Public Health England

Protecting and improving the nation's health

NHS Health Check programme:
Literature review January 2016 to April 2016

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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, PubMed, 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, general health checks, diabetes and cardiovascular screening and cardiovascular disease prevention.

Previous searches had identified references from between January 1996 and January (week 2) 2016. This search identifies references **from January 2016 to April (week 3) 2016**. The cut-off date for internet searches was **30th April 2016**.

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. cardiovascular adj3 prevention.tw. 15. (primary care or general practice or primary healthcare).tw 16. 14 and 15 17. Cardiovascular Diseases/ AND Primary Prevention/ 18. 16 or 17 19. 13 or 18 20. limit 19 to ed=20160101-20160421
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 14. Cardiovascular Diseases AND Primary Prevention[MeSH Terms] 15. "primary care"[Text Word] OR "general practice"[Text Word] OR "primary healthcare"[Text Word]) 16. (cardiovascular[Text Word] AND prevention[Text Word]) 17. #15 and #16 18. #14 or #17 19. #13 or #18 Filters: Publication date from 2016/01/01 to 2016/04/21

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. cardiovascular adj3 prevention.tw.
16. (primary care or general practice or primary healthcare).tw
17. 15 and 16
18. cardiovascular disease/ AND primary prevention/
19. 17 or 18
20. 14 or 19
21. limit 20 to dd=20160101-20160421

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 cardiovascular adj3 prevention.tw.
8 (primary care or general practice or primary healthcare).tw
9 7 and 8
10 Cardiovascular diseases/ AND exp preventive medicine/
11 9 or 10
12 6 or 11
13 limit 12 to yr="2016"

EBSCO CINAHL	S10 S1 OR S2 OR S9 Limiters - Published Date: 20160101-20160421 S9 S5 OR S8 S8 S6 AND S7 S7 (MH "Preventive Health Care+") S6 (MH "Cardiovascular Diseases+") S5 S3 AND S4 S4 "primary care" or "general practice" or "primary healthcare" S3 TX cardiovascular N3 prevention 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	S10 S6 OR S19 OR S3 Limiters - Publication Year: 2016 S9 S7 AND S8 S8 DE "preventive medicine" S7 DE "cardiovascular diseases" S6 S4 AND S5 S5 "primary care" or "general practice" or "primary healthcare" S4 TX cardiovascular N3 prevention S3 S1 OR S2 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 cardiovascular.ti,ab 11 prevention.ti,ab 12 10 AND 11 13 CARDIOVASCULAR DISORDERS/ 14 PREVENTIVE MEDICINE/ 15 13 AND 14 16 12 OR 15 17 9 OR 16 18 17 [Limit to: Publication Year 2016]

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 cardiovascular adj3 prevention.tw. #4 (primary care or general practice or primary healthcare).tw #5 #3 and #4 #6 MeSH descriptor: [Cardiovascular Diseases] this term only #7 MeSH descriptor: [Primary Prevention] explode all trees #8 #6 and #7 #9 #5 or #8 #10 #1 or #2 or #9 Publication Year from 2016 to 2016
NHS Evidence	"*health check**" OR *cardiovascular prevention primary care* Limited to last 3 months
Google Scholar	*"nhs health check"* *cardiovascular "health check"* *cardiovascular prevention "primary care"* Since 2016, sorted by relevance.
Google	"*nhs health check*" *cardiovascular prevention "primary care"* *cardiovascular "health check*" Limited to past year, sorted by relevance
Clinical trials.gov and ISRCDN registry	*"health check",* limited to 01/01/2016 to 04/21/2016

Citation titles and abstracts were then screened in order to determine whether or not they were relevant. Those citations considered relevant were categorised using the PHE Publication/Resource Types list, and are listed below 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 summary of the main aim, methods and results of each citation 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 January 1st 2016 and April (week 3) 2016

Database	No. of hits	Exclusive
Medline	408	408
PubMed	499	258
Embase	401	181
HMIC	10	7
CINAHL	134	93
Global Health	202	98
PsycInfo	115	107
Cochrane Library	4	4
TOTAL		**1156**

Table 2a. Citations added to internet sources between Jan 1st 2016 and April 30th 2016.

Internet sources	No. of hits
NHS Evidence	385
Google Scholar	466
Google	500
Trials registers	35
TOTAL	**1386**

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

From these 2542 results, 7 were identified as being relevant to the NHS Health Check programme, 15 to general health checks and 67 to diabetes/cardiovascular disease screening or prevention.

Total relevant references = 89

- **NHS Health Checks = 7**
- **general health checks = 15**
- **diabetes/cardiovascular disease screening or prevention = 67**

4. References on the NHS Health Check Programme (7)

Trials

Sallis A et al. (2016). *The effectiveness of an enhanced invitation letter on uptake of National Health Service Health Checks in primary care: a pragmatic quasi-randomised controlled trial*. BMC Family Practice 17(1): 35.

AIM: The aim was to compare attendance at the NHS Health Check using the standard national invitation template letter (control) compared to an enhanced invitation letter using insights from behavioural science (intervention).
METHODS: A pragmatic quasi-randomised controlled trial was conducted in four general practitioner practices in Medway, England with randomisation of 3511 patients.
RESULTS: 29.3 % of patients who received the control letter and 33.5 % of those who received the intervention letter attended their NHS HC (adjusted odds ratio 1.26, 95 % confidence interval 1.09–1.47, $p < 0.01$). This was an absolute difference in uptake of 4.2 percentage points for those receiving the intervention letter.
View full text

Cross-sectional studies

Chang KC et al. (2016). *Impact of the National Health Service Health Check on cardiovascular disease risk: a difference-in-differences matching analysis*. Canadian Medical Association Journal. 10.1503/cmaj.151201.

AIM: This study aimed to assess the effect of NHS Health Check program on modelled risk of cardiovascular disease, individual risk factors for cardiovascular disease, prescribing of relevant medications and diagnosis of vascular disease.
METHODS: We obtained retrospective electronic medical records for a randomly selected sample of 138 788 patients aged 40-74 years registered with 462 English general practices participating in the Clinical Practice Research Datalink between 2009 and 2013. We used a quasi-experimental design of difference-in-differences matching analysis to compare changes in outcomes between Health Check attendees and nonattendees, with a median follow-up time of 2 years.
RESULTS: Overall, 21.4% of the eligible population attended a Health Check. After matching (n = 29 672 in each group), attendees had a significant absolute reduction in modelled risk for cardiovascular disease (-0.21%, 95% confidence interval [CI] -0.24% to -0.19%) and individual risk factors: systolic blood pressure (-2.51 mm Hg, 95% CI -2.77 to -2.25 mm Hg), diastolic blood pressure (-1.46 mm Hg, 95% CI -1.62 to -1.29 mm Hg), body mass index (-0.27, 95% CI -0.34 to -0.20) and total cholesterol (-0.15 mmol/L, 95% CI -0.18 to -0.13 mmol/L). Statins were prescribed for 39.9% of attendees who were at high risk for cardiovascular disease. The

program resulted in significantly more diagnoses of selected vascular diseases among attendees, with the largest increases for hypertension (2.99%) and type 2 diabetes mellitus (1.31%).
View abstract

Cook EJ et al. (2016). *Who uses NHS health checks? Investigating the impact of ethnicity and gender and method of invitation on uptake of NHS health checks*. International Journal for Equity in Health 15(1): 13.

AIM: This study aimed to investigate how socio-demographic factors impact on uptake of NHS Health Checks, and what influence the invitation method has on uptake.
METHODS: NHS Health Check data from April 2013 to March 2014 was analysed (N=50,485) for all 30 GP Practices in Luton. Data was collected for age, ethnicity, uptake (attendance and non attendance) and invitation method (letter written, verbal face-to-face, telephone). Actual usage of NHS Health Checks was determined for each ethnic group of the population and compared using Chi-square analysis.
RESULTS: The overall uptake rate for Luton was 44 %, markedly lower that the set target of 50–75 %. The findings revealed a variation of uptake in relation to age, gender, level of deprivation. Ethnicity and gender variations were also found, with 'White British' 'Black Caribbean' and 'Indian' patients most likely to take up a NHS Health Check. However, patients from 'Any Other White Background' and 'Black African' were significantly less likely to uptake an NHS Health Check compared to all other ethnic groups. Ethnicity and gender differences were also noted in relation to invitation method.
View full text

Qualitative research

Ismail H and Atkin K (2016). *The NHS Health Check programme: insights from a qualitative study of patients*. Health Expectations 19(2): 345-355.

AIM: This qualitative study aimed to determine the extent to which patients were supported to reduce the risks of developing cardiovascular disease through behaviour change
METHODS: Semi-structured qualitative interviews were undertaken with 45 patients about their initial experiences of undertaking a NHS Health Check. They were followed up 1 year later to assess whether the behavioural changes reported after the NHS Health Check had been maintained.
RESULTS: An outcome of analysis led to the identification of four main inter-related themes: understanding of the programme, advice from health professionals, barriers encountered in changing behaviour and responsibility for behaviour change. A recurring theme was that of 'responsibility' – participants thought changing

behaviours and adopting healthier lifestyle choices was down to them and not the responsibility of the NHS.
View abstract

Krska J et al. (2016). *Views of practice managers and general practitioners on implementing NHS Health Checks*. Primary Health Care Research & Development 17(2): 198-205.

AIM: To elicit the views of general practitioners (GPs) and practice managers (PMs) on the implementation of NHS Health Checks in their area
METHODS: GPs and PMs in all 55 practices in Sefton, North West England were surveyed
RESULTS: Responses were obtained from 43/178 GPs and 40/55 PMs.Time and software were viewed as barriers to implementation, the increased nurse workload impacted on other services and payments were insufficient to cover costs. The main enabler for successful implementation was IT support. Fewer than half the respondents viewed the programme as beneficial to their practice.
View abstract

Case control

Roberts DJ and de Souza VC (2016). *A venue-based analysis of the reach of a targeted outreach service to deliver opportunistic community NHS Health Checks to 'hard-to-reach' groups*. Public Health. April 6th. doi: 10.1016/j.puhe.2016.03.004.

AIM: One aim was to investigate whether the addition of an outreach service would result in a higher percentage of health checks being done for people from the target groups (men, people of South Asian ethnicity and people from deprived areas) compared to a GP-based service alone. The second aim was to assess which types of venues used for outreach health checks were most effective in reaching these groups.
METHODS: The percentages of completed health checks in men, people of South Asian ethnicity, and participants registered at general practices with lowest quintile area-level deprivation status were compared between all opportunistic community checks conducted by the Outreach Service over a ten month period and checks conducted in general practice in a partially-overlapping time period of the same financial year. For the venue-based comparison of Outreach Service checks, the number of checks per visit and percentage of checks in each target group were calculated for each venue.
RESULTS: Of 3849 Outreach Service checks, 38% were in men (compared to 50% of checks conducted in Primary Care), and 11% were in people of South Asian ethnicity (compared to 3% in Primary Care). 3558 Outreach check participants were registered with a general practice in the County (92%), and of these, 32% of checks

were in people registered with a general practice in the lowest deprivation quintile (compared to 13% of checks in Primary Care). There were 519 visits by the outreach service to 23 different types of venue. Certain venues recorded large numbers of checks e.g. supermarkets and libraries, but they were not always the most efficient places to recruit people for checks. Mosques and bus stations were the venues with the broadest reach to all target groups
View abstract

Case study

Trivedy C et al. (2016). *An evaluation of opportunistic health checks at cricket matches: the Boundaries for Life initiative*. Sport in Society(19th April): 1-9.

AIM: This paper aimed to assess the uptake of NHS Health Checks at professional cricket matches over the 2014 and 2015 seasons - the *Boundaries For Life* initiative.
METHODS: No information given about methods in abstract – unable to access full text at this time
RESULTS: Uptake of the checks was significantly high in comparison to other sports settings, with very strong feedback from participants on the convenience of service.
View abstract
Note: we did not have access to the full text of this article

References relating to general health checks (15)

Evidence summaries

Himmelstein DU and Phillips RS (2016). *Should We Abandon Routine Visits? There Is Little Evidence for or Against*. Annals of Internal Medicine 164: 498-499 492p.

AIM: to discover whether the routine visit to a physician of patients without specific health concerns should be abandoned.
METHODS: This review focuses on the evidentiary support for recommendation from the Society for General Internal Medicine based on a Cochrane review.
RESULTS: This review suggests that general health checks for adults did not reduce morbidity and mortality.
View first page preview

Systematic reviews

Dyakova M et al. (2016). *Systematic versus opportunistic risk assessment for the primary prevention of cardiovascular disease*. Cochrane Database of Systematic Reviews. First published: 29 January 2016.

AIM: to assess the effectiveness, costs and adverse effects of systematic risk assessment compared to opportunistic risk assessment for the primary prevention of CVD.
METHODS: The Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, Web of Science Core Collection and two clinical trial registers were searched. Reference lists of relevant articles were also checked. Randomised controlled trials (RCTs) that assessed the effects of systematic risk assessment compared with opportunistic risk assessment were selected. Participants included healthy adults from the general population, including those who are at risk of CVD. Two review authors independently selected studies and evidence quality was assesses using the GRADE approach.
RESULTS: Nine trials met the inclusion criteria. Limited data were available on all-cause mortality (risk ratio (RR) 0.97, 95% confidence interval (CI) 0.92 to 1.02; 3 studies,103,571 participants, I^2 = 0%; low-quality evidence) and cardiovascular mortality (RR 1.00, 95% CI 0.90 to 1.11; 2 studies, 43,955 participants, I^2 = 0%), and suggest that screening has no effect on these outcomes. Data were also limited for cardiovascular risk factors (blood lipids and blood pressure) where there were some favourable effects with systematic risk assessment, but there were differences between studies and so results are not certain.
View full text

Hollands G et al. (2016). *The impact of communicating genetic risks of disease on risk-reducing health behaviour: systematic review with meta-analysis*. British Medical Journal. 352:i1102.

AIM: to assess the impact of communicating DNA based disease risk estimates on risk-reducing health behaviours and motivation to engage in such behaviours
METHODS: A search of Medline, Embase, PsycINFO, CINAHL, and the Cochrane Central Register of Controlled Trials up to 25 February 2015. Randomised and quasi-randomised controlled trials were selected - eligible studies included a measure of risk-reducing behaviour. This meta-analysis examined 10 515 abstracts and included 18 studies reporting on 7 behavioural outcomes (including smoking cessation (six studies; n=2663), diet (seven studies; n=1784), and physical activity (six studies; n=1704).
RESULTS:Meta-analysis revealed no significant effects of communicating DNA based risk estimates on smoking cessation (odds ratio 0.92, 95% confidence interval 0.63 to 1.35, P=0.67), diet (standardised mean difference 0.12, 95% confidence interval −0.00 to 0.24, P=0.05), or physical activity (standardised mean difference −0.03, 95% confidence interval −0.13 to 0.08, P=0.62). There were also no effects on any other behaviours (alcohol use, medication use, sun protection behaviours, and attendance at screening or behavioural support programmes) or on motivation to change behaviour, and no adverse effects, such as depression and anxiety. Subgroup analyses provided no clear evidence that communication of a risk-conferring genotype affected behaviour more than communication of the absence of such a genotype. However, studies were predominantly at high or unclear risk of bias, and evidence was typically of low quality.
View full text

Cohort studies

Alhossan A et al. (2016). *Outcomes of annual wellness visits provided by pharmacists in an accountable care organization associated with a federally qualified health center*. American Journal of Health-System Pharmacy 73(4): 225-228.

