



Public Health  
England

Protecting and improving the nation's health

# **NHS Health Check programme: Annotated Bibliography: May 1st 2019 – November 8th 2019**

## About Public Health England

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## Acknowledgements

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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, diabetes/ cardiovascular disease (CVD) risk screening in the population and CVD prevention in primary care . 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, NICE Evidence Search, TRIP database, Google Scholar, Google, Clinical Trials.gov, ISRCTN registry and Prospero 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 1st 1996 and April 30th 2019. This search identifies references from May 1<sup>st</sup> 2019 to November 8th 2019. The cut-off date for internet searches was November 11th 2019.

Table 1. Search strategies

Database	Search strategy
Ovid Medline	<ol style="list-style-type: none"> <li>1. health check*.tw.</li> <li>2. (diabetes adj3 screen*).tw.</li> <li>3. (cardiovascular adj3 screen*).tw.</li> <li>4. (population adj2 screen*).tw.</li> <li>5. (risk factor adj3 screen*).tw.</li> <li>6. (opportunistic adj3 screen*).tw.</li> <li>7. medical check*.tw.</li> <li>8. general check*.tw.</li> <li>9. periodic health exam*.tw.</li> <li>10. annual exam*.tw.</li> <li>11. annual review*.tw.</li> <li>12. NHSHC.tw.</li> <li>13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12</li> <li>14. cardiovascular adj3 prevention.tw.</li> <li>15. (primary care or general practice or primary healthcare).tw</li> <li>16. 14 and 15</li> <li>17. Cardiovascular Diseases/ AND Primary Prevention/</li> <li>18. 16 or 17</li> <li>19. 13 or 18</li> <li>20. (201905* or 201906* or 201907*).dt.</li> <li>21. (201908* or 201909*).dt.</li> <li>22. (201910* or 201911*).dt.</li> <li>23. 20 or 21 or 22</li> <li>24. 19 and 23</li> </ol>
PubMed	<ol style="list-style-type: none"> <li>1. health check*</li> <li>2. diabetes screen*</li> <li>3. cardiovascular screen*</li> <li>4. population screen*</li> <li>5. risk factor screen*</li> <li>6. opportunistic screen*</li> <li>7. medical check*</li> <li>8. general check*</li> <li>9. periodic health exam*</li> <li>10. annual exam*</li> <li>11. annual review*</li> <li>12. NHSHC</li> <li>13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12</li> <li>14. Cardiovascular Diseases AND Primary Prevention[MeSH Terms]</li> <li>15. "primary care"[Text Word] OR "general practice"[Text Word] OR "primary healthcare"[Text Word]</li> <li>16. (cardiovascular[Text Word] AND prevention[Text Word])</li> <li>17. #15 and #16</li> <li>18. #14 or #17</li> <li>19. #13 or #18 Filters: Publication date from 2019/05/01 to 2019/11/08</li> </ol>

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 dc=20190501-20191108

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="2019"

- EBSCO CINAHL
- S12 S10 AND S11  
S11 S1 OR S2 OR S9  
S10 EM 20190501-20191108  
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: 2019  
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\*
- Ovid PsycInfo
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. health screening/ or physical 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 DISORDERS/ and PREVENTIVE MEDICINE/
  19. 17 or 18
  20. 14 or 19
  21. limit 20 to up=20190501-20191108

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 with Cochrane Library publication date from May 2019 to Dec 2019
NHS Evidence	<i>"health check"</i> OR <i>cardiovascular prevention primary</i> Limited to 01/05/2019 to 11/11/2019
TRIP database	<i>(title:cardiovascular prevention primary from:2019)</i> OR <i>("nhs health check" from:2019)</i>
Google Scholar	<i>"nhs health check"</i> OR <i>cardiovascular "health check"</i> OR <i>cardiovascular prevention primary care</i> OR <i>nhs health check program</i> Since 2019, sorted by date.
Google	<i>"nhs health check"</i> <i>cardiovascular prevention "primary care"</i> <i>cardiovascular "health check"</i> <i>CVD risk prediction</i> <i>nhs health check program</i> Limited to 01/05/2019 to 11/11/2019
Clinical trials.gov, ISRCTN, Prospero	<i>"health check"</i> , Limited to 01/05/2019 to 11/11/2019

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 Types of Information, and are listed below in section 4. Categorisation has been based on information provided by authors/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 Services](#) or [OpenAthens](#).



### 3. Results

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

Table 2. Citations published/entered between May 1st 2019 and November 8th 2019

Database	No. of hits	Exclusive (non duplicates)
Ovid Medline (May 1st 2019 – Nov 7th 2019)	1191	1188
PubMed (May 1st 2019 – Nov 8th 2019)	951	251
Ovid Embase (May 1st 2019 – 2019 week 44)	2413	1360
Ovid HMIC (up to latest edition Sept 2019)	14	12
EBSCO CINAHL (May 1st 2019- Nov 8th 2019)	1007	840
EBSCO Global Health (May 1 <sup>st</sup> 2019–Nov 8th 2019)	462	271
Ovid PsycInfo (May 1st 2019 – Oct week 4 2019)	173	132
Cochrane Library (Issue 11 of 12, November 2019)	75	45
NICE Evidence (May 1st 2019 – Nov 11 <sup>th</sup> 2019)	73	60
TRIP database (2019)	65	41
<b>TOTAL</b>		<b>4200</b>

Table 2a. Citations added to internet sources between May 1st 2019 and Nov 11th 2019

Internet sources	No. of hits
Google Scholar (2019)	10
Google (May 1st 2019 – Nov 11 <sup>th</sup> 2019)	20*
Trials registers, Prospero (2019)	0
<b>TOTAL</b>	<b>30</b>

*\*Note: it is not possible to know how many of these are unique citations.*

From these 4230 results, 14 were identified as being relevant to the NHS Health Check programme, 14 to general health checks and 67 to diabetes/cardiovascular disease risk screening or CVD prevention.

#### Total relevant references = 95

- NHS Health Checks = 14
- general health checks = 14
- diabetes/cardiovascular disease screening or CVD prevention = 67

## 4. References on the NHS Health Check Programme (14)

### Guidance

Public Health England 2019. **NHS Health Checks: applying All Our Health.**

AIM: Advice and guidance for healthcare professionals, to ensure the NHS Health Check programme reaches high-risk and vulnerable communities. Updated in Sept 2019.

View [full text](#)

### Evidence summaries

Heart UK 2019. **Prioritising the prevention of cardiovascular disease (CVD).** July.

AIM: HEART UK were invited by the Parliamentary Under Secretary of State for Public Health and Primary Care to submit a proposal to be included in the forthcoming Green Paper on Prevention

METHODS: non-systematic evidence review. This paper has been developed following a cross-stakeholder roundtable discussion which included representatives from the third sector, professional organisations, NHS England, Public Health England and industry.

RESULTS: Heart UK make various recommendations including: providers of NHS Health Checks should be incentivised to improve the uptake amongst the eligible population with clear uptake targets; and reclassifying the NHS Health Check programme in the Community Pharmacy Contractual Framework as an essential service would provide the opportunity to deliver the service to a larger eligible population, making it more routinely available within a community setting.

CONCLUSION: HEART UK will support and work in a collaborative manner with both NHS England and Public Health England to achieve the ambitions set out within the Long Term Plan. We also believe, however, that there is a unique opportunity to highlight the need to drive improvements in CVD preventative measures through the DHSC's Prevention Green Paper.

View [full text](#)

NIHR 2019. **NIHR Signal: Text message reminders increase attendance at NHS health checks.**

National Institute for Health Research Signal. 17 September 2019.

AIM: NIHR Signals explain why the study was needed, what the researchers did, what the study found, how this relates to current guidelines and what the implications are of the findings. They are accompanied by commentary from experts in their field, researchers and those working in practice.

METHODS: This randomised controlled trial took place in 28 general practices in Southwark, London. It included 13,809 patients aged 40 to 74 years who were eligible for an NHS health check between November 2013 and December 2014.

This trial assessed different combinations of interventions. Patients were first assigned to receive either a pre-notification text or not. They were then assigned to receive one of 4 types of invitation letter.

RESULTS: Amongst invited patients, 24% attended health checks. This ranged from 18% of those sent the standard control letter with neither text pre-notification nor reminder, to 30% of those sent the time-limited letter with both text pre-notification and reminder. Comparatively, this latter group had almost doubled odds of attending (odds ratio [OR] 1.93, 95% confidence interval [CI] 1.52 to 2.44). All other approaches significantly increased the likelihood of attending compared with the standard letter and no texts, except the control letter with only the pre-notification text, and the time-limited or social-norms letters without text messages. These three approaches showed only 20-21% uptake. When accounting for sex, ethnicity, deprivation and practice variations, the time-limited letter with both texts remained most effective compared with the control letter and no text (adjusted OR 1.86, 95% CI 1.40 to 2.38). The reminder text appeared to be the most effective addition

**CONCLUSION:** Brief time-limited letters, telling people their check was due next month, for example, seemed most effective. However, any form of letter combined with a reminder text was more effective than no reminder

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Peate, I. 2019. **NHS screening programmes.** British Journal of Healthcare Assistants 13(8) 378-381. AIM: to provide insight and understanding of the thinking behind population screening, and to explain the differences between screening and testing.

**RESULTS:** Various charities and voluntary organisations are working with statutory bodies to encourage screening uptake among various populations; they are calling for better information and easier access to the various screening programmes. The healthcare assistant and assistant practitioner are public health practitioners, whose role in improving screening uptake is highlighted in this article.

View [abstract](#)

## Trials

Kennedy, O., Su, F., Pears, R., et al. 2019. **Evaluating the effectiveness of the NHS Health Check programme in South England: a quasi-randomised controlled trial.** BMJ Open 9(9) e029420.

AIM: to evaluate uptake, risk factor detection and management from the National Health Service (NHS) Health Check (HC).

**METHODS:** a quasi-randomised controlled trial where participants were allocated to five cohorts based on birth year. Four cohorts were invited for an NHS HC between April 2011 and March 2015 in 151 general practices in Hampshire, England, UK. 366 005 participants eligible for an NHS HC.

**RESULTS:** HC attendance rose from 12% to 30% between 2011/2012 and 2014/2015 ( $p < 0.001$ ). HC invitation increased detection of CVD risk  $>10\%$  (2.0%-3.6,  $p < 0.001$ ) and  $>20\%$  (0.1%-0.6%,  $p < 0.001-0.392$ ), TC  $>5.5$  mmol/L (4.1%-7.0%,  $p < 0.001$ ) and  $>7.5$  mmol/L (0.3%-0.4%  $p < 0.001$ ), hypertension (0.3%-0.6%,  $p < 0.001-0.003$ ), and interventions with statins (0.2%-0.9%,  $p < 0.001-0.017$ ) and antihypertensives (0.1%-0.6%,  $p < 0.001-0.205$ ). There were no consistent differences in detection of smokers, NRT, or diabetes, AF or CKD. Multivariate analyses showed associations between HC invitation and detecting CVD risk  $>10\%$  (OR 8.01, 95% CI 7.34 to 8.73) and  $>20\%$  (5.86, 4.83 to 7.10), TC  $>5.5$  mmol/L (3.72, 3.57 to 3.89) and  $>7.5$  mmol/L (2.89, 2.46 to 3.38), and diagnoses of hypertension (1.33, 1.20 to 1.47) and diabetes (1.34, 1.12 to 1.61). OR of CVD risk  $>10\%$  plus statin and  $>20\%$  plus statin, respectively, was 2.90 (2.36 to 3.57) and 2.60 (1.92 to 3.52), and for hypertension plus antihypertensive was 1.33 (1.18 to 1.50). There were no associations with AF, CKD, antiglycaemics or NRT. Detection of several risk factors varied inversely by deprivation.

**CONCLUSION:** HC invitation increased detection of cardiovascular risk factors, but corresponding increases in evidence-based interventions were modest.

View [full text](#)

Sallis, A., Sherlock, J., Bonus, A., et al. 2019. **Pre-notification and reminder SMS text messages with behaviourally informed invitation letters to improve uptake of NHS Health Checks: a factorial randomised controlled trial.** BMC Public Health 19(1) 1162.

AIM: to increase uptake of the NHS Health Check (NHS HC)

**METHODS:** We explored the impact of behaviourally informed invitation letters and pre-notification and reminder SMS on uptake of NHS HCs. Patients at 28 General Practices in the London Borough of Southwark who were eligible to receive an NHS HC between 1st November 2013 and 31st December 2014 were included. A double-blind randomised controlled trial with a mixed 2 (pre-notification SMS - yes or no) x 4 (letter - national template control, open-ended, time-limited, social norm) x 2 (reminder SMS - yes or no) factorial design was used. The open-ended letter used simplification, behavioural instruction and a personalised planning prompt for patients to record the date and time of their NHS HC. The time-limited letter was similar but stated the NHS HC was due in a named forthcoming month. The social norms letter was similar to the open-ended letter but included

a descriptive social norms message and testimonials from local residents and no planning prompt. The outcome measure was attendance at an NHS HC.

**RESULTS:** Data for 12, 244 invites were analysed. Uptake increased in almost all letter and SMS combinations compared to the control letter without SMS (Uptake 18%), with increases of up to 12 percentage points for the time-limited letter with pre-notification and reminder (Uptake 30%; Adjusted Odds Ratio AOR 1.86; 95% CI 1.45-2.83;  $p < 0.00$ ); 10 percentage points for the open-ended letter with reminder (Uptake 27%; AOR 1.68; 95% CI 1.31-2.17;  $p < 0.00$ ) and a 9 percentage point increase using the time-limited letter with reminder (Uptake 27%; AOR 1.61; 95% CI 1.25-2.10;  $p < 0.00$ ). The reminder SMS increased uptake for all intervention letters. The pre-notification did not add to this effect.

**CONCLUSION:** This large randomised controlled trial adds support to the evidence that small, low cost behaviourally informed changes to letter-based invitations can increase uptake of NHS HCs.

View [full text](#)

## Cohort studies

Alageel, S. & Gulliford, M. C. 2019. **Health checks and cardiovascular risk factor values over six years' follow-up: Matched cohort study using electronic health records in England.** PLoS Medicine / Public Library of Science 16(7) e1002863.

**AIM:** to measure the cardiovascular risk management and cardiovascular risk factor outcomes of the NHS health check programme during six years' follow-up.

**METHODS:** A controlled interrupted time series study was conducted. Participants were registered with general practices in the Clinical Practice Research Datalink (CPRD) in England and received health checks between 1 April 2010 and 31 December 2013. Control participants, who did not receive a health check, were matched for age, sex, and general practice. Outcomes were blood pressure, body mass index (BMI), smoking, and total cholesterol (TC) and high-density lipoprotein cholesterol (HDL). Analyses estimated the net effect of health check by year, allowing for the underlying trend in risk factor values and baseline differences between cases and controls, adjusting for age, sex, deprivation, and clustering by general practice.

**RESULTS:** There were 127,891 health check participants and 322,910 matched controls. Compared with controls, health check participants had lower BMI (cases mean 27.0, SD 4.8; controls 27.3, SD 5.6, Kg/m<sup>2</sup>), systolic blood pressure (SBP) (cases 129.0, SD 14.3; controls 129.3, SD 15.0, mm Hg), and smoking (21% in health check participants versus 27% in controls), but total and HDL cholesterol were similar. Health check participants were more likely to receive weight management advice (adjusted hazard ratio [HR] 5.03, 4.98 to 5.08,  $P < 0.001$ ), smoking cessation interventions (HR 3.20, 3.13 to 3.27,  $P < 0.001$ ), or statins (HR 1.24, 1.21 to 1.27,  $P < 0.001$ ). There were net reductions in risk factor values up to six years after the check for BMI (-0.30, -0.39 to -0.20 Kg/m<sup>2</sup>,  $P < 0.001$ ), SBP (-1.43, -1.70 to -1.16 mm Hg,  $P < 0.001$ ), and smoking (17% in health check participants versus 25% in controls; odds ratio 0.90, 0.87 to 0.94,  $P < 0.001$ ). The main study limitation was that residual confounding may be present because randomisation was not employed; health check-associated measurement introduced differential recording that might cause bias.

**CONCLUSIONS:** Our results suggest that people who take up a health check generally have lower risk factor values than controls and are more likely to receive risk factor interventions. Risk factor values show net reductions up to six years following a health check in BMI, blood pressure, and smoking, which may be of public health importance.

View [full text](#)

Riley, V. A., Gidlow, C., Ellis, N. J., et al. 2019. **Improving cardiovascular disease risk communication in the UK national health service health check programme.** Patient Education & Counseling 102(11) 2016-2023.

**AIM:** to develop and test training to improve practitioners' confidence and perceived understanding when communicating cardiovascular disease (CVD) risk using novel tools and metrics.

**METHODS:** A CVD risk communication training workshop was developed through interviews with patients and practitioners delivering Health Checks, a literature review, NICE guidance and the UK Health Check competency framework. It was pilot-tested with practitioners delivering Health Checks in the UK. Perceived practitioner understanding and confidence were measured before and up to 10 weeks after the workshop, and changes were compared with those in a control group (who received no intervention). Perceived impact was also explored through semi-structured interviews.

**RESULTS:** Sixty-two practitioners (34 intervention, 28 control) took part. Perceived practitioner understanding ( $p = .030$ ) and perceived patient understanding ( $p = .007$ ) improved significantly for those delivering Health Checks in the training group compared with controls. Practitioner confidence also improved significantly more in practitioners who attended the training ( $p = .001$ ). Findings were supported by interviews with a sub-sample of practitioners ( $n = 13$ ).

**CONCLUSION:** The training workshop improved practitioners' confidence and perceived understanding of CVD risk in Health Checks.

View [abstract](#)

### Cross-sectional studies

Chattopadhyay, K, Biswas M, Moore R et al. 2019. **NHS Health Check and healthy lifestyle in Leicester, England: analysis of a survey dataset.** Perspectives in Public Health 1757913919834584.

**AIM:** to explore the variations (in terms of uptake) in the NHS Health Check in Leicester and to determine its association with a healthy lifestyle.

**METHODS:** This cross-sectional study used data from the Leicester Health and Wellbeing Survey (2015).

**RESULTS:** The odds of having an NHS Health Check were found to be higher in Black and minority ethnic groups and in people of other religions. The odds were lower in people without a religion, residing in the fourth index of multiple deprivation quintile and in ex-smokers. No associations were found between having an NHS Health Check and describing a healthy lifestyle, following a healthy lifestyle, thinking of making lifestyle changes in the next 6 months, cutting down on/stopping smoking among current smokers, or amount of alcohol current drinkers would like to drink.

**CONCLUSION:** In Leicester, a few variations in having an NHS Health Check were found among different socio-economic, demographic and behavioural groups. No association was found between the NHS Health Check and a healthy lifestyle.

