



Public Health
England

Protecting and improving the nation's health

NHS Health Check programme: Annotated Bibliography: November 1st 2017 – March 15th 2018

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

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Published March 2018

PHE publications gateway number:

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Acknowledgements

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

A review of NHS Health Check literature

1. Introduction

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

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

Previous searches had identified references from between January 1996 and November 7th 2017. This search identifies references from **November 1st 2017 - March 15th 2018**. The cut-off date for internet searches was **March 20th 2018**.

Table 1. Search strategies

Database	Search strategy
Ovid Medline	<ol style="list-style-type: none"> 1. health check*.tw. 2. (diabetes adj3 screen*).tw. 3. (cardiovascular adj3 screen*).tw. 4. (population adj2 screen*).tw. 5. (risk factor adj3 screen*).tw. 6. (opportunistic adj3 screen*).tw. 7. medical check*.tw. 8. general check*.tw. 9. periodic health exam*.tw. 10. annual exam*.tw. 11. annual review*.tw. 12. NHSHC.tw. 13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 14. cardiovascular adj3 prevention.tw. 15. (primary care or general practice or primary healthcare).tw 16. 14 and 15 17. Cardiovascular Diseases/ AND Primary Prevention/ 18. 16 or 17 19. 13 or 18 20. (2017 11* or "2018*").dt. 21. 19 and 20.
PubMed	<ol style="list-style-type: none"> 1. health check* 2. diabetes screen* 3. cardiovascular screen* 4. population screen* 5. risk factor screen* 6. opportunistic screen* 7. medical check* 8. general check* 9. periodic health exam* 10. annual exam* 11. annual review* 12. NHSHC 13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 14. Cardiovascular Diseases AND Primary Prevention[MeSH Terms] 15. "primary care"[Text Word] OR "general practice"[Text Word] OR "primary healthcare"[Text Word]) 16. (cardiovascular[Text Word] AND prevention[Text Word]) 17. #15 and #16 18. #14 or #17 19. #13 or #18 Filters: Publication date from 2017/11/01 to 2018/03/15

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=20171101-20180315

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="2017-2018"

- EBSCO CINAHL S10 S1 OR S2 OR S9 Limiters - Published Date: 20171101-20180315
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: 2017-2018
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
limit 20 to yr="2017-2018"

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 NNSHC #3 cardiovascular adj3 prevention.tw. #4 (primary care or general practice or primary healthcare).tw #5 #3 and #4 #6 MeSH descriptor: [Cardiovascular Diseases] this term only #7 MeSH descriptor: [Primary Prevention] explode all trees #8 #6 and #7 #9 #5 or #8 #10 #1 or #2 or #9 Publication Year from 2017 to 2018
NHS Evidence	<i>"health check" OR cardiovascular prevention primary</i> Limited to 01/11/2017 to 15/03/2018
TRIP database	<i>"health check*" OR cardiovascular prevention primary</i> Since 2017
Google Scholar	<i>"nhs health check"</i> <i>cardiovascular "health check"</i> <i>cardiovascular prevention primary care</i> <i>nhs health check program</i> Since 2017, 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 01/11/2017 - 20/03/2018
Clinical trials.gov and ISRCTN registry	<i>"health check"</i> , Limited to 01/11/2017 - 20/03/2018

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 November 1st 2017 and March 15th 2018

Database	No. of hits	Exclusive (non duplicates)
Ovid Medline (Nov 1st 2017 – March 15 th 2018)	581	578
PubMed (Nov 1st 2017 – March 15 th 2018)	597	244
Ovid Embase (Nov 1st 2017 – March 15 th 2018)	664	572
Ovid HMIC (up to latest edition January 2018)	48	41
EBSCO CINAHL (Nov 1st 2017 – March 15 th 2018)	295	244
EBSCO Global Health (Nov 1 2017–March 15 2018)	601	563
Ovid PsycInfo (Nov 1st 2017 – March 15 th 2018)	408	358
Cochrane Library (March 15 th 2018)	234	169
NICE Evidence (March 15 th 2018)	404	389
TRIP database (March 15 th 2018)	566	429
TOTAL		3587

Table 2a. Citations added to internet sources between Nov 1st 2017 and March 20th 2018

Internet sources	No. of hits
Google Scholar (March 20 th 2018)	111*
Google (March 20 th 2018)	318*
Trials registers (March 20 th 2018)	2
TOTAL	431

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

From these results, 7 were identified as being relevant to the NHS Health Check programme, 6 to general health checks and 93 to diabetes/cardiovascular disease risk screening or prevention.

Total relevant references = 106

- **NHS Health Checks = 7**
- **general health checks = 6**
- **diabetes/cardiovascular disease screening or prevention = 93**

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

Guidance

Public Health England 2018. **Using the world leading NHS Health Check programme to prevent CVD** (January 24th).

AIM: this edition of Health Matters explores how the NHS Health Check is playing an important role in the prevention and early detection of cardiovascular disease (CVD) in England; it examines options for increasing the coverage and uptake of evidenced based interventions following the NHS Health check

METHODS: summary of evidence and data about NHS Health Checks programme

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See related: Public Health England 2018. **Health Matters: NHS Health Check - A world leading CVD prevention programme**. View [full text](#)

See related: Public Health England 2018. **NHS Health Check: stocktake and action plan** (January). View [full text](#)

Systematic reviews

Harte, E., MacLure, C., Martin, A., et al. 2018. **Reasons why people do not attend NHS Health Checks: a systematic review and qualitative synthesis**. *Br J Gen Pract* 68(666) e28-e35.

AIM: to review why people do not attend NHS Health Checks.

METHODS: A systematic review and thematic synthesis of qualitative studies. An electronic literature search was carried out from 1 January 1996 to 9 November 2016, and the reference lists of all included papers were also screened manually. Inclusion criteria were primary research studies that reported the views of people who were eligible for but had not attended an NHS Health Check.

RESULTS: Nine studies met the inclusion criteria. They highlighted three groups of individuals: those who were unaware of the NHS Health Checks programme; those who were aware of the programme but did not appreciate the preventive nature; and those who recognised the preventive nature but actively chose not to engage. There is also evidence of practical barriers to attendance, such as time constraints, competing priorities among those with work and carer obligations, perceived or actual difficulties making an appointment, wishing to avoid the GP, or concerns about the pharmacist's role in conducting NHS Health Checks

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Mills, K., Harte, E., Martin, A., et al. 2017. **Views of commissioners, managers and healthcare professionals on the NHS Health Check programme: a systematic review**. *BMJ Open* 7(11) e018606.

AIM: to synthesise data concerning the views of commissioners, managers and healthcare professionals towards the NHS Health Check programme in general and the challenges faced when implementing it in practice.

METHODS: a systematic review of surveys and interview studies with a descriptive analysis of quantitative data and thematic synthesis of qualitative data. An electronic literature search of over 10 databases from 1 January 1996 to 9 November 2016 with no language restriction and manual screening of reference lists of all included papers.

RESULTS: of 18,524 citations, 15 articles met the inclusion criteria. There was evidence from both quantitative and qualitative studies that some commissioners and general practice healthcare professionals were enthusiastic about the programme, whereas others raised concerns around inequality of uptake, the evidence base and cost-effectiveness. In contrast, those working in pharmacies were all positive about programme benefits, citing opportunities for their business and staff. The main challenges to implementation were: difficulties with information technology and computer software, resistance to the programme from some GPs, the impact on workload and staffing, funding and training needs. Inadequate privacy was also a challenge in pharmacy and community settings, along with difficulty recruiting people eligible for Health Checks and poor public access to some venues.

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Modelling studies

Mytton, O. T., Jackson, C., Steinacher, A., et al. 2018. **The current and potential health benefits of the National Health Service Health Check cardiovascular disease prevention programme in England: A microsimulation study.** *PLoS Medicine / Public Library of Science* 15(3) e1002517.

AIM: to estimate the health benefits and effect on inequalities of the current NHS Health Check programme and the impact of making feasible changes to its implementation.

METHODS: a microsimulation model was developed to estimate the health benefits (incident ischaemic heart disease, stroke, dementia, and lung cancer) of the NHS Health Check programme in England. We simulated a population of adults in England aged 40-45 years and followed until age 100 years, using data from the Health Survey of England (2009-2012) and the English Longitudinal Study of Aging (1998-2012), to simulate changes in risk factors for simulated individuals over time. We used recent programme data to describe uptake of NHS Health Checks and of 4 associated interventions (statin medication, antihypertensive medication, smoking cessation, and weight management). We estimated the benefits of the current NHS Health Check programme compared to a healthcare system without systematic health checks. This counterfactual scenario models the detection and treatment of risk factors that occur within 'routine' primary care. We also explored the impact of making feasible changes to implementation of the programme concerning eligibility, uptake of NHS Health Checks, and uptake of treatments offered through the programme.

RESULTS: We estimate that the NHS Health Check programme prevents 390 (95% credible interval 290 to 500) premature deaths before 80 years of age and results in an additional 1,370 (95% credible interval 1,100 to 1,690) people being free of disease (ischaemic heart disease, stroke, dementia, and lung cancer) at age 80 years per million people aged 40-45 years at baseline. Over the life of the cohort (i.e., followed from 40-45 years to 100 years), the changes result in an additional 10,000 (95% credible interval 8,200 to 13,000) quality-adjusted life years (QALYs) and an additional 9,000 (6,900 to 11,300) years of life. This equates to approximately 300 fewer premature deaths and 1,000 more people living free of these diseases each year in England. We estimate that the current programme is increasing QALYs by 3.8 days (95% credible interval 3.0-4.7) per head of population and increasing survival by 3.3 days (2.5-4.1) per head of population over the 60 years of follow-up. The current programme has a greater absolute impact on health for those living in the most deprived areas compared to those living in the least deprived areas (4.4 [2.7-6.5] days of additional quality-adjusted life per head of population versus 2.8 [1.7-4.0] days; 5.1 [3.4-7.1] additional days lived per head of population versus 3.3 [2.1-4.5] days). Making feasible changes to the delivery of the existing programme could result in a sizable increase in the benefit. For example, a strategy that combines extending eligibility to those with preexisting hypertension, extending the upper age of eligibility to 79 years, increasing uptake of health checks by 30%, and increasing treatment rates 2.5-fold amongst eligible patients (i.e., 'maximum potential' scenario) results in at least a 3-fold increase in benefits compared to the current programme (1,360 premature deaths versus 390; 5,100 people free of 1 of the 4 diseases versus 1,370; 37,000 additional QALYs versus 10,000; 33,000 additional years of life versus 9,000).

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Daisuke, I., Toki, S. & Hiroshi, O. 2017. **Impact of predicting health-guidance candidates using massive health check-up data: A data-driven analysis.** *International journal of medical informatics* 106 32.

AIM: to present a model for predicting whether an examinee is a candidate for health guidance

METHODS: Using machine learning methods, we developed the following five prediction models for identifying health-guidance candidates: baseline: this model included sex and age; model 1: this model included variables that can be measured in person+information on whether the examinee was a candidate in the past year; model 2: model 1+systolic blood pressure+diastolic blood pressure; model 3: model 2+all health checkup results from the past year; and model 4: model 3 using the training dataset excluding cases with missing data.

RESULTS: The performance levels of the five prediction models (the AUC values of the models for the test dataset) were as follows: 0.592 [95% CI: 0.586-0.596] for the baseline model, 0.855 [95% CI: 0.851-0.858] for model 1, 0.985 [95% CI: 0.984-0.985] for model 2, 0.993 [95% CI: 0.993-0.993] for model 3, and 0.943 [95% CI: 0.941-0.945] for model 4. The model that used all health checkup results from the past year had the highest predictive power.

View [abstract](#)

Economic evaluation

Collins, B., Kypridemos, C., Parvulescu, P., et al. 2017. **Distributive equity in the real world: would targeting the National Health Service Health Check programme to deprived groups be more cost effective?** *The Lancet* 390 S34.

AIM: to model the cost-effectiveness and distributive equity impact of the NHS Health Check Programme using real-world data from Liverpool, a deprived city in the UK with high incidence of cardiovascular disease.

METHODS: a dynamic, stochastic microsimulation model was built. Outcomes included stroke and coronary heart disease prevalence, mortality, quality-adjusted life-years (QALYs), and health and social care costs. Annualised costs and QALYs were derived from a range of sources from year 2000–11 on the basis of a pragmatic review of previous models. We compared three scenarios against a no health checks baseline scenario: current HC implementation; HC with increased rates of attendances, prescribing, and lifestyle advice; and HC targeted to the most deprived quintile of the population. The changes happened from 2017, and we measured the time until each scenario became cost effective.

RESULTS: Each scenario modelled a population of 258 000 people aged 30–84 years. Scenarios did not become cost effective until after 2030. The overall cumulative incremental cost-effectiveness ratio per QALY compared with no Health Checks over the 30 years from 2011 to 2040 was about £17 600 for the current scenario, £13 000 for the increased scenario, and £3000 for the targeted scenario. In a probabilistic sensitivity analysis, the 95% uncertainty intervals for each scenario crossed over from being dominant to dominated, indicating uncertain cost-effectiveness. Health inequalities would increase under the current scenario but would decrease under the targeted scenario. The equity gradient of the increased scenario changed from 0.19 to –0.05 when health production costs were adjusted for deprivation.

View [abstract](#)

Note: previously reported as a conference abstract in Sept 2017

Ongoing research

Martin, A., Saunders, C., Harte, E., et al. 2018. **Delivery and impact of the NHS Health Check in the first eight years: a systematic review.** *British Journal of General Practice*. (In Press).

AIM: to review quantitative evidence on coverage (the proportion of eligible individuals who attend), uptake (proportion of invitees who attend) and impact of NHS Health Checks.

METHODS: a systematic review and quantitative data synthesis.: Eleven databases and additional internet sources were searched to November 2016.

RESULTS: 26 observational studies and one additional dataset were included. Since 2013, 45.6% of eligible individuals have received a health check. Coverage is higher among older people, those with a family history of coronary heart disease, those living in the most deprived areas, and some ethnic-minority groups. Just under half (48.2%) of those invited have taken up the invitation. Data on uptake and impact (especially regarding health-related behaviours) are limited. Uptake is higher in older people and women but lower in those living in the most deprived areas. Attendance is associated with small increases in disease detection, decreases in modelled CVD risk and increased statin and anti-hypertensive prescribing.

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References relating to general health checks (6)

Trials

Hoj, K., Vinther Skriver, M., Terkildsen Maindal, H., et al. 2018. **The effect of cardiorespiratory fitness assessment in preventive health checks: a randomised controlled trial.** *Eur J Public Health* 28(1) 173-179.
AIM: to investigate the effect of cardiorespiratory fitness (CRF) assessment on CRF in a preventive health check programme.
METHODS: a randomised design, in which we invited 4153 middle-aged adults and included 2201 participants who received a preventive health check with CRF assessment (intervention) or without CRF assessment (control). After 1 year, participants were examined. The primary outcomes were adjusted absolute (l/min), relative (ml/kg/min), and poor (%) CRF assessed by the Astrand-Ryhming test. We adjusted for baseline physical activity and intra-cluster correlation within general practices.
RESULTS: A total of 901 attended the 1-year follow-up. In the intervention group, absolute CRF, relative CRF, and poor CRF were 2.7 l/min (95% confidence interval [CI]: 2.6; 2.8), 34.5 ml/kg/min (95% CI: 33.5; 35.4), and 31.0% (95% CI: 26.8; 35.2). In the control group, the corresponding figures were 2.8 l/min (95% CI: 2.7; 2.9), 35.2 ml/kg/min (95% CI: 34.2; 36.1), and 25.9% (95% CI: 21.8; 30.0). Adjusted absolute CRF was lower in the intervention group (-0.1 l/min [95% CI: -0.2; -0.01]). Adjusted relative CRF (-0.7 ml/kg/min [95% CI: -2.0; 0.6]) and poor CRF (5.0% [95% CI: -0.002; 10.1]) did not differ between groups. No differences were found when adjusting for potential confounding factors.
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Cohort studies

Geyti, C., Maindal, H. T., Dalsgaard, E. M., et al. 2018. **Mental health assessment in health checks of participants aged 30-49 years: A large-scale cohort study.** *Preventive Medicine Reports* 9 72-79.
AIM: to describe the level of poor MH among health check participants, explore the potential for early intervention, and the potential for reducing social inequality in MH.
METHODS: the study was based on 9767 randomly selected citizens aged 30-49 years invited to a health check in Denmark in 2012-14. A total of 4871 (50%) were included; 49% were men. Poor MH was defined as a mental component summary score of ≤ 35.76 in the SF-12 Health Survey. Data was obtained from national health registers and health check.
RESULTS: Participants with poor MH (9%) were more socioeconomic disadvantaged and had poorer health than those with better MH. Two thirds of men (64%) and half of women (50%) with poor MH had not received MH care one year before the health check. Among those with (presumably) unrecognized MH problems, the proportion of participants with disadvantaged socioeconomic characteristics was high (43-55%). Four out of five of those with apparently unacknowledged poor MH had seen their GP only once or not at all during the one year before the health check.
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Hiratsuka, Y., Tamaki, Y., Okamoto, E., et al. 2017. **Relationships between medical expenditures and the Specific Health Checkups scheme in Japan: a study of outpatient medical expenditures and questionnaire responses concerning lifestyle that form part of the Specific Health Checkups scheme in Japan.** *Journal of the National Institute of Public Health* 66(1) 75-84.
AIM: to investigate long-term relationships between outpatient medical expenditures and questionnaire responses concerning lifestyle that form part of the Specific Health Checkups scheme, accumulated during a 5 year period.
METHODS: A cumulative total of 43,740 recipients of Specific Health Checkups (representing 14,848 unique individuals) collected between 2008 and 2012, in Mishima City in Shizuoka Prefecture, Japan were included in this study. The average age was 65.3 ± 7.8 of which 60% were female. Questionnaire responses concerning lifestyle forming part of the Specific Health Checkups scheme, along with health insurance claims data accumulated over 5 years were used. Long-term relationships between outpatient medical expenditures and patient's lifestyle were analyzed using panel data analysis.
RESULTS: medication of low blood pressure, blood glucose or cholesterol levels, a history of stroke or heart

disease along with weight change (gain or loss of ≥ 3 kg) exhibit a relationship with increases in outpatient medical expenditures. Lifestyle factors such as physical activities, fast walking and good sleep patterns each displayed relationships with reductions in outpatient medical expenditures.