AIM: This study aimed to evaluate the clinical and financial outcomes of annual wellness visits (AWVs) conducted by clinical pharmacists working as part of an accountable care organization (ACO).
METHODS: In this retrospective, single-center, chart review study, the records of 300 patients attending an AWV at El Rio Health Center between October and December 2013 were reviewed. Data collected from patient charts included patient demographics, preventive screenings ordered by clinical pharmacists during the AWV and completed within one month after the visit, other screenings completed by clinical pharmacists during the visit, medication changes by clinical pharmacists, and revenues collected from the AWV and preventive screenings.
RESULTS: 300 patient records were reviewed. Clinical pharmacists completed 1608

interventions, with a mean of 5.4 interventions per patient. A total of 272 referrals were made, 120 (45%) of which were completed within one month of the visit. Of the 183 laboratory tests ordered for diabetes and lipid screening, 152 (83%) were completed within one month of the AWV ($p < 0.001$). Of the 370 vaccinations offered during the visits, 182 (49%) were administered ($p < 0.001$). Twenty-four medication and dosage changes were made by clinical pharmacists during AWVs, and the total revenue for the AWVs conducted by pharmacists and services completed during the visits exceeded $22,000.
View abstract

Chen QC et al. (2016). *Association between serum direct bilirubin with metabolic syndrome and its components based on a longitudinal health check-up study*. Chung-Hua Liu Hsing Ping Hsueh Tsa Chih Chinese Journal of Epidemiology 37(4): 486-490. [Full text in Chinese].
AIM: To investigate the association between serum direct bilirubin (DBIL) with metabolic syndrome (MS) and its components.
METHODS: A dynamic health check-up cohort study was set up from 2006 to 2011. 5 258 participants who were free of MS and had at least two intact health checks were included. With generalized estimating equation (GEE) model, after adjusting for items including age, gender, smoking and drinking, the multivariable relative risks (RRs) of DBIL with MS and their components were analyzed.
RESULTS: The RRs of DBIL for MS was 0.722 (95%CI: 0.654-0.797), which shows a dose-response. Serum DBIL was negatively associated with obesity and hyperlipidemia. Taking factors as gender and age into account, in the <45 years and 45-55 years groups, the RRs of DBIL for MS in females appeared as 0.516 (95%CI: 0.349-0.761) and 0.435 (95%CI: 0.256-0.740). And in males of <45 years and 45-55 years, the RRs of DBIL for MS were 0.738 (95% CI: 0.644-0.846) and 0.790 (95% CI:0.667-0.937), respectively.
View abstract

Shima A et al. (2016). *Relationship between outpatient visit frequency and hypertension control: a 9-year occupational cohort study*. Hypertens Res. Jan 14th

AIM: The purpose of this study was to investigate the relationship between the frequency of outpatient visits and hypertension control as determined from health insurance records.
METHODS: This 9-year cohort study in Japan was based on 518 participants with hypertension who underwent health checkups in 2004. Participants were aged 35-56 years and none had a history of cardiovascular or cerebrovascular disease. Mean annual outpatient visit days at a hospital/clinic during the 9-year period were classified within four quartiles (Q1, Q2, Q3, Q4). Uncontrolled hypertension was defined as a systolic blood pressure (BP) 140 mm Hg and a diastolic BP 90 mm Hg.

Logistic regression analysis was used to estimate the multivariable-adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for the prevalence of uncontrolled hypertension in groups Q1, Q2 and Q3 vs. Q4.
RESULTS: The median (25th-75th percentile) annual outpatient visit days was 9.4 (4.0-15.5). Uncontrolled hypertension was observed in 62.4% of the participants in 2013. The multivariable-adjusted ORs and 95% CIs for uncontrolled hypertension in Q1, Q2 and Q3 vs. Q4 were 4.03 (2.28-7.12), 1.67 (0.99-2.81) and 1.44 (0.86-2.41), respectively. Uncontrolled hypertension increased significantly as the number of outpatient visits decreased (P for trend <0.001).
View abstract

Kiselev AR et al. (2016). *Which Measures of Health Status Assessment are the Most Significant in Organized Cohorts with Low Current Cardiovascular Risk? The Screening Study of Penitentiary Staff in Saratov Region, Russia*. The Eurasian Journal of Medicine 48(1): 42-52.

AIM: The aim of this study was to compare different methods of health status assessment in an organized cohort of penitentiary employees in Saratov Region, Russian Federation.
METHODS: 1,014 penitentiary employees (81.8% male) aged 33.4+/-6.8 years were included in the cohort study. All participants underwent an annual preventive health examination in the Center of Medical and Social Rehabilitation of Russian Federal Penitentiary Service in Saratov Region. The prevalence of common cardiovascular risk factors was assessed. Risk Score and the number of fulfilled health metrics proposed by American Heart Association (AHA) were calculated for each participant.
RESULTS: Penitentiary staff in Saratov Region are characterized by low current risk scores (1.2±0.8%), but high prevalence of such risk factors as increased body weight and obesity (51%), tobacco use or passive smoking (81%), and unhealthy diet (55%). 98.4% of participants had the Score level of ≤5%, but only 4.5% of penitentiary staff met the ideal cardiovascular health (they met all seven AHA health metrics). One fifth of the participants met three or less AHA health metrics. A statistically significant correlation between the risk Score and the number of fulfilled AHA health metrics is revealed (Chi-square = 5.1, p=0.024). The probability of fulfilment of less than 5 AHA health metrics in subjects with medium risk score is shown to be almost twofold greater than in subjects with low risk Score. However, there are a lot of differences in the assessment of cardiovascular health by risk Score and AHA health metrics.
View full text

Cross-sectional studies

Lytvyak E et al. (2016). *Impact of a 3-year multi-centre community-based intervention on risk factors for chronic disease and obesity among free-living adults: the Healthy Alberta Communities study*. BMC Public Health 16(1): 1-15.

AIM: This paper examines changes in blood pressure (BP) and anthropometric indicators within Healthy Alberta Communities (HAC) communities compared to secular trends.
METHODS: Height, weight, waist and hip circumference and BP were measured among 1554 and 1808 community residents at baseline (2006) and follow-up (2009), respectively. A comparison sample was drawn from a representative national survey. Samples were stratified by age, and change between pre- and post-intervention was assessed using t-tests. Changes in parameters over time between groups were compared using meta-analysis. The net difference in change in outcomes (change in intervention communities minus change in comparison group) represented the effect of the intervention.
RESULTS: Adjusted systolic (SBP) and diastolic (DBP) BP declined within most age groups in HAC communities from pre- to post-intervention. The net decline in SBP was 1 mmHg in 20–39 year olds ($p = 0.006$) and 2 mmHg in 40–59 year olds ($p = 0.001$), while the net decline in DBP was 3 mmHg in 20–39 year olds ($p < 0.001$), 2 mmHg in 40–59 year olds ($p < 0.001$) and 3 mmHg in 60–79 year olds ($p < 0.001$). The net increase in the proportion of individuals with normal BP was 5.9 % ($p < 0.001$), while the net decline in the proportion of individuals with stage 1 hypertension was 4.5 % ($p < 0.001$). BMI and body weight were unchanged. There was a significant net increase in waist and hip circumference among 20–39 year olds within intervention communities.
View full text

Bryant J et al. (2015). *Is identification of smoking, risky alcohol consumption and overweight and obesity by General Practitioners improving? A comparison over time*. Fam Pract 32(6): 664-671.

AIM: This study aimed to examine whether sensitivity and specificity of GP detection of smoking, risky alcohol consumption and overweight and obesity has increased in patients presenting to see their GP, by comparing results from four Australian studies conducted between 1982 and 2011.
METHODS: Demographic characteristics of patient and GP samples and the prevalence, sensitivity and specificity of detection of each risk factor were extracted from published studies. Differences between GP and patient sample characteristics were examined.
RESULTS:There were no statistically significant changes in the sensitivity of GP detection of smoking or overweight or obesity over time. Specificity of detection of smoking increased from 64.7% to 98% (P < 0.0001) and decreased for overweight or

obesity from 92% to 89% (P = 0.01). There was a small decrease in the sensitivity of detection of alcohol consumption (P = 0.02) and an increase in specificity (P = 0.01).
View abstract

Qualitative research

Bressington D et al. (2016). *Refocusing on physical health: Community psychiatric nurses' perceptions of using enhanced health checks for people with severe mental illness*. Int J Ment Health Nurs.Feb 9th. doi: 10.1111/inm.12195.

AIM: This study aimed to explore Hong Kong community psychiatric nurses' (CPN) perceptions of using comprehensive physical health checks for service users diagnosed with severe mental illness (SMI).
METHODS: This was a qualitative, descriptive study. Research interviews were conducted with a purposive sample of 11 CPN in order to explore their perceptions about the use of the Health Improvement Profile (HIP) over a 1-year period. Interview data were analysed using inductive thematic analysis.
RESULTS: The analysis revealed that the majority of CPN appreciated the comprehensive focus on the physical health of their clients and reported positive changes in their clinical practice. Many of them observed an increase in the motivation of their clients to improve their physical health, and also noted observable benefits in service users' well-being. The use of the HIP also helped the CPN identify implementation barriers, and highlighted areas of the tool that required modifications to suit the local cultural and clinical context.
View abstract

Durbin J et al. (2016). *Evaluating the Implementation of Health Checks for Adults With Intellectual and Developmental Disabilities in Primary Care: The Importance of Organizational Context*. Intellectual & Developmental Disabilities 54(2): 136-150.

AIM: This qualitative study aimed to evaluate the implementation of a health check at two primary-care clinics in Ontario, Canada, and the influence of the clinic context on implementation decisions.
METHODS: A semi-structured template was used to record information on each site’s progress in implementing the health check across four implementation stages. At the end of the study, the research team conducted a focus group at each primary care site where individuals who had an active role in the implementation were invited to reflect on the implementation process. Across the two sites, eight individuals participated, including physicians (4), clerical staff (1), quality manager (1), and site implementation facilitators (2).
RESULTS: The study showed that though both sites were primary care organisations, they had different capabilities and work processes that influenced their implementation approach. Each clinic implemented the same core components;

however, due to contextual differences, some components were operationalized differently. Adapting to the setting context is important to ensuring successful and sustainable implementation.
View abstract

Rosedale MT et al. (2016). *Follow-up with primary care providers for elevated glycated haemoglobin identified at the dental visit*. Int J Dent Hyg.1st April. DOI: 10.1111/idh.12214.

AIM: This study explores patients' reactions to diabetes screening at a dental clinic, whether or not they sought recommended medical follow-up, and facilitating factors and barriers to obtaining follow-up care.
METHODS: At the comprehensive care clinics at a large, urban College of Dentistry in the United States, haemoglobin A1C (HbA1C) values were obtained from 379 study participants who had not been previously diagnosed with diabetes. 169 (44.6%) had elevated HbA1C values. Quantitative and qualitative data concerning these patients' follow-up with primary care providers (PCPs) were analysed,
RESULTS: We were able to contact 112 (66.3%) of the 169 study participants who had an elevated HbA1C reading. Of that group, 61 (54.5%) received recommended follow-up care from a PCP within 3 months, and an additional 28 (25.0%) said they intended to seek such care. Qualitative themes included the following: the screening letter – opportunity or burden, appreciation for the 3-month follow-up call and barriers to medical follow-up that included the following: lack of knowledge about diabetes, not understanding the importance of follow-up, busyness, financial concerns, fear and denial.
View abstract

Economic analysis

Gupta T et al. (2016). *An economic analysis comparing average cost of screening patients using remedy social platform versus popular preventive health check-up programs*. Int J Med Sci Public Health 5(5): 882-885.

AIM: To evaluate disease risk prevailing in population and recommend a personalised diagnostic plan instead of a generic plan.
METHODS: We conducted an analysis using data collected from 140 patients through an online health assessment questionnaire. All of the participants in the study were screened for a particular disease risk ,and were assigned a personalized diagnostic plan based on their risk-profile
RESULTS: The average diagnostic cost was substantially lower than the tests recommended by usual health preventive checkup plans. Personalized diagnostic plans using effective screening methods could lead to savings of a significant amount, up to 80% in some cases, of money and time.
View abstract

Service Evaluation

Cooper J and Zimmerman W (2016). *The Evaluation of a Regional Faith Community Network's Million Hearts Program.* Public Health Nursing 33(1): 53-64 12p.

AIM: This study aimed to evaluate whether recruiting and training faith community nurses has an impact on hypertension control and lifestyle changes of individuals in Washington County.
METHODS: Within a regional network of 52 faith communities, the Parish Nurse Coordinator recruited 25 faith community nurses to participate in a three-month program. Nurses were trained on proper blood pressure measurement and 22 nurses identified 58 participants engaged in blood pressure self-monitoring and coaching for lifestyle changes. Additionally, nurses took 1,729 blood pressures and provided health education to individuals within their congregations.
RESULTS: Fifty-one participants participated in blood pressure self-monitoring and lifestyle coaching with faith community nurses. There was improvement in six out of seven lifestyle areas. Eight-two percent of participants (N = 42) decreased their systolic and/or diastolic blood pressure over three months.
View abstract

Geue C et al. (2016). *Scottish Keep Well health check programme: an interrupted time series analysis*. J Epidemiol Community Health. 12th April. doi:10.1136/jech-2015-206926.

AIM: This paper aims to evaluate the impact of wave 1 of Keep Well, a Scottish health check programme, on cardiovascular outcomes.
METHODS: Interrupted time series analyses were employed, comparing trends in outcomes in participating and non-participating practices before and after the introduction of health checks. Health outcomes are defined as CVD mortality, incident hospitalisations and prescribing of cardiovascular drugs.
RESULTS: After accounting for secular trends and seasonal variation, coronary heart disease mortality and hospitalisations changed by 0.4% (95% CI −5.2% to 6.3%) and −1.1% (−3.4% to 1.3%) in Keep Well practices and by −0.3% (−2.7% to 2.2%) and −0.1% (−1.8% to 1.7%) in non-Keep Well practices, respectively, following the intervention. Adjusted changes in prescribing in Keep Well and non-Keep Well practices were 0.4% (−10.4% to 12.5%) and −1.5% (−9.4% to 7.2%) for statins; −2.5% (−12.3% to 8.4%) and −1.6% (−7.1% to 4.3%) for antihypertensive drugs; and −0.9% (−6.5% to 5.0%) and −2.4% (−10.1% to 6.0%) for antiplatelet drugs.
View full text

References relating to diabetes and cardiovascular disease screening or prevention (67)

Evidence summaries

Fletcher K et al. (2016). *The Stroke Prevention Programme: a programme of research to inform optimal stroke prevention in primary care*. Programme Grants Appl Res 4(3). National Institute for Health Research.