View [abstract](#)

NHS Digital 2019. **NHS Health Check programme, Patients Recorded as Attending and Not Attending, 2012-13 to 2017-18.**

**AIM:** to inform users, ranging from providers and commissioners of primary care services to inquiring citizens about recorded activity for patients within the NHS Health Check programme.

**METHODS:** This publication reports the demographics of patients attending and not attending an NHS Health Check between April 2012 and March 2018. Data is reported by financial year and geographically at National, Clinical Commissioning Group and local authority level.

**RESULTS:** 1,108,841 patients attended an NHS Health Check. 54% of patients attending an NHS Health Check were female

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### Economic

Collins, B., Kypridemos, C., Cookson, R., et al. 2019. **Universal or targeted cardiovascular screening? Modelling study using a sector-specific distributional cost effectiveness analysis.** Preventive Medicine, 130, 105879.

**AIM:** to build on our previous study (which found that targeting NHS health check to deprived populations would be more cost effective and equitable than having a universal offer), we explicitly

examine the distribution of health opportunity costs and look at new redesign options co-designed with stakeholders

**METHOD:** Distributional cost effectiveness analysis. We simulated four plausible scenarios: a) no CVD screening, b) 'current' basic universal CVD screening as currently implemented, c) enhanced universal CVD screening with 'increased' population-wide delivery, and d) 'universal plus targeted' with top-up delivery to the most deprived fifth. We also compared assumptions around whether displaced health spend would come from programmes that might benefit the poor more and how much health these programmes would generate. The main outcomes were net health benefit and change in the slope index of inequality (SII) in QALYs per 100,000 person years.

**RESULTS:** 'Universal plus targeted' dominated 'increased' and 'current' and also reduced health inequality by -0.65 QALYs per 100,000 person years.

**CONCLUSION:** Based on real world data from Liverpool and considering sector and deprivation specific opportunity costs, current implementation of universal cardiovascular screening does not reduce inequalities.

View [abstract](#)

### Qualitative

Alageel, S., Gulliford, M. C., Wright, A., et al. 2019. **Engagement with advice to reduce cardiovascular risk following a health check programme: A qualitative study.** Health Expectations 23 23.

**AIM:** to examine factors that might influence engagement and adherence to lifestyle change interventions and medication amongst people recently assessed at medium or high risk of CVD (>10% in the next 10 years).

**METHOD:** Qualitative study using individual semi-structured interviews. Data were analysed using the Framework method.

**RESULTS:** Twenty-two participants (12 men, 10 women) were included in the study. Four broad themes are described: (a) the meaning of 'risk', (b) experiences with medication, (c) attempts at lifestyle change, and (d) perceived enablers to longer-term change. The experience of having a health check was mostly positive and reassuring. Although participants may not have understood precisely what their CVD risk meant, many reported efforts to make lifestyle changes and take medications to reduce their risk. Individual's experience with medications was influenced by family, friends and the media. Lifestyle change services and family and friends support facilitated longer-term behaviour change.

**CONCLUSION:** People generally appear to respond positively to having a CVD health check and report being motivated towards behaviour change. Some individuals at higher risk may need clearer information about the health check and the implications of being at risk of CVD. Concerns over medication use may need to be addressed in order to improve adherence. Strategies are required to facilitate engagement and promote longer-term maintenance with lifestyle changes amongst high-risk individuals.

View [full text](#)

Hawking, M. K. D., Timmis, A., Wilkins, F., et al. 2019. **Improving cardiovascular disease risk communication in NHS Health Checks: a qualitative study.** BMJ Open 9(8) e026058.

**AIM:** to explore patient perspectives and experiences of a personalised Risk Report designed to improve cardiovascular risk communication in the NHS Health Check.

**METHOD:** This is a qualitative study with NHS Health Check attendees in three general practices in the London Borough of Newham. A personalised Risk Report for the NHS Health Check was developed to improve communication of results and advice. The Risk Report was embedded in the electronic health record, printed with auto-filled results and used as a discussion aid during the NHS Health Check, and was a take-home record of information and advice on risk reduction for the attendees. 18 purposively sampled socially diverse participants took part in semistructured interviews, which were analysed thematically.

**RESULTS:** For most participants, the NHS Health Check was an opportunity for reassurance and assessment, and the Risk Report was an enduring record that supported risk understanding, with impact beyond the individual. For a minority, ambivalence towards the Risk Report occurred in the context of attending for other reasons, and risk and lifestyle advice were not internalised or acted on.  
**CONCLUSION:** Our findings demonstrate the potential of a personalised Risk Report as a useful intervention in NHS Health Checks for enhancing patient understanding of cardiovascular risk and strategies for risk reduction. Also highlighted are the challenges that must be overcome to ensure transferability of these benefits to diverse patient groups.

View [abstract](#)

Stone, T. J., Brangan, E., Chappell, A., et al. 2019. **Telephone outreach by community workers to improve uptake of NHS Health Checks in more deprived localities and minority ethnic groups: a qualitative investigation of implementation.** *Journal of Public Health* 12 12.

**AIM:** to improve equity of uptake, and to examine the experiences of staff, in more deprived, and Black, Asian and minority ethnic (BAME) communities using a novel telephone outreach.

**METHOD:** Thematic analysis of semi-structured interviews with 10 community Telephone Outreach Workers (TOWs) making outreach calls, and 5 Primary Care Practice (PCP) staff they liaised with.

The outreach call included an invitation to an NHS Health Check appointment, lifestyle questions, and signposting to lifestyle services. Normalization Process Theory was used to examine intervention implementation.

**RESULTS:** Telephone outreach was perceived as effective in engaging patients in NHS Health Checks and could reduce related administration burdens on PCPs. Successful implementation was dependent on support from participating PCPs, and tensions between the intervention and other PCP priorities were identified. Some PCP staff lacked clarity regarding the intervention aim and this could reduce the potential to capitalize on TOWs' specialist skills.

**CONCLUSIONS:** To maximize the potential of telephone outreach to impact equity, purposeful recruitment and training of TOWs is vital, along with support and integration of TOWs, and the telephone outreach intervention, in participating PCPs. Available:

View full [text](#)

## References relating to general health checks (14)

### Evidence summaries

Heneghan, C. & Mahtani, K. R. 2019. **Is it time to end general health checks?** *BMJ Evidence based Medicine* 09.  
METHODS AND RESULTS: A non-systematic EBM commentary of some of the recent evidence on general health checks  
CONCLUSION: The results of a recent systematic review and evaluation of health checks in general practice challenge the assumption that the detection of disease is a proxy for better healthcare.  
View [full text](#)

### Systematic reviews

Hakro, S. & Jinshan, L. 2019. **Workplace Employees' Annual Physical Checkup and During Hire on the Job to Increase Health-care Awareness Perception to Prevent Disease Risk: A Work for Policy-Implementable Option Globally.** *Safety and Health at Work (Sh@w)*, 10(2), 132-140.  
AIM: to formulate a conceptual model of physical checkup for workplace employees.  
METHODS: This study applied conceptual theories and figures and used secondary data from articles and relevant websites for evaluating the validity of the study.  
RESULTS: Annual health checkup increases health-care awareness perception of states, organizations, employees, and their families and manages the annual health record of employees, organizations, and states.  
CONCLUSION: Health care and awareness perception of states, organizations, employees, and families improves with annual health checkup, and annual health checkup also prevents unhealthy acts.  
View [abstract](#)

### Trials

Bernstorff, M., Deichgraeber, P., Bruun, N. H., et al. 2019. **A Randomised Trial Examining Cardiovascular Morbidity and All-Cause Mortality 24 years Following General Health Checks: the Ebeltoft Health Promotion Project (EHPP).** *BMJ Open* 9(10) e030400.  
AIM: to examine the long-term effect of population-based general health checks on CVD and all-cause mortality.  
METHOD: The Ebeltoft Health Promotion Project (EHPP) is a parallel randomised controlled trial in a Danish primary care setting. The EHPP enrolled individuals registered in the Civil Registration System as (1) inhabitants of Ebeltoft municipality, (2) registered with a general practitioner (GP) participating in the study and (3) aged 30-49 on 1 January 1991. A total of 3464 individuals were randomised as invitees (n=2000) or non-invitees (n=1464). Of the invitees, 493 declined. As an external control group, we included 1 511 498 Danes living outside the municipality of Ebeltoft. Invitees were offered a general health check and, if test-results were abnormal, recommended a 15-45 min consultation with their GP. Non-invitees in Ebeltoft received a questionnaire at baseline and were offered a general health check at year 5. The external control group, that is, the remaining Danish population, received routine care only.  
RESULTS: Every individual randomised was analysed. When comparing invitees to non-invitees within the municipality of Ebeltoft, we found no significant effect of general health checks on CVD (HR=1.11 (0.88; 1.41)) or all-cause mortality (HR=0.93 (0.75; 1.16)). When comparing invitees to the remaining Danish population, we found similar results for CVD (adjusted HR=0.99 (0.86; 1.13)) and all-cause mortality (adjusted HR=0.96 (0.85; 1.09)).



**CONCLUSION:** We found no effect of general health checks offered to the general population on CVD or all-cause mortality.

View [full text](#)

Kamstrup-Larsen, N., Broholm-Jorgensen, M., Dalton, S. O., et al. 2019. **Why do general practitioners not refer patients to behaviour-change programmes after preventive health checks? A mixed-method study.** BMC Family Practice 20(1) 135.

**AIM:** The aim of the Check-In randomised controlled trial (an investigation of the effectiveness of general practice-based preventive health checks on the adverse health behaviour and early detection of non-communicable diseases) is to examine the referral pattern of the general practitioners and potential barriers to referring eligible patients to behaviour-change programmes.

**METHODS:** A mixed-method design was used, including patients' questionnaires, recording sheet from the health checks and semi-structured qualitative interviews with general practitioners. All data used in the study were collected during the time of the intervention. Logistic regressions were used to estimate odds ratios for being eligible and for receiving referrals. The qualitative empirical material was analysed thematically.

**RESULTS:** Of the 364 patients, who attended the health check, 165 (45%) were marked as eligible for a referral to behaviour-change programme by their general practitioner and of these, 90 (55%) received referrals. Daily smoking (OR = 3.22; 95% CI:2.01-5.17), high-risk alcohol consumption (OR = 2.66; 95% CI:1.38-5.12), obesity (OR = 2.89; 95% CI:1.61-5.16) and poor lung function (OR = 2.05; 95% CI:1.14-3.70) were all significantly associated with being eligible, but not with receiving referral. Four themes emerged as the main barriers to referring patients to behaviour-change programmes: 1) general practitioners' responsibility and ownership for their patients, 2) balancing information and accepting a rejection, 3) assessment of the right time for behavioural change and 4) general practitioners' attitudes towards behaviour-change programmes in the municipality.

**CONCLUSION:** We identified important barriers among the general practitioners which influenced whether the patients received referrals to behaviour-change programmes in the municipality and thereby influenced the dose of intervention delivered in Check-In.

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Kamstrup-Larsen, N., Dalton, S. O., Gronbaek, M., et al. 2019. **The effectiveness of general practice-based health checks on health behaviour and incidence on non-communicable diseases in individuals with low socioeconomic position: a randomised controlled trial in Denmark.** BMJ Open 9(9) e029180.

**AIM:** to assess the effect of general practice-based health checks on health behaviour and incidence on non-communicable diseases (NCDs) in individuals with low socioeconomic position.

**METHODS:** Individuals with no formal education beyond lower secondary school and aged 45-64 years were randomly assigned to the intervention group of a preventive health check or to control group of usual care in a 1:1 allocation. Randomisation was stratified by gender and 5-year age group. Due to the real-life setting, blinding of participants was only possible in the control group. Effects were analysed as intention to treat (ITT) and per protocol. The trial was undertaken in 32 general practice units in Copenhagen, Denmark. Invitation to a prescheduled preventive health check from the general practitioner (GP) followed by a health consultation and an offer of follow-up with health risk behaviour change or preventive medical treatment, if necessary.

**RESULTS:** 1104 participants were included in the study. For the primary outcome, 710 participants were included in the per protocol analysis, excluding individuals who did not attend the health check, and 1104 participants were included in the ITT analysis. At 12-month follow-up, 37% were daily smokers in the intervention group and 37% in the control group (ORs=0.99, 95% CI: 0.76 to 1.30). No difference in health behaviour nor in the incidence of metabolic risk factors and NCDs between the intervention and control group were found. Side effects were comparable across the two groups.

**CONCLUSION:** The lack of effectiveness may be due to low intensity of intervention, a high prevalence of metabolic risk factors and NCDs among the participants at baseline as well as a high

number of contacts with the GPs in general or to the fact that general practices are not an effective setting for prevention.

View [full text](#)

Orts, L. M., Lokke, A., Bjerregaard, A. L., et al. 2019. **The effect on participation rates of including focused spirometry information in a health check invitation: a cluster-randomised trial in Denmark.** BMC Public Health 19(1) 1183.

AIM: to investigate if focused information on spirometry can increase the participation rate in a general health check.

METHODS: We conducted an open-label, household cluster-randomised trial with a two-group parallel design including 4407 citizens aged 30-49 years in Denmark and an average cluster size of 1.55 citizens per household. The control group (n = 2213) received a standard invitation describing the content of the general health check and containing practical information. The intervention group (n = 2194) received an extended invitation highlighting the benefits of early detection and prevention of lung disease. The primary outcome was difference in participation rate between the two groups. The secondary outcome was the proportion of participants at risk of lung disease in both groups. Risk profile was defined as current smoking or self-reported lung symptoms.

RESULTS: No major difference in participation rate was seen between the intervention group (53.4%) and the control group (52.0%). Participants had statistically significantly higher education level compared to non-participants. A total of 24.2% of the participants were at risk of developing lung disease, but no difference was found between the intervention group and the control group.

CONCLUSION: This study revealed no effect on participation rate of including focused spirometry information in the health check invitation.

### Cross-sectional studies

Edwards, L. A., Campbell, P., Taylor, D. J., et al. 2019. **Healthy shopper? Blood pressure testing in a shopping centre Pop-Up in England.** BMC Public Health 19(42) (23 January 2019)-(23 January 2019).

AIM: to test the hypothesis that the rate of case detection from a Pop-Up health check stationed in shopping centres in England, is related to measurable 'unhealthiness' of the shopping centres.

METHOD: A Pop-Up health check was sited in four and three shopping centres sampled from the top ten unhealthiest and top 15 healthiest shopping regions respectively, following a report ranking towns/cities based on their unhealthy and healthy retail outlets. On one day in each shopping centre, people were approached and consented to BP testing. Outcome measure was people flagged with BP $\geq$ 140/90 mmHg (cases).

RESULTS: We detected 45 (22.6%) and 20 (13.1%) cases from testing 199 and 152 adults in the unhealthy and healthy locations respectively (relative risk 1.72; 95% confidence interval: 1.06 to 2.78). A measure of unhealthy retail outlets (e.g. fast-food outlets) within each shopping centre was associated with detection rate (R<sup>2</sup>=0.61; p=0.04).

CONCLUSION: An association exists between cases of suspect hypertension found in a health check Pop-Up and measured 'unhealthiness' of the shopping centre site.

View [abstract](#)

Grubb, N. R., Elder, D., Broadhurst, P., et al. 2019. **Atrial fibrillation case finding in over 65s with cardiovascular risk factors - Results of initial Scottish clinical experience.** International Journal of Cardiology 288 94-99.

AIM: to determine the feasibility of using a handheld ECG recording system for atrial fibrillation (AF) detection among individuals aged 65 years or more, who have cardiovascular risk factors, and to estimate the yield of previously undiagnosed atrial fibrillation cases, and the proportion of these who would be suitable for oral anticoagulation.

METHOD: a handheld ECG monitor was placed in each of 23 primary care practices across Scotland. Eligible patients attending for annual health checks had ECGs recorded, and the ECGs were

transmitted and interpreted by two senior cardiologists. ECG quality was rated, and an adjudication made on the rhythm. For patients confirmed with AF, stroke and bleeding risk were estimated using CHA<sub>2</sub>DS<sub>2</sub>-VASc and HAS-BLED scoring tools.

RESULTS: single lead ECGs were recorded in 1805 patients (703 female and 1102 male), mean (SD) age 74.9 (7.1) years. Rhythm regularity could be assessed in 98.7% of ECGs recorded. 92 patients (5.1%) were found to have AF. Median [range]CHA<sub>2</sub>DS<sub>2</sub>-VASc score was 4 ([2–7]) and median [range] HAS-BLED score was 2 (1–5).

CONCLUSION: handheld ECG recording can be used to identify AF in the primary care setting, with minimal training. The yield was relatively high.

View [abstract](#)

Hoang, P. T., Hodgkin, D., Thomas, J. P., et al. 2019. **Effect of periodic health exam on provider management of preventive services.** J Eval Clin Pract 25(5) 827-833.

AIM: to evaluate the relationship between receipt of annual physicals and the receipt of provider recommendation for preventive services, during a period when Medicare did not cover annual physicals (before 2011).

METHOD: Electronic medical records of patients aged 65 years and older from a US health care system were extracted for the 2001 to 2007 period. A fixed-effects logistic model was used to assess the relationship between receipt of periodic health examination (PHE) and receipt of provider recommendation for mammogram screening for 6466 female Medicare beneficiaries. Logistic regression models were used to assess the relationship between receipt of PHE and receipt of provider recommendation for colonoscopy screening and pneumococcal vaccination for 10 318 Medicare beneficiaries. Nine primary care providers from the network were also interviewed, selected by random sampling stratified by care model.

RESULTS: Electronic medical record analyses suggest that patients with a PHE were more likely to obtain provider recommendations for mammogram screening (OR = 2.17, P < 0.0001), colonoscopy screening (OR = 1.54, P < 0.0001), and pneumococcal vaccination (OR = 1.10, P < 0.0001).

Providers suggested that prevention care quality improves with the PHE because certain screening measures (eg, skin cancer screening, breast exam) would be neglected without it, and healthy patients could miss recommended preventive services entirely. Without the PHE, some providers reported having tried to incorporate discussions of preventive services by scheduling more frequent follow-up chronic care visits than they would have otherwise, and some routinely charged Medicare for a more complex follow-up visit than they would have charged without the preventive service discussions.

CONCLUSION: Periodic health examination is important in connecting patients to recommended preventive services. Provider interviews suggested that, indirectly, Medicare ended up paying for the PHE via greater frequency of follow-up visits or higher visit charges from providers integrating the services with other visits.

View [abstract](#)

Kamstrup-Larsen, N., Dalton, S. O., Broholm-Jorgensen, M., et al. 2019. **Using general practitioners to recruit individuals with low socioeconomic position to preventive health checks is feasible: a cross sectional study.** Scandinavian Journal of Primary Health Care 37(3) 294-301.