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Iseki, K., Asahi, K., Yamagata, K., et al. 2017. **Mortality risk among screened subjects of the specific health check and guidance program in Japan 2008-2012.** *Clin Exp Nephrol* 21(6) 978-985.

AIM: to examine the relationship between the baseline characteristics and mortality for participants undergoing the Specific Health Check and Guidance (Tokutei-Kenshin) in Japan

METHODS: subjects were those who participated at the 2008 Tokutei-Kenshin in six districts with baseline data of serum creatinine. Using National database of death certificate from 2008 to 2012, we identified those who might have died and confirmed further with the collaborations of the regional National Health Insurance agency and public health nurses. Causes of death were classified by ICD-10.

RESULTS: Among the total of 295,297 subjects, we identified 3764 fatal cases by end of 2012. The median BMI was 23.8 kg/m² in men and 22.5 kg/m² in women, respectively. Proteinuria, dipstick 1+ and over, was positive in 5.3%. The median eGFR was 73.8 ml/min/1.73 m² among those with data available in 81% of the total cohort (N = 239,274). The leading cause of death was neoplasm in both genders. It was 51.6% of the total, 50.4% in men and 53.7% in women. The second cause of death was circulatory; 20.4% of the total, 21.1% in men and 19.2% in women

Weng, S. F., Reys, J., Kai, J., et al. 2017. **Can machine-learning improve cardiovascular risk prediction using routine clinical data?** *PLOS ONE* 12(4) e0174944.

AIM: to assess whether machine-learning can improve cardiovascular risk prediction

METHODS: Prospective cohort study using routine clinical data of 378,256 patients from UK family practices, free from cardiovascular disease at outset. Four machine-learning algorithms (random forest, logistic regression, gradient boosting machines, neural networks) were compared to an established algorithm (American College of Cardiology guidelines) to predict first cardiovascular event over 10-years. Predictive accuracy was assessed by area under the 'receiver operating curve' (AUC); and sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) to predict 7.5% cardiovascular risk (threshold for initiating statins).

RESULTS: 24,970 incident cardiovascular events (6.6%) occurred. Compared to the established risk prediction algorithm (AUC 0.728, 95% CI 0.723–0.735), machine-learning algorithms improved prediction: random forest +1.7% (AUC 0.745, 95% CI 0.739–0.750), logistic regression +3.2% (AUC 0.760, 95% CI 0.755–0.766), gradient boosting +3.3% (AUC 0.761, 95% CI 0.755–0.766), neural networks +3.6% (AUC 0.764, 95% CI 0.759–0.769). The highest achieving (neural networks) algorithm predicted 4,998/7,404 cases (sensitivity 67.5%, PPV 18.4%) and 53,458/75,585 non-cases (specificity 70.7%, NPV 95.7%), correctly predicting 355 (+7.6%) more patients who developed cardiovascular disease compared to the established algorithm.

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Qualitative

Macdonald, S., Morrison, J., Melville, C. A., et al. 2018. **Embedding routine health checks for adults with intellectual disabilities in primary care: practice nurse perceptions.** *Journal of Intellectual Disability Research* 62(4) 349-357.

AIM: to explore practice nurse perceptions and experience of delivering an anticipatory health check for adults with IDs.

METHODS: Qualitative study in General Practices located in NHS Greater Glasgow and Clyde, Scotland, UK. Eleven practice nurses from 11 intervention practices participated in a semi-structured interview. Analysis was guided by a framework approach.

RESULTS: Practice nurses reported initially feeling 'swamped' and 'baffled' by the prospect of the intervention, but early misgivings were not realised. Health checks were incorporated into daily routines with relative ease, but this was largely contingent on existing patient engagement. The intervention was thought most successful with patients already well known to the practice. Chronic disease management models are commonly used by practice nurses and participants tailored health checks to existing practice. It emerged that few of the nurses utilised the breadth of the check instead modifying the check to respond to individual patients' needs. As such, already recognised 'problems' or issues dominated the health check process. Engaging with the health checks in this way appeared to increase the acceptability and feasibility of the check for nurses. There was universal support for the health check ethos, although some questioned whether all adults with IDs would access the health checks, and as a consequence, the long-term benefits of checks.

[View abstract](#)

References relating to diabetes and cardiovascular disease risk screening or prevention (93)

Guidance

Piepoli, M. F., Hoes, A. W., Brotons, C., et al. 2018. **Main messages for primary care from the 2016 European Guidelines on cardiovascular disease prevention in clinical practice.** *European J of General Practice* 24(1)51-56. AIM: to outline the 'to do' and 'not to do' messages from the European Guidelines on CVD prevention for primary care

METHODS: recommendations for primary care based on a 2016 guideline

RESULTS: a lifetime approach to cardiovascular risk is underscored, since both risk and prevention are dynamic and continuous as patients' age and/or accumulate co-morbidities. A great emphasis is placed on a population-based approach, on disease-specific interventions and specific subgroups deemed at increased risk such young and older individuals, women, ethnic minorities.

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See related: Marchal, S., Van't Hof, A. W. J. & Hollander, M. 2018. **The new European guideline on cardiovascular disease prevention; how to make progress in general practice?** *European Journal of General Practice* 24(1) 57-59. View [full text](#)

Public Health England 2018. **Tackling high blood pressure: an update.** *Public Health England.*

AIM: this updated action plan aims to outline the key commitments of the Blood Pressure System Leadership Board and their partners to tackling high blood pressure

METHODS: this action plan has been updated to outline the collective ambition for the next 3 years and to inspire new partners to join this collaborative action by signposting and supporting professional groups to the most up to date resources. This document will also provide detail of key highlights of progress that have been made by the Board and their partners since the last publication. A wide range of partners have contributed to updating this action plan by identifying commitments that they will seek to achieve over the next 3 years

RESULTS: notable achievements and future commitments are outlined. Local Authorities, General Practices, Pharmacists and Community settings all have a role in tackling high blood pressure. Also outlined are key roles and activities that different groups are encouraged to take up, based on evidence and the experience of those who developed this plan

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Vinther, J. L., Jacobsen, R. K. & Jorgensen, T. 2018. **Current European guidelines for management of cardiovascular disease: Is medical treatment in nearly half a population realistic?** *European Journal of Preventive Cardiology* 25(2) 157-163.

AIM: to determine if the current clinical guidelines from the European Society of Cardiology (ESC) are suitable for screening the general population for cardiovascular diseases

METHODS: a cross-sectional, population-based study of 978 men and women aged 40-65 years examined in 2010-2011 was used to estimate the proportion of the general Danish population fulfilling the criteria from the clinical guidelines from the ESC on medical treatment and lifestyle intervention to prevent cardiovascular disease. The ESC criteria for medical treatment and lifestyle intervention were applied to a general population using information on previous cardiovascular diseases, known diabetes, urinalbumin, smoking, total cholesterol, systolic and diabolic blood pressure, low-density lipoprotein cholesterol and a multifactor risk score (SCORE).

RESULTS: A total of 12.5% fulfilled the criteria for immediate medical treatment to prevent cardiovascular diseases. Furthermore, 30.4% are recommended for medical treatment if an initial lifestyle intervention fails summing to 42.9% eligible for medical treatment. The majority (79%) of persons aged 60-65 years are eligible for medical treatment, while close to half (44.9%) of all persons aged 50-59 years are recommended for medical treatment. If ESC's guidelines were followed in Denmark, a conservative estimate shows that medical preventive treatment would involve nearly half the general population aged 40-65 years.

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Martin BÄdtker, M., BÄrge, G. N., Shoaib, A., et al. 2017. **ACC/AHA guidelines superior to ESC/EAS guidelines for primary prevention with statins in non-diabetic Europeans: the Copenhagen General Population Study.** *European Heart Journal* 38(8) 586.

AIM: to compare the 2013 American College of Cardiology/American Heart Association (ACC/AHA) and the 2016 European Society of Cardiology/European Atherosclerosis Society (ESC/EAS) guidelines on prevention of atherosclerotic cardiovascular disease (ASCVD) using different risk prediction models [US Pooled Cohort Equations (US-PCE for any ASCVD) and European Systematic COronary Risk Evaluation system (European-SCORE for fatal ASCVD)] and different statin eligibility criteria.

METHODS: examined 44,889 individuals aged 40-75 recruited in 2003-09 in the Copenhagen General Population Study, all free of ASCVD, diabetes, and statin use at baseline.

RESULTS: we detected 2217 any ASCVD events and 199 fatal ASCVD events through 2014. The predicted-to-observed event ratio was 1.2 using US-PCE for any ASCVD and 5.0 using European-SCORE for fatal ASCVD. The US-PCE, but not the European-SCORE, was well-calibrated around decision thresholds for statin therapy. For a Class I recommendation, 42% of individuals qualified for statins using the ACC/AHA guidelines vs. 6% with the ESC/EAS guidelines. Using ACC/AHA- vs. ESC/EAS-defined statin eligibility led to a substantial gain in sensitivity (+62% for any ASCVD and +76% for fatal ASCVD) with a smaller loss in specificity (-35% for any ASCVD and -36% for fatal ASCVD). The ACC/AHA guidelines were superior to the ESC/EAS guidelines for primary prevention of ASCVD, that is, for accurately assigning statin therapy to those who would benefit.

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Evidence summaries

NICE 2018. **Medicines Evidence Commentary : Primary prevention of cardiovascular disease: study finds that statins were often initiated with no knowledge of the person's risk.** *National Institute for Health and Care Excellence (NICE)*. January.

AIM: Medicines evidence commentaries help contextualise important new evidence, highlighting areas that could signal a change in clinical practice.

METHODS: a study used the THIN database to look at the pattern of cardiovascular risk estimation and statin initiation for primary prevention in 248 general practices in England and Wales (2012–2015).

RESULTS: only 11% of people suitable for risk estimation had their cardiovascular risk recorded, and 73% of people who started a statin for primary prevention appear to have done so without knowing their risk (and hence the possible benefits from statins). A potential limitation is that only QRISK2 scores entered into the clinical record automatically or manually were recorded, so it is possible that the study underestimated the proportion of patients whose risk was known.

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Marijana, T., Cesare, C. & Guido, G. 2018. **Heart rate as a predictor of cardiovascular risk.** *European journal of clinical investigation* 48(3).

AIM: to summarise current knowledge regarding the influence of heart rate (HR) on cardio- and cerebrovascular morbidity and mortality.

METHODS: PubMed, MEDLINE, Ovid and EMBASE databases were searched for large follow-up studies or meta-analysis published between January 1990 and September 2017 in the English language using the following keyword "heart rate," "resting heart rate," "mortality," "outcome," "hypertension," "heart failure," "ischaemic heart disease," "coronary heart disease" and "stroke."

RESULTS: the relationship between increased HR and cardio- and cerebrovascular morbidity and mortality has been reported in a large number of studies, and the results regarding this association are concurrent. This connection is generally stronger in men than in women. The increase in HR usually occurs in parallel with elevation of blood pressure and metabolic disturbances (insulin resistance, dyslipidaemia). However, even after adjustment for the most important cardiovascular risk factors, HR remained an independent predictor of adverse events in global population or in patients with cardio- and cerebrovascular diseases. HR has an important negative effect on cardio- and cerebrovascular morbidity and mortality

View [abstract](#)

Kimberly, N. H., Valentin, F., Robert, S. R., et al. 2017. **How Low to Go With Glucose, Cholesterol, and Blood Pressure in Primary Prevention of CVD.** *Journal of the American College of Cardiology* 70(17) 2171.

AIM: to discuss the primary prevention of coronary artery disease (CAD) through the modification of 3 risk factors—diabetes mellitus (DM), hyperlipidemia, and hypertension (HTN)

METHODS: a summary of the current guidelines, pertinent clinical trial data from interventions and the varying

perspectives and controversies regarding the guidelines that stem from an evolving evidence base
RESULTS: the effect of these risk factors on incident cardiovascular disease increases with progressively higher levels of glucose, low-density lipoprotein cholesterol, and blood pressure. With regard to primary prevention of CVD, it is clear that for DM and HTN, there is no role for pharmacological interventions in individuals without overt disease, and rather, changes in lifestyle should be encouraged. Unlike DM and HTN, even in the absence of overt hyperlipidemia, there appears to be an opportunity to reduce CVD events by initiating statin therapy in individuals who are at intermediate CVD risk. Although it is attractive to consider pharmacological therapies in lower-risk patients, adverse effects and physiological barriers may make the risk–benefit ratio unfavorable, particularly if adherence to medications is affected. Appropriate selection of individuals who will benefit from more aggressive pharmacological therapies will hinge on the accuracy of CVD risk calculators.

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Mark, D. H., Denis, X. & Pablo, P. 2017. **Uses of polypills for cardiovascular disease and evidence to date.** *Lancet* 389(10073) 1055.

AIM: to propose a guide for the use of polypills in future research and clinical activities and to synthesise contemporary evidence supporting the use of polypills for prevention of atherosclerosis

METHODS: we summarise efficacy and safety results from 13 polypill trials (9059 participants) done in 32 countries

RESULTS: polypills improve adherence, are generally well tolerated, and reduce risk factor levels, although heterogeneity limits the certainty of the effect on risk factors. Trials published to date have not been designed to detect differences in clinical outcomes, and thus no significant differences between polypill and comparator groups have been reported. Polypill therapy could be one of the most scalable strategies to reduce the risk of premature mortality from atherosclerosis by 25% by 2025 by improving medication adherence and access, but further trial data and clinical experience will be useful to determine how polypills can best be implemented to achieve this goal.

View [abstract](#)

National Institute for Health Research (NIHR) 2018. **NIHR Signal: Type 2 diabetes can be reversed with very low-calorie diet.** 13th February.

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: the DiRECT cluster-randomised trial involved 49 GP practices in Scotland and Tyneside. The practices were assigned to either provide an intense weight management program or usual care according to NICE guidelines for overweight adults with type 2 diabetes. The 298 participants had been diagnosed within the last six years and were not on insulin injections

RESULTS: those that stuck with the program were more likely to lose weight (average 10kg was lost) and to go into remission compared to usual care. More than two-thirds of them were also able to stop both diabetic and high blood pressure tablets. The commentary notes that the idea that type 2 diabetes can be put into remission with weight loss is not new, but the DIRECT trial shows this is possible, and safe, in primary care in the UK, at least for those early in the course of the disease.