AIM: to explore the role of three approaches (use of a 'polypill'; self-management of hypertension; and more intensive targets for blood pressure (BP) lowering after stroke) to improve prevention of CV disease (CVD) in the community.
METHODS: A series of studies involving different approaches (surveys of practice information systems; screening of patients; interviews with patients and doctors and nurses; economic modelling; and clinical trials) were carried out to answer a variety of research questions. The research was carried out between April 2008 and March 2014.
RESULTS: For people with unknown CV risk aged ≥ 50 years, offering a polypill is cost-effective [incremental cost-effectiveness ratio (ICER) of £8115 per quality-adjusted life-year (QALY)] compared with a strategy of screening and treating according to national guidelines. Both results were sensitive to the cost of the polypill. Self-management in people with uncontrolled hypertension led to a 5.4 mmHg [95% confidence interval (CI) 2.4 to 8.5 mmHg] reduction in systolic BP at 1 year, compared with usual care. It was cost-effective for men (ICER of £1624 per QALY) and women (ICER of £4923 per QALY). In people with stroke and other high-risk groups, self-management led to a 9.2 mmHg (95% CI 5.7 to 12.7 mmHg) reduction in systolic BP at 1 year compared with usual care and dominated (lower cost and better outcome) usual care. Aiming for the more intensive BP target after stroke led to a 2.9 mmHg (95% CI 0.2 to 5.7 mmHg) greater reduction in BP and dominated the 140 mmHg target
View full text

National Institute for Health (2016). *Lowering blood pressure reduces the risk of heart disease, stroke and death.* National Institute for Health Research Signal. 23rd February.

AIM: A summary and expert commentary of a systematic review and meta-analysis by Ettehad and colleagues investigating the extent to which blood pressure treatment effects differ by baseline blood pressure levels, or are influenced by other diseases or the type of drug used.

METHODS: The study included 123 large-scale randomised controlled trials with over 600,000 participants published between 1966 and 2015.
RESULTS: This meta-analysis showed that a 10 mm Hg reduction of systolic blood pressure reduced the risk of major cardiovascular disease events by 20%, coronary heart disease by 17%, stroke by 27%, heart failure by 28%, and death from all causes by 13%.
View full text

National Institute for Health (2016). *Annual lipid monitoring places more individuals in treatment and saves money long-term compared with less frequent monitoring*. National Institute for Health Research Signal.23rd February.

AIM: A summary and expert commentary of a systematic review by Perera et al. that aimed to estimate the clinical and economic value of using different lipid measurements and different lipid testing intervals for preventing cardiovascular disease.
METHODS: This modelling study incorporated data from two systematic reviews and patient level data from the UK and Japan to reach its predictions.
RESULTS: A range of lipid blood measures showed similar ability to predict risk of cardiovascular events. For all the different lipid tests, “noise” or biological variation and measurement error make up 25% of the variation in measurements on people who are not already taking statins or using lifestyle measures to reduce their lipid levels. This means that many observed changes in repeat rest results are not “true” differences. Overall, to prevent cardiovascular disease and be cost effective, annual lipid monitoring was more beneficial compared with less frequent approaches. This applied to primary prevention in people with 10%, 15% or 20% risk of cardiovascular disease over ten years according to the Qrisk score and those already with heart disease.
View full text

Seng Chuen T et al. (2016). *Review of cardiovascular disease prevention and control programs: international experience and challenges in China*. International Cardiovascular Forum Journal 6(May).

AIM: to identify the challenges for China-specific CVD prevention and control programs, and to provide practical suggestions and recommendations for improvement
METHODS: A review of the published literature on CVD prevention and control programs, and interviews of local and foreign experts.
RESULTS: We identified several successful prevention strategies used throughout the world.Through in-depth interviews with local and international experts’ familiar with the healthcare landscape in China, we were able to identify specific challenges

to the implementation of CVD prevention programs in China. One of the challenges is the burden of financing for the programs. A further barrier to patients seeking treatment is the role of traditional Chinese medicines, which may deter or delay patients from accessing effective treatments. The continuing focus on treating acute conditions within a fee-for-service system is the most significant challenge to implementation of prevention initiatives, as fee-for-service results in a disincentive for healthcare providers to prevent patients from getting sick. Interviewed experts noted that China does not emphasize the quality of outcomes, and policies attempting to emphasize prevention and primary care are poorly-implemented. Another major challenge in the Chinese context is the lack of awareness about chronic diseases, CVD risks, and the benefits of a healthy lifestyle.
View full text

Schwalm J et al. (2016). *Resource Effective Strategies to Prevent and Treat Cardiovascular Disease*. Circulation 133(8): 742-755.

AIM: to review the current gaps in the prevention and management of CVD compared with the evidence (evidence–practice gaps), barriers to closing evidence–practice gaps, and targets for resource-effective interventions.
METHODS: The methods used for retrieving, selecting and assessing the evidence are not reported within the paper
RESULTS: this review demonstrates that significant evidence–practice gaps in the prevention and management of CVD exist, particularly in low- and middle-income countries (LMIC).
View abstract

Systematic reviews

Beishuizen CR et al. (2016). *Web-Based Interventions Targeting Cardiovascular Risk Factors in Middle-Aged and Older People: A Systematic Review and Meta-Analysis.* Journal of Medical Internet research 18(3).

AIM: This systematic review and meta-analysis evaluated whether Web-based interventions for cardiovascular risk factor management reduce the risk of cardiovascular disease in older people.
METHODS: Embase, Medline, Cochrane and CINAHL were systematically searched from January 1995 to November 2014. In a meta-analysis, outcomes regarding treatment effects on cardiovascular risk factors (blood pressure, glycated hemoglobin A1c (HbA1C), low-density lipoprotein (LDL) cholesterol, smoking status, weight and physical inactivity) and incident cardiovascular disease were pooled with random effects models.
RESULTS: A total of 57 studies (N=19,862) fulfilled eligibility criteria and 47 studies contributed to the meta-analysis. A significant reduction in systolic blood pressure

(mean difference –2.66 mmHg, 95% CI –3.81 to –1.52), diastolic blood pressure (mean difference –1.26 mmHg, 95% CI –1.92 to –0.60), HbA1c level (mean difference –0.13%, 95% CI –0.22 to –0.05), LDL cholesterol level (mean difference –2.18 mg/dL, 95% CI –3.96 to –0.41), weight (mean difference –1.34 kg, 95% CI –1.91 to –0.77), and an increase of physical activity (standardized mean difference 0.25, 95% CI 0.10-0.39) in the Web-based intervention group was found. The observed effects were more pronounced in studies with short (<12 months) follow-up and studies that combined the Internet application with human support (blended care). No difference in incident cardiovascular disease was found between groups (6 studies).
View full text

Groenewegen K et al. (2016). *Vascular age to determine cardiovascular disease risk: a systematic review of its concepts, definitions, and clinical applications*. European Journal of Preventive Cardiology 23(3): 264-274.

AIM: to examine the different methods that have been used to define vascular age, and to examine its potential clinical value in patient communication and risk prediction.
METHODS: This was a systematic review with data sources of PubMed and Embase.
RESULTS: We identified 39 articles on vascular age, 20 proposed to use vascular age as a communication tool and 19 proposed to use vascular age as a means to improve cardiovascular risk prediction. Eight papers were methodological and 31 papers reported on vascular age in study populations. Of these 31 papers, vascular age was a direct translation of the absolute risk estimated by existing cardiovascular risk prediction models in 15 papers, 12 derived vascular age from the reference values of an additional test, and in 3 papers vascular age was defined as the age at which the estimated cardiovascular risk equals the risk from non-invasive imaging observed degree of atherosclerosis. One trial found a small effect on risk factor levels when vascular age was communicated instead of cardiovascular risk.
View abstract

Kelly S et al. (2016). *Barriers and Facilitators to the Uptake and Maintenance of Healthy Behaviours by People at Mid-Life: A Rapid Systematic Review*. PLoS One 11(1): e0145074.

AIM: to understand why people do not undertake healthy behaviours or engage in unhealthy ones.
METHODS: Searches were conducted to identify systematic reviews and qualitative or longitudinal cohort studies that reported mid-life barriers and facilitators to healthy behaviours. Mid-life ranged from 40 to 64 years, but younger adults in disadvantaged

or minority groups were also eligible to reflect potential earlier disease onset. Two reviewers independently conducted reference screening and study inclusion. Included studies were assessed for quality. Barriers and facilitators were identified and synthesised into broader themes to allow comparisons across behavioural risks. RESULTS: From 16,426 titles reviewed, 28 qualitative studies, 11 longitudinal cohort studies and 46 systematic reviews were included. Evidence was found relating to uptake and maintenance of physical activity, diet and eating behaviours, smoking, alcohol, eye care, and other health promoting behaviours and grouped into six themes: health and quality of life, sociocultural factors, the physical environment, access, psychological factors, evidence relating to health inequalities. Most of the available evidence was from developed countries. Barriers that recur across different health behaviours include lack of time (due to family, household and occupational responsibilities), access issues (to transport, facilities and resources), financial costs, entrenched attitudes and behaviours, restrictions in the physical environment, low socioeconomic status, lack of knowledge. Facilitators include a focus on enjoyment, health benefits including healthy ageing, social support, clear messages, and integration of behaviours into lifestyle. Specific issues relating to population and culture were identified relating to health inequalities
View full text

McElwaine KM et al. (2016). *Systematic review of interventions to increase the delivery of preventive care by primary care nurses and allied health clinicians*. Implementation Science 11(1): 1.

AIM: This systematic review aimed to summarise evidence for the effectiveness of practice change interventions in increasing nurse or allied health professional provision of any of five preventive care elements for any of four behavioural risks (smoking, inadequate nutrition, alcohol overconsumption, physical inactivity) within a primary care setting.
METHODS: A search of Medline, Embase, PsycInfo, and CINAHL databases was undertaken to locate controlled intervention trials published between 1992 and May 2014 that provided practice change interventions to primary care nurses and/or allied health professionals to increase preventive care. A narrative synthesis was utilised.
RESULTS: From 8109 articles, seven trials met the inclusion criteria. All trials bar one, assessed multi-strategic practice change interventions (three to five strategies) focused on care by nurses (six trials) or mixed nursing/allied health clinicians. One trial examined care provision for all four risks, five trials examined care for smoking only, and one trial examined care for alcohol consumption only. For the six trials reporting significance testing (excludes one smoking care trial), significant effects favouring the intervention group were reported in at least one trial for smoking risk assessment (2/4 trials reported an effect for at least one analysis of an assessment outcome), brief advice (2/3), assistance (2/2), and arranging referral (2/3); alcohol risk assessment (1/2) and brief advice (1/2); inadequate nutrition risk assessment

(1/1); and physical inactivity risk assessment and brief advice (1/1). When the number of analyses undertaken within trials focusing on smoking care was considered, the results were less promising (e.g. of the 15 analyses conducted on brief advice variables across three trials, four showed a positive effect)
View full text

Rodrigues AL et al. (2016). *A systematic review and meta-analysis of primary prevention programmes to improve cardio-metabolic risk in non-urban communities*. Preventive Medicine 87: 22-34.

AIM: To systematically review the effectiveness of primary prevention programmes aimed at reducing risk factors for CVD/T2DM, including blood pressure, body mass index (BMI), blood lipid and glucose, diet, lifestyle, and knowledge in adults residing in non-urban areas
METHODS: Twenty-five manuscripts, globally, from 1990 were selected for review (seven included in the meta-analyses)
RESULTS: Multiple strategies within interventions focusing on health behaviour change effectively reduced cardio-metabolic risk in non-urban individuals. Pre-/post-test design studies showed more favourable improvements generally, while RCTs showed greater improvements in physical activity and disease and risk knowledge. Short-term programmes were more effective than long-term programmes and in pre-/post-test designs reduced systolic blood pressure by 4.02mmHg (95% CI -6.25 to -1.79) versus 3.63mmHg (95% CI -7.34 to 0.08) in long-term programmes. Community-based programmes achieved good results for most risk factors except BMI and (glycated haemoglobin) HbA1c.
View abstract

Savitha AK et al. (2016). *The Need for Patient Follow-up Strategies to Confirm Diabetes Mellitus in Large Scale Opportunistic Screening*. Journal of Clinical and Diagnostic Research JCDR 10(2): LE01-04.

AIM: to review the existing strategies of diabetes mellitus control in India
METHODS: A detailed review of National and State programme modules of non communicable diseases (NCD) interventions in India was carried out, along with an extensive review of published articles relating to the need for follow up strategies to confirm diabetes.
RESULTS: Based on the extensive review the following gaps were observed in the existing programmes: an individual currently has to visit 3 or 4 times to discover the blood glucose test results, the programme guidelines and modules don’t mention ways for stringent follow up of screened positive cases to undergo confirmatory tests and the same is not imparted during the training, the roles and responsibilities of health staff to follow screened positive cases at different levels are not explained, the

focus on how the referral is done in screening camps and ensuring the screened positive individuals visit the health facility is not clear, and the reports only reflect on suspected diabetics or the positivity rate but not on the number that need confirmatory tests
View full text

Selak V et al. (2016). *Do polypills lead to neglect of lifestyle risk factors? Findings from an individual participant data meta-analysis among 3140 patients at high risk of cardiovascular disease*. European Journal of Preventive Cardiology: 2047487316638216.

AIM: to investigate whether polypill-based care for the prevention of cardiovascular disease (CVD) is associated with a change in lifestyle risk factors when compared with usual care, among patients with CVD or high calculated cardiovascular risk.
METHODS: An individual participant data meta-analysis of three trials including patients from Australia, England, India, Ireland, the Netherlands and New Zealand that compared a strategy using a polypill containing aspirin, statin and antihypertensive therapy with usual care in patients with a prior CVD event or who were at high risk of their first event was conducted. Analyses investigated any differential effect on anthropometric measures and self-reported lifestyle behaviours.
RESULTS: Among 3140 patients (75% male, mean age 62 years and 76% with a prior CVD event) there was no difference in lifestyle risk factors in those randomised to polypill-based care compared with usual care over a median of 15 months, either across all participants combined, or in a range of subgroups. Furthermore, narrow confidence intervals (CIs) excluded any major effect; for example differences between the groups in body mass index was -0.1 (95% CI -0.2 to 0.1) kg/m2, in weekly duration of moderate intensity physical activity was -2 (-26 to 23) minutes and the proportion of smokers was 16% vs 17% (RR 0.98, 0.84 to 1.15) at the end of trial.
View abstract

Shaw RL et al. (2016). *Patients' perceptions and experiences of cardiovascular disease and diabetes prevention programmes: A systematic review and framework synthesis using the Theoretical Domains Framework*. Soc Sci Med 156: 192-203.