AIM: to test whether demographic and health-related characteristics are associated with non-attendance of preventive health checks offered to individuals with low levels of education using proactive recruitment by the general practitioners.

METHOD: A cross-sectional study. 32 general practice clinics in Copenhagen, Denmark. A total of 549 individuals aged 45-64, with low levels of education, enrolled in the intervention group of a randomised controlled trial on preventive health checks offered by general practitioner. Descriptive characteristics of attendees and non-attendees, and crude and adjusted multi-level logistic regression to examine associations of individual characteristics with non-attendance of preventive health checks.

**RESULTS:** Overall, 33% did not attend the prescheduled preventive health checks at their general practitioners. Non-attendees were more likely to live without a partner, be of non-Western origin, be daily smokers, have poor self-rated health, have higher pulmonary symptoms score, have increased level of stress, have low levels of self-efficacy, have metabolic risk factors or non-communicable diseases and have had no contact with their general practitioner within the past year.

**CONCLUSION:** The findings suggest that, it is feasible to use general practitioners for recruiting individuals for preventive health checks. However, even in a trial targeting individuals with low levels of education, there are differences between attendees and non-attendees, with a more adverse health behaviour profile and worse health status observed among the non-attendees.

View [full text](#)

Medlinskiene, K. & Tomlinson, J. 2019. **Piloting an undergraduate student-led health check service.** *Clinical Pharmacist* 11(5).

**AIM:** to pilot a student-led health check service to the university's community

**METHOD:** The service, including standard operating procedures, was adapted from the NHS Health Check StARS framework and work from the University of Reading. Following ethical approval, third-year pharmacy students attended two training sessions, each of which lasted for two hours: Practical skills training to perform health check tests; Competency assessment, which students were required to pass. Tests performed included height and weight measurement; body mass index (BMI) calculation; waist and hip measurements; body fat composition; blood pressure and pulse readings; physical activity and lifestyle assessment. Where appropriate, they also implemented the QRISK3 cardiovascular health risk algorithm.

**RESULTS:** A total of 38 participants - 28 staff members and 10 students from the university - used the service. More females (n=23) than males participated and the average age of participants was 40 years (range 20–62 years). Nearly 70% of participants (n=26) had not had a health check before, and 14 (37%) had at least one long-term condition. Health checks lasted on average 41 minutes (range 18–60 minutes). All participants were offered tailored healthy lifestyle information and were encouraged to set a goal. Nearly all participants (n=37, 97%) were provided information on healthy diet and increasing physical activity owing to high BMI, high waist-to-hip ratio, and/or elevated cholesterol readings.

**CONCLUSION:** We have demonstrated that students can deliver a health check service that is valuable to participants and contributes to the development of students' confidence in undertaking clinical activities. Future work will focus on incorporating this service into our current pharmacy undergraduate programme, which would allow all students the opportunity to take an active role in service provision.

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Movahedi, M., Farajzadegan, Z. & Khadivi, R. 2019. **Middle-aged Health Checks Program Outputs in Non-communicable Diseases Screening in Iran.** *International Journal of Preventive Medicine* 10 128.

**AIM:** to identify the outputs of middle-aged health checks program (MAHCP) in Isfahan province in central of Islamic Republic of Iran.

**METHODS:** This is a cross-sectional study. During 30 months, from March 2014 to September 2016, 30-59 years old females and males were screened for abdominal obesity, overweight, obesity, physical inactivity, dyslipidemia, hypertension, diabetes, and also breast, skin, cervix, colorectal, and prostate cancers in all health houses, health posts, and health centers in the province. Based on the data bank of the family health office of the health center of Isfahan province, we estimated the outputs of MAHCP.

**RESULTS:** The utilization rate of MAHCP was 0.39-273.06 per 1000 middle-aged population (MAP). The utilization rate in 2015 was higher for women (43.02-273.06 per 1000 MAP), particularly in rural areas (273.06 per 1000 MAP). The case detection rate of physical inactivity was 26.40-498.6, abdominal obesity was 16.50-428.38, overweight was 38.73-365.59, obesity was 3.30-261.99, and

body mass index (BMI)  $\geq 25$  was 63.21-593.41 per 1000 MAP. Also dyslipidemia was 21.51-171.62, hypertension was 12.33-53.88, and diabetes mellitus was 10.71 - 36.99 per 1000 MAP. Cancers detection rate in women included: breast cancers (99.52-330.32), skin (14.24-245.52), cervix (11.94-87.43), and colorectal (0-47.4) per 100,000 MAP. Cancer detection rate in men included: skin (0-59.18), colorectal (0-80.06), and prostate (0-42.03) per 100,000 MAP.

CONCLUSION: The MAHCP utilization rate in both the genders, particularly in men, was lower than it had been expected.

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Powell, W., Richmond, J., Mohottige, D., et al. 2019. **Medical mistrust, racism, and delays in preventive health screening among African-American men.** Behavioral Medicine 45(2) 102-117.

AIM: to examine associations between medical mistrust, perceived racism in healthcare, everyday racism, and preventive health screening delays.

METHOD: Analyses were conducted using cross-sectional data from 610 African-American men aged 20 years and older recruited primarily from barbershops in four US regions (2003-2009). Independent variables were medical mistrust (MM), everyday racism (ER), and perceived racism in healthcare (PRH). Dependent variables were self-reported routine checkup, blood pressure screening, and cholesterol screening delays. Using multiple logistic regression and tests for mediation, we calculated odds ratios and 95% confidence intervals to assess associations between the independent and dependent variables.

RESULTS: After final adjustment, African-American men with higher MM were significantly more likely to delay blood pressure screenings. Men with more frequent ER exposure were significantly more likely to delay routine checkups and blood pressure screenings. Higher levels of PRH were associated with a significant increased likelihood of delaying cholesterol screening. MM did not mediate associations between ER and screening delays.

CONCLUSION: Increasing preventive health screening among African-American men requires addressing medical mistrust and racism in and outside healthcare institutions.

View [abstract](#)

## Qualitative

Moller, A. & Merrild, C. H. 2019. **Exploring targeted preventive health checks in a socially disadvantaged neighborhood in Denmark.** Health Promotion International 07 07.

AIM: to explore the significance of participating in a preventive health check and how participation configured into everyday life.

METHOD: Based on semi-structured interviews with 18 people living in a social housing association. All participants in our study had been identified with a 'risk' health profile.

RESULTS: Overall, we found that participants were well aware of their health risks and challenges, and that they reflected a great deal on how their health status was intrinsically linked with their lifestyle and health practices, such as lack of exercise or smoking. The health checks were, however, not able to support or improve their general health, and did not seem to address the challenges the participants seemed to struggle with in life.

CONCLUSION: We suggest that we implement a more practice-oriented form of public health that focus on the 'lives' that people live, and the problems that they face. Moreover, attention should be paid to how and to whom health promotion initiatives are offered, in order to ensure the relevance of targeted interventions.

View [abstract](#)

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

### Guidance

Bonner, C., Fajardo, M. A., Doust, J., et al. 2019. **Implementing cardiovascular disease prevention guidelines to translate evidence-based medicine and shared decision making into general practice: theory-based intervention development, qualitative piloting and quantitative feasibility.** Implementation Science 14(1) 86.

AIM: to outline the theory-based development of a website for GP guidelines, and piloting of a new risk calculator/decision aid, for the use of cardiovascular disease (CVD) prevention guidelines based on absolute risk assessment

METHOD: Stage 1 involved identifying evidence-based solutions using the Behaviour Change Wheel (BCW) framework, informed by previous research involving 400 GPs and 600 patients/consumers. Stage 2 co-developed website content with GPs. Stage 3 piloted a prototype website at a national GP conference. Stage 4 iteratively improved the website based on "think aloud" interviews with GPs and patients. Stage 5 was a feasibility study to evaluate potential efficacy (guidelines-based recommendations for each risk category), acceptability (intended use) and demand (actual use over 1 month) amongst GPs (n = 98).

RESULTS: Stage 1 identified GPs as the target for behaviour change; the need for a new risk calculator/decision aid linked to existing audit and feedback training; and online guidelines as a delivery format. Stage 2-4 iteratively improved content and format based on qualitative feedback from GP and patient user testing over three rounds of website development. Stage 5 suggested potential efficacy with improved identification of hypothetical high risk patients (from 26 to 76%) and recommended medication (from 57 to 86%) after viewing the website (n = 42), but prescribing to low risk patients remained similar (from 19 to 22%; n = 37). Most GPs (89%) indicated they would use the website in the next month, and 72% reported using it again after one month (n = 98). Open feedback identified implementation barriers including a need for integration with medical software, low health literacy resources and pre-consultation assessment.

CONCLUSION: Following a theory-based development process and user co-design, the resulting intervention was acceptable to GPs with high intentions for use, improved identification of patient risk categories and more guidelines-based prescribing intentions for high risk but not low risk patients.

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Mach, F., Baigent, C. & Catapano, A. L. 2019. **2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk.** European Heart Journal 31st August.

AIM: to update the previous ESC/EAS lipid Guidelines published in August 2016.

METHOD: Selected experts in the field from both societies undertook a comprehensive review of the published evidence for management of a given condition according to ESC Committee for Practice Guidelines (CPG) policy. A critical evaluation of diagnostic and therapeutic procedures was performed, including assessment of the risk–benefit ratio. The level of evidence and the strength of the recommendation of particular management options were weighed and graded according to predefined ESC scales.

RESULTS: New evidence has confirmed that the key initiating event in atherogenesis is the retention of low-density lipoprotein (LDL) cholesterol (LDL-C) and other cholesterol-rich apolipoprotein (Apo) B-containing lipoproteins within the arterial wall. Several recent placebo-controlled clinical studies have shown that the addition of either ezetimibe or anti-proprotein convertase subtilisin/kexin type 9

(PCSK9) monoclonal antibodies (mAbs) to statin therapy provides a further reduction in atherosclerotic cardiovascular disease (ASCVD) risk, which is directly and positively correlated with the incrementally achieved absolute LDL-C reduction. Furthermore, these clinical trials have clearly indicated that the lower the achieved LDL-C values, the lower the risk of future cardiovascular (CV) events, with no lower limit for LDL-C values, or 'J'-curve effect. In addition, studies of the clinical safety of these very low achieved LDL-C values have proved reassuring, albeit monitoring for longer periods is required. For raising high-density lipoprotein (HDL) cholesterol (HDL-C), recent studies have indicated that the currently available therapies do not reduce the risk of ASCVD. Finally, human Mendelian randomization studies have demonstrated the critical role of LDL-C, and other cholesterol-rich ApoB-containing lipoproteins, in atherosclerotic plaque formation and related subsequent CV events. Thus, there is no longer an 'LDL-C hypothesis', but established facts that increased LDL-C values are causally related to ASCVD, and that lowering LDL particles and other ApoB-containing lipoproteins as much as possible reduces CV events.

**CONCLUSION:** These novel ESC/EAS Guidelines on lipids provide important new advice on patient management, which should enable more clinicians to efficiently and safely reduce CV risk through lipid modification.

View [abstract](#)

### Evidence summaries

Kulendrarajah, B., Grey, A. & Nunan, D. 2019. **How effective are 'age' tools at changing patient behaviour? A rapid review.** *bmjebm-2019-111244*.

**AIM:** to determine the effect of 'effective age' tools on patient behaviour as compared with more traditional methods of risk communication.

**METHOD:** We performed a search of the PubMed database up to February 2019 for systematic reviews and randomised controlled trials (RCT) that answered our question. Interventions were 'effective age' tools, comparators were usual care or alternative risk communication tools. Primary outcomes were behavioural change measures.

**RESULTS:** We included 1 overview of systematic reviews (level 1 evidence), 2 systematic reviews (level 1 evidence) and 13 RCTs (level 2 evidence). Both systematic reviews concluded the evidence base was not conclusive enough to make specific recommendations. Age tools assessed in the 13 RCTs were: 'lung age' (n=5), 'heart age' (n=3), 'health age' (n=2), 'cardiovascular age' (n=1), 'body age' (n=1) and 'net present value' (n=1). 7/13 (54%) RCTs demonstrated a clinical effect on behaviour change favouring the 'age' tool; 2/13 (15%) demonstrated a null effect; 4/13 (31%) favoured control.

**CONCLUSION:** Our findings indicate that systematic review evidence needs updating. The evidence from RCTs on the effect of using age metrics on patient behaviour is poor.

View [abstract](#)

### NICE 2019. Lipid modification - CVD prevention.

**AIM:** to provide trusted information on lipid modification for CVD prevention in primary care

**METHOD:** Clinical Knowledge Summaries are concise, accessible summaries of current evidence for primary care professionals. A literature search was conducted for guideline and systematic reviews on lipid modification for CVD prevention in primary care..

**RESULTS:** The recommendations are largely based on the National Institute for Health and Care Excellence (NICE) guideline Lipid modification: Cardiovascular risk assessment and the modification of blood lipids for the primary and secondary prevention of cardiovascular disease, the Scottish Intercollegiate Guidelines Network (SIGN) guideline Risk estimation and the prevention of cardiovascular disease, the Medicines and Healthcare products Regulatory Agency (MHRA) drug safety update Statins: benefits and risks.

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Public Health England 2019. **Health matters: life course approach to prevention.** Public Health England.

AIM: to provide information for NHS and public health professionals focusing on taking a life course approach to the prevention of ill health

METHOD: Expert summary of evidence

RESULTS: When using a life course approach: ensure your intervention fits the life course framework of taking action early, appropriately and together; take the long view - consider the intra and intergenerational aspects of the issue you are trying to tackle; consider how your intervention minimises risk factors and enhances protective factors; ensure your intervention strives to achieve health equity and tackle health inequalities, working together with partners; undertake evaluation and monitoring of your approach to add to the evidence base

CONCLUSION: Now is the time to prioritise prevention of ill health. Action is needed by the NHS, by national government and by local government, all working in partnership with the voluntary, community and private sector. Together we can ensure that our children have the best start in life and are ready to start school, that our young people are supported so they enter adulthood ready to start work, that adults are able to secure and maintain a job and a home and that older adults have fulfilling, productive and connected lives.

View [full text](#)

Rossello, X., Dorresteijn, J. A. N., Janssen, A., et al. 2019. **Risk prediction tools in cardiovascular disease prevention: A report from the ESC Prevention of CVD Programme led by the European Association of Preventive Cardiology (EAPC) in collaboration with the Acute Cardiovascular Care Association (ACCA) and the Association of Cardiovascular Nursing and Allied Professions (ACNAP).** European Journal of Cardiovascular Nursing 18(7) 534-544.

AIM: to review the rationale for using risk prediction tools as well as a compilation of the currently available tools that make risk algorithms available for use in clinical practice

METHOD: Non-systematic evidence review

RESULTS: The message of this paper is that for patient groups with different risk factor profiles and different baseline cardiovascular risk, different risk algorithms are to be used. An overview is provided of most available risk prediction tools, with their strengths and weaknesses

CONCLUSION: The EAPC advises the use HeartScore for risk prediction in healthy people and the use of the U-Prevent tool developed by the University of Utrecht

View [abstract](#)

Young, L. & Cho, L. 2019. **Unique cardiovascular risk factors in women.** Heart 105(21) 1656-1660.

AIM: to review both traditional and unique risk factors of CVD in women, as well as sex-specific risk stratification and management options

METHOD: a non-systematic review of selected evidence

RESULTS: The first evidence-based, sex-specific guidelines for CVD prevention in women were first published by ACC/AHA in 2004 and since updated in 2007 and 2011. These guidelines succinctly outline the benefit of early risk factor identification within women and the potential for aggressive risk factor modification, which can begin simply at the recognition of pregnancy-related CVD risk factors or increased postmenopausal CVD risk. The 2018 ACC/AHA cholesterol guidelines reiterate these points, identifying early menopause and a number of pregnancy-associated conditions as risk enhancers for ASCVD. Early identification and then aggressive risk factor modification with diet and exercise and in certain patients, drug treatment is key to lowering life-time risk of CVD.

CONCLUSION: Unfortunately, data have shown that this increased awareness of CVD risk in women has not yet translated into changes in standard clinical care. Studies have shown that women still receive less cholesterol screening, less lipid-lowering therapies, less cardiac rehabilitation referrals, and are less often prescribed antiplatelet therapy and beta-blockers for secondary prevention. Further



outreach is necessary to ensure that primary care providers and cardiologists alike are attuned to the sex and gender disparities in the management of CVD risk.

View [abstract](#)

### Systematic reviews

Abdelaziz, H. K., Saad, M., Pothineni, N. V. K., et al. 2019. **Aspirin for Primary Prevention of Cardiovascular Events**. *Journal of the American College of Cardiology* 73(23) 2915-2929.

AIM: to examine the clinical outcomes with aspirin for primary prevention of CVD after the recent publication of large trials adding >45,000 individuals to the published data.

METHOD: A review of randomized controlled trials comparing clinical outcomes with aspirin versus control for primary prevention with follow-up duration of  $\geq 1$  year were included. Efficacy outcomes included all-cause death, cardiovascular (CV) death, myocardial infarction (MI), stroke, transient ischemic attack (TIA), and major adverse cardiovascular events. Safety outcomes included major bleeding, intracranial bleeding, fatal bleeding, and major gastrointestinal (GI) bleeding. Random effects DerSimonian-Laird risk ratios (RRs) for outcomes were calculated.

RESULTS: A total of 15 randomized controlled trials including 165,502 participants (aspirin  $n = 83,529$ , control  $n = 81,973$ ) were available for analysis. Compared with control, aspirin was associated with similar all-cause death (RR: 0.97; 95% confidence interval [CI]: 0.93 to 1.01), CV death (RR: 0.93; 95% CI: 0.86 to 1.00), and non-CV death (RR: 0.98; 95% CI: 0.92 to 1.05), but a lower risk of nonfatal MI (RR: 0.82; 95% CI: 0.72 to 0.94), TIA (RR: 0.79; 95% CI: 0.71 to 0.89), and ischemic stroke (RR: 0.87; 95% CI: 0.79 to 0.95). Aspirin was associated with a higher risk of major bleeding (RR: 1.5; 95% CI: 1.33 to 1.69), intracranial bleeding (RR: 1.32; 95% CI: 1.12 to 1.55), and major GI bleeding (RR: 1.52; 95% CI: 1.34 to 1.73), with similar rates of fatal bleeding (RR: 1.09; 95% CI: 0.78 to 1.55) compared with the control subjects.

CONCLUSION: Aspirin for primary prevention reduces nonfatal ischemic events but significantly increases nonfatal bleeding events.

View [abstract](#)

Barbarawi, M., Kheiri, B., Zayed, Y., et al. 2019. **Aspirin Efficacy in Primary Prevention: A Meta-analysis of Randomized Controlled Trials**. *High Blood Pressure & Cardiovascular Prevention* 26(4) 283-291.

