstract

Modelling studies

Gaziano T et al. (2015). *Cardiovascular Disease Screening By Community Health Workers Can Be Cost-Effective In Low-Resource Countries*. Health Affairs 34(9): 1538-1545 1538p.

"*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
View abstract

McCoy RG et al. (2015). *Development and validation of healthimpact: An incident diabetes prediction model based on administrative data*. Diabetes 64: A347. 75th Scientific Sessions of the American Diabetes Association Boston, MA United States.

"*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

Dukpa W et al. (2015). "*Is diabetes and hypertension screening worthwhile in resource-limited settings? An economic evaluation based on a pilot of a Package of Essential Non-communicable disease interventions in Bhutan*. Health Policy and Planning 30(8): 1032-1043.

"*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
View abstract

Diagnostic test studies

Khandoker AH and Jelinek HF (2013). *Evaluating cardiovascular risk using the tone-entropy algorithm.* Conference Proceedings: Annual International Conference of the IEEE Engineering in Medicine & Biology Society 2013: 6139-6141.

"*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
View abstract

Allan GM et al. (2015). *Variation among cardiovascular risk calculators in relative risk increases with identical risk factor increases*. BMC Research Notes 8(1): 417.

"*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
View full text

Mbanya VN et al. (2015). *Body mass index, waist circumference, hip circumference, waist-hip-ratio and waist-height-ratio: which is the better discriminator of prevalent screen-detected diabetes in a Cameroonian population*? Diabetes Research and Clinical Practice 108(1): 23-30.

"Combining adiposity variables did not improve discrimination beyond multivariable models with WC [waist circumference] ***alone****……WC was the best predictors and to some extent WHtR* [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
View abstract

Muller G et al. (2015). *Non-invasive screening of diabetes risk by assessing abnormalities of sudomotor function*. Experimental & Clinical Endocrinology & Diabetes 123(1): 34-38.

"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 abstract

Shimodaira M et al. (2015). *Optimal hemoglobin a1c levels for screening of diabetes and prediabetes in the japanese population*. Journal of Diabetes Research DOI: 10.1155/2015/932057.

"*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

Theise ND et al. (2015). *Glucose poptest: Saliva glucose measurements reflect blood glucose level in diabetes population*. Diabetes 64: A236-A237. 75th Scientific Sessions of the American Diabetes Association Boston, MA United States.

"*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

Strauss SM et al. (2015). *The potential for glycemic control monitoring and screening for diabetes at dental visits using oral blood*. American Journal of Public Health 105(4): 796-801.

"*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