AIM: to discover patients' experiences of prevention programmes for cardiovascular disease (CVD) and diabetes
METHODS: A systematic review and framework synthesis were conducted. Web of Knowledge and PubMed were searched and reference chaining of relevant studies conducted. Qualitative research studies reporting evaluations of existing early detection or prevention or screening programmes for CVD or diabetes in primary care or in the community were included.

RESULTS: Findings from 14 original studies were coded deductively into the Theoretical Domains Framework (TDF) and subsequently an inductive thematic analysis was conducted. Synthesized findings produced six themes relating to: knowledge, beliefs, cues to (in)action, social influences, role and identity, and context. A conceptual model was generated illustrating combinations of factors that produce cues to (in)action. This model demonstrated interrelationships between individual (beliefs and knowledge) and societal (social influences, role and identity, context) factors
View abstract

Trials

Brunstrom M et al. (2016). *From efficacy in trials to effectiveness in clinical practice: The Swedish Stroke Prevention Study*. Blood Press: 1-6.

AIM: to perform an intervention to improve blood pressure control in the county of Vasterbotten, using Sodermanland County as a control.
METHODS: The intervention was directed towards primary care physicians and included lectures on blood pressure treatment, a computerized decision support system with treatment recommendations, and yearly feed back on hypertension control. The effect of the intervention will be estimated by combining the blood pressure data collected from the electronic medical records, with data on stroke, myocardial infarction and mortality from Swedish health registers.
RESULTS: During follow-up, more than 400 000 patients had their blood pressure recorded. The mean number of measurements was eight per patient, yielding a total of 3.4 million blood pressure recordings. The effect of the intervention will be estimated combining the blood pressure data collected from the electronic medical records, with data on stroke, myocardial infarction and mortality from Swedish health registers. Additional variables, from health registers and Statistics Sweden, will be collected to address for confounders.
View abstract

Davies MJ et al. (2016). *A community based primary prevention programme for type 2 diabetes integrating identification and lifestyle intervention for prevention: the Let's Prevent Diabetes cluster randomised controlled trial*. Preventive Medicine 84: 48-56.

AIM: to assess whether a structured education programme targeting lifestyle and behaviour change was effective at preventing progression to T2DM in people with pre-diabetes.
METHODS: Forty-four general practices were randomised to receive either standard care or a 6 hour group-structured education programme with an annual refresher course, and regular phone contact. Participants were followed up for 3 years. The primary outcome was progression to T2DM.

RESULTS: Eight hundred and eighty participants were included (36% female, mean age 64years, 16% ethnic minority group); 131 participants developed T2DM. There was a non-significant 26% reduced risk of developing T2DM in the intervention arm compared to standard care (HR 0.74, 95% CI 0.48, 1.14, p=0.18). The reduction in T2DM risk when excluding those who did not attend the initial education session was also non-significant (HR 0.65, 0.41, 1.03, p=0.07). There were statistically significant improvements in HbA1c (-0.06, -0.11, -0.01), LDL cholesterol (-0.08, -0.15, -0.01), sedentary time (-26.29, -45.26, -7.32) and step count (498.15, 162.10, 834.20) when data were analysed across all time points.
View abstract

Lonn EM et al. (2016). *Blood-pressure lowering in intermediate-risk persons without cardiovascular disease*. New England Journal of Medicine. April 2nd.

AIM: to evaluate the role of antihypertensive therapy in reducing the risk of cardiovascular events amongst persons at intermediate risk and with lower blood pressure
METHODS: In one comparison from a 2-by-2 factorial trial, we randomly assigned 12,705 participants at intermediate risk who did not have cardiovascular disease to receive either candesartan at a dose of 16 mg per day plus hydrochlorothiazide at a dose of 12.5 mg per day or placebo. The first coprimary outcome was the composite of death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke; the second coprimary outcome additionally included resuscitated cardiac arrest, heart failure, and revascularization. The median follow-up was 5.6 years.
RESULTS: The mean blood pressure of the participants at baseline was 138.1/81.9 mm Hg; the decrease in blood pressure was 6.0/3.0 mm Hg greater in the active-treatment group than in the placebo group. The first coprimary outcome occurred in 260 participants (4.1%) in the active-treatment group and in 279 (4.4%) in the placebo group (hazard ratio, 0.93; 95% confidence interval [CI], 0.79 to 1.10; P=0.40); the second coprimary outcome occurred in 312 participants (4.9%) and 328 participants (5.2%), respectively (hazard ratio, 0.95; 95% CI, 0.81 to 1.11; P=0.51).
View abstract

Yusuf S et al. (2016). *Cholesterol lowering in intermediate-risk persons without cardiovascular disease.* New England Journal of Medicine. April 2nd .

AIM: to evaluate the use of statins to lower cholesterol and reduce the risk of cardiovascular events amongst ethnically diverse persons with an intermediate-risk, without cardiovascular disease.
METHODS:In one comparison from a 2-by-2 factorial trial, we randomly assigned 12,705 participants in 21 countries who did not have cardiovascular disease and were at intermediate risk to receive rosuvastatin at a dose of 10 mg per day or

placebo. The first coprimary outcome was the composite of death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke, and the second coprimary outcome additionally included revascularization, heart failure, and resuscitated cardiac arrest. The median follow-up was 5.6 years.
RESULTS: The overall mean low-density lipoprotein cholesterol level was 26.5% lower in the rosuvastatin group than in the placebo group. The first coprimary outcome occurred in 235 participants (3.7%) in the rosuvastatin group and in 304 participants (4.8%) in the placebo group (hazard ratio, 0.76; 95% confidence interval [CI], 0.64 to 0.91; P=0.002). The results for the second coprimary outcome were consistent with the results for the first (occurring in 277 participants [4.4%] in the rosuvastatin group and in 363 participants [5.7%] in the placebo group; hazard ratio, 0.75; 95% CI, 0.64 to 0.88; P<0.001).
View abstract

Yusuf S et al. (2016). *Blood-Pressure and Cholesterol Lowering in Persons without Cardiovascular Disease*. New England Journal of Medicine. April 2nd.

AIM: to evaluate the effects of a moderate dose of a potent statin (without lipid monitoring) versus placebo, a fixed combination of moderate doses of an angiotensin-receptor blocker plus a diuretic (without blood-pressure targets) versus placebo, and the combination of both treatments versus dual placebo on the prevention of major cardiovascular events.
METHODS: In a trial with 2-by-2 factorial design, we randomly assigned 12,705 participants at intermediate risk who did not have cardiovascular disease to rosuvastatin (10 mg per day) or placebo and to candesartan (16 mg per day) plus hydrochlorothiazide (12.5 mg per day) or placebo. In the analyses reported here, we compared the 3180 participants assigned to combined therapy (with rosuvastatin and the two antihypertensive agents) with the 3168 participants assigned to dual placebo. The first coprimary outcome was the composite of death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke, and the second coprimary outcome additionally included heart failure, cardiac arrest, or revascularization. The median follow-up was 5.6 years.
RESULTS: The decrease in the LDL cholesterol level was 33.7 mg per deciliter (0.87 mmol per liter) greater in the combined-therapy group than in the dual-placebo group, and the decrease in systolic blood pressure was 6.2 mm Hg greater with combined therapy than with dual placebo. The first coprimary outcome occurred in 113 participants (3.6%) in the combined-therapy group and in 157 (5.0%) in the dual-placebo group (hazard ratio, 0.71; 95% confidence interval [CI], 0.56 to 0.90; P=0.005). The second coprimary outcome occurred in 136 participants (4.3%) and 187 participants (5.9%), respectively (hazard ratio, 0.72; 95% CI, 0.57 to 0.89; P=0.003).
View abstract

Shewade HD and Kumar S (2016). *Mobile reminders to improve opportunistic screening of type 2 diabetes mellitus: Data documentation and data analysis plan of a randomized trial data*. Data in Brief 6: 817-819.

AIM: This Data in Brief article contains individual level data of a randomized trial to determine the effect of mobile reminders on screening yield during opportunistic screening for type 2 diabetes mellitus in a primary health care setting in Puducherry, India.
METHODS: This trial offered mobile reminder to follow up for definitive tests during opportunistic screening of diabetes mellitus. Variables collected included the baseline characteristics of study participants (n=390) and information on initial screening and eligibility for definitive test, study group (intervention/control), follow up for definitive test and definitive test results. The data was double entered with adequate checks and validated in EpiData.
RESULTS: We have shared the data entry plan, EpiData triplet files for data entry and program file for data analysis. They may be used by other researchers who intend to replicate this research in their setting.
View full text

Tsuyuki RT et al. (2016). *Effectiveness of Community Pharmacist Prescribing and Care on Cardiovascular Risk Reduction: Randomized Controlled RxEACH Trial*. Journal of the American College of Cardiology.

AIM: to evaluate the effectiveness of a community pharmacy-based case finding and intervention on cardiovascular risk.
METHODS: RxEACH was a randomized trial conducted in 56 community pharmacies across Alberta, Canada. Participants were recruited by their pharmacist, enrolling adults at high risk for CVD. Patients were randomized to intervention or usual care groups. Intervention group received a Medication Therapy Management review from their pharmacist with CVD risk assessment and education. Subjects received monthly follow-up visits for 3 months. Usual care group received usual pharmacist care with no specific intervention. Primary outcome was difference in change in estimated CVD risk between intervention and usual care groups at 3 months.
RESULTS: We enrolled 723 patients. Mean age was 62 (standard deviation, SD 12) years, 58% male and 27% smokers. After adjusting for baseline values and center effect, there was a 21% difference in CVD risk ($p<0.001$) between intervention and usual care groups. Intervention group had greater reductions of 0.2 mmol/L in LDL-c ($p<0.001$), 9.37 mmHg systolic blood pressure ($p<0.001$), 0.92% HbA1c ($p<0.001$), and 20.2% in smoking cessation ($p=0.002$).
View abstract

Wennehorst K et al. (2016). *A Comprehensive Lifestyle Intervention to Prevent Type 2 Diabetes and Cardiovascular Diseases: the German CHIP Trial*. Prev Sci 17(3): 386-397.

AIM: to examine the effects of a holistic lifestyle intervention on clinical and laboratory parameters as well as on the long-term diabetes risk in patients at risk to develop diabetes.
METHODS: We conducted a randomized controlled trial in a primary care setting in Hannover, Germany, with 83 patients diagnosed as (pre)diabetic or at risk for diabetes. CHIP Germany is a 40-hour coaching lifestyle intervention program for the primary and secondary prevention of type 2 diabetes and cardiovascular diseases. The primary outcome parameter was the body mass index (BMI). Secondary outcome parameters included body weight, blood pressure, fasting glucose, HbA1c, blood lipids, and the FINDRISK score, which assesses long-term diabetes risk.
RESULTS: At the final measurement after 12 months, in the intervention group the BMI was reduced by 1.4 versus 0.2 kg/m(2) in controls (p = .119). The mean sustained weight loss after 12 months was -4.1 kg in the intervention group versus -0.8 kg in controls. Furthermore, we found a trend toward a stronger reduction in blood pressure, fasting glucose, and HbA1c as well as an improved FINDRISK score in the intervention group, compared to controls. Although failing to reach statistical significance at the final assessment, this comprehensive lifestyle intervention showed a noticeable reduction in several cardiometabolic risk factors which may facilitate the prevention of diabetes.
View abstract

Williams LB et al. (2016). *Turn the Beat Around: A Stroke Prevention Program for African-American Churches*. Public Health Nursing 33(1): 11-20.

AIM: to pilot a socioculturally tailored church-based stroke prevention program delivered by trained community health workers (CHWs) and to test its effects on participant knowledge scores.
METHODS: A single-group, pre-post test pilot study was conducted with a convenience sample of 201 adult African-Americans recruited from nine churches in three Alabama counties. Measurements included participant weight, blood pressure (BP), physical activity level; knowledge related to hypertension, heart disease, and stroke; cigarette smoking; and access to care, as well as the Stages of Change constructs within the Transtheoretical Model. The intervention was a six-session group-based health education program delivered by trained CHWs.
RESULTS: From baseline to 12 weeks, knowledge increased significantly (p < .001). Systolic BP measures improved (p = .0008). More than half of participants lost weight; however, weight change did not reach significance (p = .1380). Most (87%) participants indicated having a medical home at baseline; at the end of the study the percentage increased to 92% (p = .0138).
View abstract

Cohort studies

Angelow A et al. (2016). *Utility of repeat serum cholesterol measurements for assessment of cardiovascular risk in primary prevention*. European Journal of Preventive Cardiology 23(6): 628-635.

AIM: to assess whether previously measured total cholesterol values could be used to estimate cardiovascular disease risk in primary prevention.
METHODS: A longitudinal analysis using data of a population-based prospective cohort study (Study of Health in Pomerania) over a period of 10 years. 1112 subjects (45% male, mean age 57.8 years, SD +/- 6.8 years) without prior history of myocardial infarction or stroke were included. We calculated diagnostic test properties for SCORE-Germany estimates using 5- and 10-year-old total cholesterol values to predict high (>5%) cardiovascular disease risk using estimates based on current total cholesterol as a gold standard.
RESULTS: Mean total cholesterol decreased from 5.88 mmol/l (SD ± 1.21) at baseline to 5.73 mmol/l (SD ± 1.10) after 10 years. A high cardiovascular disease risk was found in 3.2% of subjects at baseline, in 4.9% after 5 years and in 16.2% after 10 years based on current total cholesterol values. SCORE-estimates using 5-year-old total cholesterol had a sensitivity of 90.9% (95% confidence interval 87.7-94.1) and specificity of 97.2% (95% confidence interval 96.4-98.0). For 10-year-old total cholesterol, sensitivity was 94.2% (95% confidence interval 91.6-96.8) and specificity 96.3% (95% confidence interval 95.3-97.2).
View abstract

Boggan AMN et al. (2016). *Patient's perceived versus predicted cardiovascular disease risk: Challenges for shared decision-making in cholesterol management*. Journal of the American College of Cardiology 1): 1929.