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National Institute for Health Research (NIHR) 2018. **NIHR Signal: Diet and exercise programmes can prevent diabetes in high-risk individuals.** 27th February

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: The review identified 53 randomised controlled trials assessing prevention strategies in 49,029 adults with prediabetes. Studies of bariatric surgery, alternative therapies and including people with metabolic syndrome were excluded. Results from 43 studies were pooled in meta-analysis. Average participant age was 57 years, and body mass index was borderline obese (BMI 30.8). Nineteen studies evaluated single or multiple medications, 19 tested lifestyle modifications, and five tested both lifestyle modifications and medications. Follow-up times ranged from six months to six years in 40 studies, with three studies assessing outcomes at 10-20 years

RESULTS: At the end of treatment (average 2.6 years) lifestyle modification reduced risk of diabetes by about 40% (relative risk [RR], 0.61, 95% confidence interval [CI] 0.54 to 0.68; 19 studies). Diabetes developed in around seven per 100 people per year following combined diet and physical activity strategies compared with 11 per 100 controls. Overall 25 people would be needed to be treated to prevent one case of diabetes. Medication also

reduced risk of diabetes at the end of the treatment period (average 3.1 years). Weight loss drugs like orlistat gave the highest overall risk reduction (RR 0.37, 95% CI 0.22 to 0.62), followed by certain diabetes drugs including metformin (RR 0.47, 95% CI 0.32 to 0.68). An overall risk reduction of 36% was found across all medication studies, though this included three lifestyle-plus-medication studies (RR 0.64, 95% CI 0.54 to 0.76; 21 studies). There were five cases of diabetes per 100 people taking medication per year compared with nine per 100 controls. Overall 25 people would need treatment to prevent one case of diabetes. Four studies considered the effect of lifestyle modification at later follow-up (average 7.2 years). Three were diet and physical activity interventions, and one trial looked at a reduced-fat diet alone. Overall the risk of diabetes was 28% lower at follow-up compared to controls (RR 0.72, 95% CI 0.60 to 0.86). This had decreased from a 45% risk reduction at the end of active treatment in the same studies.

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National Institute for Health Research (NIHR) 2017. **NIHR Signal: Being overweight or obese is linked with heart disease even without other metabolic risk factors.** 7th November.

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 prospective, observational study, EPIC-CVD, followed 17,640 adults from 10 European countries, including the UK. They were aged between 36 and 70 years with no history of a stroke or heart attack. Participants completed questionnaires about diet, lifestyle, education and medical health. They were classified as metabolically unhealthy if they had three or more of the following: large waist circumference, high blood pressure, high blood glucose, high triglycerides and low HDL (good) cholesterol levels. Their BMI was also calculated at the start of the study. People were then followed up to see who developed coronary heart disease.

RESULTS: obese people with metabolic risk factors were two and a half times as likely to have heart disease compared with people of normal weight who were metabolically healthy (adjusted HR 2.54, 95% confidence interval [CI] 2.21 to 2.92). Metabolically unhealthy overweight people were more than twice as likely to develop heart disease as healthy people of normal weight (HR 2.33, 95% CI 1.97 to 2.76). Metabolically unhealthy people of normal weight had just over twice the risk of heart disease compared with those who were of normal weight and metabolically healthy (HR 2.15, 95% CI 1.79 to 2.57). Metabolically healthy obese people had a 28% increased risk of heart disease compared with people of normal weight who were metabolically healthy (HR 1.28, 95% CI 1.03 to 1.58). Metabolically healthy overweight people had a 26% increased risk of heart disease compared to healthy people of normal weight (HR 1.26, 95% CI 1.14 to 1.40).

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Stol, Y. H., Schermer, M. H. N. & Asscher, E. C. A. 2017. **Omnipresent health checks may result in over-responsibilization.** *Public Health Ethics* 10(1) 35-48.

AIM: Health checks identify (risk factors for) disease in individuals without a medical indication. More and more checks are offered by more providers on more risk factors and diseases, so we may speak of an omnipresence of health checks. Current ethical evaluation of health checks considers checks on an individual basis only. However, omnipresent checks have effects over and above the effects of individual health checks. They might give the impression that health is entirely manageable by individual actions and strengthen the norm of individual responsibility for health to the point where people hold themselves and others responsible for health outcomes they cannot reasonably be held accountable for. This process of so-called 'over-responsibilization' may result in increased feelings of guilt over health, decreased health solidarity and unfairly distributed health outcomes. Moreover, effects on privacy and peace of mind may be observed. Taking into account all possible harms and benefits of health checks in their ethical evaluation requires evaluation of health checks on an individual basis as well as on the level of all checks. Therefore, we urge the amendment of existing ethical evaluation to include the effects of an omnipresence of health checks. We make a first attempt at the formulation of amended criteria.

<https://academic.oup.com/phe/article-abstract/10/1/35/2907928>

Systematic reviews

Sisti LG, Dajko M, Campanella P et al. 2018. **The effect of multifactorial lifestyle interventions on cardiovascular risk factors: A systematic review and meta-analysis of trials conducted in the general population and high risk groups.** *Prev Med.* 2018 Apr;109:82-97.

AIM: to evaluate the impact of multifactorial lifestyle interventions on cardiovascular risk modification, both in the general and risk population

METHODS: a systematic review and meta-analysis of the randomized controlled trials (RCTs) were performed by

including articles published up to April 16th, 2016. RCTs were selected if they had investigated the impact of multifactorial lifestyle interventions on lipids, blood pressure, BMI and waist circumference, smoking and physical activity. Changes in the level of modifiable risk factors from baseline were evaluated

RESULTS: search resulted in 19,847 studies, of which 36 were included in the analysis. Compared to a usual care, the multifactorial lifestyle intervention is able to lower the blood pressure, total cholesterol, BMI and waist circumference, at both 6 and 12 months, and to increase physical activity at 12 months. Better results were obtained in primary prevention and in moderate and high risk groups.

View [abstract](#)

Lin, J., Evans, C. & Johnson, E. 2018. **Nontraditional Risk Factors in Cardiovascular Disease Risk Assessment: A Systematic Evidence Report for the U.S. Preventive Services Task Force.** *Agency for Healthcare Research and Quality.* January.

AIM: to systematically review evidence for the use of nontraditional risk factors—anklebrachial index (ABI), high-sensitivity C-reactive protein (hsCRP), and coronary artery calcium (CAC)—in asymptomatic adults without known cardiovascular disease (CVD)

METHODS: MEDLINE, PubMed, and Cochrane Collaboration Registry of Controlled Trials were searched through May 22, 2017, to update existing systematic reviews supporting the previous USPSTF recommendations

RESULTS: 22,707 abstracts and 483 full-text articles were screened against a priori inclusion criteria. A total of 43 unique studies were found reported in 54 publications. There remains scant information on the incremental value of nontraditional risk factors to help with the problem of miscalibration of traditional cardiovascular risk assessment. Clinicians could use ABI in addition to

the Framingham Risk Score (FRS) to improve upon discrimination and reclassification in populations for whom the FRS model has poor discrimination. While CAC appears to be the most promising nontraditional risk factor to improve discrimination and reclassification, it is based on a smaller body of evidence. High-intensity statin therapy in individuals with elevated hsCRP and normal lipid levels can reduce CVD morbidity and mortality, but it is unclear whether these benefits would not also be applicable to individuals with normal hsCRP

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Smith, T., Cross, J., Poland, F., et al. 2018. **Systematic Review Investigating Multi-disciplinary Team Approaches to Screening and Early Diagnosis of Dementia in Primary Care - What are the Positive and Negative Effects and Who Should Deliver It?** *Curr Alzheimer Res* 15(1) 5-17.

AIM: to determine what early diagnostic and screening programmes have been adopted in primary care practice, to explore who should deliver these and to determine the possible positive and negative effects of an early diagnostic and screening programme for people with dementia in primary care

METHODS: a systematic review of the literature was undertaken using published and unpublished research databases. All papers answering our research objectives were included. A narrative analysis of the literature was undertaken, with the CASP tools used appropriately to assess study quality.

RESULTS: 33 papers were identified of moderate to high quality. The limited therapeutic options for those diagnosed with dementia means that even if such a programme was instigated, the clinical value remains questionable. Furthermore, accuracy of the diagnosis remains difficult to assess due to poor evidence and this raises questions regarding whether people could be over- or under-diagnosed. Given the negative social and psychological consequences of such a diagnosis, this could be devastating for individuals.

View [abstract](#)

Wandell, P. E., de Waard, A. M., Holzmann, M. J., et al. 2018. **Barriers and facilitators among health professionals in primary care to prevention of cardiometabolic diseases: A systematic review.** *Fam Pract.* Jan 29. doi: 10.1093/fampra/cmz137.

AIM: to identify potential facilitators and barriers for health care professionals to undertake selective prevention of cardiometabolic diseases (CMD) in primary health care.

METHODS: Medline, Embase, Cinahl and PubMed were searched. We also screened reference lists of relevant articles to retain barriers and facilitators for prevention of CMD.

RESULTS: 19 qualitative studies, 7 quantitative studies and 2 mixed qualitative and quantitative studies were found. In terms of five overarching categories, the most frequently reported barriers and facilitators were as follows: Structural (barriers: time restraints, ineffective counselling and interventions, insufficient reimbursement and problems with guidelines; facilitators: feasible and effective counselling and interventions, sufficient assistance and support, adequate referral, and identification of obstacles), Organizational (barriers: general organizational problems, role of practice, insufficient IT support, communication problems within health teams and lack of support services, role of staff, lack of suitable appointment times; facilitators: structured practice, IT

support, flexibility of counselling, sufficient logistic/practical support and cooperation with allied health staff/community resources, responsibility to offer and importance of prevention), Professional (barriers: insufficient counselling skills, lack of knowledge and of experience; facilitators: sufficient training, effective in motivating patients), Patient-related factors (barriers: low adherence, causes problems for patients; facilitators: strong GP-patient relationship, appreciation from patients), and Attitudinal (barriers: negative attitudes to prevention; facilitators: positive attitudes of importance of prevention).

View [abstract](#)

Brunström M, and Carlberg B. 2017. **Association of Blood Pressure Lowering With Mortality and Cardiovascular Disease Across Blood Pressure Levels A Systematic Review and Meta-analysis.** *JAMA Internal Medicine.* January.

AIM: to assess the association between blood pressure (BP) lowering treatment and death and CVD at different BP levels

METHODS: previous systematic reviews were identified from PubMed, the Cochrane Database of Systematic Reviews, and the Database of Abstracts of Reviews of Effect. Reference lists of these reviews were searched for randomized clinical trials. Randomized clinical trials published after November 1, 2015, were also searched for in PubMed and the Cochrane Central Register for Controlled Trials during February 2017

RESULTS: Seventy-four unique trials, representing 306 273 unique participants (39.9% women and 60.1% men; mean age, 63.6 years) and 1.2 million person-years, were included in the meta-analyses. In primary prevention, the association of BP-lowering treatment with major cardiovascular events was dependent on baseline systolic BP (SBP). In trials with baseline SBP 160 mm Hg or above, treatment was associated with reduced risk for death (RR, 0.93; 95% CI, 0.87-1.00) and a substantial reduction of major cardiovascular events (RR, 0.78; 95% CI, 0.70-0.87). If baseline SBP ranged from 140 to 159 mm Hg, the association of treatment with mortality was similar (RR, 0.87; 95% CI, 0.75-1.00), but the association with major cardiovascular events was less pronounced (RR, 0.88; 95% CI, 0.80-0.96). In trials with baseline SBP below 140 mm Hg, treatment was not associated with mortality (RR, 0.98; 95% CI, 0.90-1.06) and major cardiovascular events (RR, 0.97; 95% CI, 0.90-1.04). In trials including people with previous CHD and mean baseline SBP of 138 mm Hg, treatment was associated with reduced risk for major cardiovascular events (RR, 0.90; 95% CI, 0.84-0.97), but was not associated with survival (RR, 0.98; 95% CI, 0.89-1.07)

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Haw JS, Galaviz KI, Straus AN et al. 2017. **Long-term Sustainability of Diabetes Prevention Approaches: A Systematic Review and Meta-analysis of Randomized Clinical Trials.** *JAMA Internal Medicine.* December.

AIM: to estimate aggregate long-term effects of different diabetes prevention strategies on diabetes incidence

METHODS: systematic searches of MEDLINE, EMBASE, Cochrane Library, and Web of Science databases. The initial search was conducted on January 14, 2014, and was updated on February 20, 2015. Search terms included prediabetes, primary prevention, and risk reduction.

RESULTS: Forty-three studies were included and pooled in meta-analysis (49 029 participants; mean [SD] age, 57.3 [8.7] years; 48.0% [n = 23 549] men): 19 tested medications; 19 evaluated LSM, and 5 tested combined medications and LSM. At the end of the active intervention (range, 0.5-6.3 years), LSM was associated with an RR reduction of 39% (RR, 0.61; 95% CI, 0.54-0.68), and medications were associated with an RR reduction of 36% (RR, 0.64; 95% CI, 0.54-0.76). The observed RD for LSM and medication studies was 4.0 (95% CI, 1.8-6.3) cases per 100 person-years or a number-needed-to-treat of 25. At the end of the washout or follow-up periods, LSM studies (mean follow-up, 7.2 years; range, 5.7-9.4 years) achieved an RR reduction of 28% (RR, 0.72; 95% CI, 0.60-0.86); medication studies (mean follow-up, 17 weeks; range, 2-52 weeks) showed no sustained RR reduction (RR, 0.95; 95% CI, 0.79-1.14).

View [abstract](#)

Bardach AE, Elorriaga N, Alcaraz AO et al. 2017. **Community-based cardiovascular health promotion in Argentina. A systematic review.** *Health promotion international.* Jan 30. pii:daw107.doi:10.1093/heapro/daw107.

AIM: to characterise those population-based interventions and public policies implemented in Argentina to reduce the burden of cardiovascular disease with an adequate evaluation of their impact on population health

METHODS: a systematic review of studies that assessed interventions in health promotion and/or primary prevention conducted in adult populations of Argentina, addressing specific CVD factors, from 1999 to 2016. We searched major bibliographic databases, grey literature, ministries and secretariats of health, and academic national libraries. Key informants, non-governmental organizations, universities, hospitals and experts were also contacted.

RESULTS: 1686 references were identified from databases. After reviewing title and abstracts 18 studies were

selected, five of them corresponded to evaluations of public policies-all addressing tobacco smoking. We presented a structured review of each experience. Most of the studies were deemed to entail moderate or high risk of bias. We summarized the findings and characteristics of these studies, including implementation strategies, process and impact evaluation

View [abstract](#)

Roberts, S., Barry, E., Craig, D., et al. 2017. **Preventing type 2 diabetes: systematic review of studies of cost-effectiveness of lifestyle programmes and metformin, with and without screening, for pre-diabetes.** *BMJ Open* 7(11) e017184.

AIM: to explore the cost-effectiveness of lifestyle interventions and metformin in reducing subsequent incidence of type 2 diabetes, both alone and in combination with a screening programme to identify high-risk individuals.

METHODS: Systematic review of economic evaluations. Database searches (Embase, Medline, PreMedline, NHS EED) and citation tracking identified economic evaluations of lifestyle interventions or metformin alone or in combination with screening programmes in people at high risk of developing diabetes.

RESULTS: 27 studies were included; all had evaluated lifestyle interventions and 12 also evaluated metformin.

Primary studies exhibited considerable heterogeneity in definitions of pre-diabetes and intensity and duration of lifestyle programmes. Lifestyle programmes and metformin appeared to be cost effective in preventing diabetes in high-risk individuals (median incremental cost-effectiveness ratios of 7490/quality-adjusted life-year (QALY) and 8428/QALY, respectively) but economic estimates varied widely between studies. Intervention-only programmes were in general more cost effective than programmes that also included a screening component. The longer the period evaluated, the more cost-effective interventions appeared. There was insufficient evidence to answer the question of (1) whether lifestyle programmes are more cost effective than metformin or (2) whether low-intensity lifestyle interventions are more cost effective than the more intensive lifestyle programmes that were tested in trials.

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Hermosilla SC, Kujawski SA, Richards CA et al. 2017. **An Ounce of Prevention: Deaths Averted From Primary Prevention Interventions.** *American journal of preventive medicine* 52(6) 778.

AIM: to examine the potential population health benefit of widespread implementation of US primary prevention interventions that have been shown to be efficacious

METHODS: The meta-analytic literature from October 2013 to March 2014 of primary prevention interventions published between January 2000 and March 2014 was reviewed. The authors then estimated the number of deaths that could have been averted in the U.S. in 2010 if all rigorously studied, efficacious primary prevention interventions for which population attributable risk proportions could be estimated were implemented nationwide.

RESULTS: A total of 372,054 (15.1%) of all U.S. deaths in 2010 would have been averted if all rigorously studied, efficacious primary prevention interventions were implemented. Two in three averted deaths would have been from cardiovascular disease or malignancy.

View [abstract](#)

Zhang X, Devlin HM, Smith B et al. 2017. **Effect of lifestyle interventions on cardiovascular risk factors among adults without impaired glucose tolerance or diabetes: A systematic review and meta-analysis.** *PloS one* 12(5) 0176436.