AIM: to conduct a meta-analysis of all randomized controlled trials (RCTs) to evaluate the role of aspirin in primary prevention.

METHOD: Literature search was performed via PubMed, Embase, and the Cochrane Library for all related RCTs. All-cause mortality was the primary endpoint. Secondary endpoints included major adverse cardiovascular events (MACE), myocardial infarction (MI), cardiovascular mortality, cerebrovascular events, and bleeding events. We used a random effects model to report the risk ratios (RRs) with 95% confidence intervals (CIs).

RESULTS: Our analysis included 17 RCTs (164,862 patients; 83,309 received aspirin and 81,744 received placebo). Our study did not demonstrate any significant reduction in all-cause mortality for patients treated with aspirin when compared with placebo (RR 0.97; 95% CI 0.93-1.01;  $P = 0.13$ ). Sensitivity analysis performed by excluding healthy elderly ( $\geq 65$ ) showed significant reductions in all-cause mortality in the aspirin-treated patients (RR 0.94; 95% CI 0.90-0.99;  $P = 0.01$ ). There were no significant differences between both groups regarding cardiovascular mortality and cerebrovascular events ( $P > 0.05$ ). However, aspirin-treated patients significantly reduced MACE and MI events (RR 0.89; 95% CI 0.85-0.93;  $P < 0.001$  and RR 0.88; 95% CI 0.78-0.98;  $P = 0.02$ , respectively), respectively. However, aspirin was associated with a significantly higher incidence of bleeding, including major bleeding and intracranial bleeding ( $P < 0.001$ ).

CONCLUSION: Aspirin use in primary prevention has resulted in a lower incidence of MACE and MI without significantly effecting cerebrovascular events. However, aspirin was associated with a higher bleeding risk.

View [abstract](#)

Byrne, P., O'Donovan, O., Smith, S. M., et al. 2019. **Medicalisation, risk and the use of statins for primary prevention of cardiovascular disease: a scoping review of the literature.** Health, Risk and Society. Volume 21, Issue 7-8.

AIM: to present a broad scoping review of the literature on how preventative health, risk and 'candidacy' for statin treatment are perceived and negotiated by clinicians and patients.

METHOD: A scoping review. We examine how evidence and knowledge about cardiovascular risk reduction is produced, interpreted and communicated and how patients' gender, socio-demographic and cultural differences may impact patterns of statin use.

RESULTS: We found that few studies differentiated between the use of statins in those with and those without established cardiovascular disease, despite the fact that the majority of statin users, and women in particular, fall into the primary prevention category.

CONCLUSION: In this context, the process of medicalisation is predicated on healthy individuals being subject to medical surveillance of risk factors, which have acquired the status of disease in their own right. Central to this process has been the heuristic that identifies elevated cholesterol as a medical problem warranting statin treatment, as well as the difficulties encountered by doctors and patients in understanding, interpreting and communicating risk. This individualised construction of risk and disease has largely ignored the supposedly widely recognised social and political determinants of health and illness.

View [abstract](#)

Carson, E. & Hemenway, A. N. 2019. **Recent Evidence Examining Efficacy and Safety of Aspirin for Primary Cardiovascular Disease Prevention.** Annals of Pharmacotherapy 53(7) 738-745.

AIM: to review recent data evaluating the efficacy and safety of aspirin for primary prevention of CVD.

METHOD: Articles evaluating aspirin for primary prevention of CVD were gathered using a MEDLINE search with the keywords aspirin review, aspirin peripheral artery disease, aspirin stroke, aspirin coronary artery disease, aspirin diabetes, aspirin primary prophylaxis, and aspirin elderly. Primary literature published from January 2008 through November 2018 was reviewed. Additional references were identified from a review of citations. Randomized clinical trials that reported on aspirin for primary CVD prevention were included. In all, 10 publications met the inclusion criteria. The authors individually compared and contrasted the results from each publication.

RESULTS: The evidence for primary CVD prevention using aspirin varies widely. Previous analyses identified a benefit to aspirin use in certain populations, and current guidelines reflect this. However, new studies published in the past 10 years call the historically identified benefit of aspirin into question and force us to reexamine which patients, if any, are indicated for aspirin for primary prevention of CVD.

CONCLUSION: This review provides a thorough discussion on the evidence behind aspirin for primary prevention of CVD and based on current evidence, aspirin is not recommended for primary prevention of CVD. View [abstract](#)

Christiansen, M., Grove, E. L. & Hvas, A. M. 2019. **Primary Prevention of Cardiovascular Events with Aspirin: Toward More Harm than Benefit-A Systematic Review and Meta-Analysis.**

Seminars in Thrombosis and Hemostasis 45(5) 478-489.

AIM: to perform a systematic review and meta-analysis of aspirin's efficacy and safety in the primary prevention of cardiovascular events in healthy individuals and in individuals with cardiovascular risk factors, and separately in those with diabetes.

METHOD: The Medline database was searched, without time restrictions, for relevant human trials published in English up to December 10, 2018, and additional trials were identified from reference lists. Data on efficacy (cardiovascular death and nonfatal myocardial infarction) and safety (major bleeding) were extracted for analysis. In total, 20 randomized trials were identified. Separate meta-analyses were performed on 10 trials including 144,930 individuals, who were healthy or had cardiovascular risk factors, and on 4 trials including 20,326 individuals with diabetes.

**RESULTS:** In healthy individuals and individuals with cardiovascular risk factors, aspirin reduced the risk of nonfatal myocardial infarction by 21% ( $p < 0.001$ ), but had no effect on cardiovascular death ( $p = 0.52$ ), and increased the risk of major bleeding by 48% ( $p < 0.001$ ). In individuals with diabetes, aspirin had no effect on nonfatal myocardial infarction ( $p = 0.93$ ) or cardiovascular death ( $p = 0.92$ ) and increased the risk of bleeding by 49% ( $p = 0.13$ ). This meta-analysis suggests that aspirin should not be used on a routine basis in the primary prevention of cardiovascular events, especially in individuals with diabetes.

View [abstract](#)

Groenhouf, T. K. J., Asselbergs, F. W., Groenwold, R. H., et al. 2019. **The effect of computerized decision support systems on cardiovascular risk factors: a systematic review and meta-analysis.** 19(1) 108.

**AIM:** to evaluate the effects of computerized decision support systems (CDSS) on cardiovascular risk factor management (CVRM)

**METHOD:** A systematic review and meta-analysis evaluating the effects of CDSS on CVRM, defined as the change in absolute values and attainment of treatment goals of systolic blood pressure (SBP), low density lipoprotein cholesterol (LDL-c) and HbA1c. Also, CDSS characteristics related to more effective CVRM were identified. Eligible articles were methodologically appraised using the Cochrane risk of bias tool. We calculated mean differences, relative risks, and if appropriate ( $I^2 < 70\%$ ), pooled the results using a random-effects model.

**RESULTS:** Of the 14,335 studies identified, 22 were included. Four studies reported on SBP, 3 on LDL-c, 10 on CVRM in patients with type II diabetes and 5 on guideline adherence. The CDSSs varied considerably in technical performance and content. Heterogeneity of results was such that quantitative pooling was often not appropriate. Among CVRM patients, the results tended towards a beneficial effect of CDSS, but only LDL-c target attainment in diabetes patients reached statistical significance. Prompting, integration into the electronic health record, patient empowerment, and medication support were related to more effective CVRM.

**CONCLUSION:** We did not find a clear clinical benefit from CDSS in cardiovascular risk factor levels and target attainment. Some features of CDSS seem more promising than others. However, the variability in CDSS characteristics and heterogeneity of the results – emphasizing the immaturity of this research area - limit stronger conclusions.

View [full text](#)

Hawley, C. E., Roefaro, J., Forman, D. E., et al. 2019. **Statins for Primary Prevention in Those Aged 70 Years and Older: A Critical Review of Recent Cholesterol Guidelines.** *Drugs and Aging* 36(8) 687-699.

**AIM:** to compare the discordant recommendations of the seven major North American and European guidelines on cholesterol management released in the past 5 years and highlight gaps in the literature regarding primary prevention of cardiovascular disease in older adults.

**METHOD:** A critical review of guidelines and other literature

**RESULTS:** Retrospective studies of existing data and re-analysis of prospective data have yielded differing conclusions regarding the benefits of statins for primary prevention in older adults.

**CONCLUSION:** Further research and new types of analyses are needed to better determine which older individuals may benefit from statins for primary prevention based on broader considerations of risk and function, and to weigh the risks of negative functional and cognitive outcomes against the potential of prolonged (and possibly even improved) life.

View [abstract](#)

Yebo, HG, Aschmann, H.E, Kaufmann, M. et al. 2019. **Comparative effectiveness and safety of statins as a class and of specific statins for primary prevention of cardiovascular disease: A systematic review, meta-analysis, and network meta-analysis of randomized trials with 94,283 participants.** *American Heart Journal* 210 18.

AIM: to conduct a review of randomised controlled trials of statins for primary cardiovascular disease (CVD) prevention

METHOD: We searched in PubMed for existing systematic reviews and individual open-label or double-blinded randomized controlled trials that compared a statin with a placebo or another, which were published in English until January 01, 2018. We performed a random-effect pairwise meta-analysis of all statins as a class and network meta-analysis for the specific statins on different benefit and harm outcomes.

RESULTS: In the pairwise meta-analyses, statins as a class showed statistically significant risk reductions on non-fatal MI (risk ratio [RR] 0.62, 95% CI 0.53-0.72), CVD mortality (RR 0.80, 0.71-0.91), all-cause mortality (RR 0.89, 0.85-0.93), non-fatal stroke (RR 0.83, 0.75-0.92), unstable angina (RR 0.75, 0.63-0.91), and composite major cardiovascular events (RR 0.74, 0.67-0.81). Statins increased statistically significantly relative and absolute risks of myopathy (RR 1.08, 1.01-1.15; Risk difference [RD] 13, 2-24 per 10,000 person-years); renal dysfunction (RR 1.12, 1.00-1.26; RD 16, 0-36 per 10,000 person-years); and hepatic dysfunction (RR 1.16, 1.02-1.31; RD 8, 1-16 per 10,000 person-years). The drug-level network meta-analyses showed that atorvastatin and rosuvastatin were most effective in reducing CVD events while atorvastatin appeared to have the best safety profile.

CONCLUSION: All statins showed statistically significant risk reduction of CVD and all-cause mortality in primary prevention populations while increasing the risk for some harm risks. However, the benefit-harm profile differed by statin type. A quantitative assessment of the benefit-harm balance is thus needed since meta-analyses alone are insufficient to inform whether statins provide net benefit.

View [abstract](#)

Jawad, M., Vamos, E. P., Najim, M., et al. 2019. **Impact of armed conflict on cardiovascular disease risk: a systematic review.** Heart 105(18) 1388-1394.

AIM: to assess the impact of armed conflict on cardiovascular disease (CVD) risk among civilians in low/middle-income countries (LMICs).

METHODS: In February 2019, we performed a systematic review searching Medline, Embase, PsychINFO, Global Health and Web of Science without language or date restrictions. We included adult, civilian populations in LMICs. Outcomes included CVDs and diabetes, and eight clinical and behavioural factors (blood pressure, blood glucose, lipids, tobacco, alcohol, body mass index, nutrition, physical activity). We systematically reanalysed data from original papers and presented them descriptively.

RESULTS: Sixty-five studies analysed 23 conflicts, and 66% were of low quality. We found some evidence that armed conflict is associated with an increased coronary heart disease, cerebrovascular and endocrine diseases, in addition to increased blood pressure, lipids, alcohol and tobacco use. These associations were more consistent for mortality from chronic ischaemic heart disease or unspecified heart disease, systolic blood pressure and tobacco use. Associations between armed conflict and other outcomes showed no change, or had mixed or uncertain evidence. We found no clear patterning by conflict type, length of follow-up and study quality, nor strong evidence for publication bias.

CONCLUSIONS: Armed conflict may exacerbate CVDs and their risk factors, but the current literature is somewhat inconsistent. Postconflict reconstruction efforts should deliver low-resource preventative interventions through primary care to prevent excess CVD-related morbidity and mortality.

View [abstract](#)

Krzysztof, S. s., Tomasz, T., Janusz, K., et al. 2019. **Effect of using cardiovascular risk scoring in routine risk assessment in primary prevention of cardiovascular disease: an overview of systematic reviews.** BMC Cardiovascular Disorders 19(1) 11.

AIM: to critically appraise and summarise the current evidence for the effectiveness of using cardiovascular disease (CVD) risk scoring (total risk assessment - TRA) in routine risk assessment in primary prevention of CVD compared with standard care with regards to patients outcomes, clinical risk factor levels, medication prescribing, and adverse effects.

**METHOD:** We carried out an overview of existing systematic reviews (SRs). Presentation of the results aligned guidelines from the PRISMA statement. The data is presented as a narrative synthesis. We searched MEDLINE (Ovid), EMBASE, CENTRAL and SCOPUS databases from January 1990 to March 2017, reviewed the reference lists of all included SRs and searched for ongoing SRs in PROSPERO database. We encompassed SRs and meta-analyses which took into account RCTs, quasi-RCTs, and observational studies investigating the effect of using CVD risk scoring. Only studies performed in a primary care setting, with adult participants free of clinical CVD were eligible. Intervention was CVD risk assessment with use of the total CVD risk scoring compared with standard care with no use of TRA .

**RESULTS:** We identified 2157 records, we then recognised and analysed 10 relevant SRs. One SR reported statistically insignificant reduction of CVD death, when using TRA, the second SR presented meta-analysis which reported no effect on fatal and non-fatal CV events compared with conventional care (5.4% vs 5.3%; RR 1.01, 95% CI 0.95 to 1.08; I<sub>2</sub> = 25%). Three SRs have shown that using TRA causes no adverse events. The impact of TRA on global CVD risk as well as individual risk factors is ambiguous, but a tendency towards slight reduction of blood pressure, total cholesterol and smoking levels, especially in high risk patient groups was observed. TRA had no influence on lifestyle behaviour.

**CONCLUSION:** There is limited evidence, of low overall quality, suggesting a possible lack of effectiveness of TRA in reducing CVD events and mortality, as well as a clinically insignificant influence on individual risk factor levels. Using TRA does not cause harm to patients.

View [full text](#)

Petryszyn, P., Niewinski, P., Staniak, A., et al. 2019. **Effectiveness of screening for atrial fibrillation and its determinants. A meta-analysis.** PLoS ONE 14(3) e0213198-e0213198.

**AIM:** to assess the effectiveness of screening for AF compared to no screening and to compare efficacy outcomes of different screening strategies.

**METHODS:** Cochrane Central Register of Controlled Trials, EMBASE and MEDLINE from Jan 1, 2000-Dec 31, 2015 were searched. Studies employing systematic or opportunistic screening and using ECG or pulse palpation in populations age ≥40 years were included. Data describing study and patient characteristics and number of patients with new AF were extracted. The outcome was the incidence of previously undiagnosed AF. **RESULTS:** We identified 25 unique (3 RCTs and 22 observational) studies (n=88 786) from 14 countries. The incidence of newly detected AF due to screening was 1.5% (95% CI 1.1 to 1.8%). Systematic screening was more effective than opportunistic: 1.8% (95% CI 1.4 to 2.3%) vs. 1.1% (95% CI 0.6 to 1.6%), p<0.05, GP-led screening than community based: 1.9% (95% CI 1.4 to 2.4%) vs. 1.1% (95% CI 0.7 to 1.6%), p<0.05, and repeated heart rhythm measurements than isolated assessments of rhythm: 2.1% (95% CI 1.5-2.8) vs. 1.2% (95% CI 0.8-1.6), p<0.05. Only heart rhythm measurement frequency had statistical significance in a multivariate meta-regression model (p<0.05).

**CONCLUSION:** Active screening for AF, whether systematic or opportunistic, is effective beginning from 40 years of age. The organisation of screening process may be more important than technical solutions used for heart rhythm assessment.

View [full text](#)

Sparrow, R., Khan, A. & Ferreira-Legere, L. 2019. **Effectiveness of Interventions Aimed at Increasing Statin-Prescribing Rates in Primary Cardiovascular Disease Prevention: A Systematic Review of Randomized Clinical Trials.** JAMA cardiology.

**AIM:** to perform a systematic review and synthesis of the literature on patient-oriented and physician-oriented interventions aimed at increasing statin-prescribing rates in adults without a history of cardiovascular disease.

**METHOD:** PubMed, Embase, and the Cochrane Library were searched for randomized clinical trials published between January 2000 and May 2019. Data abstraction was performed using the Cochrane Public Health Review Group's data collection template, and a narrative synthesis of study results was

conducted. The risk of bias in each study was qualitatively assessed, and a funnel plot was created to further evaluate the risk of publication bias.

**RESULTS:** Among 7948 citations and 128 full-text articles reviewed, 20 studies (of 109 807 patients) were included in the review. Eight trials reported a statistically significant increases in statin-prescribing rates. Among the effective trials, absolute effect sizes ranged from 4.2% (95% CI, 2.2%-6.4%) to 23% (95% CI, 7.3%-38.9%) and odds ratios from 1.29 (95% CI, 1.01-1.66) to 11.8 (95% CI, 8.8-15.9). Patient-education initiatives were the most commonly effective intervention, with 4 of 7 trials indicating increases in statin-prescribing rates. Two trials combined electronic decision-support tools with audit-and-feedback systems, both of which were effective overall. Physician-education programs without dynamic input regarding patient risk or updated treatment recommendations were generally found to be less effective.

**CONCLUSION:** While heterogeneous in their interventions and outcomes, a number of interventions have demonstrated increases in statin-prescribing rates, with patient-education initiatives demonstrating more promising results than those focused on physician education alone. As opposed to more education about generic recommendations, tailored patient-focused and physician-focused interventions were more effective when they provided personalized cardiovascular risk information, dynamic decision-support tools, or audit-and-feedback reports in a multicomponent program.

View [abstract](#)

## Trials

Adarkwah, C. C., Jegan, N., Heinzel-Gutenbrunner, M., et al. 2019. **The Optimizing-Risk-Ccommunication (OptRisk) randomized trial - impact of decision-aid-based consultation on adherence and perception of cardiovascular risk.** Patient Preference and Adherence 13 441-452.

**AIM:** to compare the effect of two methods (the decision-aid software Arriba (emoticons) and a lifetime-risk or time-to-event (TTE) illustration) of presenting cardiovascular risk to patients on their subsequent adherence to intervention

**METHOD:** Randomised controlled trial. A total of 294 patients were interviewed 3 months after they had had a consultation with their GP on cardiovascular risk prevention. Adherence to behavioral change or medication intervention was measured as the primary outcome. The latter was expressed as a generated score. Furthermore, different secondary outcomes were measured, ie, patient perception of risk and self-rated importance of avoiding a cardiovascular event, as well as patient numeracy, which was used as a proxy for patient health literacy.