AIM: to determine patient's perceived versus predicted cardiovascular disease risk
METHODS: 1011 patients ages 40+ free of CVD from 59 primary care, cardiology, and endocrine clinics in the Patient and Provider Assessment of Lipid Management (PALM) Registry estimated their 10-year CVD risk, and compared these with calculated risks using the 2013 ACC/AHA Pooled Cohort Equations.
RESULTS: There was no correlation between patient perceived and calculated CVD risk estimates (correlation rho=-0.02, p=0.55, figure). Only 27.3% of patients estimated their risk within 10 points of their calculated risk. Perceived risk was higher than calculated risk (mean 33.7% vs 15.6%, p<0.0001). Younger (<60 years), female, and non-black adults overestimated risk by a larger degree than older adults (magnitude of over-estimation: 27.7% vs. 13.5% for <60 vs >60, p<0.001), males (23.2% vs. 12.3% for females p<0.001), and blacks (19.0% vs 12.5% non-black p=0.003). Overestimation did not vary by education level (p=0.10). Between statin users and non-users, there was no difference in perceived (p=0.2) or actual CVD risk (p=0.8).
View abstract

Chamnan P et al. (2016). *Repeat Cardiovascular Risk Assessment after Four Years: Is There Improvement in Risk Prediction*? PLoS One 11(2): e0147417.

AIM: to compare the discrimination and risk reclassification of approaches using estimated cardiovascular risk at single and repeat risk assessments
METHODS: Using data on 12,197 individuals enrolled in EPIC-Norfolk cohort, with 12 years of follow-up, we examined rates of cardiovascular events by levels of estimated absolute risk (Framingham risk score) at the first and second health examination four years later. We calculated the area under the receiver operating characteristic curve (aROC) and risk reclassification, comparing approaches using information from single and repeat risk assessments (i.e., estimated risk at different time points).
RESULTS: The mean Framingham risk score increased from 15.5% to 17.5% over a mean of 3.7 years from the first to second health examination. Individuals with high estimated risk (≥20%) at both health examinations had considerably higher rates of cardiovascular events than those who remained in the lowest risk category (<10%) in both health examinations (34.0 [95%CI 31.7–36.6] and 2.7 [2.2–3.3] per 1,000 person-years respectively). Using information from the most up-to-date risk assessment resulted in a small non-significant change in risk classification over the previous risk assessment (net reclassification improvement of -4.8%, p>0.05). Using information from both risk assessments slightly improved discrimination compared to information from a single risk assessment (aROC 0.76 and 0.75 respectively, p<0.001).
View full text

Gharipour M et al. (2016). *Comparison between European and Iranian cutoff points of triglyceride/high-density lipoprotein cholesterol concentrations in predicting cardiovascular disease outcomes*. Journal of Clinical Lipidology 10(1): 143-149.

AIM: to determine the optimal cutoff point for the TG/HDL-C ratio in predicting cardiovascular disease events in the Iranian population.
MESTHOD: The Isfahan Cohort Study (ICS) is an ongoing, longitudinal, population-based study that was originally conducted on adults aged >35 years, living in urban and rural areas of three districts in central Iran. After 10 years of follow-up, 5431 participants were re-evaluated using a standard protocol similar to the one used for baseline. At both measurements, participants underwent medical interviews, physical examinations, and fasting blood measurements. "High-risk" subjects were defined by the discrimination power of indices, which were assessed using receiver operating characteristic (ROC) analysis
RESULTS: The mean age of the participants was 50.7 ± 11.6 years. The TG/HDL-C ratio, at a threshold of 3.68, was used to screen for cardiovascular events among the study population. Subjects were divided into two groups ("low" and "high" risk) according to the TG/HDL-C concentration ratio at baseline. A slightly higher number

of high-risk individuals were identified using the European cutoff points of 63.7% in comparison with the ICS cutoff points of 49.5%. The unadjusted hazard ratio (HR) was greatest in high-risk individuals identified by the ICS cutoff points (HR = 1.54, 95% CI [1.33-1.79]) vs European cutoff points (HR = 1.38, 95% [1.17-1.63]). There were no remarkable changes after adjusting for differences in sex and age (HR = 1.58, 95% CI [1.36-1.84] vs HR = 1.44, 95% CI [1.22-1.71]) for the ICS and European cutoff points, respectively.
View abstract

Nicholls AR et al. (2016). *Fighting fat through football: Do weight loss programmes present an opportunity for diabetes screening?* Diabetic Medicine 33: 176-177.

AIM: to determine whether men attending a 12 week fitness programme delivered by Southampton Football Club are at increased risk of diabetes.
METHODS: Baseline data from 11 men was recorded including age, body mass index (BMI), blood pressure and body fat percentage. These data were recorded again at 12 weeks to assess the effectiveness of the programme. The Leicester Risk Assessment Score (LRAS) was used to calculate their risk of diabetes.
RESULTS: One man was found to have diabetes during the programme, and three men left the programme prior to the 12 week assessment. The average age was 61, with a mean BMI of 33.4 and waist circumference of 118.35 cm. At 12 weeks men lost a mean of 5.9% body weight and 7.69 cm from their waist. Calculation of the LRAS showed six men (54.5%) scored above 16 - the cut-off for further investigation of diabetes
No online abstract available.

Jansson SP et al. (2016). *Mortality and cardiovascular disease outcomes among 740 patients with new-onset Type 2 diabetes detected by screening or clinically diagnosed in general practice*. Diabetic Medicine 33(3): 324-331.

AIM: to analyse all-cause mortality and cardiovascular disease (CVD) outcomes in patients with Type 2 diabetes detected by screening or diagnosed clinically.
METHODS: A diabetes register was established at the primary healthcare centre in Laxa, Sweden beginning in 1972. The register was based on data from clinical records with information on medical treatment and laboratory data, as well as all-cause mortality, CVD, myocardial infarction and stroke events from national registers until 31 December 2013. A total of 740 patients with new-onset Type 2 diabetes were registered between 1972 and 2001. In addition, an opportunistic diabetes-screening programme involving people aged 35-79 years started in 1983 and was repeated onwards in 5-year cycles.
RESULTS: Baseline characteristics showed a significantly higher CVD risk, mainly depending on more prevalent CVD events in the screened compared with the

clinically detected group (propensity score 0.59 vs. 0.46, P < 0.0001). After mean follow-up periods of 12.9 and 13.6 years for screening detected vs. clinically detected patients, respectively, hazard ratios were as follows: all-cause mortality, 0.99 (P = 0.89); CVD, 1.17 (P = 0.10); myocardial infarction, 1.08 (P = 0.49); and stroke, 1.03 (P = 0.83).
View abstract

Jørstad HT et al. (2016). *Estimated 10-year cardiovascular mortality seriously underestimates overall cardiovascular risk*. Heart 102(1): 63-68.

AIM: to investigate the ratio of total CVD to CVD mortality in a large population-based cohort.
METHODS: CVD mortality and total CVD were analysed using Kaplan-Meier estimates among 24 014 men and women aged 39–79 years without baseline CVD or diabetes mellitus in the prospective population-based European Prospective Investigation of Cancer and Nutrition-Norfolk cohort. CVD outcomes included death and hospitalisations for ischaemic heart disease, heart failure, cerebrovascular disease, peripheral artery disease or aortic aneurysm. The main study outcome was the ratio of 10-year total CVD to 10-year CVD mortality stratified by age and sex.
RESULTS: Ten year CVD mortality was 3.9% (900 CVD deaths, 95% CI 3.6% to 4.1%); the rate of total CVD outcomes was 21.2% (4978 fatal or non-fatal CVD outcomes, 95% CI 20.7% to 21.8%). The overall ratio of total CVD to CVD mortality was 5.4. However, we found major differences in this ratio when stratified by gender and age. In young women (39–50 years), the ratio of total CVD to CVD mortality was 28.5, in young men (39–50 years) 11.7. In the oldest age group, these ratios were considerably lower (3.2 in women and 2.4 in men aged 75–79 years).
View full text

Jousilahti P et al. (2016). *Primary prevention and risk factor reduction in coronary heart disease mortality among working aged men and women in eastern Finland over 40 years: population based observational study*. British Medical Journal. 352:i721.

AIM: to estimate how much changes in the main risk factors of cardiovascular disease (smoking prevalence, serum cholesterol, and systolic blood pressure) can explain the reduction in coronary heart disease mortality observed among working aged men and women in eastern Finland.
METHODS: A population based observational study. 34 525 men and women aged 30-59 years who participated in the national FINRISK studies between 1972 and 2012 were included. Main outcome measures were the predicted and observed age standardised mortality due to coronary heart disease.
RESULTS: During the 40 year study period, levels of the three major cardiovascular

risk factors decreased except for a small increase in serum cholesterol levels between 2007 and 2012. From years 1969-1972 to 2012, coronary heart disease mortality decreased by 82% (from 643 to 118 deaths per 100 000 people) and 84% (114 to 17) among men and women aged 35-64 years, respectively. During the first 10 years of the study, changes in these three target risk factors contributed to nearly all of the observed mortality reduction. Since the mid-1980s, the observed reduction in mortality has been larger than predicted. In the last 10 years of the study, about two thirds (69% in men and 66% in women) of the reduction could be explained by changes in the three main risk factors, and the remaining third by other factors.
View abstract

Keyworth C et al. (2016). *Communicating Cardiovascular Disease Risk to People with Psoriasis: What Techniques do Practitioners Use?* Int J Behav Med 23(2): 168-178.

AIM: to examine how primary care practitioners communicate risk information when conducting CVD risk assessments.
METHODS: Consultations (n = 44) between primary care practitioners (general practitioners and practice nurses) and patients with psoriasis across 10 practices were audio-recorded and analysed using content analysis. A coding frame was used to record specific techniques used by practitioners to communicate risk information.
RESULTS: Most frequently used communication methods were verbal descriptors of risk factors accompanied by numerical data (n = 28) rather than verbal descriptors alone (n = 16). Practitioners did not use numerical risk communication methods alone. Where CVD risk factors were discussed with patients (n = 156 occasions across all consultations), interpretations of this information was provided to patients on 131 (84 %) occasions. However, specific advice about behaviour/risk modification was only given on 60 (38.5 %) out of a possible 156 occasions.
View abstract

O'Keeffe A et al. (2016). *Time trends in the prescription of statins for the primary prevention of cardiovascular disease in the United Kingdom: A cohort study using The Health Improvement Network (THIN) primary care data*. Clinical Epidemiology (In press).

AIM: to determine how statin prescription trends vary with respect to demographic variables.
METHODS: Using the THIN primary care database, statin therapy initiation and statin prescription prevalence rates were calculated using data from 7,027,711 individuals across the UK for the years 1995 to 2013, overall and stratified by gender, age group and socio-economic deprivation level (Townsend score).
RESULTS: Statin therapy initiation rates rose sharply from 1995 (0.51 per 1000

personyears) up to 2006 (19.83 per 1000 person-years) and thereafter declined (10.76 per 1000 personyears in 2013). Males had higher initiation rates than females and individuals aged 60-85 years had higher initiation rates than younger or more elderly age groups. Initiation rates were slightly higher as social deprivation level increased, after accounting for age and gender. Prescription prevalence increased sharply from 1995 (2.36 per 1000 person-years) to 2013 (128.03 per 1000 person-years) with males generally having a higher prevalence rate, over time, than females. Prevalence rates over time were generally higher for older age groups but were similar with respect to social deprivation level
View abstract

Son YJ et al. (2016). *Association of Waist-Height Ratio with Diabetes Risk: A 4-Year Longitudinal Retrospective Study*. Endocrinology and Metabolism 31(1): 127-133.

AIM: to examine the association of various baseline adiposity indices, including Waist-Height Ratio (WHtR), with the development of diabetes over 4 years of follow-up in apparently healthy Korean individuals.
METHODS: A total of 2,900 nondiabetic participants (mean age, 44.3 years; 2,078 men) in a health screening program, who repeated the medical check-up in 2005 and 2009, were recruited. Subjects were divided into two groups according to development of diabetes after 4 years. The cut-off values of baseline body mass index (BMI), waist circumference (WC), and WHtR for the development of diabetes over 4 years were calculated. The sensitivity, specificity, and mean area under the receiver operator characteristic curve (AUROC) of each index were assessed. The odds ratio (OR) for diabetes development was analyzed for each of the three baseline adiposity indices.
RESULTS: During the follow-up period, 101 new cases (3.5%) of diabetes were diagnosed. The cut-off WHtR value for diabetes development was 0.51. Moreover, WHtR had the highest AUROC value for diabetes development among the three adiposity indices (0.716, 95% confidence interval [CI], 0.669 to 0.763; 0.702, 95% CI, 0.655 to 0.750 for WC; 0.700, 95% CI, 0.651 to 0.750 for BMI). After adjusting for confounding variables, the ORs of WHtR and WC for diabetes development were 1.95 (95% CI, 1.14 to 3.34) and 1.96 (95% CI, 1.10 to 3.49), respectively. No significant differences were observed between the two groups regarding BMI.
View full text

Welsh P et al. (2016). *Prediction of Cardiovascular Disease Risk by Cardiac Biomarkers in 2 United Kingdom Cohort Studies Does Utility Depend on Risk Thresholds For Treatment?* Hypertension 67(2): 309-315.

AIM: to investigate the ability of 3 cardiac biomarkers (N-terminal pro B-type natriuretic peptide (NT-proBNP), high-sensitivity troponin T, and midregional pro

adrenomedullin) to predict CVD in two United Kingdom cohort studies
METHODS: The British Regional Heart Study (BRHS) of men aged 60 to 79 years, and the MIDSPAN Family Study (MFS) of men and women aged 30 to 59 years included 3757 and 2226 participants, respectively, and during median 13.0 and 17.3 years follow-up the primary CVD event rates were 16.6 and 5.3 per 1000 patient-years, respectively.
RESULTS: In Cox models adjusted for basic classical risk factors, 1 SD increases in log-transformed NT-proBNP, high-sensitivity troponin T, and midregional pro adrenomedullin were generally associated with increased primary CVD risk in both the studies (P<0.006) except midregional pro adrenomedullin in MFS (P=0.10). In BRHS, QRISK2 risk factors yielded a C-index of 0.657, which was improved by 0.017 (P=0.005) by NT-proBNP, but not by other biomarkers. Using 28% 14-year risk as a proxy for 20% 10-year risk, NT-proBNP improved risk classification for primary CVD cases (case net reclassification index, 5.9%; 95% confidence interval, 2.8%-9.2%), but only improved classification of noncases at a 14% 14-year risk threshold (4.6%; 2.9%-6.3%). In MFS, ASSIGN risk factors yielded a C-index of 0.752 for primary CVD; none of the cardiac biomarkers improved the C-index. Improvements in risk classification were only seen using NT-proBNP and high-sensitivity troponin T among cases using the 28% 14-year risk threshold (4.7%; 1.0%-9.2% and 2.6%; 0.0%-5.8%, respectively).
View abstract

Cross-sectional studies

Allenby A et al. (2016). *The quality of cardiovascular disease prevention in rural primary care*. Australian Journal of Rural Health 24(2): 92-98.