AIM: to examine if structured lifestyle interventions should be implemented among persons without impaired glucose tolerance (IGT)

METHODS: We conducted a systematic review and meta-analyses to assess the effectiveness of lifestyle interventions on CVD risk among adults without IGT or diabetes. We systematically searched MEDLINE, EMBASE, CINAHL, Web of Science, the Cochrane Library, and PsychInfo databases, from inception to May 4, 2016. We selected randomized controlled trials of lifestyle interventions, involving physical activity (PA), dietary (D), or combined strategies (PA+D) with follow-up duration > 12 months.

RESULTS: 79 studies met inclusion criteria. Compared to usual care, lifestyle interventions achieved significant improvements in systolic blood pressure (SBP) (-2.16mmHg[95%CI, -2.93, -1.39]), diastolic blood pressure (DBP) (-1.83mmHg[-2.34, -1.31]), total cholesterol (TC) (-0.10mmol/L[-0.15, -0.05]), low density lipoprotein cholesterol (LDL-C) (-0.09mmol/L[-0.13, -0.04]), density lipoprotein cholesterol (HDL-C) (0.03mmol/L[0.01, 0.04]), and triglycerides (TG) (-0.08mmol/L[-0.14, -0.03]). Similar effects were observed among both low-and high-range study groups except for TC and TG. Similar effects also appeared in SBP and DBP categories regardless of follow-up duration.

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Trials

Luymes, C. H., Poortvliet, R. K. E., van Geloven, N., et al. 2018. **Deprescribing preventive cardiovascular medication in patients with predicted low cardiovascular disease risk in general practice - the ECSTATIC study: a cluster randomised non-inferiority trial.** *BMC Medicine* 16(1) 5.

AIM: to determine whether deprescribing preventive cardiovascular medication in patients without a strict indication for such medication is safe and cost-effective in general practice

METHODS: In this pragmatic cluster randomised controlled non-inferiority trial, we recruited 46 general practices in the Netherlands. Patients aged 40-70 years who were using antihypertensive and/or lipid-lowering drugs without CVD and with low risk of future CVD were followed for 2 years.

RESULTS: Of 1067 participants recruited between 7 November 2012 and 18 February 2014, 72% were female.

Overall, their mean age was 55 years and their mean predicted CVD risk at baseline was 5%. Of 492 participants in the ITT intervention group, 319 (65%) quit the medication (PP intervention group); 135 (27%) of those participants were still not taking medication after 2 years. The predicted CVD risk increased by 2.0 percentage points in the PP intervention group compared to 1.9 percentage points in the usual care group. The difference of 0.1 (95% CI -0.3 to 0.6) fell within the non-inferiority margin. After 2 years, compared to the usual care group, for the PP intervention group, systolic blood pressure was 6 mmHg higher, diastolic blood pressure was 4 mmHg higher and total cholesterol and low-density lipoprotein-cholesterol levels were both 7 mg/dl higher (all $P < 0.05$). Cost and quality-adjusted life years did not differ between the groups.

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Osborn, D., Burton, A., Hunter, R., et al. 2018. **Clinical and cost-effectiveness of an intervention for reducing cholesterol and cardiovascular risk for people with severe mental illness in English primary care: a cluster randomised controlled trial.** *The Lancet. Psychiatry*. 15 15.

AIM: to evaluate the effects of a primary care intervention on decreasing total cholesterol concentrations and cardiovascular disease risk in people with severe mental illnesses.

METHODS: cluster randomised trial in general practices across England, with general practices as the cluster unit. We randomly assigned general practices (1:1) with 40 or more patients with severe mental illnesses using a computer-generated random sequence with a block size of four. Researchers were masked to allocation, but patients and general practice staff were not. We included participants aged 30-75 years with severe mental illnesses (schizophrenia, bipolar disorder, or psychosis), who had raised cholesterol concentrations (5.0 mmol/L) or a total:HDL cholesterol ratio of 4.0 mmol/L or more and one or more modifiable cardiovascular disease risk factors.

RESULTS: Between Dec 10, 2013, and Sept 30, 2015, we recruited general practices and between May 9, 2014, and Feb 10, 2016, we recruited participants and randomly assigned 76 general practices with 327 participants to the Primrose intervention (n=38 with 155 patients) or treatment as usual (n=38 with 172 patients). Total cholesterol concentration data were available at 12 months for 137 (88%) participants in the Primrose intervention group and 152 (88%) participants in the treatment-as-usual group. The mean total cholesterol concentration did not differ at 12 months between the two groups (5.4 mmol/L [SD 1.1] for Primrose vs 5.5 mmol/L [1.1] for treatment as usual; mean difference estimate 0.03, 95% CI -0.22 to 0.29; $p=0.788$). This result was unchanged by pre-agreed supportive analyses. Mean cholesterol decreased over 12 months (-0.22 mmol/L [1.1] for Primrose vs -0.36 mmol/L [1.1] for treatment as usual). Total health-care costs (1286 [SE 178] in the Primrose intervention group vs 2182 [328] in the treatment-as-usual group; mean difference -895, 95% CI -1631 to -160; $p=0.012$) and psychiatric inpatient costs (157 [135] vs 956 [313]; -799, -1480 to -117; $p=0.018$) were lower in the Primrose intervention group than the treatment-as-usual group. Six serious adverse events of hospital admission and one death occurred in the Primrose group (n=7) and 23, including three deaths, occurred in the treatment-as-usual group (n=18).

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Skaaby, T., Jorgensen, T. & Linneberg, A. 2018. **A randomized general population study of the effects of repeated health checks on incident diabetes.** *Endocrine* 60(1) 122-128.

AIM: to examine the effect of repeated health checks on the 30-year incidence of diabetes

METHODS: a randomised trial using a randomly selected population cohort. The study included all persons from 11 municipalities in Copenhagen aged 30, 40, 50, and 60 years (n=17845). An age-stratified and gender-stratified random sample (N=4789) was invited to participate in a maximum of three health checks between 1982 and 1994 ('intervention group'). The remaining 12994 persons were defined as the 'control group'. The health checks included a questionnaire, a physical examination including assessment of overweight and blood pressure, and blood sampling with determination of serum lipid levels. Based on the person's answers and test results, the participants were given individual information about the results, disease risk and lifestyle. Their general

practitioner, too, was provided with written information on the test results.

RESULTS: There were 2636 incident cases of diabetes and a mean follow-up time of 24.1 years. The age-adjusted and gender-adjusted hazard ratio (HR) (95% confidence interval, CI) for the intervention group versus the control group was HR=1.07 (95% CI: 0.98, 1.16, p=0.153). Offering repeated general health checks to the general population had no preventive effect on the development of diabetes during 30 years of follow-up.

View [abstract](#)

Patel, B., Peiris, D., Usherwood, T., et al. 2017. **Impact of sustained use of a multifaceted computerized quality improvement intervention for cardiovascular disease management in Australian primary health care.**

Journal of the American Heart Association 6(10) (no pagination).

AIM: to evaluate a multifaceted, computerized quality improvement intervention for management of cardiovascular disease (CVD) risk in Australian primary health care.

METHODS: Data from 41 health services were analyzed. Outcomes were (1) proportion of eligible population with guideline-recommended CVD risk factor measurements; and (2) the proportion at high CVD risk with current prescriptions for guideline-recommended medications. Patient-level analyses were conducted using generalized estimating equations to account for clustering and time effects and tests for heterogeneity were conducted to assess impact of original treatment allocation. Median follow-up for 22 809 patients (mean age, 64.2 years; 42.5% men, 26.5% high CVD risk) was 17.9 months post-trial and 35 months since trial inception

RESULTS: At the end of the post-trial period there was no change in CVD risk factor screening overall when compared with the end of the trial period (64.7% versus 63.5%, P=0.17). For patients at high CVD risk, there were significant improvements in recommended prescriptions at end of the post-trial period when compared with the end of the trial period (65.2% versus 56.0%, P<0.001). There was no heterogeneity of treatment effects on the outcomes based on original randomization allocation.

View [full text](#)

Simmons, R. K., Griffin, S. J., Witte, D. R., et al. 2017. **Effect of population screening for type 2 diabetes and cardiovascular risk factors on mortality rate and cardiovascular events: a controlled trial among 1,912,392 Danish adults.** *Diabetologia* 60(11) 2183-2191.

AIM: to evaluate the effect of population-based screening for type 2 diabetes and cardiovascular risk factors on mortality rates and cardiovascular events

METHODS: This register-based, non-randomised, controlled trial included men and women aged 40-69 years without known diabetes who were registered with a general practice in Denmark (n=1,912,392). Between 2001 and 2006, 153,107 individuals registered with 181 practices participating in the Anglo-Danish-Dutch Study of Intensive Treatment in People with Screen-Detected Diabetes in Primary Care (ADDITION)-Denmark study were sent a diabetes risk score questionnaire. Individuals at moderate-to-high risk were invited to visit their GP for assessment of diabetes status and cardiovascular risk (screening group). The 1,759,285 individuals registered with all other general practices in Denmark constituted the retrospectively constructed no-screening (control) group.

RESULTS: Among the screening group, 27,177 (18%) individuals attended for assessment of diabetes status and cardiovascular risk. Of these, 1,533 were diagnosed with diabetes. During a median follow-up of 9.5 years, there were 11,826 deaths in the screening group and 141,719 in the no-screening group (HR 0.99 [95% CI 0.96, 1.02], p=0.66). There were 17,941 cardiovascular events in the screening group and 208,476 in the no-screening group (HR 0.99 [0.96, 1.02], p=0.49). A population-based stepwise screening programme for type 2 diabetes and cardiovascular risk factors among all middle-aged adults in Denmark was not associated with a reduction in rate of mortality or cardiovascular events between 2001 and 2012.

View [full text](#)

Vallejo-Vaz, A. J., Robertson, M., Catapano, A. L., et al. 2017. **Low-Density Lipoprotein Cholesterol Lowering for the Primary Prevention of Cardiovascular Disease Among Men With Primary Elevations of Low-Density Lipoprotein Cholesterol Levels of 190 mg/dL or Above: Analyses From the WOSCOPS (West of Scotland Coronary Prevention Study) 5-Year Randomized Trial and 20-Year Observational Follow-Up.** *Circulation* 136(20) 1878-1891.

AIM: to assess the benefits of LDL-C lowering on cardiovascular outcomes among individuals with primary elevations of LDL-C \geq 190 mg/dL without preexisting vascular disease at baseline.

METHODS: In the present analysis, we provide hitherto unpublished data on the cardiovascular effects of LDL-C lowering among a primary prevention population with LDL-C \geq 190 mg/dL. We performed post hoc analyses from the WOSCOPS (West of Scotland Coronary Prevention Study) randomized, placebo-controlled trial, and observational posttrial long-term follow-up, after excluding individuals with evidence of vascular disease at baseline. WOSCOPS enrolled 6595 men aged 45 to 64 years, who were randomly assigned to pravastatin 40 mg/d

or placebo. In the present analyses, 5529 participants without evidence of vascular disease were included, stratified by LDL-C levels into those with LDL-C <190 mg/dL (n=2969; mean LDL-C 178+/-6 mg/dL) and those with LDL-C ≥190 mg/dL (n=2560; mean LDL-C 206+/-12 mg/dL). The effect of pravastatin versus placebo on coronary heart disease and major adverse cardiovascular events were assessed over the 4.9-year randomized controlled trial phase and on mortality outcomes over a total of 20 years of follow-up.

RESULTS: Among 5529 individuals without vascular disease, pravastatin reduced the risk of coronary heart disease by 27% (P=0.002) and major adverse cardiovascular events by 25% (P=0.004) consistently among those with and without LDL-C ≥190 mg/dL (P-interaction >0.9). Among individuals with LDL-C ≥190 mg/dL, pravastatin reduced the risk of coronary heart disease by 27% (P=0.033) and major adverse cardiovascular events by 25% (P=0.037) during the initial trial phase and the risk of coronary heart disease death, cardiovascular death, and all-cause mortality by 28% (P=0.020), 25% (P=0.009), and 18% (P=0.004), respectively, over a total of 20 years of follow-up.

View [full text](#)

Navar, A. M., Wang, T. Y., Zakrofsky, P., et al. 2016. **Impact of communication format and risk horizon on patient perceptions of CVD risk: Findings from the palm registry.** *Circulation. Conference: American Heart Association's* 134(Supplement 1).

AIM: to understand the optimal formats for communicating CVD risk

METHODS: The PALM (Patient and Provider Assessment of Lipid Management) Registry is a cross sectional registry of patients at risk for CVD or with prior CVD seen across 138 US cardiology, endocrinology, and primary care clinics (May-Sept 2015). Patients were asked to consider a hypothetical scenario where they were told they had a 10-year CVD risk of 15%, and to rate how high they perceived this risk to be. Patients were randomized to receive the risk estimate without a visual aid or with a bar graph or a pictogram (100 smile/frown faces). The scenario was then changed to present the same risk but as the corresponding SCORE (4% 10-year risk of death) and lifetime risk (50% lifetime risk) estimates. Responses were compared by risk horizon and graphical format.

RESULTS: Of 3060 respondents with mean age 66 years, 10.5% were African American and 54.8% male. Patients (n=3,060) were more likely to report that they perceived risk as "high or very high" when presented with lifetime CVD risk (72.6%) than 10-year CVD risk (32.1%, p<0.001 vs. lifetime risk) or CV death risk (25.6% p<0.001 vs. lifetime risk). When risk was presented as a pictogram, risk perceptions were lower across all three risk time horizons than when presented as a bar graph or without graphics (Figure).

View [abstract](#)

Cohort studies

Safai N, Carstensen B, Vestergaard H. 2018. **Impact of a multifactorial treatment programme on clinical outcomes and cardiovascular risk estimates: a retrospective cohort study from a specialised diabetes centre in Denmark.** *BMJ Open*.

AIM: To investigate the impact of a multifactorial treatment programme in a real-life setting on clinical outcomes and estimated cardiovascular disease (CVD) risk.

METHODS: A retrospective observational cohort study, using data from the electronic medical records and national registers. Patients with type 2 diabetes (n=4299) referred to a programme with focus on treatment of hyperglycaemia, hypertension and dyslipidaemia between 1 January 2001 and 1 April 2016.

RESULTS: The patients achieved a mean±SD decrease in HbA1c, systolic and diastolic BP and LDL cholesterol of 1.0%±0.04% (10.6±0.4 mmol/mol), 6.3±0.4 mm Hg, 2.7±0.2 mm Hg and 0.32±0.02 mmol/L, respectively (p<0.0001). The proportion of patients who met the treatment goal for HbA1c (<7% (<53 mmol/mol)) increased from 31% to 58% (p<0.0001); for BP (<130/80 mm Hg) from 24% to 34% (p<0.0001), and for LDL cholesterol (<2.5 mmol/L (patients without previous CVD) or <1.8 mmol/L (patients with previous CVD)) from 52% to 65%. Those reaching all three guideline treatment targets increased from 4% to 15% (p<0.0001), and when relaxing the BP target to <140/85 from 8% to 24%. The estimated CVD risk was relatively reduced by 15.2% using the Swedish National Diabetes Register risk engine and 30.9% using the UK Prospective Diabetes Study risk engine

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Arca, M., Ansell, D., Averna, M., et al. 2018. **Statin utilization and lipid goal attainment in high or very-high cardiovascular risk patients: Insights from Italian general practice.** *Atherosclerosis* 271 120-127.

AIMS: to estimate statin utilization and lipid goal achievement in a large sample of Italian patients at high/very-high cardiovascular (CV) risk.

METHODS: Patients aged ≥18 years with a valid low-density lipoprotein cholesterol (LDL-C) measurement in 2015 were selected from the IMS Health Real World Data database; non-high-density lipoprotein cholesterol

(non-HDL-C) was assessed in those with available total cholesterol measurements. Index dates were defined as the last valid lipid measurement in 2015. Patients were hierarchically classified into mutually exclusive risk categories: heterozygous familial hypercholesterolemia (primary and secondary prevention), atherosclerotic CV disease (including recent acute coronary syndrome [ACS], chronic coronary heart disease, stroke, and peripheral arterial disease), and diabetes mellitus (DM) alone. Statin and non-statin lipid-modifying therapy (LMT) use, and European Society of Cardiology (ESC)/European Atherosclerosis Society (EAS) guideline-recommended goal attainment, were assessed.