**RESULTS:** Overall, no significant difference in patient adherence was found depending on risk representation. In the emoticon group, the number of interventions had a significant impact on the adherence score ( $P=0.025$ ). Perception of risk was significantly higher in patients counseled with the TTE risk display, whereas the importance of avoiding a cardiovascular event was rated equally highly in both groups and actually increased over time.

**CONCLUSION:** The TTE format is an appropriate means for counseling patients. Adherence is a very complex construct, which cannot be fully explained by our findings. The study results support our call for considering TTE illustrations as a valuable alternative to current decision-support tools covering cardiovascular prevention.

View [abstract](#)

**Erratum to: Baseline findings of the population-based, randomized, multifaceted Danish cardiovascular screening trial (DANCAVAS) of men aged 65-74years** (BJS, (2019), 106, 7, (862-871), 10.1002/bjs.11135. [Abstract](#)). British Journal of Surgery 106(12) 1616.

In the Results sections of the abstract and main text, a total of 47 322 men randomized is given. This is an error. The correct number is 46 611.

View [erratum](#)

Benson, G., Sidebottom, A. C., Sillah, A., et al. 2019. **Population-level changes in lifestyle risk factors for cardiovascular disease in the Heart of New Ulm Project.** 13 332-340.

AIM: to document how lifestyle risk factors changed at the population level in the context of Heart of New Ulm (HONU), a community-based CVD prevention initiative in Minnesota.

METHOD: HONU intervened across worksites, healthcare and the community/environment to reduce CVD risk factors. HONU collected behavioral measures including smoking, physical activity, fruit/vegetable consumption, alcohol use and stress at heart health screenings from 2009 to 2014. All screenings were documented in the electronic health record (EHR). Changes at the community level for the target population (age 40–79) were estimated using weights created from EHR data and modeled using generalized estimating equation models.

RESULTS: Screening participants were similar to the larger patient population with regard to age, race, and marital status, but were slightly healthier in regards to BMI, LDL cholesterol, blood pressure, and less likely to smoke. Community-level improvements were significant for physical activity (62.8% to 70.5%,  $p < 0.001$ ) and 5+ daily fruit/vegetable servings (16.9% to 28.1%,  $p < 0.001$ ), with no significant change in smoking, stress, alcohol or BMI.

CONCLUSION: By leveraging local EHR data and integrating it with patient-reported outcomes, improvements in nutrition and physical activity were identified in the HONU population, but limited changes were noted for smoking, alcohol consumption and stress.

View [abstract](#)

Carlijn Van Der Aalst, C. M., Vonder, M., Gratama, J. W., et al. 2019. **Risk Or Benefit IN Screening for Cardiovascular Disease (ROBINSCA): The rationale and study design of a population-based randomised-controlled screening trial for cardiovascular disease.** European Journal of Preventive Cardiology 26 (Supplement 1) S106.

AIM: to describe the rationale, study design, and first results of the Dutch Risk Or Benefit IN Screening for Cardiovascular disease (ROBINSCA) trial, the first population-based randomised-controlled Computed-Tomography screening trial for cardiovascular disease, powered to detect a benefit of 15% reduced CHD-morbidity and mortality.

METHOD: Addresses of men (aged 45-74 years) and women (aged 55-74 years) were obtained ( $n=394,058$ ) from the population registry. All received a mailing with an information brochure, a questionnaire and waist measurement tape and an informed consent form. Asymptomatic people with an expected high-risk for developing CHD were randomised (1:1:1) to one of the study arms: intervention arm A (screening by traditional risk factors), intervention arm B (screening by Coronary Artery Calcium scoring only) or the control arm (usual care).

RESULTS: A total of 87,866 (22.3%) people responded to the questionnaire, of which 43,447 (49.4%) were randomised to intervention arm A ( $n=14,478$  (33.3%)), intervention arm B ( $n=14,450$  (33.3%)), or the control arm ( $n=14,519$  (33.4%)). Screening was completed in August 2018. In intervention arm A, 12,184 (84.2%) were screened and in 54.9% risk reducing treatment by the general practitioner was advised. In intervention arm B, 12,950 (89.6%) were screened and only 24% were advised to receive risk reducing treatment.

CONCLUSION: CHD-related morbidity and mortality will be measured at 5-year of follow-up. Evidence for net-effectiveness of population-based screening for cardiovascular risk in an asymptomatic population will possibly enable large health gains.

View [abstract](#)

Khunti, K., Jung, H., Dans, A. L., et al. 2019. **Statin Use in Primary Prevention: A Simple Trial-Based Approach Compared With Guideline-Recommended Risk Algorithms for Selection of Eligible Patients.** Canadian Journal of Cardiology 35(5) 644-652.

AIM: to compare outcomes using the American College of Cardiology/American Heart Association (ACC/AHA) risk algorithm and the Framingham Risk Score (FRS) tool in the Heart Outcomes Prevention Evaluation (HOPE)-3 study.

**METHODS:** We compared outcomes using the ACC/AHA algorithm and the FRS with those seen in HOPE-3, which randomized participants to 10 mg rosuvastatin or placebo. The first coprimary outcome was the composite of death from cardiovascular causes, nonfatal myocardial infarction, or nonfatal stroke; second coprimary outcome additionally included heart failure, cardiac arrest, and revascularization.

**RESULTS:** Relative risks using risk scores were similar to those observed in the HOPE-3. Hazards ratios for the first coprimary outcome according to risk categories of  $\leq 10\%$ ,  $10\%-20\%$ , and  $\geq 20\%$  using the ACC/AHA algorithm were 0.82 (95% confidence interval [CI], 0.53-1.28), 0.72 (95% CI, 0.53-0.96), and 0.72 (95% CI, 0.55-0.93), and absolute risk reduction (ARR) of 0.18%, 1.33%, and 1.85%, respectively, over a median of 5.6 years. Corresponding results using the FRS were 0.69 (95% CI, 0.36-1.35), 0.73 (95% CI, 0.52-1.01), and 0.75 (95% CI, 0.60-0.94); and ARR of 1.32%, 0.61%, and 1.43%. Hazard ratios for the second coprimary outcome were 0.77 (95% CI, 0.51-1.14), 0.73 (95% CI, 0.56-0.95), and 0.74 (95% CI, 0.58-0.94); and ARR of 0.36%, 1.49%, and 1.85%, using the ACC/AHA algorithm and 0.76 (95% CI, 0.41-1.41), 0.70 (95% CI, 0.52-0.95), and 0.76 (95% CI, 0.62-0.94); and ARR of 1.08%, 0.83%, and 1.56% using the FRS.

**CONCLUSION:** The pragmatic HOPE-3 trial approach identifies in an ethnically diverse primary prevention population individuals at intermediate risk who benefit from statin therapy using simple clinical characteristics without the need for complex, currently used risk assessment tools.

View [abstract](#)

Rains, S. A., Hingle, M. D., Surdeanu, M., et al. 2019. **A Test of The Risk Perception Attitude Framework as a Message Tailoring Strategy to Promote Diabetes Screening.** Health Commun 34(6) 672-679.

**AIM:** to test the risk perception attitude (RPA) framework as a message tailoring strategy to encourage diabetes screening

**METHOD:** Participants (N = 602) were first categorized into one of four RPA groups based on their diabetes risk and efficacy perceptions and then randomly assigned to receive a message that matched their RPA, mismatched their RPA, or a control message.

**RESULTS:** Participants receiving a matched message reported greater intentions to engage in self-protective behavior than participants who received a mismatched message or control message. The results also showed differences in attitudes and behavioral intentions across the four RPA groups.

**CONCLUSION:** Participants in the responsive group had more positive attitudes toward diabetes screening than the other three groups, whereas participants in the indifferent group reported the weakest intentions to engage in self-protective behaviour.

View [abstract](#)

Sinclair, P. M., Kable, A., Levett-Jones, T., et al. 2019. **The CKD-DETECT study: An RCT aimed at improving intention to initiate a kidney health check in Australian practice nurses.** J Clin Nurs 28(15-16) 2745-2759.

**AIM:** to evaluate the effectiveness of a targeted asynchronous web based e-learning module on general practice nurses' behavioural intentions in relation to opportunistic screening practices for people at risk of CKD.

**METHOD:** Double blinded pre-post interventional randomised control design. Participants were nurses working in general practice settings in Australia. Participants were randomised to a knowledge based active control or targeted behavioural based intervention which were delivered using asynchronous e-learning modules. The intervention was designed to influence the behavioural constructs of the theory of planned behaviour (TPB): attitude, subjective norm and perceived behavioural control (PBC).

**RESULTS:** Of the 420 participants, we analysed the primary and secondary outcomes for 212 (50.47%) who had complete follow up data. There were no significant differences (p 0.424, [d] 0.04) in behavioural intention between the intervention and control groups at follow-up, when controlling for baseline values. However, regression models assessing the relationship between the change in the



TPB constructs and behavioural intention at follow-up for all participants, regardless of study arm, demonstrated a significant change in intention to initiate a kidney health check. Although these changes could not be attributed to the effect of the intervention. Attitude ( $r^2 = 0.3525$ ,  $p = 0.0004$ ) and PBC ( $r^2 = 0.3510$ ,  $p = 0.0005$ ) models accounted for approximately 35% of the explained variance in behavioural intentions and social norm ( $r^2 = 0.3297$ ,  $p = 0.0171$ ) accounted for approximately 33% of the variance. When all TPB constructs were included in the model, 37% of the variance in intention was explained.

**CONCLUSION:** A targeted behavioural online intervention was no more effective than a knowledge based online program to improve primary health care nurses' intention to initiate a kidney health check in people at risk of chronic kidney disease.

View [abstract](#)

## Cohort studies

Bødtker Mortensen, M. & Grønne Nordestgaard, B. 2019. **Statin Use in Primary Prevention of Atherosclerotic Cardiovascular Disease According to 5 Major Guidelines for Sensitivity, Specificity, and Number Needed to Treat.** *JAMA Cardiology* 4(11) 1131-1138.

**AIM:** to compare the sensitivity, specificity, and estimated number needed to treat (NNT10) to prevent 1 ASCVD event in 10 years according to statin criteria from the 5 guidelines.

**METHOD:** Population-based contemporary cohort study. Analyses were performed in the Copenhagen General Population Study, with a mean follow-up time of 10.9 years. We included 45 750 individuals aged 40 to 75 years. The participants were enrolled between 2003 and 2009 and were all free of ASCVD at baseline. Data were analyzed between January 1, 2019, and August 4, 2019.

**RESULTS:** Median age at baseline examination was 56 years, and 43% of participants were men ( $n = 19\,870$  of 45 750). During follow-up, we observed 4156 ASCVD events. Overall, 44% of individuals in Copenhagen General Population Study were statin eligible with CCS ( $n = 19\,953$  of 45 750), 42% with ACC/AHA ( $n = 19\,400$  of 45 750), 40% with NICE ( $n = 19\,400$  of 45 750), 31% with USPSTF ( $n = 13\,966$  of 45 750), and 15% with ESC/EAS ( $n = 6870$  of 45 750). Sensitivity and specificity for ASCVD events were 68% ( $n = 2815$  of 4156) and 59% ( $n = 24\,456$  of 41 594) for CCS, 70% ( $n = 2889$  of 4156) and 60% ( $n = 25\,083$  of 41 594) for ACC/AHA, 68% ( $n = 2815$  of 4156) and 63% ( $n = 26\,213$  of 41 594) for NICE, 57% ( $n = 2377$  of 4156) and 72% ( $n = 30\,005$  of 41 594) for USPSTF, and 24% ( $n = 1001$  of 4156) and 86% ( $n = 35\,725$  of 41 594) for ESC/EAS. The NNT10 to prevent 1 ASCVD using moderate-intensity and high-intensity statin therapy, respectively, was 32 and 21 for CCS criteria, 30 and 20 for ACC/AHA criteria, 30 and 20 for NICE criteria, 27 and 18 for USPSTF criteria, and 29 and 20 for ESC/EAS criteria.

**CONCLUSION:** With similar NNT10 to prevent 1 event, the CCS, ACC/AHA, and NICE guidelines correctly assign statin therapy to many more of the individuals who later develop ASCVD compared with the USPSTF and ESC/EAS guidelines. Our results therefore suggest that the CCS, ACC/AHA, or NICE guidelines may be preferred for primary prevention.

View [abstract](#)

Brotons, C., Moral, I., Fernandez, D., et al. 2019. **Estimation of Lifetime Risk of Cardiovascular Disease (IBERLIFERISK): A New Tool for Cardiovascular Disease Prevention in Primary Care.** *Rev Esp Cardiol (Engl Ed)* 72(7) 562-568.

**AIM:** to develop a predictive function of lifetime cardiovascular risk, including morbidity and mortality, in a healthy working population in Spain.

**METHOD:** Retrospective cohort study. We selected healthy workers, aged 18 to 65 years, with no history of cardiovascular disease, who underwent a health assessment between 2004 and 2007. We used 70% of the cohort to develop the risk equation, and the remaining 30% to validate the equation. Four Cox proportional hazards models were constructed using cardiovascular events and competing events as dependent variables. The same models were replicated for men and women separately. Fatal and nonfatal events were assessed until 2014.

**RESULTS:** A total of 762 054 individuals were selected. The mean age was 35.48 years and 71.14% were men. Significant risk variables in the model included manual occupations, being a smoker or exsmoker, diabetes mellitus, antihypertensive treatment, systolic blood pressure, total cholesterol, high-density lipoprotein cholesterol, and lipid-lowering treatment; in men, the model also included alcohol consumption, body mass index, a family history of early coronary disease in first-degree relatives, renal failure, and diastolic blood pressure. The area under the curve receiver operating characteristic was 0.84 (95%CI, 0.82-0.85) in men and 0.73 (95%CI, 0.66-0.80) in women. Calibration showed underestimation in low-risk deciles and overestimation in high-risk deciles.

**CONCLUSION:** The new lifetime cardiovascular risk model has satisfactory discrimination and calibration, with better results in men than in women.

View [abstract](#)

Giral, P., Neumann, A. & Weill, A. 2019. **Cardiovascular effect of discontinuing statins for primary prevention at the age of 75 years: a nationwide population-based cohort study in France.** European Heart Journal.

**AIM:** to assess the effect of statin discontinuation on cardiovascular outcomes in previously adherent 75-year-olds treated for primary prevention.

**METHOD:** A population-based cohort study using French national healthcare databases was performed, studying all subjects who turned 75 in 2012–14, with no history of cardiovascular disease and with a statin medication possession ratio  $\geq 80\%$  in each of the previous 2 years. Statin discontinuation was defined as three consecutive months without exposure. The outcome was hospital admission for cardiovascular event. The hazard ratio comparing statin discontinuation with continuation was estimated using a marginal structural model adjusting for both baseline and time-varying covariates (cardiovascular drug use, comorbidities, and frailty indicators).

**RESULTS:** A total of 120 173 subjects were followed for an average of 2.4 years, of whom 17 204 (14.3%) discontinued statins and 5396 (4.5%) were admitted for a cardiovascular event. The adjusted hazard ratios for statin discontinuation were 1.33 [95% confidence interval (CI) 1.18–1.50] (any cardiovascular event), 1.46 (95% CI 1.21–1.75) (coronary event), 1.26 (95% CI 1.05–1.51) (cerebrovascular event), and 1.02 (95% CI 0.74–1.40) (other vascular event).

**CONCLUSION:** Statin discontinuation was associated with a 33% increased risk of admission for cardiovascular event in 75-year-old primary prevention patients.

View [abstract](#)

Herrett, E., Gadd, S., Jackson, R., et al. 2019. **Eligibility and subsequent burden of cardiovascular disease of four strategies for blood pressure-lowering treatment: a retrospective cohort study.** Lancet 394(10199) 663-671.

**AIM:** to investigate the implications of alternative strategies for offering blood pressure treatment, using the UK as an illustrative example.

**METHOD:** We did a retrospective cohort study in primary care patients aged 30-79 years without cardiovascular disease, using data from the UK's Clinical Practice Research Datalink linked to Hospital Episode Statistics and Office for National Statistics mortality. We assessed and compared four different strategies to determine eligibility for treatment: using 2011 UK National Institute for Health and Care Excellence (NICE) guideline, or proposed 2019 NICE guideline, or blood pressure alone (threshold  $\geq 140/90$  mm Hg), or predicted 10-year cardiovascular risk alone (QRISK2 score  $\geq 10\%$ ). Patients were followed up until the earliest occurrence of a cardiovascular disease diagnosis, death, or end of follow-up period (March 31, 2016). For each strategy, we estimated the proportion of patients eligible for treatment and number of cardiovascular events that could be prevented with treatment. We then estimated eligibility and number of events that would occur during 10 years in the UK general population.

**RESULTS:** Between Jan 1, 2011, and March 31, 2016, 1 222 670 patients in the cohort were followed up for a median of 4.3 years (IQR 2.5-5.2). 271 963 (22.2%) patients were eligible for treatment under the 2011 NICE guideline, 327 429 (26.8%) under the proposed 2019 NICE guideline, 481 859

(39.4%) on the basis of a blood pressure threshold of 140/90 mm Hg or higher, and 357 840 (29.3%) on the basis of a QRISK2 threshold of 10% or higher. During follow-up, 32 183 patients were diagnosed with cardiovascular disease (overall rate 7.1 per 1000 person-years, 95% CI 7.0-7.2). Cardiovascular event rates in patients eligible for each strategy were 15.2 per 1000 person-years (95% CI 15.0-15.5) under the 2011 NICE guideline, 14.9 (14.7-15.1) under the proposed 2019 NICE guideline, 11.4 (11.3-11.6) with blood pressure threshold alone, and 16.9 (16.7-17.1) with QRISK2 threshold alone. Scaled to the UK population, we estimated that 233 152 events would be avoided under the 2011 NICE guideline (28 patients needed to treat for 10 years to avoid one event), 270 233 under the 2019 NICE guideline (29 patients), 301 523 using a blood pressure threshold (38 patients), and 322 921 using QRISK2 threshold (27 patients).

**CONCLUSION:** A cardiovascular risk-based strategy (QRISK2  $\geq 10\%$ ) could prevent over a third more cardiovascular disease events than the 2011 NICE guideline and a fifth more than the 2019 NICE guideline, with similar efficiency regarding number treated per event avoided.

View [full text](#)

Larsen, L. B., Sondergaard, J., Thomsen, J. L., et al. 2019. **Step-wise approach to prevention of chronic diseases in the Danish primary care sector with the use of a personal digital health profile and targeted follow-up - an assessment of attendance.** BMC Public Health 19(1) 1092. AIM: to examine individual characteristics and health-care usage of patients who took up the targeted (personal digital health profile) preventive programs.