AIM: to measure the differences in the recording of risk factors and lifestyle advice between those at high risk of cardiovascular disease and those diagnosed with cardiovascular disease, and to identify the practice characteristics associated with such recording in rural primary care.
METHODS: A cross-sectional observation study of 14 general practices in rural Australia. Medical records were audited to measure recording of risk factors and lifestyle advice for those at high risk of and those diagnosed with cardiovascular disease. Practice characteristics were collected, with logistic regression used to test for an association with the recording of risk factors. The main outcome measures were the recording of risk factors and lifestyle advice in patient records and practice characteristics.
RESULTS: 282 records were audited with 142 being high risk and 140 diagnosed with cardiovascular disease.Measures recorded significantly less in the high-risk group were: blood pressure (94% versus 99%; P = 0.019); physical activity (24% versus 56%; P = 0.000); dietary advice (32% versus 51%; P = 0.001); and physical activity advice (34% versus 56%; P = 0.000). Recording of risk factors was positively associated with practice involvement in quality improvement (P < 0.001), continuing

education (P < 0.001), and greater percentage of general practitioners (P < 0.05) and practice nurses (P < 0.001).
View abstract

Anderson AE et al. (2016). *Electronic health record phenotyping improves detection and screening of type 2 diabetes in the general United States population: A cross-sectional, unselected, retrospective study*. J Biomed Inform 60: 162-168.

AIM: to assess whether electronic health record (EHR) phenotyping could improve DM2 screening compared to conventional models, even when records are incomplete and not recorded systematically across patients and practice locations, as is typically seen in practice.
METHODS: In this cross-sectional, retrospective study, EHR data from 9948 US patients were used to develop a pre-screening tool to predict current DM2, using multivariate logistic regression and a random-forests probabilistic model for out-of-sample validation. We compared (1) a full EHR model containing commonly prescribed medications, diagnoses (as ICD9 categories), and conventional predictors, (2) a restricted EHR DX model which excluded medications, and (3) a conventional model containing basic predictors and their interactions (BMI, age, sex, smoking status, hypertension).
RESULTS: Using a patient's full EHR or restricted EHR was superior to using basic covariates alone for detecting individuals with diabetes (hierarchical X(2) test, p<0.001). Migraines, depot medroxyprogesterone acetate, and cardiac dysrhythmias were associated negatively with DM2, while sexual and gender identity disorder diagnosis, viral and chlamydial infections, and herpes zoster were associated positively. Adding EHR phenotypes improved classification; the AUC for the full EHR Model, EHR DX model, and conventional model using logistic regression, were 84.9%, 83.2%, and 75.0% respectively. For random forest machine learning out-of-sample prediction, accuracy also was improved when using EHR phenotypes; the AUC values were 81.3%, 79.6%, and 74.8%, respectively. Improved AUCs reflect better performance for most thresholds that balance sensitivity and specificity.
View abstract

Bayindir Cevik A et al. (2016). *Prevalence and screening for risk factors of type 2 diabetes in Rize, Nourtheast Turkey: findings from a population-based study*. Primary care diabetes 10(1): 10-18.

AIM: to determine the prevalence of diagnosed and undiagnosed diabetes, risk factors affecting the healthy population, and factors that increase diabetes risk in the adult northeast Turkish population.
METHODS: Using population proportional cluster sampling, 930 adults were selected. After excluding people with diabetes, risk screening was conducted in the

healthy population (n: 825) using the Information Form and FINDRISK questionnaire. Fasting venous blood and biochemical parameters were measured.
RESULTS: Prevalence of diabetes was 13.6% (new % 2.3), translating to approximately 44 thousand adults. Among the healthy population, 37.5% had high risk. Prevalence of not exercising (78.2%), obesity (36.1%), and hypertension (24.5%) were high. Predictors of risk of diabetes were aging (OR 1.09), low education (OR 0.51), familial diabetes history (OR 15.27), not exercising (OR 0.41), obesity (OR 5.17), high waist circumference (OR 1.05), heart disease (OR 4.81), and hypertension (OR 2.60).
View abstract

Bossart M et al. (2016). *A pilot study of an HbA1c chairside screening protocol for diabetes in patients with chronic periodontitis: the dental hygienist's role*. International Journal of Dental Hygiene 14(2): 98-107.

AIM: to assess effectiveness, convenience and cost of point-of-care diabetes screenings performed by a dental hygienist for patients with periodontitis, using a diabetes risk questionnaire, periodontal findings and a glycosylated haemoglobin (HbA1c) analyser.
METHODS: A purposive sample of 50 participants with periodontitis, never diagnosed with diabetes, reporting >one diabetes risk factor, were administered an HbA1c test.
RESULTS: Thirty-two per cent (n = 16) of participants presented HbA1c values indicating prediabetes; one HbA1c value indicated type 2 diabetes, totalling 34% (N = 17). No relationships existed between HbA1c values and diabetes risk scores (rs = 0.153; P = 0.144), numbers of missing teeth (r = 0.190; P = 0.093), percentage of deep pockets (rs = −0.048; P = 0.370) or percentage of BOP sites (rs = 0.066, P = 0.324). Direct cost for each HbA1c was $9US, excluding follow-up medical diagnosis. Mean screening time including patient education was 14 min (SD = 6.2). Fifty-three per cent (n = 9 of 17) of participants with elevated HbA1c values contacted their primary healthcare provider within 2 weeks as recommended.
View abstract

De Backer G et al. (2016). *Lifestyle and risk factor management in people at high cardiovascular risk from Bulgaria, Croatia, Poland, Romania and the United Kingdom who participated in both the EUROASPIRE III and IV primary care surveys*. Eur J Prev Cardiol.

AIM: to determine time trends in the implementation of European guidelines on the management of cardiovascular disease prevention in people at high cardiovascular risk.
METHODS: Cardiovascular disease prevention as reflected in the primary care arms

of the EUROASPIRE III and IV surveys were compared in centres from Bulgaria, Croatia, Poland, Romania and the United Kingdom that participated in both surveys. All patients were free of cardiovascular disease but considered at high cardiovascular disease risk since they had been started on blood pressure and/or lipid and/or glucose lowering treatments. They were interviewed and examined by means of standardized methods >/=6 months after the start of therapy.
RESULTS: There were no major differences between the two surveys in age, gender, centres and reasons for inclusion. The prevalence of smoking was similar between EUROASPIRE III and IV. The proportion of smokers who did not intend to quit was significantly greater in EUROASPIRE IV compared with III. The prevalence of overweight or obesity was high and identical in both surveys. No significant differences were observed in physical activity. In participants not on blood pressure lowering treatment an elevated blood pressure was observed in 47% in both EUROASPIRE III and IV. In participants not on lipid lowering drugs the low-density lipoprotein cholesterol was ≥2.5 mmol/l in 87% and 88% in EUROASPIRE III and IV respectively. In participants free from known diabetes fasting plasma glucose was ≥7 mmol/l in 12% and 18% in EUROASPIRE III and IV. In subjects with known arterial hypertension blood pressure was at or below guideline recommended targets in 28% in EUROASPIRE III and 35% in IV. In participants on lipid lowering drugs the low-density lipoprotein cholesterol was < 2.5 mmol/l in 28% and 37% in EUROASPIRE III and IV. Glycated haemoglobin was < 7.0% in participants with known diabetes in 62% and 60% in EUROASPIRE III and IV.
View abstract

Dunkley AJ et al. (2016). *Screening for people at high risk of Type 2 diabetes in a population with intellectual disabilities*. Diabetic Medicine 33: 177.

AIM: to conduct a diabetes screening programme to determine prevalence of Type 2 diabetes and impaired glucose regulation (IGR) in people with ID.
METHODS: The screening programme was conducted in a variety of community settings in Leicestershire, UK. Adults with ID, aged 18-74, were invited using a multi-pronged approach: general practices; Leicestershire Learning Disability Register; ID psychiatric services; direct contact with research team. Reasonable adjustments were made to research processes; capacity assessment and consent followed English mental capacity legislation. Screening involved collection of anthropometric, biomedical and questionnaire data. Type 2 diabetes and IGR were defined according to (venous) fasting plasma glucose or HbA1c, following current WHO criteria.
RESULTS: Screening took place between February 2013 and September 2015. 930 participants (58% male, 16% South Asian, mean age 43 years, 62% mild/moderate ID) were enrolled onto the study. Overall 1% (95% confidence interval 0.5-2%) were screen positive for Type 2 diabetes and 5% (95% confidence interval 4- 7%) identified as high risk (IGR)
No abstract available online.

Eastwood SV et al. (2016). *Ethnic differences in cross-sectional associations between impaired glucose regulation, identified by oral glucose tolerance test or HbA1c values, and cardiovascular disease in a cohort of European and South Asian origin.* Diabetic Medicine 33(3): 340-347.

AIM: to contrast impaired glucose regulation (prediabetes) prevalence and studied cross-sectional associations between prediabetes and subclinical/clinical cardiovascular disease (CVD) in a cohort of European and South Asian origin.
METHODS: For 682 European and 520 South Asian men and women, aged 58-85 years, glycaemic status was determined by oral glucose tolerance test or HbA1c thresholds. Questionnaires, record review, coronary artery calcification scores and cerebral magnetic resonance imaging established clinical plus subclinical coronary heart and cerebrovascular disease.
RESULTS: Prediabetes was more prevalent in South Asian participants when defined by HbA_{1c} rather than by oral glucose tolerance test criteria. Accounting for age, sex, smoking, systolic blood pressure, triglycerides and waist–hip ratio, prediabetes was associated with coronary heart disease and cerebrovascular disease in European participants, most obviously when defined by HbA_{1c} rather than by oral glucose tolerance test [odds ratios for HbA_{1c}-defined prediabetes 1.60 (95% CI 1.07, 2.39) for coronary heart disease and 1.57 (95% CI 1.00, 2.51) for cerebrovascular disease]. By contrast, non-significant associations were present between oral glucose tolerance test-defined prediabetes only and coronary heart disease [odds ratio 1.41 (95% CI 0.84, 2.36)] and HbA_{1c}-defined prediabetes only and cerebrovascular disease [odds ratio 1.39 (95% CI 0.69, 2.78)] in South Asian participants. Prediabetes defined by HbA_{1c} or oral glucose tolerance test criteria was associated with cardiovascular disease (defined as coronary heart and/or cerebrovascular disease) in Europeans [odds ratio 1.95 (95% CI 1.31, 2.91) for HbA_{1c} prediabetes criteria] but not in South Asian participants [odds ratio 1.00 (95% CI 0.62, 2.66); ethnicity interaction P=0.04].
View full text

Eckman M et al. (2016). *Using handgrip strength to screen for diabetes in developing countries*. Journal of Medical Engineering & Technology 40(1): 8-14.

AIM: to study whether handgrip strength (HGS) measurements have the potential to be an affordable and effective screening tool for conditions that cause muscle weakness
METHODS: Translators were used to collect data on age, gender, height, weight, blood pressure, HGS and key demographic data.
RESULTS: HGS was significantly lower for diabetics than patients without diabetes. A simple binary logistic model was created that used HGS, age, blood pressure and BMI to predict a patient's probability of having diabetes.
View abstract

Khoury M et al. (2016). *Universal screening for cardiovascular disease risk factors in adolescents to identify high-risk families: a population-based cross-sectional study*. BMC Pediatrics 16(1): 11.

AIM: to assess the benefit of screening adolescents for cardiovascular disease risk factors in order to identify "at-risk" families in which adult members might also be at elevated risk
METHODS: Cross-sectional study of grade 9 students evaluating adiposity, lipids and blood pressure. Data collected by Heart Niagara Inc. through the Healthy Heart Schools' Program. Parents completed questionnaires, evaluating family history of dyslipidemia, hypertension, diabetes and early cardiovascular disease events in parents and siblings (first-degree relatives), and grandparents (second-degree relatives). Associations between positive risk factor findings in adolescents and presence of a positive family history were assessed in logistic regression models.
RESULTS: $N = 4014$ adolescents ages 14–15 years were screened; 3467 (86 %) provided family medical history. Amongst adolescents, 4.7 % had dyslipidemia, 9.5 % had obesity, and 3.5 % had elevated blood pressure. Central adiposity (waist-to-height ratio ≥0.5) in the adolescent was associated with increased odds of diabetes in first- (OR:2.0 (1.6–2.6), $p < 0.001$) and second-degree relatives (OR:1.3 (1.1–1.6), $p = 0.002$). Dyslipidemia was associated with increased odds of diabetes (OR:1.6 (1.1–2.3), $p < 0.001$), hypertension (OR:2.2 (1.5–3.2), $p < 0.001$) and dyslipidemia (OR:2.2 (1.5–3.2),$p < 0.001$) in first degree relatives. Elevated blood pressure did not identify increased odds of a positive family history.
View full text

Kotseva K et al. (2016). *Achievement of lifestyle, blood pressure, lipids and diabetes goals for primary prevention of cardiovascular disease across Europe: Results of euroaspire iv survey*. Journal of the American College of Cardiology 67(13_S):1976-1976.

AIM: to determine whether the 2012 Joint European Societies' guidelines on cardiovascular disease (CVD) prevention for people at high cardiovascular risk have been followed in everyday clinical practice.
METHODS: A cross-sectional survey carried out in 2014-2015 in 14 European countries.
Patients without a history of coronary or other atherosclerotic disease either started on antihypertensive and/or lipid lowering and/or anti-diabetes treatments were identified retrospectively from general practices medical notes and interviewed and examined at least six months after the start of medication
RESULTS: A total of 4579 high CVD risk individuals (57.8% females) were interviewed (participation rate 68.3%). Overall, 16.6% smoked cigarettes, 43.5% had BMI≥30 kg/m2, and 63.9% were centrally obese (waist circumference of ≥88 cm for women and ≥102 cm for men). The medical risk factor control was very poor, with

less than half (42.8%) of the patients on blood pressure lowering medication reaching the target of <140/90 mmHg (< 140/80 mmHg in people with self-reported diabetes). Among treated dyslipidaemic patients only 32.7% attained LDL-cholesterol target of <2,5 mmol/L. Among treated patients with type 2 diabetes mellitus, 58.5% achieved the HbA1c target of < 7.0mmol/L. The use of blood pressure lowering medication in people with treated hypertension was: beta-blockers 36.8%; ACE inhibitors/ARBs 79.8%; calcium channel blockers 29.1%; diuretics 38.3%. Statins were prescribed in 96.1% of people with treated hypercholesterolaemia
View abstract

Lang SJ et al. (2016). *Impact of socioeconomic deprivation on screening for cardiovascular disease risk in a primary prevention population: a cross-sectional study*. BMJ Open 6(3): e009984.