RESULTS: Among 66,158 patients meeting selection criteria, the overall rate of LMT prescriptions was 53.3%, including 7.7% on high-intensity statin therapy. Statin use was highest for recent ACS and lowest for DM alone. LDL-C goal attainment was 16.0% for <1.8mmol/l and 45.0% for <2.5mmol/l; 24.3% reached non-HDL-C <2.6mmol/l and 52.2% were at <3.3mmol/l. Goal achievement was greatest with high-intensity statin use.

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Dahl, M., Frost, L., Sogaard, R., et al. 2018. **A population-based screening study for cardiovascular diseases and diabetes in Danish postmenopausal women: acceptability and prevalence.** *BMC Cardiovascular Disorders* 18(1) 20.

AIM: to investigate the prevalence of CVD and diabetes mellitus (DM) as well as the acceptability toward screening and preventive actions.

METHODS: An observational study was performed among all women born in 1936, 1941, 1946 and 1951 living in Viborg Municipality, Denmark, from October 2011. In total, 1984 were invited to screening for abdominal aortic aneurysm (AAA), peripheral arterial disease (PAD), carotid plaque (CP), hypertension (HT), atrial fibrillation (AF), DM and dyslipidaemia. Participants with positive tests were offered prophylactic intervention including follow-up consultations in case of AAA, PAD and/or CP. Participants with AAA ≥ 50 mm were referred to specialists in vascular surgery. Women with AF or potential familial hypercholesterolaemia (FH) were referred to cardiology work-up.

RESULTS: Among those invited, 1474 (74.3%) attended screening, but the attendees' share decreased with increasing age groups ($p < 0.001$). AAA was diagnosed in 10 (0.7%) women, PAD in 101 (6.9%) and CP in 602 (40.8%). The percentage of women with these conditions rose with increasing age group ($p < 0.05$). Unconfirmed potential HT was observed in 94 (6.4%), unknown AF in 6 (0.4%), DM in 14 (1%) and potential FH in 35 (2.4%). None of these findings differed across age groups. Among the 631 women diagnosed with AAA, PAD and/or CP, 182 (28.8%) were already in antiplatelet and 223 (35.3%) in lipid-lowering therapy prior to screening. Antiplatelet therapy was initiated in 215 (34.1%) and lipid-lowering therapy in 191 (30.3%) women. Initiation of antiplatelet and lipid-lowering therapy was further recommended to 134 (21.2%) and 141 (22.4%) women, respectively, who hesitated to follow the recommendation.

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Aguilar-Palacio I, Malo S, Feja C. et al. 2018. **Risk factors control for primary prevention of cardiovascular disease in men: Evidence from the Aragon Workers Health Study (AWHS).** *PLoS ONE* 13(2) 0193541.

AIM: to evaluate the prevalence of CVD risk factors among men in a worker's cohort with no previous CVD, to study control variations across time and the factors associated with poor control.

METHODS: a cohort reexamination (2010-2014) within the context of the Aragon Workers Health Study (AWHS). Data from working characteristics, analytical values and pharmacological prescription were included in the analysis. Prevalences of risk factor diagnosis and control were calculated, as well as factors associated with poor control.

RESULTS: The prevalence of CVD risk factors was high. In 2014 dyslipidaemia was the most prevalent (85.2%) followed by Hypertension (HT) (42.0%). People under treatment increased for the period analysed ($p < 0.001$). The proportion of people treated varied from 72.2% in Diabetes Mellitus to 31.1% in dyslipidaemia in 2014. 46.2% of the workers with HT were controlled, decreasing to 21.9% in Diabetes and 11.0% in dyslipidaemia (2014). Working in a turn different to central shift was associated with poor control, especially for those working at night with HT (Odds Ratio in 2010: 3.6; Confidence Interval 95% 1.8-7.4) and dyslipidaemia (Odds Ratio 2010: 4.7; Confidence Interval 95% 1.3-16.4).

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Koch, K., Meddings, C., Collings, V., et al. 2018. **4CPS-030 Evaluation of pharmacist-led cardiovascular services within primary care, provided by cardiovascular pharmacists.** *European Journal of Hospital Pharmacy* Volume 25, Issue Suppl 1.

AIM: to identify and evaluate the pharmacist-led cardiovascular services provided within primary care from June 2016 (when the new services were started) to July 2017.

METHODS: Retrospective data for all patients seen within the pharmacist-led clinics and hypertension virtual clinics and all returned surveys were included in this service evaluation.

RESULTS: A total of 65 patients from the hypertension virtual clinic were reviewed. There were 108 pharmacists' interventions made and 51 patients were followed-up after 6 months. Blood pressure was recorded at 6 months for 34 patients and a mean systolic blood pressure decline of $-18 (\pm 18.0)$ mmHg was observed. There were 26 patients who had a systolic blood pressure >160 mm/Hg compared with three patients after 6 months. A total of 17 patients have been seen in the pharmacist-led clinics; of which six patients have had follow-up recordings. A mean systolic blood pressure decline of $-23 (\pm 2.0)$ mmHg was achieved for three patients and a mean non-HDL decline of $-1.61 (\pm 0.69)$ mmol/l was achieved in three patients. The satisfaction of service users was stated as high in the returned surveys

View [abstract](#)

Kraushaar, L. E., Dressel, A. & Maßmann, A. 2018. **Vascular robustness: The missing parameter in cardiovascular risk prediction.** *Preventive medicine reports* 9 107-113.

AIM: we suggest that vascular robustness against risk factor stress is an important but unexplored parameter that may improve the risk factor models' detection rates more substantially than additional biomarkers of risk and aim to answer the question of whether our proposed robustness criterion warrants the execution of more resource-intensive prospective studies that examine the predictive utility of robustness for efforts to reduce premature CVD mortality as demanded by the UN

METHODS: This is a retrospective cohort study of 372 adults (mean age 56.1 years, range 21–92; 45% female) with a variety of CV risk factors. An arterial model (VascAssist 2, iSYMED GmbH, Germany) was used to derive global parameters of arterial function from non-invasively acquired pulse pressure waves. Participants were stratified by health status: apparently healthy (AH; n = 221); with hypertension and/or hypercholesterolemia (CC; n = 61); with history of CV event(s) (CVE; n = 90).

RESULTS: Robustness correlated linearly with calendar age in CC ($F(1, 59) = 10.42$; $p < 0.01$) and CVE ($F(1, 88) = 40.34$; $p < 0.0001$) but not in the AH strata, supporting the hypothesis of preferential elimination of less robust individuals along the aging trajectory under risk factor challenges. Vascular robustness may serve as a biomarker of vulnerability to CVD risk factor challenges, prognosticating otherwise undetectable elevated risk for premature CVD mortality

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Mehta, S., Jackson, R., Wells, S., et al. 2018. **Cardiovascular medication changes over 5 years in a national data linkage study: implications for risk prediction models.** *Clinical Epidemiology* 10 133-141.

AIM: to examine changes in CVD pharmacotherapy over 5 years in preparation for developing new 5-year risk prediction models

METHODS: Anonymized individual-level linkage of eight national administrative health datasets enabled identification of all New Zealanders aged 30–74 years, without prior hospitalization for CVD or heart failure, who utilized publicly funded health services during 2006. We determined proportions of participants dispensed blood pressure lowering, lipid lowering, and antiplatelet/ anticoagulant pharmacotherapy at baseline in 2006, and the proportion of person years of follow-up (2007–2011) where dispensing occurred.

RESULTS: The study population comprised of 1,766,584 individuals, representing ~85% of all New Zealanders aged 30–74 years without prior CVD or heart failure in 2006, with mean follow-up of 4.9 years (standard deviation 0.6 years; 8,589,931 total person years). CVD medications were dispensed to 21% of people at baseline, with most single or combination pharmacotherapies continuing for $\geq 80\%$ of follow-up. Complete discontinuation of baseline treatment accounted for 2% of follow-up time while CVD pharmacotherapy that commenced after baseline accounted for 7% of total follow-up time.

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Saeed, A., Nambi, V., Sun, W., et al. 2018. **Short-Term Global Cardiovascular Disease Risk Prediction in Older Adults.** *Journal of the American College of Cardiology*.

AIM: To determine whether adding biomarkers to Pooled Cohort Equation(PCE) variables improves global CVD (coronary heart disease [CHD], stroke, and HF) risk prediction in older adults over a shorter time period.

METHODS: Atherosclerosis Risk in Communities Study participants without prevalent CVD including HF (n=4760; mean \pm SD age=75.4 \pm 5.1 years) were followed for incident global CVD events. Adding N-terminal pro-B-type natriuretic peptide, high-sensitivity cardiac troponin T, and high-sensitivity C-reactive protein to the PCE and a "lab model" with the biomarkers, age, race, and gender were assessed for prediction improvement. Area under the receiver operating characteristic curve (AUC) and net reclassification index (NRI) were calculated.

RESULTS: Over median follow-up of ~4 years, incident HF was the leading CVD event (n=193 vs 118 CHD and 81

stroke events). Compared to the PCE, each biomarker improved risk prediction. The largest improvement in risk prediction metrics was with the addition of all 3 biomarkers (Δ AUC 0.103; continuous NRI 0.484). The lab model also performed better than the PCE model (Δ AUC 0.091, continuous NRI 0.355).

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Son, K. Y., Shin, D. W., Yang, H. K., et al. 2018. **Effect of one-time brief additional counseling on periodic health examination for 40- and 66-year-olds: 2-Year follow up of 101 260 participants.** *Geriatrics & Gerontology International* 18(2) 329-337.

AIM: to evaluate whether the effect of one-time brief additional counseling in periodic health examinations (PHE) through the National Screening Program for the Translational Ages in Korea is sustained after 2 years.

METHODS: We collected data from National Screening Program for the Translational Ages participants in 2007 and 2008. To evaluate behavior change after 2 years, we collected the participants' health behavior data 2 years later (2009 and 2010). We defined the basic group as participants who only received PHE, and the additional group as received PHE and counseling. We carried out propensity score matching to ensure that additional counseling was the only different variable affecting health behavior between the two groups.

RESULTS: After propensity score matching, 50 630 remaining matched participants were matched for each group. Of these participants, 26.5% (26 855/101 260) were aged 66 years, and 60.9% (61 653/101 260) were men. The additional group showed a significant increase in odds of smoking cessation among the 66-year-olds (adjusted OR 1.173, 95% CI 1.003–1.372). This effect was significant, especially when the participants did not have hypertension or hypercholesterolemia (adjusted OR 1.193, 95% CI 1.000–1.423 for hypertension and adjusted OR 1.188, 95% CI 1.009–1.398 for hypercholesterolemia). However, there was no significant association for alcohol drinking and regular exercise.

View [abstract](#)

Stol, D. M., Hollander, M., Nielen, M. M. J., et al. 2018. **Implementation of selective prevention for cardiometabolic diseases; are Dutch general practices adequately prepared?** *Scandinavian Journal of Primary Health Care* 36(1) 20-27.

AIM: to assess the organizational preparedness of Dutch general practices and the facilitators and barriers for performing CMD-prevention in practices currently implementing selective CMD-prevention.

METHODS: Observational study. Setting: Dutch primary care. Subjects: General practices. Main outcome measures: Organizational characteristics.

RESULTS: General practices implementing selective CMD-prevention are more often organized as a group practice (49% vs. 19%, $p = .000$) and are better organized regarding chronic disease management compared to reference practices. They are motivated for performing CMD-prevention and can be considered as 'frontrunners' of Dutch general practices with respect to their practice organization. The most important reported barriers are a limited availability of staff (59%) and inadequate funding (41%).

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Van Houtven, C. H., Greiner, M. A., Heidenfelder, B., et al. 2018. **Medicare utilization, screening, and costs among participants in the Southeastern Diabetes Initiative: A population-based evaluation.** *Primary care diabetes* 12(2) 172-183.

AIM: to describe the population-based evaluation approach of the Southeastern Diabetes Initiative (SEDI) intervention from a Medicare utilization and cost perspective.

METHODS: We measured associations between the SEDI intervention and receipt of diabetes screening (i.e., HbA1c test, eye exam, lipid profile), health care resource use, and costs among intervention enrollees, compared with a control cohort of Medicare beneficiaries in geographically adjacent counties.

RESULTS: The intervention cohort had slightly lower 1-year screening in 2 of 3 domains (4% for HbA1c; 9% for lipid profiles) in the post-intervention period, compared with the control cohort. The SEDI intervention cohort did not have different Medicare utilization or total Medicare costs in the post-intervention period from surrounding control counties.

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Ariela, R. O., Gaziano, J. M., Luc, D., et al. 2017. **Statins for Primary Prevention of Cardiovascular Events and Mortality in Older Men.** *Journal of the American Geriatrics Society* 65(11) 2362.

AIM: to determine whether statin use for primary prevention is associated with a lower risk of cardiovascular events or mortality in older men

METHODS: Prospective cohort study. Physicians' Health Study participants. 7,213 male physicians >70 years without a history of cardiovascular disease (CVD). Multivariable propensity score for statin use with greedy matching (1:1)

to minimize confounding by indication. Median baseline age was 77 (70-102), median follow-up was 7.5 years. Non-users were matched to 1,130 statin users.

RESULTS: Statin use was associated with an 18% lower risk of all-cause mortality, HR 0.82 (95% CI 0.69-0.98) and non-significant lower risk of CVD events, HR 0.86 (95% CI 0.70-1.06) and stroke, HR 0.70 (95% CI 0.45-1.09). In subgroup analyses, results did not change according to age group at baseline (70-76 or >76 years) or functional status. There was a suggestion that those >76 at baseline did not benefit from statins for mortality, HR 1.14 (95% CI 0.89-1.47), compared to those 70-76 at baseline, HR 0.83 (95% CI 0.61-1.11); however the CIs overlap between the two groups, suggesting no difference. Statin users with elevated total cholesterol had fewer major CVD events than non-users, HR 0.68 (95% CI 0.50-0.94) and HR 1.43 (95% CI 0.99-2.07), respectively. Statin use was associated with a significant lower risk of mortality in older male physicians ≥ 70 and a nonsignificant lower risk of CVD events. Results did not change in those who were >76 years at baseline or according to functional status. There was a suggestion that those with elevated total cholesterol may benefit

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Garcia-Gil, M., Comas-Cufí, M., Blanch, J., et al. 2017. **Effectiveness of statins as primary prevention in people with different cardiovascular risk: A population-based cohort study.** *Clinical Pharmacology & Therapeutics*.

AIM: to analyze statin effectiveness in a general population with differing levels of coronary heart disease (CHD) risk.

METHODS: Patients (35-74 years) without previous cardiovascular disease were included and stratified according to 10-year CHD risk (<5%, 5-7.4%, 7.5-9.9%, and 10-19.9%). New users were categorized according to their medical possession ratio (MPR). The main outcome was atherosclerotic cardiovascular disease (ASCVD) (myocardial infarction and ischemic stroke).

RESULTS: In adherent patients (MPR 70%), statin treatment decreased ASCVD risk across the range of coronary risk (from 16-30%). The 5-year number needed to treat (NNT) was 470 and 204 in the risk categories <5% and 5-7.4%, respectively, and 75 and 62 in the 7.5-9.9% category than in the 10-19.9% category, respectively

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Geers, J., Scheepers, A., Hulshagen, L., et al. 2017. **Diabetes screening in the pharmacy by patient self-testing.** *Acta Clinica Belgica: International Journal of Clinical and Laboratory Medicine* 72 (Supplement 1) 3-4.

AIM: to investigate the possibility of diabetes screening in a pharmacy setting

METHODS: During 3 weeks a screening campaign was held in 10 pharmacies in Houthalen-Helchteren. A two-step method was used, consisting of the validated FINDRISC questionnaire, followed by an HbA1c self-test.

RESULTS: In total 1369 people were screened by the FINDRISC questionnaire, resulting in 38.64% with a high risk, 40.61% with a medium and 20.75% with a low risk to develop diabetes. Of all participants, 791 people carried out an HbA1c self-test, resulting in 25 people with an indication for diabetes and 405 for prediabetes. The high risk groups detected from both the questionnaire and the HbA1c self-test were referred to the GP for a consultation after being advised by their pharmacist about the different risk profiles. Two-step screening resulted to be a lot more sensitive and specific compared to the FINDRISC questionnaire which proves the added value of the use of a validated self-test in the pharmacy. The pharmacists were unanimously positive and patients confirmed to feel very comfortable being screened for diabetes in the pharmacy (99.12%). An economic analysis indicates a potential cost saving of more than 3 million on a longer term. Extrapolated on a national level this would rise to more than 1.7 billion.

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Hippisley-Cox, J. 2017. **Development and validation of QDiabetes-2018 risk prediction algorithm to estimate future risk of type 2 diabetes: cohort study.** *British Medical Association*

AIM: To derive and validate updated QDiabetes-2018 prediction algorithms to estimate the 10 year risk of type 2 diabetes in men and women, taking account of potential new risk factors, and to compare their performance with current approaches.