**METHOD:** A sample of patients born between 1957 and 1986 was randomly selected from the patient-list system of participating general practitioners in two Danish municipalities. The selected patients received a digital invitation to participate. Consenting patients received a second digital invitation for a personal digital health profile based on questionnaire and electronic patient record data. The personal digital health profile contained individualized information on risk profile and personalized recommendations on further actions. If at-risk or presenting with health-risk behaviour a patient would be advised to contact either their general practitioner or municipal health centre for targeted preventive programs. Attendance at the targeted preventive programs was examined using Poisson regression and chi-squared automatic interaction detection methods.

**RESULTS:** A total of 9400 patients were invited. Of those who participated (30%), 22% were advised to get a health check at their general practitioner. Of these, 19% did so. Another 23% were advised to schedule an appointment for behaviour-change counselling at their municipal health centre. A total of 21% took the advice. Patients who had fair or poor self-rated health, a body mass index above 30, low self-efficacy, were female, non-smokers, or lead a sedentary lifestyle, were most likely to attend the targeted preventive programs.

**CONCLUSION:** A personal digital health profile shows some promise in a step-wise approach to prevention in the Danish primary care sector and seems to motivate people with low self-efficacy to attend targeted preventive programs.

View [full text](#)

Lindbohm, J. V., Sipilä, P. N., Mars, N. J., et al. 2019. **5-year versus risk-category-specific screening intervals for cardiovascular disease prevention: a cohort study.** 4(4) e189-e199.

AIM: to compare different screening intervals in terms of timely detection of high-risk individuals, cardiovascular events prevented, and health-care costs.

**METHOD:** We used data from participants in the British Whitehall II study (aged 40–64 years at baseline) who had repeated biomedical screenings at 5-year intervals and linked these data to electronic health records between baseline (Aug 7, 1991, to May 10, 1993) and June 30, 2015. We estimated participants' 10-year risk of a major cardiovascular event (myocardial infarction, cardiac death, and fatal or non-fatal stroke) using the revised Atherosclerotic Cardiovascular Disease (ASCVD) calculator. We used multistate Markov modelling to estimate optimum screening intervals on the basis of progression rates from low-risk and intermediate-risk categories to the high-risk category (ie,  $\geq 7.5\%$  10-year risk of a major cardiovascular event). Our assessment criteria included person-

years spent in a high-risk category before detection, the number of major cardiovascular events prevented and quality-adjusted life-years (QALYs) gained, and screening costs.

**RESULTS:** Of 6964 participants (mean age 50.0 years [SD 6.0] at baseline) with 152 700 person-years of follow-up (mean follow-up 22.0 years [SD 5.0]), 1686 participants progressed to the high-risk category and 617 had a major cardiovascular event. With the 5-year screening intervals, participants spent 7866 (95% CI 7130–8658) person-years unrecognised in the high-risk group. For individuals in the low, intermediate-low, and intermediate-high risk categories, 21 alternative risk category-based screening intervals outperformed the 5-yearly screening protocol. Screening intervals at 7 years, 4 years, and 1 year for those in the low, intermediate-low, and intermediate-high-risk category would reduce the number of person-years spent unrecognised in the high-risk group by 62% (95% CI 57–66; 4894 person-years), reduce the number of major cardiovascular events by 8% (7–9; 49 events), and raise 44 QALYs (40–49) for the study population.

**CONCLUSION:** In terms of timely preventive interventions, the 5-year screening intervals were unnecessarily frequent for low-risk individuals and insufficiently frequent for intermediate-risk individuals. Screening intervals based on risk-category-specific progression rates would perform better in terms of preventing major cardiovascular disease events and improving cost-effectiveness

Sabia, S., Fayosse, A. & Dumurgier, J. 2019. **Association of ideal cardiovascular health at age 50 with incidence of dementia: 25 year follow-up of Whitehall II cohort study.** British Medical Journal.

**AIM:** to examine the association between the Life Simple 7 cardiovascular health score at age 50 and incidence of dementia.

**METHOD:** Prospective cohort study in civil service departments in London (Whitehall II study; study inception 1985-88). 7899 participants with data on the cardiovascular health score at age 50. The cardiovascular health score included four behavioural (smoking, diet, physical activity, body mass index) and three biological (fasting glucose, blood cholesterol, blood pressure) metrics, coded on a three point scale (0, 1, 2). The cardiovascular health score was the sum of seven metrics (score range 0-14) and was categorised into poor (scores 0-6), intermediate (7-11), and optimal (12-14) cardiovascular health. Main outcome measure Incident dementia, identified through linkage to hospital, mental health services, and mortality registers until 2017.

**RESULTS:** 347 incident cases of dementia were recorded over a median follow-up of 24.7 years. Compared with an incidence rate of dementia of 3.2 (95% confidence interval 2.5 to 4.0) per 1000 person years among the group with poor cardiovascular health, the absolute rate differences per 1000 person years were -1.5 (95% confidence interval -2.3 to -0.7) for the group with intermediate cardiovascular health and -1.9 (-2.8 to -1.1) for the group with optimal cardiovascular health. Higher cardiovascular health score was associated with a lower risk of dementia (hazard ratio 0.89 (0.85 to 0.95) per 1 point increment in the cardiovascular health score). Similar associations with dementia were observed for the behavioural and biological subscales (hazard ratios per 1 point increment in the subscores 0.87 (0.81 to 0.93) and 0.91 (0.83 to 1.00), respectively). The association between cardiovascular health at age 50 and dementia was also seen in people who remained free of cardiovascular disease over the follow-up (hazard ratio 0.89 (0.84 to 0.95) per 1 point increment in the cardiovascular health score).

**CONCLUSION:** Adherence to the Life Simple 7 ideal cardiovascular health recommendations in midlife was associated with a lower risk of dementia later in life.

View [full text](#)

Son, J. W., Lee, S. S., Kwon, H. S., et al. 2019. **Relationship among BMI, WC, and cardiovascular disease risk factors: Findings from the Korea national health insurance system (Knhis) health checkup data.** Diabetes. Conference: 79th Scientific Sessions of the American Diabetes Association, ADA 68(Supplement 1).

**AIM:** to investigate the relationship between BMI, WC and subsequent CVD risk factors (at least one from type 2 diabetes, hypertension or dyslipidemia).

**METHOD:** BMI was categorized into 5 subgroups at 18.5, 23.0, 25.0 and 30.0kg/m<sup>2</sup>. The cut-off points of WC for central obesity were 90cm in men and 85cm in women. The participants were subdivided into a total of 10 subgroups according to the presence of central obesity in each of the 5 BMI ranges. The incidence risk of CVD risk factors in each subgroup was comparatively analyzed using a multivariable Cox's proportional hazard model. Participants were 14,170,134 adults above 20 years of age who did not have type 2 diabetes, hypertension or dyslipidemia at the baseline examinations.

**RESULTS:** During a mean follow-up of 5.3 years, CVD risk factors developed in 1,857,307 participants. The HRs for CVD risk factors were increased by 8.2% per 1kg/m<sup>2</sup> increment of BMI. The HRs (95% CI) for CVD risk factors across BMI categories were 0.573, 1.0, 1.479, 1.962 and 3.03, respectively, after adjusting for age, sex, smoking, alcohol drinking, physical activity, and monthly income. Compared to the group with BMI of 18.5 to 23 kg/m<sup>2</sup> without central obesity, which served as the reference group, the multivariable-adjusted HRs in those with central obesity was significantly increased from 1.00 to 1.27 with a BMI of 18.5 to 23.0 kg/m<sup>2</sup>, from 1.45 to 1.64 with a BMI of 23.0 to 25.0 kg/m<sup>2</sup>, from 1.83 to 2.10 with a BMI of 25.0 to 30.0 kg/m<sup>2</sup>, and from 2.56 to 3.08 with a BMI of 30.0 kg/m<sup>2</sup> or over.

**CONCLUSION:** These findings show that assessment of central obesity provided additional clinical utility beyond BMI for reclassifying the risk of CVD risk factors in Korean populations, even those with a low BMI.

View [abstract](#)

van Doorn, D., Richardson, N., Osborne, A., et al. 2019. **The impact of a workplace cardiovascular health screening programme 'Farmers Have Hearts' on health behaviour change among Irish farmers.** *Work* 63(1) 113-123. **BACKGROUND:** Irish farmers are a high-risk group for cardiovascular disease (CVD) which imposes not only a risk to their health but has more far-reaching implications for occupational health and safety.

**AIM:** This study assessed the impact of a workplace health screening and health behaviour change programme among a sub-group of male Irish farmers.

**METHOD:** Data were collected from male livestock farmers (n = 310) who attended health screenings at livestock marts. Participating farmers also received lifestyle advice to prompt health behaviour change. Health behaviour change was tracked by two phone questionnaires at Week 1 (n = 224) and Week 12 (n = 172). All data were entered into SPSS v22 and analysed using chi-square and regression techniques.

**RESULTS:** At Week 12, 48% reported having changed at least one health behaviour. The majority of farmers were referred to their GP and by Week 12, 32% had acted on this advice. Participants most in need of health behaviour change based on adverse health screening results were, paradoxically, the least likely to contemplate or engage in health behaviour change.

**CONCLUSION:** Findings demonstrate that whilst workplace health screenings can be a catalyst for behaviour change for some farmers, more follow-up supports are needed to encourage sustainable behaviour change.

View [abstract](#)

Yusuf, S., Joseph, P. & Rangarajan, S. 2019. **Modifiable risk factors, cardiovascular disease, and mortality in 155 722 individuals from 21 high-income, middle-income, and low-income countries (PURE): a prospective cohort study.** *The Lancet*. Sep 3

**AIM:** to examine associations for 14 potentially modifiable risk factors with mortality and cardiovascular disease in participants without a prior history of cardiovascular disease

**METHOD:** In this multinational, prospective cohort study, we examined associations for 14 potentially modifiable risk factors with mortality and cardiovascular disease in 155 722 participants without a prior history of cardiovascular disease from 21 high-income, middle-income, or low-income countries (HICs, MICs, or LICs). The primary outcomes for this paper were composites of cardiovascular disease events (defined as cardiovascular death, myocardial infarction, stroke, and heart failure) and

mortality. We describe the prevalence, hazard ratios (HRs), and population-attributable fractions (PAFs) for cardiovascular disease and mortality associated with a cluster of behavioural factors (ie, tobacco use, alcohol, diet, physical activity, and sodium intake), metabolic factors (ie, lipids, blood pressure, diabetes, obesity), socioeconomic and psychosocial factors (ie, education, symptoms of depression), grip strength, and household and ambient pollution. Associations between risk factors and the outcomes were established using multivariable Cox frailty models and using PAFs for the entire cohort, and also by countries grouped by income level. Associations are presented as HRs and PAFs with 95% CIs.

**RESULTS:** Between Jan 6, 2005, and Dec 4, 2016, 155 722 participants were enrolled and followed up for measurement of risk factors. 17 249 (11.1%) participants were from HICs, 102 680 (65.9%) were from MICs, and 35 793 (23.0%) from LICs. Approximately 70% of cardiovascular disease cases and deaths in the overall study population were attributed to modifiable risk factors. Metabolic factors were the predominant risk factors for cardiovascular disease (41.2% of the PAF), with hypertension being the largest (22.3% of the PAF). As a cluster, behavioural risk factors contributed most to deaths (26.3% of the PAF), although the single largest risk factor was a low education level (12.5% of the PAF). Ambient air pollution was associated with 13.9% of the PAF for cardiovascular disease, although different statistical methods were used for this analysis. In MICs and LICs, household air pollution, poor diet, low education, and low grip strength had stronger effects on cardiovascular disease or mortality than in HICs.

**CONCLUSION:** Most cardiovascular disease cases and deaths can be attributed to a small number of common, modifiable risk factors. While some factors have extensive global effects (eg, hypertension and education), others (eg, household air pollution and poor diet) vary by a country's economic level.

View [abstract](#)

### Cross-sectional

Bacchini, M., Bonometti, S., Del Zotti, F., et al. 2019. **Opportunistic Screening for Atrial Fibrillation in the Pharmacies: A Population-Based Cross-Sectional Study.** *High Blood Pressure & Cardiovascular Prevention* 26(4) 339-344.

**AIM:** to evaluate the feasibility of a large-scale screening for atrial fibrillation using a blood pressure monitor (MicrolifeAFIB) endowed with a validated algorithm able to detect AF calculating the irregularity of interval times between heartbeats.

**METHOD:** In this cross-sectional study conducted in 74 pharmacies in Verona participated 3071 people aged 50 years or more. In 6 months, information about drugs, previous diagnoses of cardiovascular diseases, anthropometric and demographic data was recorded, together with the measurement of blood pressure and cardiac rhythm by using the MicrolifeAFIB device. Pharmacists also collected anthropometric and demographic data of the participants, along with information concerning their personal history of cardiovascular disease and the use of antihypertensive and antithrombotic agents. All those who were positive at the screening for atrial fibrillation were referred to their family doctor.

**RESULTS:** The screening revealed 98 subjects (3.2%) positive for AF; 44 of these reported a previous diagnosis of AF and were treated with anticoagulants (77%) or with antiplatelet agents (7%). By logistic regression analysis, age, male sex and heart failure were independently associated with positivity for AF. Association between positive test and previous stroke/TIA was found in the 54 subjects without a previous diagnosis of AF (9% had a previous stroke/TIA).

**CONCLUSION:** Opportunistic screening for atrial fibrillation in the pharmacies is feasible and allows to identify a number of subjects with silent, non-previously diagnosed AF, therefore is potentially useful in large-scale projects aimed at the prevention of cardiovascular morbidity and mortality.

View [abstract](#)

Bochaliya, R. K., Sharma, A., Saxena, P., et al. 2019. **To Evaluate the Association of Neck Circumference with Metabolic Syndrome and Cardiovascular Risk Factors.** *Journal of the Association of Physicians of India* 67(3) 60-62.

AIM: to evaluate the association of neck circumference with metabolic syndrome and cardiovascular risk factors.

METHOD: The present study was a hospital based observational, Descriptive and comparative analysis, conducted at Department of General Medicine at a tertiary care centre of west India after Ethical clearance from the institute's ethical committee and written informed consent. A total of 405 subjects aged 18 - 60 years were selected consecutively after inclusion and exclusion criteria. Subjects were evaluated for metabolic syndrome components and cardiovascular risk factors. Neck circumference of  $\geq 37$  cm in males and  $\geq 34$  cm in females was considered abnormal.

RESULTS: Metabolic syndrome was seen in 189 (46.7%) subjects. Raised triglyceride level was the most common (52.8%) component. Neck circumference was found to be statistically significant associated with metabolic syndrome ( $p < 0.001$ ) as well as cardiovascular risk factors like BMI, Waist circumference, Hypertension, Fasting blood sugar, TG and HDL were also found to be statistically significant associated with neck circumference.

CONCLUSION: Neck Circumference can be used as a sensitive tool for metabolic syndrome and cardiovascular risk factors. Patients with abnormal Neck circumference should be screened for cardiovascular risk factors to detect abnormality for early and appropriate intervention

View [abstract](#)

Cheadle, A., Rosaschi, M., Burden, D., et al. 2019. **A Community-Wide Collaboration to Reduce Cardiovascular Disease Risk: The Hearts of Sonoma County Initiative**. Prev Chronic Dis 16 E89.

AIM: to describe outcomes and lessons learned from the Hearts of Sonoma County (HSC) initiative, a successful multi-sector collaborative effort to reduce cardiovascular disease (CVD) risk in Sonoma County, California.

METHOD: The clinical component involves activating primary care providers around management of CVD risk factors; community activities include community health workers conducting blood pressure screenings and a local heart disease prevention campaign. The impact of the clinical improvement efforts was tracked using blood pressure data from the 4 health systems participating in HSC.

Descriptive information on the community-engagement efforts was obtained from program records. Lessons learned in developing and maintaining the collaborative were gathered through document review and interviews with key informants.

RESULTS: Favorable trends were seen in blood pressure control among patients with hypertension in the participating health systems: patients with controlled blood pressure increased from 58% in 2014 to 67% in 2016 ( $P < .001$ ). Between 2017 and 2019, the community engagement effort conducted 99 outreach events, reaching 1,751 individuals, and conducted 1,729 blood pressure screenings, with 441 individuals referred to clinical providers for follow-up care. HSC scored highly on 6 essential elements of an effective coalition and achieved a degree of sustainability that has eluded many other collaboratives.

CONCLUSION: Factors contributing to the success of HSC include 1) starting small and focused to build trust among participants and demonstrate value, 2) working within the framework of a larger effort, and 3) providing long-term, open-ended backbone support.

View [abstract](#)

Gillis-Januszewski, J., Gottfried-Kwasniok, R., Gillis-Januszewski, T., et al. 2019. **The role of lipoprotein a as a cardiovascular risk factor in primary prevention screening**. European Journal of Preventive Cardiology 26 (Supplement 1) S108.

AIM: to evaluate the association between elevated Lp a level, individual risk factors and PROCAM risk score in German employees of different companies taking part in primary prevention screening programme at work 'Unternehmen mit Herz'.

METHOD: 1470 working employees (33.6% women und 66.4% men) of different companies undergoing a cardiovascular screening programme at work ('Unternehmen mit Herz') were enrolled in this study. Depending on Lp a levels two groups were separated (first group with Lp a levels  $< 60$  mg/dl and second group with Lp a  $> 60$  mg/dl). Gender, age, BMI, cholesterol, low density lipoprotein

(LDL), high density lipoprotein (HDL), triglyceride, HbA1c, systolic and diastolic pressure, nicotine abuse and PROCAM score were evaluated with respect to the Lp a levels.

**RESULTS:** In the first group of 1332 employees with Lp a <60 mg/dl (mean age 44 +/- 11 years, 65% male and 35% female) cholesterol level was 203 +/- 37 mg/dl, HDL 53 +/- 13 mg/dl, LDL 127 +/- 34 mg/dl, triglyceride 159 +/- 102 mg/dl, BMI 26 +/- 4, mean systolic pressure was 137 +/- 15 mmHg, mean diastolic pressure 84 +/- 11 mmHg and PROCAM score 3.8 +/- 6.8%. In the second group of 138 employees with Lp a >60 mg (mean age 45 +/- 11 years, 78% male and 22% female) cholesterol level was 217 +/- 38 mg/dl, HDL 52 +/- 13 mg/dl, LDL 139 +/- 35 mg/dl, triglyceride 175 mg/dl +/- 64 mg/dl (34-660 mg/dl), BMI 26 +/- 4, mean systolic pressure was 137 +/- 14 mmHg, mean diastolic pressure 84 +/- 9 mmHg and PROCAM score 4.3% +/- 5.2. In this study, high levels of Lp a were significantly associated with higher cholesterol level  $p=0.000032$ , LDL  $p=0.000075$ , triglyceride  $p=0.03$  and male gender  $p=0.003$ . The elevated Lp a level correlated also with a higher PROCAM score  $p=0.0008$ . We did not see significant differences in our study between the two groups regarding age, BMI, HbA1c, HDL, systolic, diastolic pressure and nicotine abuse.