AIM: to investigate the association between socioeconomic deprivation and completeness of cardiovascular disease (CVD) risk factor recording in primary care, uptake of screening in people with incomplete risk factor recording and with actual CVD risk within the screened subgroup.
METHODS: A cross-sectional study in 9 UK general practices. CVD risk was estimated using the Framingham equation from data extracted from the primary care electronic health records of 7987 people (aged 50-74 years with no CVD diagnosis). Outcomes were: proportion of patients for whom clinical data were sufficiently complete to enable CVD risk to be calculated; proportion of patients invited to screening who attended; proportion of patients who attended screening whose 10-year risk of a cardiovascular event was high (>20%).
RESULTS: People who had lower Indices of Multiple Deprivation (IMD) scores (less deprived) had significantly worse routine CVD risk factor recording (adjusted OR 0.97 (0.95 to 1.00) per IMD decile; p=0.042). Screening attendance was poorer in those with more deprivation (adjusted OR 0.89 (0.86 to 0.91) per IMD decile; p<0.001). Among those who attended screening, the most deprived were more likely to have CVD risk >20% (OR 1.09 (1.03 to 1.15) per IMD decile; p=0.004).
View full text

Misra R et al. (2016). *Community-Based Diabetes Screening and Risk Assessment in Rural West Virginia*. Journal of Diabetes Research 2016: Article ID 2456518.

AIM: to assess diabetes risk among individuals from 12 counties in West Virginia
METHODS: This project utilized a cross-sectional study design to assess diabetes risk among 540 individuals from 12 counties using trained extension agents and community organizations in West Virginia. Individuals were screened for diabetes using (1) the validated 7-item diabetes risk assessment survey and (2) hemoglobin

A1c tests. Demographic and lifestyle behaviors were also collected. The majority were females, Non-Hispanic Whites with no prior diagnosis of diabetes.
RESULTS: Screenings showed that 61.8% of participants were at high risk for diabetes. Family history of diabetes (siblings or parents), overweight or obese status, sedentary lifestyle, and older age were commonly prevalent risk factors. Higher risk scores computed from the 7-item questions correlated positively with higher A1c ($r=0.221$, $p<0.001$). In multivariate logistic regression analyses, higher diabetes risk was predicted by obesity, older age, family history of hypertension, and gestational diabetes. Females were 4 times at higher risk than males.
View full text

Nicholls AR et al. (2016). *Improving the screening for diabetes: Can glucose measurements help?* Diabetic Medicine 33: 177.

AIM: to determine whether the addition of a fasting glucose to a Leicester Risk Assessment Score (LRAS) can predict a person's HbA1c better than the use of an LRAS alone and consequently reduce the need for further blood tests to exclude diabetes.
METHODS: Adults aged between 40 and 80 without diabetes were identified from a GP list and recruited by letter. The LRAS was calculated for each participant, and a fasting blood glucose (FBG) and HbA1c measurement were taken
RESULTS: 184 adults were recruited (a response rate of 38%). The explained variance in HbA1c using the LRAS was 20.8% improving to 46.7% with the inclusion of FBG. An LRAS of >17 and an FBG >5.3 mmol/l identified 76.2% of those with an HbA1c >42 mmol/mol and reduced the number of participants requiring further blood tests to 33.2%.
No online abstract available.

Prata J et al. (2016). *Gender differences in quality of life perception and cardiovascular risk in a community sample*. Revista Portuguesa de Cardiologia 35(3): 153-160.

AIM: to determine how gender differences in cardiovascular risk factors impact quality of life perception.
METHODS: Primary healthcare users (n=261, 158 women) were screened for cardiovascular risk factors and completed the Medical Outcomes Study Short Form (SF-36).
RESULTS: Women had significantly lower alcohol consumption, body mass index and exercise frequency than men, but more prevalent psychiatric history, depressive and anxiety symptoms, and negative affectivity. Prevalences of hypertension, diabetes, dyslipidemia and type D personality were similar between genders. Women reported significantly worse quality of life on most SF-36 subscales and

gender differences were apparent in predictors of quality of life. Moreover, high negative affectivity was an independent predictor of worse general health for women, whereas high social inhibition and high anxiety had a comparable role for men.
View abstract

Rasmussen SS et al. (2016). *Incidence of register-based diabetes 10 years after a stepwise diabetes screening programme: the ADDITION-Denmark study*. Diabetologia 59(5): 989-997.

AIMS: to describe the incidence of diabetes for risk groups according to advancement in a screening process.
METHODS: In 2001-2006, a diabetes screening programme based on the Danish diabetes risk score and measures of HbA1c and glucose was carried out in Danish general practices. The present study includes 13,249 individuals with low diabetes risk scores and 22,726 with high diabetes risk scores but no diabetes according to WHO 1999 criteria. Seven incremental levels of diabetes risk were defined and followed for incident diabetes recorded in the Danish National Diabetes Register until December 2012. For each group, cumulative diabetes incidence was calculated.
RESULTS: After 10 years of follow-up 1,164 new diabetes cases were registered. Incidence rates were 1.0, 4.2, 14.5, 28.8 and 52.6 per 1,000 person-years in individuals at low risk and in those with normal glucose tolerance, impaired fasting glucose, impaired glucose tolerance and one diabetic glucose value, respectively. For each step in the screening algorithm, the risk of developing diabetes was higher than in the previous step.
View abstract

Redon J et al. (2016). *Impact of hypertension on mortality and cardiovascular disease burden in patients with cardiovascular risk factors from a general practice setting: the ESCARVAL-risk study*. J Hypertens. Jun;34(6):1075-83.

AIM: to estimate the attributable risk associated to hypertension for all-cause mortality and cardiovascular hospitalization endpoints in a prospective study of patients with at least one cardiovascular risk factors participating in the Estudio Cardiovascular Valencia-risk project
METHODS: Prospective electronic health recording-based study in a Mediterranean population that included 52 007 cardiovascular disease-free men and women aged 30 years or older (mean age 62.6 year) with hypertension (79.0%), diabetes mellitus (37.3%), or dyslipidemia (88.2%), who underwent routine health examinations. All-cause mortality and hospitalization records for coronary heart disease (CHD) or stroke were collected.
RESULTS: During an average follow-up time of 3.2 years, 928 deaths and 1682 and 1529 hospitalizations for CHD and stroke, respectively, were recorded. In both men

and women, hypertension significantly increased the multiadjusted rates of death and CHD and stroke hospitalizations. Hypertension was associated with a substantial amount of avoidable deaths both in men and women, population attributable risks were 41.81 (95% confidence interval 28.02, 53.24)% and 37.84 (5.74, 61.51)%, respectively. Similarly, the population attributable risk of hospitalization for CHD and stroke associated to hypertension was among the highest in both the sexes as compared with the impact of the other main cardiovascular risk factors. Increasing cardiovascular risk factors clustering was associated with increasing burden of disease.
View abstract

Rutter MK et al. (2016). *Primary care based screening for cardiovascular risk factors in patients with psoriasis*. Br J Dermatol. Mar 15. doi: 10.1111/bjd.14557

AIM: to investigate whether CVD risk factor screening of patients with psoriasis in primary care augments the known prevalence of CVD risk factors in a cross-sectional study
METHODS: Patients listed as having psoriasis in Primary Care were recruited, screened and risk assessed by QRISK2.
RESULTS: Two hundred and eighty-seven patients attended (mean age 53 years; 57% female; 94% white British; 22% severe disease; 33% self-reported psoriatic arthritis. The proportion with known and screen-detected (previously unknown) risk factors was: hypertension: 35% known, 13% screen-detected; hypercholesterolaemia: 32% and 37%; diabetes: 6.6% and 3.1%; and chronic kidney disease 1.1% and 4.5%. At least one screen-detected risk factor was found in 48% and two or more risk factors in 21% of patients. One in three patients (37%) not known to be high risk were found to have a high (>10%) 10-year CVD risk. Amongst the participants receiving treatment for known CVD risk factors, nearly half had suboptimal levels for blood pressure (46%) and cholesterol (46%).
View abstract

Sharma SK et al. (2016). *Screening of cardiovascular risk factors among, urban, semiurban, and rural residents in Jammu district of Jammu and Kashmir*. International Journal of Medical Science and Public Health 5(3): 443-447.

AIM: to study the cardiovascular disease risk factors in urban, semiurban, and rural populations.
METHODS: A cross-sectional study was conducted in the urban, semiurban, and rural areas of Jammu district of Jammu and Kashmir state, India, for a period of 2 years. Of the 4,050 volunteers screened, 1,030 were in urban, 1,270 in semiurban, and 1,750 in rural areas; the demographic profile, blood pressure, and blood sugar were observed, and the results were evaluated in percentages.

RESULTS: The mean age of the screened subjects was above 50 years of age, and the male to female ratio was, approximately, 1.5:1 at urban, 4:1 at semiurban, and 2.5:1 at rural areas. The majority of them were smokers, and about 58.9% of urban, 60% of semiurban, and 39.9% of rural volunteers were overweight and obese. The systolic prehypertension was 30%, 29.8%, and 30.9% and hypertension was 42.7%, 44.2%, and 44.9% among urban, semiurban, and rural population, respectively. The random blood sugar was positive in 9.3%, 12.8%, and 11.5% in urban, semiurban, and rural population, respectively.
View abstract

Sidebottom AC et al. (2016). *Changes in cardiovascular risk factors after 5 years of implementation of a population-based program to reduce cardiovascular disease: The Heart of New Ulm Project*. American Heart Journal. May, Volume 175, Pages 66–76.

AIM: to determine the changes in cardiovascular disease risk factors after 5 years of implementation of the Heart of New Ulm Project (a population-based project with health care, community, and workplace interventions addressing multiple levels of the social-ecological model designed to reduce modifiable CVD risk factors in rural New Ulm, MN.)
METHODS: The community is served by one health system, enabling the use of electronic health record data for surveillance. Electronic health record data were extracted at baseline (2008-2009) and 2 follow-up periods (2010-2011, 2012-2013) for residents aged 40 to 79 years. Generalized estimating equations were used to fit longitudinal models of the risk factors.
RESULTS: Of 7,855 residents in the target population, 80% had electronic health record data for each period. The prevalence of at goal (blood pressure [BP] <140/90 mm Hg) and (low-density lipoprotein cholesterol [LDL-C] <130 mg/dL) increased from 79.3% to 86.4% and 68.9% to 71.1%, respectively, from baseline to 5 years, with the largest reductions in BP and LDL-C seen in individuals not at goal at baseline. Blood pressure and lipid-lowering medication use increased from 41.8% to 44.0% and 25.3% to 29.1%, respectively. The proportion at goal for glucose increased from 46.9% to 48.2%. The prevalence body mass index <30 kg/m2 (55%) did not change, whereas the proportion at-goal for high-density lipoprotein decreased from 63.8% to 58%, and smoking showed an increase from 11.3% to 13.6%.
View abstract

Sohler N et al. (2016). *Opportunistic Screening for Diabetes and Prediabetes Using Hemoglobin A1c in an Urban Primary Care Setting*. Endocrine Practice 22(2): 143-150.

AIM: to describe the use of HbA1c testing for screening during routine visits in primary care clinics of an urban health care system in the U.S.
METHODS: In 2013 to 2014, retrospective analyses of deidentified electronic health records over a 2-year period, January 2010 to December 2011, for academic private practices (clinic group 1) and federally-qualified Community Health Centers (clinic group 2) identified 11,885 adults without prior diabetes or recent HbA1c testing. We estimated the proportion of patients eligible for screening according to ADA and U.S. Preventative Services Task Force (USPSTF) guidelines and calculated the potential yield of previously undiagnosed diabetes or prediabetes among those who received at least 1 HbA1c test.
RESULTS: Overall, 3,316 and 5,613 patients of clinic groups 1 and 2 (75.2% of each) were eligible for screening by ADA guidelines, while only 1,764 (39.9%) of clinic group 1 and 3,799 (50.9%) of clinic group 2 were eligible by USPSTF guidelines. In those eligible by either guideline, 731 (21.4%) patients of clinic group 1 and 1,293 (21.5%) of clinic group 2 received HbA1c testing; among these, in 71 (9.7%) and 121 (9.4%) patients from clinic groups 1 and 2, respectively, HbA1c results were in the diabetes range, and in 330 (45.2%) and 733 (56.7%), results were in the prediabetes range.
View abstract

Tahaineh L et al. (2016). *Primary prevention of cardiovascular disease in a primary care setting*. Primary Health Care Research & Development 17(3): 311-316.

AIM: to investigate primary prevention of cardiovascular disease in a primary care setting in Jordan.
METHODS: Adult patients without clinical cardiovascular disease who attended a primary care setting were interviewed and their medical files were reviewed. Data collected to assess primary prevention of cardiovascular disease included lifestyle/risk factor screening, weight assessment, blood pressure measurement and control, and blood lipid measurement and control.
RESULTS: A total of 224 patients were interviewed. The proportions of patients' files with risk factors documentation were 37.9% for smoking status, 30.4% for physical activity assessment and 72.8% for blood pressure assessment. The majority of hypertensive patients (95.9%) had a blood pressure reading at their most recent visit of $\leqslant$140/90 or was prescribed $\geqslant$2 antihypertensive medications.
View abstract

Twig G et al. (2016). *Body-Mass Index in 2.3 Million Adolescents and Cardiovascular Death in Adulthood*. New England Journal of Medicine.

AIM: to examine the association between body-mass index (BMI) in late adolescence and death from cardiovascular causes in adulthood.
METHODS: Our study was based on a national database of 2.3 million Israeli adolescents in whom height and weight were measured between 1967 and 2010. We assessed the association between the BMI in late adolescence and death from coronary heart disease, stroke, and sudden death in adulthood
RESULTS: During 42,297,007 person-years of follow-up, 2918 of 32,127 deaths (9.1%) were from cardiovascular causes, including 1497 from coronary heart disease, 528 from stroke, and 893 from sudden death. On multivariable analysis, there was a graded increase in the risk of death from cardiovascular causes and all causes that started among participants in the group that was in the 50th to 74th percentiles of BMI (i.e., within the accepted normal range). Hazard ratios in the obese group (≥95th percentile for BMI), as compared with the reference group in the 5th to 24th percentiles, were 4.9 (95% confidence interval [CI], 3.9 to 6.1) for death from coronary heart disease, 2.6 (95% CI, 1.7 to 4.1) for death from stroke, 2.1 (95% CI, 1.5 to 2.9) for sudden death, and 3.5 (95% CI, 2.9 to 4.1) for death from total cardiovascular causes, after adjustment for sex, age, birth year, sociodemographic characteristics, and height. Hazard ratios for death from cardiovascular causes in the same percentile groups increased from 2.0 (95% CI, 1.1 to 3.9) during follow-up for 0 to 10 years to 4.1 (95% CI, 3.1 to 5.4) during follow-up for 30 to 40 years; during both periods, hazard ratios were consistently high for death from coronary heart disease.
View abstract

Wee LE et al. (2016). *Primary care characteristics and their association with health screening in a low-socioeconomic status public rental-flat population in Singapore- a mixed methods study*. BMC Family Practice 17(1): 16.