METHODS: Prospective open cohort study. Routinely collected data from 1457 general practices in England contributing to the QResearch database: 1094 were used to develop the scores and a separate set of 363 were used to validate the scores. 11.5 million people aged 25-84 and free of diabetes at baseline: 8.87 million in the derivation cohort and 2.63 million in the validation cohort.

RESULTS: In the derivation cohort, 178 314 incident cases of type 2 diabetes were identified during follow-up arising from 42.72 million person years of observation. In the validation cohort, 62 326 incident cases of type 2 diabetes were identified from 14.32 million person years of observation. All new risk factors considered met our model inclusion criteria. Model A included age, ethnicity, deprivation, body mass index, smoking, family history of diabetes in a first degree relative, cardiovascular disease, treated hypertension, and regular use of corticosteroids,

and new risk factors: atypical antipsychotics, statins, schizophrenia or bipolar affective disorder, learning disability, and gestational diabetes and polycystic ovary syndrome in women. Model B included the same variables as model A plus fasting blood glucose. Model C included HBA1c instead of fasting blood glucose. All three models had good calibration and high levels of explained variation and discrimination. In women, model B explained 63.3% of the variation in time to diagnosis of type 2 diabetes (R²), the D statistic was 2.69 and the Harrell's C statistic value was 0.89. The corresponding values for men were 58.4%, 2.42, and 0.87. Model B also had the highest sensitivity compared with current recommended practice in the National Health Service based on bands of either fasting blood glucose or HBA1c. However, only 16% of patients had complete data for blood glucose measurements, smoking, and body mass index.

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Jorgensen, P., Langhammer, A., Krokstad, S., et al. 2017. **Mortality in persons with undetected and diagnosed hypertension, type 2 diabetes, and hypothyroidism, compared with persons without corresponding disease - a prospective cohort study; The HUNT Study, Norway.** *BMC Fam Pract* 18(1) 98.

AIM: to explore whether all-cause mortality differed between persons with diagnosed hypothyroidism, type 2 diabetes (T2DM), and hypertension, compared with persons with undetected-, and with persons without the corresponding disease.

METHODS: A prospective cohort study of the general population in Nord-Trøndelag, Norway. Persons ≥ 20 years at baseline 1995-97 were followed until death or June 15, 2016. Cox proportional hazards models were used to compute age and multiple adjusted hazard ratios (HR) with 95% confidence intervals (CI) for the association between disease status and all-cause mortality. The number of participants in the hypothyroidism study was 31,960, in the T2DM study 37,957, and in the hypertension study 63,371.

RESULTS: Mortality was increased in persons with diagnosed type 2 diabetes and hypertension, compared to persons without corresponding disease; HR 1.69 (95% CI 1.55-1.84) and HR 1.23 (95% CI 1.09-1.39), respectively. Among persons with undetected T2DM, the HR was 1.21 (95% CI 1.08-1.37), whilst among undetected hypothyroidism and hypertension, mortality was not increased compared with persons without the diseases. Further, the association with mortality was stronger in persons with long duration of T2DM (HR 1.96 (95% CI 1.57-2.44)) and hypertension (HR 1.32 (95% CI 1.17-1.49)), compared with persons with short duration (HR 1.29 (1.09-1.53) and HR 1.16 (1.03-1.30) respectively).

[View full text](#)

Kashiwagi, R., Iwahashi, H., Yamada, Y., et al. 2017. **Effective waist circumference reduction rate necessary to avoid the development of type 2 diabetes in Japanese men with abdominal obesity.** *Endocrine Journal* 64(9) 881-894.

AIM: to determine the effective waist circumference (WC) reduction rate in avoiding the development of type 2 diabetes mellitus (T2DM) in > 55 years and ≥ 55 years Japanese men with abdominal obesity.

METHODS: The study subjects were 795 men with WC ≥ 85 cm, fasting plasma glucose < 126 mg/dL, 2-hr plasma glucose on 75 g of oral glucose tolerance test < 200 mg/dL, and HbA1c 5.6-6.4 % (38-40 mmol/mol) at baseline who underwent general health checkups more than twice between April 2007 and May 2015. They were divided into 5 groups based on the change in WC during the observation period (WC gain group, and four groups stratified according the rate of WC loss). The subjects were also divided into the < 55 years and ≥ 55 years (at baseline) subgroups. The cumulative incidence rate of T2DM was analyzed and compared among the groups.

RESULTS: The cumulative incidence rates of the largest WC loss quartile (≥ 5.45 %) in all age, of the largest WC loss quartile (≥ 5.60 %) and second largest WC loss quartile (3.44-5.59 %) in the < 55 years subgroup, and of the largest WC loss quartile (≥ 5.37 %) in the ≥ 55 years subgroup were significantly lower than that of the gain group ($p < 0.001$, $p = 0.009$, 0.012, and 0.012, respectively). WC reduction rate of at least about 3 % in the younger (< 55 years) and at least about 5 % in the older (≥ 55 years) non-diabetic Japanese men with abdominal obesity can effectively reduce the chance of development of T2DM.

[View full text](#)

Lee, C. M. Y., Versace, V. L., Malo, J. A., et al. 2018. **Screening for diabetes prevention with diabetes risk scores - A balancing act.** *Diabetes Research & Clinical Practice* 135 120-127.

AIM: To compare the diabetes prevention impact and cost of several screening scenarios for diabetes prevention programs with the scenario which included an oral glucose tolerance test (OGTT).

METHODS: We included 4864 participants of the Australian Diabetes, Obesity and Lifestyle study who were aged ≥ 40 years, did not have known diabetes at baseline, and attended the five year follow-up. The proportions of participants eligible or ineligible for diabetes prevention program were estimated for each scenario. The costs of screening and diabetes prevention programs were also estimated.

RESULTS: Screening with OGTT alone identified 21% of participants as eligible for diabetes prevention. While 3.1% of the cohort were identified as high risk and developed diabetes after five years, 1.0% of the cohort were identified as low risk and developed diabetes. The population prevention potential (i.e. sensitivity) for OGTT alone was 76.5%. Screening all Australian adults aged ≥ 40 years in 2015 by OGTT would have cost a total of AU\$2025million (AU\$1031million on screening and AU\$994million on prevention programs). The total costs of screening and prevention were substantially lower when AUSDRISK was used alone or in combination with a blood test. However, the population prevention potentials were also lower (ranged from 20.1% to 50.7%).
View [abstract](#)

Mangurian, C., Niu, G. C., Schillinger, D., et al. 2017. **Utilization of the Behavior Change Wheel framework to develop a model to improve cardiometabolic screening for people with severe mental illness.** *Implementation Science* 12(1) 134.

AIM: to describe the application of an implementation science framework in designing a model to improve CVD outcomes for individuals with severe mental illness (SMI) who receive services in a community mental health setting.

METHODS: Using principles from the theory of planned behavior, focus groups were conducted to understand stakeholder perspectives of barriers to CVD risk factor screening and treatment identify potential target behaviors. We then applied results to the overarching Behavior Change Wheel framework, a systematic and theory-driven approach that incorporates the COM-B model (capability, opportunity, motivation, and behavior), to build an intervention to improve CVD risk factor screening and treatment for people with SMI.

RESULTS: Following a stepped approach from the Behavior Change Wheel framework, a model to deliver primary preventive care for people that use community mental health settings as their de facto health home was developed. The CRANIUM (cardiometabolic risk assessment and treatment through a novel integration model for underserved populations with mental illness) model focuses on engaging community psychiatrists to expand their scope of practice to become responsible for CVD risk, with significant clinical decision support.

View [full text](#)

Manjusha, K., Foraker, R. E., McNeill, A. M., et al. 2017. **Evaluation of the modified FINDRISC to identify individuals at high risk for diabetes among middle-aged white and black ARIC study participants.** *Diabetes, Obesity and Metabolism* 19(9) 1260-1266.

AIM: to evaluate a modified Finnish Diabetes Risk Score (FINDRISC) for predicting the risk of incident diabetes among white and black middle-aged participants from the Atherosclerosis Risk in Communities (ARIC) study.

METHODS: We assessed 9754 ARIC cohort participants who were free of diabetes at baseline. Logistic regression and receiver operator characteristic (ROC) curves were used to evaluate a modified FINDRISC for predicting incident diabetes after 9 years of follow-up, overall and by race/gender group. The modified FINDRISC used comprised age, body mass index, waist circumference, blood pressure medication and family history.

RESULTS: The mean FINDRISC (range, 2 [lowest risk] to 17 [highest risk]) for black women was higher (9.9 ± 3.6) than that for black men (7.6 ± 3.9), white women (8.0 ± 3.6) and white men (7.6 ± 3.5). The incidence of diabetes increased generally across deciles of FINDRISC for all 4 race/gender groups. ROC curve statistics for the FINDRISC showed the highest area under the curve for white women (0.77) and the lowest for black men (0.70).

View [abstract](#)

Paige, E., Barrett, J., Nazareth, I., et al. 2016. **A new cardiovascular disease risk model using historical repeated predictors in electronic health records.** *Circulation. Conference: American Heart Association's* 134(Supplement 1).

AIM: to develop a new proposed CVD risk algorithm that utilizes historical risk predictors and handles missing data in electronic health records.

METHODS: Prospective open cohort study with routinely collected data from across 10 GP practices in England and Wales contributing to The Health Improvement Network database. Data from 63,437 patients aged 40-84 with 3,873 cardiovascular events were split into 2/3 derivation and 1/3 validation cohorts. The main outcome was newly recorded diagnoses of CVD. Risk factors included age, sex, diabetes status, antihypertensive medication use, and all repeated measures of systolic blood pressure, total cholesterol, HDL cholesterol and smoking status. A landmark-age Cox model, stratified by sex, using data from patients without previous CVD and/or statin prescriptions was constructed using summary measures of the historical risk predictors estimated from multivariate mixed models that allow for missing data.

RESULTS: Model fit and risk discrimination from the validation sample indicated that use of historical predictors improves 10-year CVD risk prediction. Although the model complexity increased, model fit was improved with the inclusion of summary statistics from the multivariate mixed models. The C-index, a measure of how well the

model discriminates individuals with and without CVD, for a null model with age and diabetes status only was 0.7450 [95% CI: 0.7267, 0.7634] and increased to 0.7667 [0.7490, 0.7844] when repeated measurements of systolic blood pressure, total and HDL cholesterol and smoking status were included in the risk prediction algorithm.

[View abstract](#)

Rains, S. A., Hingle, M. D., Surdeanu, M., et al. 2018. **A Test of The Risk Perception Attitude Framework as a Message Tailoring Strategy to Promote Diabetes Screening.** *Health Communication* 1-8.

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

METHODS: 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 the control message. The results also showed differences in attitudes and behavioral intentions across the four RPA groups. 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 behavior.

[View abstract](#)

Cross-sectional studies

Byrne, P., Cullinan, J., Murphy, C., et al. 2018. **Cross-sectional analysis of the prevalence and predictors of statin utilisation in Ireland with a focus on primary prevention of cardiovascular disease.** *BMJ Open* 8(2) e018524.

AIM: To describe the prevalence of statin utilisation by people aged over 50 years in Ireland and the factors associated with the likelihood of using a statin, focusing particularly on those using statins for primary prevention of cardiovascular disease (CVD).

METHODS: This is a cross-sectional analysis of cardiovascular risk and sociodemographic factors associated with statin utilisation from wave 1 of The Irish Longitudinal Study on Ageing. A hierarchy of indications for statin utilisation, consisting of eight mutually exclusive levels of CVD-related diagnoses, was created. Participants were assigned one level of indication. The prevalence of statin utilisation was calculated.

RESULTS: In this nationally representative sample (n=5618) of community-dwelling participants aged 50 years and over, 1715 (30.5%) were taking statins. Of these, 65.0% (57.3% of men and 72.7% of women) were doing so for the primary prevention of CVD. Thus, almost two-thirds of those taking statins did so for primary prevention and there was a notable difference between women and men in this regard. We also found that statin utilisation was highest among those with a prior history of CVD and was significantly associated with age (compared with the base category 50-64 years; 65-74 years OR 1.38 (95% CI 1.16 to 1.65); 75+ OR 1.33 (95% CI 1.04 to 1.69)), living with a spouse or partner (compared with the base category living alone; OR 1.35 (95% CI 1.10 to 1.65)), polypharmacy (OR 1.74 (95% CI 1.39 to 2.19)) and frequency of general practitioner visits (compared with the base category 0 visits per year; 1-2 visits OR 2.46 (95% CI 1.80 to 3.35); 3-4 visits OR 3.24 (95% CI 2.34 to 4.47); 5-6 visits OR 2.98 (95% CI 2.08 to 4.26); 7+ visits OR 2.51 (95% CI 1.73 to 3.63)), even after controlling for clinical need. There was no association between using statins and gender, education, income, social class, health insurance status, location or Systematic Coronary Risk Evaluation (SCORE) risk in the multivariable analysis.

[View full text](#)

Diederichs, C., Neuhauser, H., Rucker, V., et al. 2018. **Predicted 10-year risk of cardiovascular mortality in the 40 to 69 year old general population without cardiovascular diseases in Germany.** *PLOS ONE* 13(1) e0190441.

AIM: To estimate the 10-year risk of fatal cardiovascular disease (CVD) in the 40 to 69 year old general population in Germany stratified by sex and to analyze differences between socio-economic status (SES), region and community size in individuals without CVD.

METHODS: In 3,498 participants (40–69 years) from the German Health Examination Survey for Adults 2008–2011 (DEGS1) without a history of CVD (myocardial infarction, coronary heart disease, heart failure, stroke) we estimated the proportion with a low (SCORE <1%), moderate (SCORE 1–<5%) and high 10-year CVD mortality risk (SCORE ≥5% or diabetes, renal insufficiency, SBP/DPB ≥180/110 mmHg or cholesterol >8 mmol/l).

RESULTS: The prevalence of low, moderate and high risk was 42.8%, 38.5% and 18.8% in men and 73.7%, 18.1% and 8.2% in women. The prevalence of high risk was significantly lower in women with a high compared to a low SES (3.3% vs. 11.2%) and in communities with ≥100,000 inhabitants compared to <20,000 inhabitants (5.4%

vs.10.9%). There were no significant associations between predicted CVD mortality risk and SES or community size in men and regions in men and women. Among the high risk group, 58.2% of men and 9.8% of women had SCORE \geq 5%, leaving the majority of women (60.1%) classified as high risks due to diabetes and SCORE <5%.

View [full text](#)

Hu, H., Nakagawa, T., Yamamoto, S., et al. 2018. **Development and validation of risk models to predict the 7-year risk of type 2 diabetes: The Japan Epidemiology Collaboration on Occupational Health Study.** *Journal of Diabetes Investigation* 30 30.

AIM: to develop and validate flexible risk models that can predict the risk of diabetes for any arbitrary time-point during 7 years.

METHODS: The participants were 46,198 Japanese employees aged 30-59 years, without diabetes at baseline and with a maximum follow-up period of 8 years. Incident diabetes was defined according to the American Diabetes Association criteria. With routine health checkup data (age, sex, abdominal obesity, body mass index, smoking status, hypertension status, dyslipidemia, glycated hemoglobin and fasting plasma glucose), we developed non-invasive and invasive risk models based on the Cox proportional hazards regression model among a random two-thirds of the participants, and used another one-third for validation.

RESULTS: The range of the area under the receiver operating characteristic curve increased from 0.73 (95% confidence interval 0.72-0.74) for the non-invasive prediction model to 0.89 (95% confidence interval 0.89-0.90) for the invasive prediction model containing dyslipidemia, glycated hemoglobin and fasting plasma glucose. The invasive models showed improved integrated discrimination and reclassification performance, as compared with the non-invasive model. Calibration appeared good between the predicted and observed risks. These models performed well in the validation cohort.

View [abstract](#)

Nielsen, J., Hulman, A. & Witte, D. R. 2018. **Spousal cardiometabolic risk factors and incidence of type 2 diabetes: a prospective analysis from the English Longitudinal Study of Ageing.** *Diabetologia* 08 08.

AIM: to investigate whether diabetes and cardiometabolic risk factors in one spouse can be used as an indicator of incident type 2 diabetes in the other spouse.

METHODS: We analysed data from 3649 men and 3478 women from the English Longitudinal Study of Ageing with information on their own and their spouse's diabetes status and cardiometabolic risk factors. We modelled incidence rates and incidence rate ratios with Poisson regression, using spousal diabetes status or cardiometabolic risk factors (i.e. BMI, waist circumference, systolic and diastolic BP, HDL- and LDL-cholesterol and triacylglycerols) as exposures and type 2 diabetes incidence in the index individual as the outcome. Models were adjusted for two nested sets of covariates.