**CONCLUSION:** Lp a has a significant role in the primary prevention and correlates with pertinent risk factors as well as with the PROCAM score.

View [abstract](#)

Grigoriadis, A., Sorsa, T., Raisanen, I., et al. 2019. **Prediabetes/Diabetes Can Be Screened at the Dental Office by a Low-Cost and Fast Chair-Side/Point-of-Care aMMP-8 Immunotest.**

Diagnostics 9(4) 17.

**AIM:** to test the feasibility of screening for prediabetes and diabetes at the dental office by chairside tests.

**METHOD:** Chair-side assessment of HbA1c and a quantitative point-of-care (PoC) active matrix metalloproteinase (aMMP)-8 oral rinse immunotest developed for periodontal diseases, were performed on patients ( $n = 69$ ) attending a Periodontology University Clinic who fulfilled the criteria for testing according to the screening questionnaire of the Centers for Disease Control and Prevention, USA. Clinical parameters of periodontal disease were also recorded with an automated probe.

**RESULTS:** Twenty seven-point-five percent of the subjects were found with previously unknown hyperglycemia (HbA1c  $\geq 5.7\%$ ). There was a statistically-significant positive association between the aMMP-8test and prediabetes ( $p < 0.05$ , unadjusted and adjusted for BMI and age  $\geq 45$  years logistic regression models).

**CONCLUSION:** The dental setting is suitable for opportunistic screening for undiagnosed diabetes and pre-diabetes and point-of-care HbA1c, especially when combined with aMMP-8 assessment by dental professionals, being convenient and effective.

View [full text](#)

Hansen, T. B., Lindholt, J. S., Diederichsen, A., et al. 2019. **Do Non-participants at Screening have a Different Threshold for an Acceptable Benefit-Harm Ratio than Participants? Results of a Discrete Choice Experiment.** The Patient: Patient-Centered Outcomes Research 12(5) 491-501.

**AIM:** to investigate non-participants' preferences for cardiovascular disease screening programme characteristics and whether non-participation can be rationally explained by differences in preferences, decision-making styles and informational needs between non-participants and participants.

**METHOD:** We conducted a discrete choice experiment at three screening sites between June and December 2017 among 371 male non-participants and 830 male participants who were asked to trade different levels of five key programme characteristics (chance of health benefit, risk of overtreatment, risk of later regret, screening duration and screening location). Data were analysed using a multinomial mixed-logit model. Health benefit was used as a payment vehicle for estimation of marginal substitution rates.

**RESULTS:** Non-participants were willing to accept that 0.127 (95% confidence interval 0.103-0.154) fewer lives would be saved to avoid overtreatment of one individual, whilst participants were willing to



accept 0.085 (95% confidence interval 0.077-0.094) fewer lives saved. This translates into non-participants valuing health benefits 7.9 times higher than overtreatment. The corresponding value of participants is 11.8. Similarly, non-participants had higher requirements than participants for advanced technology and a quicker screening duration. With regard to their participation decision, 64% of the non-participants felt certain about their choice compared with 89% among participants. **CONCLUSION:** This study shows that non-participants have different preferences than participants at screening as they express relatively more concern about overtreatment and have higher requirements for a high-tech screening programme. Non-participants also report to be more uncertain about their participation decision and more often seek additional information to the standard information provided in the invitation letter

View [abstract](#)

Inanc, N., Basmisirli, E. & Capar, A. G. 2019. **The Diabetes Risk Evaluation with Findrisk in Healthy Adults: Kayseri/Turkey**. *Clinical Nutrition* 38 (Supplement 1) S220.

**AIM:** to evaluate the risk of diabetes with the FINDRISK screening tool.

**METHOD:** 1500 healthy subjects, aged 18 years and older in Kayseri/Turkey. Demographic information of the participants was recorded by face-to-face interviews with the questionnaire. Body weight, height, waist and hip circumference were measured and Body Mass Index ( $\text{kg/m}^2$ ) was calculated. Individuals were grouped according to WHO BMI standards. Diabetes risk of participants had been tried to be revealed by FINDRISK. FINDRISK score of 15 and above was accepted as high risk in terms of Type 2 diabetes.

**RESULTS:** There was a statistically significant relationship between total FINDRISK score and gender ( $p < 0.05$ ). While 15.2% of the women were in high risk group, 12.4% of the men were in high risk group. The percentage of the women in the low risk group (35.9%) is less than the men with low risk of diabetes (38.5%). As the BMI increased, the individuals were found to have a high risk compared to FINDRISK.

**CONCLUSION:** As a result of this study, it has been shown that the use of FINDRISK screening tool can be an effective way to detect the risk of diabetes in practice.

View [abstract](#)

Le, P. H., Zhang, L., Misra-Hebert, A. D., et al. 2019. **Is diabetes occurring at younger ages? Surprising Results from nhanes 2001-16**. *Journal of General Internal Medicine* 34 (2 Supplement) S267.

**AIM:** to describe population-based trends in mean age at diabetes diagnosis from 2001-2016 among US adults. **METHODS:** We conducted a retrospective analysis of National Health and Nutrition Examination Survey (NHANES) data from 2001-2002 through 2015-2016. We included participants aged 18 years and defined diabetes as having ever been told they had diabetes,  $\text{HbA1C} > 6.4\%$ , or fasting plasma glucose  $> 125 \text{ mg/dL}$ . Pregnant women and participants with missing data were excluded. Age at diabetes diagnosis was self-reported. For patients with previously undiagnosed diabetes, we assigned age at the interview as age at diagnosis. Diabetes duration was calculated as the difference between age at interview and age at diagnosis. Mean age at diagnosis and diabetes duration were estimated for each 2-year period and also stratified by patient characteristics and risk factors. Trends were assessed using linear regression. We used Stata 14.2, accounting for the complex survey design of NHANES.

**RESULTS:** The sample included 46,668 adults, 7,059 (15.1%) of whom had diabetes. Mean age at diagnosis was 48.2 years and mean diabetes duration was 11.3 years, neither of which changed over time ( $p$  for trend  $> 0.05$ ). In all years, age at diagnosis was younger for those who were severely obese, poor, uninsured, Hispanic, or Black; had a family history of diabetes; or were current smokers or excessive alcohol users. Compared to 2001-2006, the number of patients diagnosed in 2013-2016 was 2x, 1.8x and 1.7x higher for ages 30, 50, and 70 years, respectively (figure).

**CONCLUSION:** Mean age at diagnosis did not vary throughout the study period. However, the absolute number of 30-year-olds diagnosed doubled, creating the appearance that diabetes was occurring at younger ages.

No online abstract available.

Liu, Y., Guo, H., Wang, Q., et al. 2019. **Use of capillary glucose combined with other non-laboratory examinations to screen for diabetes and prediabetes.** Diabetic Medicine 07 07.

**AIM:** to evaluate the value and feasibility of capillary glucose assessment, combined with other non-laboratory measures, in screening for diabetes and prediabetes in the community.

**METHOD:** In this cross-sectional study, we assessed fasting capillary glucose, fasting plasma glucose, and both capillary glucose and plasma glucose values after 2-h oral glucose tolerance tests in a total of 3736 samples. We determined the optimal threshold of capillary glucose using receiver-operating characteristic curve analysis. The effect of screening methods using capillary glucose combined with other variables, such as age, BMI and waist circumference, was assessed according to area under the receiver-operating characteristic curve.

**RESULTS:** There was a strong positive correlation between capillary glucose and venous plasma glucose. The area under the curve for the model using fasting capillary glucose to screen for impaired fasting glucose was 0.722, while that for the model using capillary glucose after a 2-h oral glucose tolerance test to screen for impaired glucose tolerance was 0.916. The area under the curve for the model using fasting capillary glucose to screen for diabetes was 0.835, while that for the model using 2-h oral glucose tolerance test capillary glucose was 0.912. The area under the curve for the model using fasting capillary glucose + 2-h oral glucose tolerance test capillary glucose to screen for diabetes was 0.945. The discriminatory capability of models using capillary glucose was somewhat improved by adding non-laboratory variables.

**CONCLUSION:** Capillary glucose could be an alternative for screening for diabetes and prediabetes, especially in low-resource areas.

Mean, M., Waeber, G. & Marques-Vidal, P. 2019. **Do Hospital Doctors Screen for Diabetes?** Experimental and Clinical Endocrinology and Diabetes 127(8) 511-516.

**AIM:** to assess whether hospital doctors measure HbA1c in hospitalized patients and act consequently.

**METHOD:** Data from patients hospitalized between January 2013 and December 2014 in a Swiss teaching hospital was collected. We assessed the frequency of HbA1c measurements and the number of newly detected prediabetes or DM. We also examined whether HbA1c values were associated with the antidiabetic drugs prescription and reporting of DM in the discharge letter.

**RESULTS:** Of the 2618 patients studied, 298 (11.4%) had HbA1c measured, of whom 136 (45.6%) had no previous history of DM. Of the 136 patients without history of DM, 51 (37.5%) had prediabetic state and 23 (16.9%) had DM. Newly detected prediabetes or DM were reported in 5.8% (3/51) and 65.8% of cases (15/23), respectively. Only half of patients (11/23, 47.8%) with newly detected DM received antidiabetic drug treatment at discharge. Patients with newly detected DM (n=23) had a longer length of stay (median and interquartile range: 16 [9-25] versus 10 [8-16] days, p=0.028) compared to patients without DM, while no such differences were found regarding in-hospital mortality.

**CONCLUSION:** Hospital doctors seldom prescribe HbA1c measurement in medical hospitalized patients. Prescription of HbA1c measurement leads to a high detection rate (53%) of (pre)DM among patients unaware of their status, but management and reporting of these conditions at discharge could be further improved.

View [abstract](#)

Perini, W., Snijder, M. B., Agyemang, C., et al. 2019. **Eligibility for cardiovascular risk screening among different ethnic groups: The HELIUS study.** European Journal of Preventive Cardiology 2047487319866284.

AIM: to determine ethnic differences in the age to initiate cardiovascular risk screening, with and without implementation of ethnic-specific modification of estimated cardiovascular risk.

METHOD: We included 18,031 participants of Dutch, South-Asian Surinamese, African Surinamese, Ghanaian, Turkish and Moroccan background from the HELIUS study (Amsterdam). Eligibility for cardiovascular risk screening was defined as being eligible for blood pressure-lowering treatment, based on a combination of systolic blood pressure, estimated cardiovascular risk, and ethnic-specific conversion of estimated cardiovascular risk as recommended by European cardiovascular disease prevention guidelines. Age-specific proportions of eligibility were determined and compared between ethnic groups via logistic regression analyses.

RESULTS: Dutch men reached the specified threshold to initiate cardiovascular risk screening (according to Dutch guidelines) at an average age of 51.5 years. Among ethnic minority men, this age ranged from 39.8 to 52.4. Among Dutch women, the average age threshold was 53.4. Among ethnic minority women, this age ranged from 36.8 to 49.1. Age-adjusted odds of eligibility were significantly higher than in the Dutch among all subgroups, except among Moroccan men. Applying ethnic-specific conversion factors had minimal effect on the age to initiate screening in all subgroups.

CONCLUSION: Most ethnic minority groups become eligible for blood pressure-lowering treatment at a lower age and may therefore benefit from lower age-thresholds to initiate cardiovascular risk screening.

View [abstract](#)

Perini, W., Snijder, M. B., Peters, R. J., et al. 2019. **Estimation of cardiovascular risk based on total cholesterol versus total cholesterol/high-density lipoprotein within different ethnic groups: The HELIUS study.** European Journal of Preventive Cardiology.

AIM: to determine whether discrepancies in cardiovascular risk classification between two SCORE algorithms are more common in ethnic minority groups relative to the Dutch.

METHOD: Using HELIUS study data (Amsterdam, The Netherlands), we obtained data from 7572 participants without self-reported prior cardiovascular disease of Dutch, South-Asian Surinamese, African Surinamese, Ghanaian, Turkish and Moroccan ethnic origin. For both SCORE algorithms, cardiovascular risk was estimated and used to categorise participants as low (<1%), medium (1-5%), high (5-10%) or very high ( $\geq 10\%$ ) risk. Odds of differential cardiovascular risk classification were determined by logistic regression analyses.

RESULTS: The percentage of participants classified differently between the algorithms ranged from 8.7% to 12.4% among ethnic minority men versus 11.4% among Dutch men, and from 1.9% to 5.5% among ethnic minority women versus 6.2% among Dutch women. Relative to the Dutch, only Turkish and Moroccan women showed significantly different (lower) odds of differential cardiovascular risk classification.

CONCLUSION: We found no indication that discrepancies in cardiovascular risk classification between the two SCORE algorithms are consistently more common in ethnic minority groups than among ethnic majority groups.

View [abstract](#)

Reynolds, M. M. & Childers, T. B. 2019. **Cardiovascular Disease Screening Among Immigrants from Eight World Regions.** Journal of Immigrant & Minority Health 21(4) 820-829.

AIM: to expand knowledge of preventative-health screening differences by analyzing screening rates for blood sugar, blood pressure, and serum cholesterol among nine groups overall and (for immigrants) at various stages of US residency.

METHOD: We used nationally representative data from the National Health Interview Survey

RESULTS: We find that immigrants from eight geographic regions receive preventative care at lower rates than US-born Whites and that preventative screening is generally higher after 15 years than

during the first 4 years of residency in the United States. Importantly, our data also show that screening patterns and trends vary based on region of origin and outcome.

**CONCLUSION:** These findings improve our understanding of immigrant health and health care use in the United States.

View [abstract](#)

Rodriguez, L. A., Bradshaw, P. T., Shiboski, S., et al. 2019. **Are the American diabetes association screening guidelines appropriate for the racial/ethnically diverse u.s. population? Evidence from the multiethnic study of atherosclerosis.** Diabetes. Conference: 79th Scientific Sessions of the American Diabetes Association, ADA 68(Supplement 1).

**AIM:** to determine if current ADA guidelines that recommend screening adults with a BMI  $\geq 25$  (or  $\geq 23$  for Asian Americans) who have at least one risk factor (e.g., belonging to a race/ethnic minority group, hypertension, dyslipidemia, physical inactivity) for diabetes are appropriate.

**METHOD:** We used data from the Multi-Ethnic Study of Atherosclerosis (exams 1-5 every 1.5 to 3 years between 2002-2013). Incident cases of diabetes were defined as fasting glucose  $\geq 126$  mg/dL and/or use of any diabetes medication. We used multivariable Weibull regression adjusting for age, sex, education, diet, exercise, hypertension, and dyslipidemia to estimate the differential association between BMI and incident diabetes by race/ethnicity.

**RESULTS:** Among 4,541 MESA participants without prevalent diabetes, 1,860 were white, 539 Chinese American, 1,167 African American, and 975 Hispanic. In a median 9.1 years of follow-up, 557 new cases of diabetes occurred (166 in whites, 66 in Chinese Americans, 169 in African Americans, and 156 in Hispanics). Incidence rates were 11.4 (95% CI 9.8 to 13.2), 15.9 (12.5 to 20.3), 19.9 (17.1 to 23.1) and 22 (18.8 to 25.7) per 1,000 person-years among whites, Chinese Americans, African Americans and Hispanics, respectively. The race/ethnic-specific BMI for participants without any additional diabetes risk factors, compared to whites with a BMI of 25 and one or more diabetes risk factor was 29.2 in whites, 22.8 in Chinese Americans, 26.2 in African Americans and 25.4 in Hispanics.

**CONCLUSION:** Our findings show that the current American Diabetes Association diabetes screening guidelines are appropriate for the ethnically and racially diverse populations, and suggest that a higher BMI cut point, such as 29, may be appropriate for screening whites without other risk factors.

View [abstract](#)

Ross, M., Zhou, K., Perilli, A., et al. 2019. **Screening for Cardiovascular Disease Risk Factors in a Physical Therapist Wound Care Practice: A Retrospective, Observational Study.** Wound Management & Prevention 65(8) 20-28.

**AIM:** to assess the prevalence of cardiovascular risk factors in individuals seeking physical therapist services for an integumentary disorder in an outpatient wound care center.

**METHOD:** Using a retrospective, observational study design, records from patients who were screened upon initial evaluation by a physical therapist for cardiovascular risk according to the American College of Sports Medicine (ACSM) guidelines were abstracted. The screening process entailed assessment of current signs and symptoms of cardiovascular, pulmonary, or metabolic disease; an individual or family history of cardiovascular disease; whether the patient was considered obese; and whether the patient was a current smoker, had a sedentary lifestyle, dyslipidemia, elevated glucose, or blood pressure  $>140/90$  mm Hg. Patient demographics and wound history also were summarized and described, including wound type and duration and pain associated with the wound. Wounds then were classified by the physical therapist as either venous leg ulcers or nonvenous leg ulcers based upon the referring physician's diagnosis. Descriptive statistics and frequency distributions were calculated to assess the prevalence of individual cardiovascular risk factors, total number of cardiovascular risk factors, cardiovascular risk stratification, and patient disposition. Frequencies of individual cardiovascular risk factors, total number of cardiovascular risk factors, and cardiovascular risk stratification also were assessed between patients with venous leg

ulcers and nonvenous leg ulcers using chi-square tests for categorical data and t tests for continuous data. The alpha level was set at  $P < .05$ .

**RESULTS:** Among the 70 study participants (41 male, 29 female; mean age 63.5 +/- 15.1 years), 38 were treated for venous leg ulcers and 32 were treated for nonvenous leg ulcers. Overall, 38 patients (54%) had a history of cardiovascular disease and 29 (41%) had current signs and symptoms of cardiovascular disease. Patients with nonvenous leg ulcers had a significantly higher frequency of having a family history of cardiovascular disease than patients with venous leg ulcers (28% vs. 8%;  $P = .03$ ). According to the ACSM guidelines, 5 patients (7%) were considered low risk, 22 (31%) were moderate risk, and 43 (62%) were at high risk for experiencing a future cardiovascular event. Cardiovascular risk did not vary significantly according to wound type.

**CONCLUSION:** The patient risk-stratification profile in this study strongly suggested physical therapists should screen for cardiovascular risk factors before prescribing aerobic exercise or other physical activity for all patients being seen for an integumentary disorder in an outpatient wound care practice.

View [abstract](#)

Venkataramani, M. S. & Maruthur, N. 2019. **Social service touchpoints as opportunities to screen women at high risk for type 2 diabetes.** *Journal of General Internal Medicine* 34 (2 Supplement) S355.