AIM: to determine whether proximity to primary care, subsidised primary care, or having regular primary care is associated with health screening participation in a low socioeconomic-status public rental-flat community in Singapore.
METHODS: From 2009-2014, residents in five public rental-flat enclaves (N=936) and neighboring owner-occupied precincts (N=1060) were assessed for participation in cardiovascular and cancer screening. We then evaluated whether proximity to primary care, subsidised primary care, or having regular primary care associated with improved adherence to health screening. We also investigated attitudes to health screening using qualitative methodology.
RESULTS: In the rental flat population, for cardiovascular screening, regular primary care was independently associated with regular diabetes screening (adjusted odds ratio, aOR = 1.59, CI = 1.12–2.26, p = 0.009) and hyperlipidemia screening

(aOR = 1.82, CI = 1.10–3.04, *p* = 0.023). In the owner-occupied flats, regular primary care was independently associated with regular hypertension screening (aOR = 9.34 (1.82–47.85, *p* = 0.007), while subsidized primary care was associated with regular diabetes screening (aOR = 2.94, CI = 1.04–8.31, *p* = 0.042). On qualitative analysis, patients were discouraged from screening by distrust in the doctor-patient relationship.
View full text

Zou X et al. (2016). *Decreased Glycemic Difference Between Diabetes and Nondiabetes in the Elderly Leads to the Reduced Diagnostic Accuracy of Hemoglobin A1c for Diabetes Screening in an Aged Chinese Population*. Diabetes Technology & Therapeutics 18(4): 226-232.

AIM: to investigate the impact of age on the accuracy of glycated hemoglobin (HbA1c) for diabetes screening
METHODS: Data from 3,050 Chinese participants 25-75 years of age without known diabetes in a population-based cross-sectional survey were analyzed. Diabetes was diagnosed by the oral glucose tolerance test (OGTT). The performance of HbA1c for detecting OGTT-defined diabetes in tertile groups (divided by age) was evaluated by the area under the curve (AUC) of the receiver operating characteristic curve (ROC). The effect of age on the difference in glucose levels between participants with and without diabetes and the impact of this difference on the performance of HbA1c were evaluated.
RESULTS: In young (25-41 years old), middle-aged (41-53 years old), and old (55-72 years old) participants, the ROC AUC (95% confidence interval) of HbA1c for detecting OGTT-defined diabetes was 0.958 (0.915, 1.000), 0.891 (0.852, 0.930), and 0.861 (0.821, 0.901), respectively (P = 0.005). The difference of fasting plasma glucose between participants with diabetes and those without diabetes decreased with increasing age: 3.01 (2.80, 3.22) mmol/L, 2.90 (2.71, 3.09) mmol/L, and 2.33 (2.16, 2.50) mmol/L in the three consecutive age groups, respectively. A similar pattern was found in 2-h postprandial plasma glucose. The impact of age on the diagnostic power of HbA1c diminished after data were rearranged to artificially increase the difference between participants without diabetes and those with diabetes.
View abstract

Case-control study

Lei F et al. (2016). *Screening for suspected coronary heart disease in patients, using integrated serum biochemical indices*. Journal of Epidemiology & Community Health 70(2): 195-201.

AIM: to evaluate the value on screening CHD of the integrated serum biochemical

indices.
METHODS: 627 healthy controls and 1049 patients with CHD were recruited to develop CHD screening models for males and females using unconditional logistic regression. The performance of the screening models was evaluated by areas under the receiver operating characteristic (ROC) curves (AUCs), and externally validated in another population comprised of 190 healthy controls and 246 patients with CHD.
RESULTS: Backward stepwise variable selection showed that increasing age, total cholesterol (TC), logarithm-transformed homocysteine (lnHCY), logarithm-transformed γ-glutamyl transpeptidase (lnGGT), and decreasing uric acid, logarithm-transformed triglyceride, apolipoprotein A (apoA) and apolipoprotein B (apoB), increased the detection of CHD in males. In comparison, increasing age, TC, lnHCY, lnGGT and high-density lipoprotein cholesterol versus low-density lipoprotein cholesterol, and decreasing apoA, apoB, logarithm transformed lipoprotein (A) and logarithm transformed total bilirubin, increased the detection of CHD in females. The AUCs for the screening models for males and females were 0.958 (95% CI 0.946 to 0.969) and 0.986 (95% CI 0.977 to 0.994), respectively. The performance of the screening models was further evaluated in external validation samples, the AUCs for males and females were 0.907 and 0.992, respectively.
View full text

Qualitative research

Lee MJ et al. (2016). *Potential Motivators and Barriers for Encouraging Health Screening for Cardiovascular Disease Among Latino Men in Rural Communities in the Northwestern United States*. Journal of Immigrant & Minority Health 18(2): 411-419.

AIM: The purpose of this qualitative, descriptive study was to determine what motivates Latino men to participate in health screening for diabetes, high blood pressure, and high cholesterol.
METHODS: Self-identified Latino men (n = 17) were interviewed following a community health screening targeting Latinos. Individual semi-structured interviews were conducted in either Spanish or English after giving written consent. Trained interpreters were used for Spanish interviews.
RESULTS: Emerging themes include motivating factors and barriers to participate in screening.
View abstract
Note: we did not have access to the full text of this article

Mattei J et al. (2016). *Perceptions and Motivations to Prevent Heart Disease among Puerto Ricans*. American Journal of Health Behavior 40(3): 322-331.

AIM: to perform a qualitative assessment of Puerto Ricans' knowledge and perceptions of cardiovascular disease (CVD), and motivations/barriers and preferences to participate in community/ clinical programs for CVD-prevention.
METHODS: Four guided focus group discussions were conducted on a total of 24 Puerto Ricans, aged 40-60 years in Boston, MA.
RESULTS: Participants were aware of CVD, but less knowledgeable about its prevention. They perceived it as serious, and either had CVD or knew someone who had it. They favored education and activities on nutrition, exercise, clinical advice, and social interaction, in weekly/ biweekly small-group sessions with other Latinos, led in Spanish by a familiar health professional, in a convenient community location. Age- and culture-specific program content and educational materials were preferred. A theme emerged on 'personal or family motivations' such as to become healthier and live longer so they would feel better and support their families, or to learn about CVD-prevention. Main barriers included family obligations, weather, safety concerns, transportation, and depressive mood.
View abstract

Thoopputra T et al. (2016). *Opportunistic Risk Screening for Type 2 Diabetes: Exploring of Application of Diabetes Risk Assessment Tool in Community Pharmacy in Australia and Thailand*. Value in Health Regional Issues 9: 1-7.

AIM: to evaluate the feasibility of providing diabetes risk assessment at community pharmacy level in Australia and Thailand from organizational aspects.
METHODS: The intervention study was conducted in eight community pharmacies in New South Wales, Australia, and six community pharmacies in Central Thailand. Diabetes risk assessment tools were applied to determine the risk of developing type 2 diabetes. An open-ended question was asked to solicit the willingness-to-pay value for the service. A semistructured interview was conducted with participating pharmacists to solicit the perceived facilitators and barriers in providing the service..
RESULTS: There were a total of 132 and 185 participants, with the ratio of participants in the three risk categories of low, intermediate, and high being 1:4:11 and 2:1:1.5 for Australia and Thailand, respectively. More Thai participants were willing to pay for the service (72.4% vs. 18.9%; $P = 0.0001$). Pharmacists from both countries agreed that providing risk assessment would increase health awareness and assist in dampening the burden of disease. A major barrier is time and staff shortage. Support from the government and collaboration among health care providers were major facilitators from Thai pharmacists' perspective, whereas remuneration was a major facilitator from Australian pharmacists' perspective.
View abstract

Economic analysis

Kamboj L et al. (2016). *Cost effectiveness of a systematic guidelines-based approach to the prevention and management of vascular disease in a primary care setting*. Int J Cardiol 203: 893-899.

AIM: to examine the cost effectiveness of the Comprehensive Vascular Disease Prevention and Management Initiative (CVDPMI) program compared to no CVDPMI program in adult patients identified at risk for an initial or subsequent vascular event in a primary care setting
METHODS: A one year and a ten year cost effectiveness analyses were conducted. To determine the uncertainty around the cost per life year gained ratio, a non-parametric bootstrap analysis was conducted.
RESULTS: The overall population base case analysis at one year resulted in a cost per CV event avoided of $70,423. FRS subgroup analyses showed the high risk cohort (FRS >20%) had an incremental cost effectiveness ratio (ICER) that was dominant. In the moderate risk subgroup (FRS 10%-20%) the ICER was $47,439 per CV event avoided and the low risk subgroup (FRS <10%) showed a highly cost ineffective result of greater than $5 million per CV event avoided. The ten year analysis resulted in a dominant ICER.
View abstract

van Kempen BJ et al. (2016). *Comparing the cost-effectiveness of four novel risk markers for screening asymptomatic individuals to prevent cardiovascular disease (CVD) in the US population*. International Journal of Cardiology 203: 422-431.

AIM: to determine the benefit of screening for CVD with high sensitivity CRP (hsCRP), coronary artery calcification on CT (CT calcium), carotid artery intima media thickness on ultrasound (cIMT) and ankle-brachial index (ABI) in the U.S. population.
METHODS: A microsimulation model evaluating lifelong cost-effectiveness for individuals aged 40-85 at intermediate risk of CVD, using 2003-2004 NHANES-III (N=3736), Framingham Heart Study, U.S. Vital Statistics, meta-analyses of independent predictive effects of the four novel risk markers and treatment effects was constructed. Using both an intention-to-treat and an as-treated analysis, quality adjusted life years (QALYs), lifetime costs (2014 US $), and incremental cost-effectiveness ratios (ICER in $/QALY gained) of screening with hsCRP, CT coronary calcium, cIMT and ABI were established compared with current practice, full adherence to current guidelines, and ubiquitous statin therapy
RESULTS: In the intention-to-treat analysis in men, screening with CT calcium was cost effective ($32,900/QALY) compared with current practice. In women, screening with hsCRP was cost effective ($32,467/QALY). In the as-treated analysis, statin therapy was both more effective and less costly than all other strategies for both men and women.
View abstract

Modelling studies

van den Brekel-Dijkstra K et al. (2016). *Personalized prevention approach with use of a web-based cardiovascular risk assessment with tailored lifestyle follow-up in primary care practice - a pilot study*. Eur J Prev Cardiol 23(5): 544-551.

AIM: The aim of this prospective implementation study is to evaluate feasibility of a personalized prevention approach with use of a web-based health risk assessment for cardiovascular diseases combined with tailored lifestyle feedback and interventions in the community setting.
METHODS: A random sample of 800 inhabitants of Leidsche Rijn (a newly built residential area in the city of Utrecht) between 45 and 70 years old was invited by their general practitioner to participate in this study and sent a web-based health risk assessment containing a questionnaire, covering socio-demographic variables, family and personal medical history, lifestyle behaviour and psychological variables. The system generates an individual cardiovascular risk based on prognostic modelling. In the case of increased risk further biometric and laboratory evaluation is advised. All participants received tailored web-based feedback with an electronic referral to available medical, psychological and lifestyle interventions in the neighbourhood, or online interventions, and a follow-up questionnaire after six months.
RESULTS: The participation rate was 29% (230/800) of which 39% (89/230) were at increased risk for cardiovascular disease and were advised to perform biometric measures, of which 36% (32/89) actually did. Of these respondents 25% (8/32) had increased blood pressure (≥140/90), 56% (18/32) increased total cholesterol (>6.0 mmol/l).One-third of the participants started changing their lifestyle, 20% indicated planning to do this later; 32% (41/129) increased their physical activity and 28% (36/129) were eating healthier. Seventy-nine per cent of the responders stated their participation was ‘meaningful’.
View abstract

Ongoing research

Lonn E et al. (2016). *Novel Approaches in Primary Cardiovascular Disease Prevention: The HOPE-3 Trial Rationale, Design, and Participants' Baseline Characteristics*. Canadian Journal of Cardiology 32(3): 311-318.

AIM: The Heart Outcomes Prevention Evaluation-3 (HOPE-3) trial aims to evaluate whether cholesterol lowering with a statin drug, BP lowering with low doses of 2 antihypertensive agents, and their combination safely reduce major CV events in individuals at intermediate risk who have had no previous vascular events and have average cholesterol and BP levels
METHODS: 12,705 women 65 years or older and men 55 years or older from 21 countries in North America, South America, Europe, Asia, and Australia were recruited. Mean age at randomization was 66 years and 46% were women. They

were randomized to rosuvastatin or placebo and to candesartan/hydrochlorothiazide or placebo, and will be followed for a mean of 5.8 years. The coprimary study outcomes are the composite of CV death, nonfatal myocardial infarction (MI), and nonfatal stroke and the composite of CV death, nonfatal MI, nonfatal stroke, resuscitated cardiac arrest, heart failure, and arterial revascularization.
RESULTS: The trial enrolled 12,705 participants, will have a long duration of follow-up, and will provide robust data on the efficacy of the study interventions and also on their safety and impact on quality of life and health care costs. Importantly, the trial randomized a large number of women (46%) and has broad geographic and ethnic representation, including large numbers of participants from Asia, South America, India, and Africa (81% of the study population), regions of the world with increasing CVD burden but that were under-represented in previous primary prevention trials. The HOPE-3 trial will provide new information on cholesterol and BP lowering in intermediate-risk populations with average cholesterol and BP levels and is expected to inform approaches to primary prevention worldwide.
View abstract

Osborn D et al. (2016). *Evaluating the clinical and cost effectiveness of a behaviour change intervention for lowering cardiovascular disease risk for people with severe mental illnesses in primary care (PRIMROSE study): study protocol for a cluster randomised controlled trial*. Trials 17(1): 1.

AIM: to test the effectiveness of a behavioural intervention to lower cardiovascular disease risk in people with severe mental illnesses in United Kingdom General Practices.
METHODS: The study is a cluster randomised controlled trial in 70 GP practices for people with severe mental illnesses, aged 30 to 75 years old, with elevated cardiovascular disease risk factors. The trial will compare the effectiveness of a behavioural intervention designed to lower cardiovascular disease risk and delivered by a practice nurse or healthcare assistant, with standard care offered in General Practice. A total of 350 people will be recruited and followed up at 6 and 12 months. The primary outcome is total cholesterol level at the 12-month follow-up and secondary outcomes include blood pressure, body mass index, waist circumference, smoking status, quality of life, adherence to treatments and services and behavioural measures for diet, physical activity and alcohol use.
RESULTS: The results of this pragmatic trial will provide evidence on the clinical and cost effectiveness of the intervention on lowering total cholesterol and addressing multiple cardiovascular disease risk factors in people with severe mental illnesses in GP Practices.
View full text