RESULTS: Spousal BMI and waist circumference were associated with incident type 2 diabetes, but with different patterns for men and women. A man's risk of type 2 diabetes increased more steeply with his wife's obesity level, and the association remained statistically significant even after adjustment for the man's own obesity level. Having a wife with a 5 kg/m² higher BMI (30 kg/m² vs 25 kg/m²) was associated with a 21% (95% CI 11%, 33%) increased risk of type 2 diabetes. In contrast, the association between incident type 2 diabetes in a woman and her husband's BMI was attenuated after adjusting for the woman's own obesity level. Findings for waist circumference were similar to those for BMI. Regarding other risk factors, we found a statistically significant association only between the risk of type 2 diabetes in women and their husbands' triacylglycerol levels.

View [abstract](#)

Streit, S., Gussekloo, J., Burman, R. A., et al. 2018. **Burden of cardiovascular disease across 29 countries and GPs' decision to treat hypertension in oldest-old.** *Scandinavian Journal of Primary Health Care* 36(1) 89-98.

AIM: to explore whether differences in country-specific cardiovascular disease (CVD) burden and life expectancy could explain the large variations in general practitioner (GP) hypertension treatment probability in oldest-old (>80 years) between countries

METHODS: This is a survey study using case-vignettes of oldest-old patients with different comorbidities and blood pressure levels. An ecological multilevel model analysis was performed. GP respondents from European General Practice Research Network (EGPRN) countries, Brazil and New Zealand. This study included 2543 GPs from 29 countries. Main outcome measures: GP treatment probability to start or not start antihypertensive treatment based on responses to case-vignettes; either low (<50% started treatment) or high (\geq 50% started treatment). CVD burden is defined as ratio of disability-adjusted life years (DALYs) lost due to ischemic heart disease and/or stroke and total DALYs lost per country; life expectancy at age 60 and prevalence of oldest-old per country.

RESULTS: In this study including 1947 GPs from 29 countries, we found that a high country-specific cardiovascular disease (CVD) burden (i.e. myocardial infarction and/or stroke) was associated with a higher GP treatment probability in patients aged >80 years. However, the association was modified by country-specific life expectancy at age 60. While there was a positive association for GPs in countries with a low life expectancy at age 60, there was no association in countries with a high life expectancy at age 60

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Tschaftary, A., Hess, N., Hiltner, S., et al. 2018. **The association between sex, age and health literacy and the uptake of cardiovascular prevention: a cross-sectional analysis in a primary care setting.** *Journal of Public Health* 1-8.

AIM: to identify social determinants associated with the willingness to engage in prevention and healthy lifestyle choices.

METHODS: A total of 1,056 (70% response rate) of the patients attending a cardiology/primary care practice in the urban area of Berlin, Germany, were recruited to fill out a questionnaire for this cross-sectional survey.

Patients provided sociodemographic and health literacy information, described their attitude towards prevention and lifestyle choices, as well as hurdles and requests towards measure design.

RESULTS: Sex, age and health literacy emerged as prime influencers of preventative choices. Sex differences affected the attendance of screening measures and lifestyle choices, although no differences emerged in attitude towards prevention between women and men. Low health literacy consistently associated with consideration of healthy lifestyle changes, but not with active engagement in them. Men more frequently reported a need for clear explanation of the utility of prevention by their physicians (44% vs 37%) and low health literacy correlated with an increased request for free or subsidized offers (56% vs 44%). Time constraint was the most frequently mentioned hurdle (32%) for attendance, followed by costs (19%).

View [abstract](#)

Albu, J. B., Sohler, N., Li, R., et al. 2017. **An interrupted time series analysis to determine the effect of an electronic health record-based intervention on appropriate screening for type 2 diabetes in urban primary care clinics in New York City.** *Diabetes Care* 40(8) 1058-1064.

AIM: To determine the impact of a health system-wide primary care diabetes management system, which included targeted guidelines for type 2 diabetes (T2DM) and prediabetes (dysglycemia) screening, on detection of previously undiagnosed dysglycemia cases.

METHODS: Intervention included electronic health record (EHR)-based decision support and standardized providers and staff training for using the American Diabetes Association guidelines for dysglycemia screening. Using EHR data, we identified 40,456 adults without T2DM or recent screening with a face-to-face visit (March 2011-December 2013) in five urban clinics. Interrupted time series analyses examined the impact of the intervention on trends in three outcomes: (1) monthly proportion of eligible patients receiving dysglycemia testing, (2) two negative comparison conditions (dysglycemia testing among ineligible patients and cholesterol screening), and (3) yield of undiagnosed dysglycemia among those tested.

RESULTS: Baseline monthly proportion of eligible patients receiving testing was 7.4-10.4%. After the intervention, screening doubled (mean increase + 11.0% [95% CI 9.0, 13.0], proportion range 18.6-25.3%). The proportion of ineligible patients tested also increased (+5.0% [95% CI 3.0, 8.0]) with no concurrent change in cholesterol testing (+0% [95% CI -0.02, 0.05]). About 59% of test results in eligible patients showed dysglycemia both before and after the intervention.

View [full text](#)

Avilés-Santa, M. L., Pérez, C. M., Schneiderman, N., et al. 2017. **Detecting prediabetes among Hispanics/Latinos from diverse heritage groups: does the test matter? Findings from the Hispanic Community Health Study/Study of Latinos.** *Preventive Medicine* 95 110-118.

AIM: to compare the ability of fasting plasma glucose (FPG), post oral load plasma glucose (2hPG), and hemoglobin A1c (HbA1c) to identify U.S. Hispanic/Latino individuals with prediabetes, and to assess its cardiovascular risk factor correlates.

METHODS: This is a cross-sectional analysis of baseline data from 15,507 adults without self-reported diabetes mellitus from six Hispanic/Latino heritage groups, enrolled in the Hispanic Community Health Study/Study of Latinos, which takes place in four U.S. communities. The prevalence of prediabetes was determined according to individual or combinations of ADA-defined cut points: FPG=5.6-7.0 mmol/L, 2hPG=7.8-11.1 mmol/L, and HbA1c=5.7%-6.4% (39-46 mmol/mol). The sensitivity of these criteria to detect prediabetes was estimated. The prevalence ratios (PRs) for selected cardiovascular risk factors were compared among alternative categories of prediabetes versus normoglycemia.

RESULTS: Approximately 36% of individuals met any of the ADA prediabetes criteria. Using 2hPG as the gold standard, the sensitivity of FPG was 40.1%, HbA1c was 45.6%, and that of HbA1c + FPG was 62.2%. The number of significant PRs for cardiovascular risk factors was higher among individuals with isolated 2hPG=7.8-11.1 mmol/L, FPG=5.6-7.0 mmol/L + HbA1c=5.7%-6.4%, or those who met the three prediabetes criteria.

[View full text](#)

Eun-Jung, R., Kyungdo, H., Seung-Hyun, K., et al. 2017. **Increased risk for diabetes development in subjects with large variation in total cholesterol levels in 2,827,950 Koreans: A nationwide population-based study.** *PLoS ONE* 12(5) 0176615.

AIM: to analyze the relationship between variations of total cholesterol (TC) levels and the risk for type 2 diabetes development from a Korean nationwide population-based database.

METHODS: We examined the General Health Check-up sub-dataset of the Korean National Health Insurance Service (NHIS) of 2,827,950 participants who had at least three health check-ups between 2002 and 2007, and were not reported to have diabetes during that time. The examinees were divided into 10 groups according to TC variation, and the hazard ratio for diabetes development from 2007 to 2013, were analyzed.

RESULTS: During the follow-up period, 3.4% of the participants had developed diabetes. The hazard ratio (HR) for diabetes development relative to the overall risk in the whole study population started to be higher than 1.0 from eighth decile of TC variation. The highest decile group showed an increased HR for diabetes development after adjustment for confounding variables (1.139; 95% confidence interval 1.116~1.163). These results were similar regardless of the use of anti-hyperlipidemic medication and baseline TC levels. The participants with a large variation in TC levels showed an increased risk for diabetes development, independent of the use of anti-hyperlipidemic medications. These results suggest a relationship between fluctuations in lipid levels and the development of type 2 diabetes.

[View full text](#)

Jackson, S. L., Safo, S. E., Staimez, L. R., et al. 2017. **Glucose challenge test screening for prediabetes and early diabetes.** *Diabetic Medicine* 34(5) 716-724.

AIM: To test the hypothesis that a 50-g oral glucose challenge test with 1-h glucose measurement would have superior performance compared with other opportunistic screening methods.

METHODS: In this prospective study in a Veterans Health Administration primary care clinic, the following test performances, measured by area under receiver-operating characteristic curves, were compared: 50-g oral glucose challenge test; random glucose; and HbA1c level, using a 75-g oral glucose tolerance test as the 'gold standard'.

RESULTS: The study population was comprised of 1535 people (mean age 56 years, BMI 30.3 kg/m², 94% men, 74% black). By oral glucose tolerance test criteria, diabetes was present in 10% and high-risk prediabetes was present in 22% of participants. The plasma glucose challenge test provided area under receiver-operating characteristic curves of 0.85 (95% CI 0.78-0.91) to detect diabetes and 0.76 (95% CI 0.72-0.80) to detect high-risk dysglycaemia (diabetes or high-risk prediabetes), while area under receiver-operating characteristic curves for the capillary glucose challenge test were 0.82 (95% CI 0.75-0.89) and 0.73 (95% CI 0.69-0.77) for diabetes and high-risk dysglycaemia, respectively. Random glucose performed less well [plasma: 0.76 (95% CI 0.69-0.82) and 0.66 (95% CI 0.62-0.71), respectively; capillary: 0.72 (95% CI 0.65-0.80) and 0.64 (95% CI 0.59-0.68), respectively], and HbA1c performed even less well [0.67 (95% CI 0.57-0.76) and 0.63 (95% CI 0.58-0.68), respectively]. The cost of identifying one case of high-risk dysglycaemia with a plasma glucose challenge test would be \$42 from a Veterans Health Administration perspective, and \$55 from a US Medicare perspective

[View abstract](#)

Jun, J., Lee, S., Lee, Y., et al. 2017. **Increase in serum albumin concentration is associated with prediabetes development and progression to overt diabetes independently of metabolic syndrome.** *PLoS ONE* 12(4) e0176209-e0176209.

AIM: to investigate whether baseline serum albumin and change in serum albumin could be independent risk factors for prediabetes in subjects without metabolic syndrome (MetS).

METHODS: Among 10,792 participants without diabetes and MetS who consecutively underwent yearly health check-ups over six years, 9,807 subjects without incident MetS were enrolled in this longitudinal retrospective study. The risk of developing prediabetes (impaired fasting glucose or hemoglobin A1c) was analyzed according to baseline and percent change in serum albumin concentration using Cox regression analysis. Serial changes in serum albumin concentration were measured from baseline to one year before prediabetes diagnosis, and then from the time of prediabetes diagnosis to progression to overt diabetes or final follow-up.

RESULTS: A total of 4,398 incident cases of prediabetes developed during 35,807 person-years (median 3.8 years).

The hazard ratio for incident prediabetes decreased as percent change in serum albumin concentration (quartiles and per 1%) increased in a crude and fully adjusted model. However, baseline serum albumin concentration itself was not associated with prediabetic risk. Serum albumin levels kept increasing until the end of follow-up in prediabetic subjects who returned to normal glycemic status, whereas these measures did not change in prediabetic subjects who developed type 2 diabetes. Serum albumin concentration measured at the end of follow-up was the highest in the regression group, compared to the stationary ($p=0.014$) or progression groups ($p=0.009$).

View [full text](#)

Hyun KK, Redfern J, Patel A. et al. 2017. **Gender inequalities in cardiovascular risk factor assessment and management in primary healthcare.** *Heart* 103(7) 492.

AIM: To quantify contemporary differences in cardiovascular disease (CVD) risk factor assessment and management between women and men in Australian primary healthcare services.

METHODS: Records of routinely attending patients were sampled from 60 Australian primary healthcare services in 2012 for the Treatment of Cardiovascular Risk using Electronic Decision Support study. Multivariable logistic regression models were used to compare the rate of CVD risk factor assessment and recommended medication prescriptions, by gender.

RESULTS: Of 53 085 patients, 58% were female. Adjusting for demographic and clinical characteristics, women were less likely to have sufficient risk factors measured for CVD risk assessment (OR (95% CI): 0.88 (0.81 to 0.96)). Among 13 294 patients (47% women) in the CVD/high CVD risk subgroup, the adjusted odds of prescription of guideline-recommended medications were greater for women than men: 1.12 (1.01 to 1.23). However, there was heterogeneity by age ($p < 0.001$), women in the CVD/high CVD risk subgroup aged 35-54 years were less likely to be prescribed the medications (0.63 (0.52 to 0.77)), and women in the CVD/high CVD risk subgroup aged ≥ 65 years were more likely to be prescribed the medications (1.34 (1.17 to 1.54)) than their male counterparts.

View [abstract](#)

Rhee, M. K., Safo, S. E., Jackson, S. L., et al. 2018. **Inpatient Glucose Values: Determining the Nondiabetic Range and Use in Identifying Patients at High Risk for Diabetes.** *American Journal of Medicine.* Apr; 131(4): 443.e11-443.e24.

AIM: to evaluate the utility of inpatient glucose levels as an opportunistic screening tool for identifying patients at high risk for diabetes.

METHODS: We retrospectively examined 462,421 patients in the US Department of Veterans Affairs healthcare system, hospitalized on medical/surgical services in 2000-2010, for ≥ 3 days, with ≥ 2 inpatient random plasma glucose (RPG) measurements. All had continuity of care: ≥ 1 primary care visit and ≥ 1 glucose measurement within 2 years before hospitalization and yearly for ≥ 3 years after discharge. Glucose levels during hospitalization and incidence of diabetes within 3 years after discharge in patients without diabetes were evaluated.

RESULTS: Patients had a mean age of 65.0 years, body mass index of 29.9 kg/m², and were 96% male, 71% white, and 18% black. Pre-existing diabetes was present in 39.4%, 1.3% were diagnosed during hospitalization, 8.1% were diagnosed 5 years after discharge, and 51.3% were never diagnosed (NonDM). The NonDM group had the lowest mean hospital RPG value (112 mg/dL [6.2 mmol/L]). Having at least 2 RPG values > 140 mg/dL (> 7.8 mmol/L), the 95th percentile of NonDM hospital glucose, provided 81% specificity for identifying incident diabetes within 3 years after discharge.

View [abstract](#)

Sartini, C., Whincup, P. H., Wannamethee, S. G., et al. 2017. **Associations of time of day with cardiovascular disease risk factors measured in older men: results from the British Regional Heart Study.** *BMJ Open* 7(11).

AIM: to estimate associations of time of day with cardiovascular disease (CVD) risk factors measured in older men.

METHODS: CVD risk factors (markers of inflammation and haemostasis, and cardiac markers) were measured on one occasion between 08:00 and 19:00 hours in 4252 men aged 60-79 years from the British Regional Heart Study. Linear models were used to estimate associations between time of day and risk factors. When an association was found, we examined whether the relationship between risk factors and cardiovascular mortality was affected by the adjustment for time of day using survival analyses.

RESULTS: N-terminal pro-brain natriuretic peptide (NT-proBNP) levels increased by 3.3% per hour (95% CI 1.9% to 4.8%), interleukin-6 (IL-6) increased by 2.6% per hour (95% CI 1.8% to 3.4%), while tissue plasminogen activator (t-PA) decreased by 3.3% per hour (95% CI 3.7% to 2.9%); these associations were unaffected by adjustment for possible confounding factors. The percentages of variation in these risk factors attributable to time of day were less than 2%. In survival analyses, the association of IL-6, NT-proBNP and t-PA with cardiovascular mortality was

not affected by the adjustment for time of day. C reactive protein, fibrinogen, D-dimer, von Willebrand factor and cardiac troponin T showed no associations with time of day.

[View full text](#)

Rosendaal, N. T. A., Alvarado, B., Wu, Y. Y., et al. 2017. **Adolescent Childbirth Is Associated With Greater Framingham Risk Scores for Cardiovascular Disease Among Participants of the IMIAS (International Mobility in Aging Study)**. *Journal of the American Heart Association* 6(11).

AIM: to examine the association of age at first childbirth (AFB) with a summary cardiovascular risk measure (Framingham Risk Score [FRS]).