**AIM:** to examine the proportion of mothers with gestational diabetes who accessed WIC or Head Start services who had not received recent diabetes screening.

**METHOD:** We analyzed data from the 2016 and 2017 National Health Interview Survey. Our analytic sample consisted of sample females ages 18 to 45, linked to at least one child (age 17 or younger). We excluded women with a diagnosis of diabetes or prediabetes. We analyzed 2 groups: 1) those who received WIC services/had a child who received WIC (in the past calendar year); and 2) those with a child currently enrolled in Head Start. In each group, we characterized the prevalence of self-reported gestational diabetes, and the proportion of these women who had diabetes testing in the past 3 years. As women may have reported testing associated with pregnancy, we conducted sensitivity analyses using a definition of recent screening that could exclude testing during pregnancy (e.g, within 2 years if the youngest child was 2).

**RESULTS:** A total of 6661 (29,628,017 weighted) women between the ages of 18 and 45 could be linked to a child; 90.8% (26,890,789 weighted) did not report a history of diabetes or prediabetes. Among these women, 16.2% (937 unweighted; 4,343,424 weighted) reported WIC receipt for either themselves or their child. 7.5% (456 unweighted; 2,016,894) had a child currently enrolled in Head Start. (2.5% reported both). Among women who had accessed WIC, 10.6% reported a history of gestational diabetes. 9.9% of these women did not report recent diabetes screening. 8.8% with a child in Head Start reported a history of gestational diabetes, and 8.2% of these women did not have testing within 3 years. In sensitivity analyses that could exclude recent pregnancy related testing, 35.0% (in WIC) and 21.2% (in Head Start) did not report recent screening.

**CONCLUSION:** About 1 in 12 women with a history of gestational diabetes and recent contact with WIC or Head Start had not been screened for diabetes in the past 3 years, and this proportion maybe 3 to 4-fold higher (if self-report included pregnancy-related testing). More precise estimates are difficult to ascertain due to limitations in pinpointing if testing occurred during pregnancy and the use of self-reported measure.

No online abstract

Zhang, M., Lin, L., Xu, X., et al. 2019. **Noninvasive screening tool to detect undiagnosed diabetes among young and middle-aged people in Chinese community.** *International Journal of Diabetes in Developing Countries* 39(3) 458-462.

**AIM:** to develop a noninvasive screening tool for diagnosing type 2 diabetes among young and middle-aged people in Chinese community.

**METHOD:** In total, 1432 participants without diabetes diagnosis were enrolled from Chinese communities. Diabetes was defined as fasting plasma glucose (FPG)  $\geq 126$  mg/dL ( $\geq 7.0$  mmol/L) or glycated hemoglobin (HbA1c)  $\geq 6.5\%$ . The noninvasive diabetes screening model score was developed using the coefficients of the final multivariable logistic regression model. Undiagnosed diabetes was detected using a receiver-operating characteristic curve and the area under the curve (AUC).

**RESULTS:** Of the 1432 participants, 142 (9.9%) were newly diagnosed with diabetes through FPG or HbA1c, 67 (4.7%) through FPG alone, and 121 (8.4%) through HbA1c alone. The noninvasive diabetes screening model was developed using significant risk factors, namely age, family history of diabetes, hypertension, waist circumference, body mass index, smoking, daily consumption of vegetables, and daily consumption of fruits. The cutoff score of 22.5 was the optimum to detect undiagnosed diabetes with an AUC of 0.758 (95% confidence interval 0.714-0.803), sensitivity of 83.1%, and specificity of 60.0%.

**CONCLUSION:** We developed a practical and effective noninvasive screening tool for detecting undiagnosed diabetes among young and middle-aged people in Chinese community.

View [abstract](#)

## Economic

Carl, P. W. & Kevin, F. E. 2019. **The cost-effectiveness of lipid lowering for primary cardiovascular prevention in chronic kidney disease: moving beyond statins.** *Kidney International* 96(1) 22.

**AIM:** to describe the importance of lipid lowering for primary cardiovascular prevention in chronic kidney disease patients

**METHOD:** A cost-effectiveness analysis.

**RESULTS:** Adding ezetimibe to high-dose statins for primary cardiovascular disease prevention in patients with non-dialysis-dependent chronic kidney disease found treatment with ezetimibe to be cost-effective for many patients with chronic kidney disease

View [abstract](#)

Dadwani, R., Skandari, M. R., Phillips, L., et al. 2019. **Comparing the national cost-effectiveness of alternative diabetes screening strategies.** *Journal of General Internal Medicine* 34 (2 Supplement) S171.

**AIM:** to assess the utility of fasting plasma glucose (FPG), glycated hemoglobin (HbA1c), oral glucose tolerance test (OGTT) or random plasma glucose (RPG) for diabetes screening

**METHOD:** Using a lifetime Markov Monte Carlo simulation model (US Type 2 Diabetes Policy Model), this study examined the cost-effectiveness of all 16 combinations of two of five possible tests [FPG ( $> 125$  mg/dl), HbA1c ( $> 6.4\%$ ), OGTT ( $> 199$  mg/dl), glucose challenge (GCT) ( $> 160$  mg/dl) and RPG ( $> 120$  mg/dl) values collected for clinical purposes besides diabetes screening (opportunistic screening)]. We estimated lifetime costs and quality adjusted life years (QALYs) for each combination of screening tests for a nationally-representative sample of U.S adults (National Health and Nutrition Examination Survey 2013-2014) at high risk of developing diabetes according to United States Preventative Services Task Force criteria.

**RESULTS:** There was no statistically significant difference in either lifetime costs or QALYs between any of the 16 screening strategies. Lifetime costs ranged from \$ 78,333 (FPG followed by HbA1c) to \$ 82,059 (RPG followed by GCT) per person screened. QALYs ranged from 19.6274 (OGTT followed by GCT) to 19.6287 (HbA1c followed by OGTT or FPG).

**CONCLUSION:** This study suggests that diabetes screening strategies that utilize opportunistic RPG values at a lower threshold ( $> 120$  mg/dl) than currently recommended by the ADA ( $> 200$  mg/dl and symptoms of hyper-glycemia) or the GCT may be comparable in effectiveness to current screening modalities.

No online abstract available

## Diagnostic studies

Kalidoss, R. & Umapathy, S. 2019. **A comparison of online and offline measurement of exhaled breath for diabetes pre-screening by graphene-based sensor; From powder processing to clinical monitoring prototype.** Journal of Breath Research 13 (3) (no pagination)(036008).

AIM:to (i) fabricate and validate graphene-based chemi-resistive sensors for selective and sensitive detection of acetone, (ii) perform offline breath analysis by a static gas sensing set-up to acquire olfactory signals, and (iii) develop an LED-based portable on/off binary e-nose system for pre-screening diabetes through online analysis. METHOD: The fabricated sensors showed selective detection for acetone with high sensitivity (5.66 for 1 ppm acetone vapor) and fast response and recovery times (10 s and 12 s) at low concentrations. The sensor responses of end tidal fractional breath (collected in Tedlar bags) in the fasting and postprandial conditions were compared with BG levels and glycated hemoglobin (HbA1c) levels taken at the same time in 30 volunteers (13 healthy and 17 diabetic subjects).

RESULTS: The mean sensor responses of the diabetic subjects as obtained by offline analysis were 1.1 times higher than those of the healthy subjects. The optimal regression equation framed with the significant correlating variables for HbA1c estimation achieved an accuracy of 66.67%. The online breath analysis by on/off binary prototype exhibited an accuracy of 60.51%.

CONCLUSION: Though there exists a minimal uncertainty in classification, the on/off type portable prototype is easy to operate, gives a quicker response with a refresh/recovery rate of 19 s and can be used for preliminary diagnosis, and can be used for preliminary diagnosis. This inexpensive sensor technology may revolutionize personalized medicine in the near future and greatly benefit the underprivileged.

View [abstract](#)

Koga, M., Okuda, M., Inada, S., et al. 2019. **HbA1c levels measured by enzymatic assay during off-site health checkups are lower than those measured by on-site HPLC assay.** Diabetology International.

AIM: to compare the HbA1c levels measured by an enzymatic assay (EA-HbA1c) off-site during health checkups with the HbA1c levels measured by on-site ion-exchange high-performance liquid chromatography (HPLC; HPLC-HbA1c) in a hospital.

METHOD: A total of 96 individuals (53 males and 43 females; age, 68.9 +/- 8.4 years old; 70 diabetic and 26 non-diabetic individuals) whose HbA1c levels were measured by both the methods listed above were included in the study. Since no HPLC-HbA1c levels were measured on the day of the health checkup, HPLC-HbA1c levels were estimated using HPLC-HbA1c levels measured before and after the health checkup.

RESULTS: A significant correlation of HbA1c levels was observed between the two groups ( $R = 0.973$ ;  $p < 0.001$ ). However, EA-HbA1c levels measured off-site during health checkups are lower than estimated HPLC-HbA1c levels measured on-site (6.37 +/- 0.75% vs. 6.69 +/- 0.75%;  $p < 0.001$ ).

CONCLUSION: Since lower EA-HbA1c levels measured during health checkups, which diverged from on-site measurements, may lead to underestimating diabetes mellitus, accurate measurement of HbA1c is required irrespective of the measuring method.

View [abstract](#)

Legvold, B. T., Staimez, L. R., Li, D., et al. 2019. **Use of random glucose followed by hba1c improves the accuracy of opportunistic screening.** Diabetes. Conference: 79th Scientific Sessions of the American Diabetes Association, ADA 68(Supplement 1).

AIM: to test if the use of glucose followed by HbA1c could improve the accuracy of diabetic screening.

METHOD: With the Screening for Impaired Glucose Tolerance (SIGT) study dataset of 1,573 adults without known diabetes, we used Receiver Operating Characteristic (ROC) analysis and OGTTs with ADA diagnostic criteria as a "standard" to evaluate screening; random plasma and capillary glucose (RPG and RCG) were measured on a separate day. Subjects were 58% female and 58% black, with mean age 47.9 year, BMI 30.3 kg/m<sup>2</sup> and HbA1c 5.4%.

**RESULTS:** Using OGTTs, 51.5% had normal glucose metabolism, 33.3% prediabetes (PreDM), 4.6% type 2 diabetes (DM), and 37.9% dysglycemia (PreDM or DM). For HbA1c to identify DM by ADA OGTT criteria, the ROC area 2 under the curve (AUC) was 0.818 in all 1573 subjects. However, using an RPG cutoff of 100 mg/dl, the ROC was increased to 0.857 in the 576 with RPG >100 mg/dl but only 0.603 in the 997 with RPG <100 mg/dl (both  $p < 0.001$  vs. all subjects). There was similar improvement in identification of DM in the 756 subjects with RCG >100 mg/dl (ROC 0.841,  $p < 0.001$ ), and parallel improvement in identification of dysglycemia (ROC 0.671 for all subjects, vs. 0.740 and 0.741 for those with RPG or RCG >110 mg/dl, respectively, both  $p < 0.001$ ). Results were similar with RCG in a separate dataset ( $n = 1,037$ ). For identification of DM among those with RPG >100 mg/dl in the SIGT dataset, specificity and sensitivity were 79% and 74%, respectively, for HbA1c >5.7%, 84% and 69%, for HbA1c >5.8%, and 90% and 64% for HbA1c >5.9%.

**CONCLUSION:** Use of random glucose followed by HbA1c improves the accuracy and efficiency of screening, identifying both individuals who should and should not have an OGTT.

View [abstract](#)

## Modelling studies

Alaa, A. M., Bolton, T., Di Angelantonio, E., et al. 2019. **Cardiovascular disease risk prediction using automated machine learning: A prospective study of 423,604 UK Biobank participants.** PLoS One 14(5) e0213653.

**AIM:** to test (1) whether ML techniques based on a state-of-the-art automated ML framework (AutoPrognosis) could improve CVD risk prediction compared to traditional approaches, and (2) whether considering non-traditional variables could increase the accuracy of CVD risk predictions.

**METHOD:** Using data on 423,604 participants without CVD at baseline in UK Biobank, we developed a ML-based model for predicting CVD risk based on 473 available variables. Our ML-based model was derived using AutoPrognosis, an algorithmic tool that automatically selects and tunes ensembles of ML modeling pipelines (comprising data imputation, feature processing, classification and calibration algorithms). We compared our model with a well-established risk prediction algorithm based on conventional CVD risk factors (Framingham score), a Cox proportional hazards (PH) model based on familiar risk factors (i.e. age, gender, smoking status, systolic blood pressure, history of diabetes, reception of treatments for hypertension and body mass index), and a Cox PH model based on all of the 473 available variables. Predictive performances were assessed using area under the receiver operating characteristic curve (AUC-ROC).

**RESULTS:** Overall, our AutoPrognosis model improved risk prediction (AUC-ROC: 0.774, 95% CI: 0.768-0.780) compared to Framingham score (AUC-ROC: 0.724, 95% CI: 0.720-0.728,  $p < 0.001$ ), Cox PH model with conventional risk factors (AUC-ROC: 0.734, 95% CI: 0.729-0.739,  $p < 0.001$ ), and Cox PH model with all UK Biobank variables (AUC-ROC: 0.758, 95% CI: 0.753-0.763,  $p < 0.001$ ). Out of 4,801 CVD cases recorded within 5 years of baseline, AutoPrognosis was able to correctly predict 368 more cases compared to the Framingham score. Our AutoPrognosis model included predictors that are not usually considered in existing risk prediction models, such as the individuals' usual walking pace and their self-reported overall health rating. Furthermore, our model improved risk prediction in potentially relevant sub-populations, such as in individuals with history of diabetes. We also highlight the relative benefits accrued from including more information into a predictive model (information gain) as compared to the benefits of using more complex models (modeling gain).

**CONCLUSION:** Our AutoPrognosis model improves the accuracy of CVD risk prediction in the UK Biobank population. This approach performs well in traditionally poorly served patient subgroups. Additionally, AutoPrognosis uncovered novel predictors for CVD disease that may now be tested in prospective studies. We found that the "information gain" achieved by considering more risk factors in the predictive model was significantly higher than the "modeling gain" achieved by adopting complex predictive models.

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Yebyo, H. G., Aschmann, H. E., Menges, D., et al. 2019. **Net benefit of statins for primary prevention of cardiovascular disease in people 75 years or older: a benefit-harm balance modeling study.** Therapeutic Advances in Chronic Disease 10(no pagination).

AIM: to determine the risk thresholds above which statin use would be more likely to provide a net benefit for people over the age of 75 years without history of cardiovascular disease (CVD).

METHOD: An exponential model was used to estimate the differences in expected benefit and harms in people treated with statins over a 10-year horizon versus not treated. The analysis was repeated 100,000 times to consider the statistical uncertainty and produce a distribution of the benefit-harm balance index from which we determined the 10-year CVD risk threshold where benefits outweighed the harms. We considered treatment estimates from trials and observational studies, baseline risks, patient preferences, and competing risks of non-CVD death, and statistical uncertainty.

RESULTS: Based on average preferences, statins were more likely to provide a net benefit at a 10-year CVD risk of 24% and 25% for men aged 75-79 years and 80-84 years, respectively, and 21% for women in both age groups. However, these thresholds varied significantly depending on differences in individual patient preferences for the statin-related outcomes, with interquartile ranges of 21-33% and 23-36% for men aged 75-79 years and 80-84 years, respectively, as well as 20-32% and 21-32% for women aged 75-79 years and 80-84 years, respectively.

CONCLUSION: Statins would more likely provide a net benefit for primary prevention in older people taking the average preferences if their CVD risk is well above 20%.

View [full text](#)

### Ongoing research

Cuijpers, C., Lucassen, W. & Becker, R. 2019. **The role of aspirin in primary prevention of cardiovascular disease: a systematic review and meta-analysis.** PROSPERO.

AIM: to study whether aspirin for primary prevention leads to improved cardiovascular outcomes and outweighs the risk of bleeding

View [full record](#)

Jahangiri, R., Rezapour, A. & Olyaeemanesh, A. 2019. **A systematic review of economic evaluation studies of polypills (fixed-dose combinations) in primary and secondary prevention of cardiovascular diseases.** PROSPERO.

AIM: to find out if the use of polypills (fixed-dose combinations) is cost-effective or cost beneficial compared to usual care in the primary and secondary prevention of cardiovascular diseases

View [full record](#)

Kunutsor, S., Seidu, S. & Khunti, K. 2019. **Aspirin for primary prevention of cardiovascular outcomes in diabetes: an updated literature-based and individual participant data meta-analysis of randomised controlled trials.** PROSPERO.

AIM: to review the benefits and harms of aspirin for the prevention of cardiovascular disease and all-cause mortality events in patients with diabetes

View [full record](#)

Lindholt, J. 2019. **Danish Cardiovascular Screening Trial II.**

AIM: In the investigators first unique CVD screening RCT (2008-11), the VIVA trial, more than 50.000 65-74 year old men were randomised for population-based ultrasound screening for abdominal aortic aneurysm (AAA), peripheral arterial disease (PAD) and hypertension. A second trial (DANCAVAS) initiated was initiated in 2014 randomizing 45.000 65-74 year old men with the potential of a huge beneficial effect on health, quality of life (QoL) and survival. However, screening is impaired by lower social class, and adherence to initiated prevention could be impacted as well. Consequently, we want to conduct a third RCT (FISICH) to test a number of add-ons to screening that potentially balance the benefits across socio economic groups

View [full record](#)

Missud, D. C., Parot-Schinkel, E., Connan, L., et al. 2019. **Physical activity prescription for general practice patients with cardiovascular risk factors-the PEPPER randomised controlled trial protocol.** BMC Public Health 19(1) 688.

AIM: to demonstrate efficacy and practicality in the promotion of physical exercise in the prevention of cardiovascular diseases in patients with hypertension, dyslipidaemia or diabetes.

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Saadi, A., Parekh, J. & Jhand, A. 2019. **The effect of aspirin on the primary prevention of cardiovascular outcomes: a systematic review and meta-analysis.** PROSPERO.

AIM: Question 1: In patients without known coronary artery or other forms of atherosclerotic disease, does primary prevention therapy with aspirin as compared to placebo improve cardiovascular outcomes ( all-cause mortality, myocardial infarction, all-cause cardiovascular events and stroke)?

Question 2: In patients without known coronary artery or other forms of atherosclerotic vascular disease, does primary prevention therapy with aspirin as compared to placebo, increase bleeding outcomes ( GI bleeding and intracranial bleeding)?

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Zhao, B. & Ma, W. 2019. **Aspirin for primary prevention of cardiovascular events, pros and cons: a proof-based, real-world conditions, systematic review and meta-analysis of trial sequential analysis.** PROSPERO.

AIM: to address the issue of aspirin use in cardiovascular disease (CVD) for primary prevention, with quantitative methods and discuss whether aspirin should be recommended as a common drug for primary prevention.

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