METHODS: As part of the IMIAS (International Mobility in Aging Study), data were collected in 2012 among 1047 women, aged 65 to 74 years, from Canada, Albania, Colombia, and Brazil. FRSs were calculated to describe cardiovascular risk profiles, and linear regression analyses were performed, adjusting for early life and socioeconomic variables. Women with an AFB of <20 years were compared with women with an AFB of 20 to 24, 25 to 29, and ≥30 years, as well as nulliparous women.

RESULTS: Compared with the lowest AFB risk group (25–29 years), women with an AFB of <20 years had a 5.8-point higher mean FRS (95% confidence interval, 3.4–8.3 points). Nulliparous women presented the lowest mean FRS in all analyses. The analysis comparing combinations of AFB and parity categories showed no meaningful differences in FRS between women who had 1 to 3 childbirths and those who had ≥4 childbirths within the stratum of AFB <20 years, and in the stratum of AFB ≥20 years.

[View full text](#)

Suh, S., Bae, J. C., Jin, S.-M., et al. 2017. **Serum calcium changes and risk of type 2 diabetes mellitus in Asian population**. *Diabetes Research & Clinical Practice* 133 109-114.

AIM: to examine the association between changes in serum calcium levels with the incidence of type 2 diabetes mellitus (T2DM) in apparently healthy South Korean subjects.

METHODS: A retrospective longitudinal analysis was conducted with subjects who had participated in comprehensive health check-ups at least four times over a 7-year period (between 2006 and 2012). In total, 23,121 subjects were categorized into tertiles based on changes in their albumin-adjusted serum calcium levels. Multivariate Cox regression models were fitted to assess the association between changes in serum calcium levels during follow-up and the relative risk of diabetes incidence.

RESULTS: After a median follow-up of 57.4 months, 1,929 (8.3%) new cases of T2DM occurred. Simple linear regression analysis showed serum calcium level changes correlated positively with changes in HbA1c and fasting plasma glucose (FPG) levels (B=5.72, p<0.001 for FPG; B=0.13, p<0.001 for HbA1c). An increase in albumin-adjusted serum calcium levels during follow-up was related to an increased risk of T2DM. After adjustment for potential confounders, the risk of T2DM was 1.6 times greater for subjects whose albumin-adjusted serum calcium levels were in the highest change tertile during follow-up than for subjects whose levels were in the lowest tertile (HR 1.65, 95% CI 1.44-1.88, P<0.001).

[View abstract](#)

Tsujiguchi, H., Hori, D., Kambayashi, Y., et al. 2017. **Sex- and age-specific associations of social status and health-related behaviors with health check attendance: findings from the cross-sectional Kanazawa Study**. *Health* 9(9) 1285-1300.

AIM: to examine the sex- and age-specific association of social status and health-related behaviors with health check attendance in eligible persons.

METHODS: Data were derived from the Kanazawa Study 2011 (n=12,781), a cross-sectional study which investigated all the residents in model areas of Kanazawa City, Ishikawa Prefecture, Japan. We selected participants aged 23 years or older with National Health Insurance (n=4920). Attendance at health checks was the outcome. We used social status and health-related behaviors as predictor variables. We analyzed them by sex and applied stratified analyses by age groups for each sex.

RESULTS: Working men and women aged 23 to 39 years and aged 40 to 64 years had significantly increased ORs for health check attendance compared with non-working persons. Men, men aged 23 to 39 years and men aged 65 years or older with more physical activity had significantly increased ORs for health check attendance. Male ex-smokers, female ex- and non-smokers, male ex-smokers aged 65 years or older, and female non-smokers aged 40 to 64 years had significantly increased ORs.

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Czupryniak, L., Szymanska-Garbacz, E., Bijos, P., et al. 2016. **Diabetes or prediabetes should be actively sought in overweight individuals aged >45 with family history of diabetes.** *Diabetes* 65 (Supplement 1) A598.

AIM: to conduct a primary care physician (PCP)-based nationwide screening programme in order to identify individuals with undiagnosed diabetes or prediabetes

METHODS: 561 PCPs enrolled 21 726 subjects. No earlier diagnosis of diabetes or prediabetes and the presence of at least one risk factor (age>45 yrs, family history of diabetes, sedentary lifestyle, smoking, presence of fatty liver disease, hypertension, hyperlipidemia, coronary artery disease, peripheral artery disease, obstructive sleep apnoea syndrome, polycystic ovary syndrome, history of stroke, gestational diabetes or having a child of birth weight >4 kg, BMI>25 kg/m² or waist circumference >80 cm [women] or 94 cm [men]) were inclusion criteria. All subjects underwent fasting plasma glucose (FPG) measurement, and if it was >125 mg/dl, second FPG measurement was conducted. The subjects with first FPG measurement 100-125 mg/dl had an oral 75 g glucose tolerance test (OGTT) performed.

RESULTS: Diabetes was diagnosed in 4221 (19.4%), and prediabetes in 5829 (26.8%) subjects. 2825 (66.9%) diabetes cases were diagnosed upon two FPG measurements >125 mg/dl. In 6265 (28.8%) subjects the concomitant presence of three main unmodifiable risk factors, simple to be identified in PCP setting, i.e., age >45 years, family history of diabetes and BMI >25 kg/m² were noted. In this subgroup 1989 (31.7%) individuals were found to have diabetes and 2101 (33.5%) to have prediabetes. Odds ratio (OR) for diabetes in this subgroup was 2.757 (95% CI 2.57-2.957), and for both diabetes or prediabetes 2.998 (2.818-3.189). In conclusion, almost half of the subjects visiting their PCP have undiagnosed diabetes or prediabetes.

View [abstract](#) (pA598)

Modelling studies

Daisuke, I., Toki, S. & Hiroshi, O. 2017. **Impact of predicting health-guidance candidates using massive health check-up data: A data-driven analysis.** *International journal of medical informatics* 106 32.

AIM: to present a model for predicting whether an examinee is a candidate for health guidance

METHODS: Using machine learning methods, we developed the following five prediction models for identifying health-guidance candidates: baseline: this model included sex and age; model 1: this model included variables that can be measured in person+information on whether the examinee was a candidate in the past year; model 2: model 1+systolic blood pressure+diastolic blood pressure; model 3: model 2+all health checkup results from the past year; and model 4: model 3 using the training dataset excluding cases with missing data.

RESULTS: The performance levels of the five prediction models (the AUC values of the models for the test dataset) were as follows: 0.592 [95% CI: 0.586-0.596] for the baseline model, 0.855 [95% CI: 0.851-0.858] for model 1, 0.985 [95% CI: 0.984-0.985] for model 2, 0.993 [95% CI: 0.993-0.993] for model 3, and 0.943 [95% CI: 0.941-0.945] for model 4. The model that used all health checkup results from the past year had the highest predictive power.

View [abstract](#)

DeFilippis AP, Young R, McEvoy JW et al. 2017. **Risk score overestimation: the impact of individual cardiovascular risk factors and preventive therapies on the performance of the American Heart Association-American College of Cardiology-Atherosclerotic Cardiovascular Disease risk score in a modern mult.** *European Heart Journal* 38(8) 598.

AIM: To evaluate the 2013 American Heart Association (AHA)-American College of Cardiology (ACC)-Atherosclerotic Cardiovascular Disease (ASCVD) risk score among four different race/ethnic groups and to ascertain which factors are most associated with risk overestimation by the AHA-ACC-ASCVD score.

METHODS: The Multi-Ethnic Study of Atherosclerosis (MESA), a prospective community-based cohort, was used to examine calibration and discrimination of the AHA-ACC-ASCVD risk score in 6441 White, Black, Chinese, and Hispanic Americans (aged 45-79 years and free of known ASCVD at baseline). Using univariable and multivariable absolute risk regression, we modelled the impact of individual risk factors on the discordance between observed and predicted 10-year ASCVD risk.

RESULTS: Overestimation was observed in all race/ethnic groups in MESA and was highest among Chinese (252% for women and 314% for men) and lowest in White women (72%) and Hispanic men (67%). Higher age, Chinese race/ethnicity (when compared with White), systolic blood pressure (treated and untreated), diabetes, alcohol use, exercise, lipid-lowering medication, and aspirin use were all associated with more risk overestimation, whereas family history was associated with less risk overestimation in a multivariable model (all P < 0.05). The AHA-ACC-ASCVD risk score overestimates ASCVD risk among men, women, and all four race/ethnic groups evaluated in a modern American primary prevention cohort.

View [full text](#)

Michel, R., Michel, L., Michel, C., et al. 2017. **Number of patients needed to prescribe statins in primary cardiovascular prevention: mirage and reality.** *Family Practice*.
 AIM: to provide estimates of the number of individuals needed to be prescribed a statin to prevent one CHD event accounting for their level of CHD risk and for persistence to treatment.
 METHODS: A post hoc analysis was conducted based on a Cochrane review on statins for the primary prevention of cardiovascular diseases. Five-year NNTs were calculated separately from randomized clinical trials (RCTs), including 'lower' and 'higher' risk populations (CHD mean event rates of 3.7 and 14.4 per 1000 person-years, respectively). NNTs were adjusted for 5-year persistence to treatment using a value of 65%.
 RESULTS: Persistence-adjusted 5-year NNTs to prevent one CHD for the lower and higher CHD risk categories were 146 [95% confidence interval (CI): 117-211] and 53 (95% CI: 39-88) respectively, values 25% and 15% higher than their unadjusted counterpart (117, 95% CI: 94-167 and 46, 95% CI: 34-78).
 View [abstract](#)

Sweeting, M. J., Barrett, J. K., Thompson, S. G., et al. 2017. **The use of repeated blood pressure measures for cardiovascular risk prediction: a comparison of statistical models in the ARIC study.** *Stat Med* 36(28) 4514-4528.
 AIM: to investigate various prediction models that incorporate data from repeat measurements of systolic blood pressure (SBP) into cardiovascular risk prediction.
 METHODS: we compare prediction models that use simple summary measures of the repeat information on SBP, such as (i) baseline only; (ii) last observation carried forward; and (iii) cumulative mean, against more complex methods that model the repeat information using (iv) ordinary regression calibration; (v) risk-set regression calibration; and (vi) joint longitudinal and survival models.
 RESULTS: In comparison with the baseline-only model, we observed modest improvements in discrimination and calibration using the cumulative mean of systolic blood pressure, but little further improvement from any of the complex methods.
 View [full text](#)

Formative Evaluation

Penn, L., Rodrigues, A., Haste, A., et al. 2018. **NHS Diabetes Prevention Programme in England: formative evaluation of the programme in early phase implementation.** *BMJ Open* 8(2) e019467.
 AIM: to evaluate the demonstrator phase and first wave roll-out of the National Health Service (NHS) Diabetes Prevention Programme (DPP) in England; to examine: (1) intervention design, provision and fidelity assessment procedures; (2) risk assessment and recruitment pathways and (3) data collection for monitoring and evaluation.
 METHODS: We reviewed programme documents, mapping against the NHS DPP specification and National Institute for Health and Care Excellence (NICE) public health guideline: Type 2 diabetes (T2D) prevention in people at high risk (PH38), conducted qualitative research using individual interviews and focus group discussions with stakeholders and examined recruitment, fidelity and data collection procedures. Intensive behavioural intervention with weight loss, diet and physical activity goals. The national programme specifies at least 13 sessions over 9 months, delivered face to face to groups of 15-20 adults with non-diabetic hyperglycaemia, mainly recruited from primary care and NHS Health Checks.
 RESULTS: The NHS DPP specification reflected current evidence with a clear framework for service provision. Providers, with national capacity to deliver, supplied intervention plans compliant with this framework. Stakeholders highlighted limitations in fidelity assessment and recruitment and retention challenges, especially in reach and equity, that could adversely impact on implementation. Risk assessment for first wave eligibility differed from NICE guidance.
 View [full text](#)

Process Evaluation

Lewer, S. & Hamid, F. 2016. **Move away from pre-diabetes (MAP), delivering excellence in prevention to reduce rates of diabetes in the UK; A service evaluation.** *Revista Espanola de Nutricion Humana y Dietetica* 20 (Supplement 1) 494.
 AIM: to demonstrate the effectiveness of a locally run, dietetic led diabetes prevention programme in reducing and delaying the onset of type 2 diabetes.
 METHODS: A service evaluation. Between October 2012 and March 2015 individuals (n=801) aged 40-74yrs who were identified with non-diabetic hyperglycaemia (pre-diabetes) (HbA1c of 42-47mmol/mol or Oral Glucose Tolerance Test 7.8-11.1mmol/L) through the NHS health check programme were referred onto the MAP by their

local Primary Care Physician. Dietitians focussed on empowering patients by encouraging self-management and providing each patient with tailored goals for weight loss, improving diet and increasing exercise. Participants had their anthropometry, exercise level and dietary intake measured throughout the programme and these results alongside biochemistry, were compared pre and post intervention.

RESULTS: 54% (n=434/801) of patients who started the programme completed the 6 month intervention. Of those retested (n=387) 79% of patients achieved a reduction in their blood glucose levels and 56% of patients moved out of pre-diabetes.

No freely available abstract.

Qualitative

Cheong, A. T., Chinna, K., Khoo, E. M., et al. 2017. **Determinants for cardiovascular disease health check questionnaire: A validation study.** *PLoS ONE [Electronic Resource]* 12(11) e0188259.

AIM: to develop and validate an instrument that assess determinants that influence individuals' intention to undergo CVD health checks.

METHODS: The concepts and items were developed based on findings from our prior exploratory qualitative study on factors influencing individuals' intention to undergo CVD health checks. Content validity of the questionnaire was assessed by a panel of six experts and the item-level content validity index (I-CVI) was determined. After pretesting the questionnaire was pilot tested to check reliability of the items. Exploratory factor analysis was used to test for dimensionality using a sample of 240 participants.

RESULTS: The finalized questionnaire consists of 36 items, covering nine concepts. The I-CVI for all items was satisfactory with values ranging from 0.83 to 1.00. The exploratory factor analysis showed that the number of factors extracted was consistent with the theoretical concepts. Correlations values between items ranged from 0.30 to 0.85 and all the factor loadings were more than 0.40, indicating satisfactory structural validity. All concepts showed good internal consistency, Cronbach's alpha values ranged 0.66-0.85.

View [full text](#)

Nerida, V., Lauren, T. W., Rachel, C. D., et al. 2017. **Implementation of cardiovascular disease prevention in primary health care: enhancing understanding using normalisation process theory.** *BMC Family Practice* 18(1) 28.

AIM: the main aim of the Model for Prevention (MoFoP) study was to focus on the feasibility of embedding the intervention approach into real world practice, both in the general practice and community setting.

METHODS: Data was collected through interviews with 40 intervention participants and included general practitioners, practice nurses, practice managers, lifestyle advisors and participants. Data analysis was informed by normalisation process theory constructs.

RESULTS: Stakeholders were in agreement that, while prevention is a key function of general practice, it was not their usual work. There were varying levels of engagement with the intervention by practice staff due to staff interest, capacity and turnover, but most staff reconfigured their work for required activities. The Lifestyle Advisors believed staff had varied levels of interest in and understanding of, their service, but most staff felt their role was useful. Patients expanded their existing relationships with their general practice, and most achieved their lifestyle modification goals. While the study highlighted the complex nature of the change required, many of the new or enhanced processes implemented as part of the intervention could be scaled up to improve the systems approach to prevention. Overcoming the barriers to change, such as the perception of CVD prevention as a 'hard sell', is going to rely on improving the value proposition for all stakeholders

View [full text](#)

Economic Evaluations

Jacob, K. K., Philimon, G., Suzanne, G. L., et al. 2017. **Cost-effectiveness of the non-laboratory based Framingham algorithm in primary prevention of cardiovascular disease: A simulated analysis of a cohort of African American adults.** *Preventive Medicine.*

AIM: to examine the incremental cost-effectiveness ratio (ICER) of two cardiovascular disease (CVD) prevention programs guided by the non-lab versus lab-based Framingham algorithm.

METHODS: We simulated the World Health Organization CVD prevention guidelines on a cohort of 2690 AA participants in the Atherosclerosis Risk in Communities (ARIC) cohort. Costs were estimated using Medicare fee schedules (diagnostic tests, drugs & visits), Bureau of Labor Statistics (RN wages), and estimates for managing incident CVD events. Outcomes were assumed to be true positive cases detected at a data driven treatment threshold.

RESULTS: Both algorithms had the best balance of sensitivity/specificity at the moderate risk threshold (>10%

risk). Over 12 years, 82% and 77% of 401 incident CVD events were accurately predicted via the non-lab and lab-based Framingham algorithms, respectively. There were 20 fewer false negative cases in the non-lab approach translating into over \$900,000 in savings over 12 years. The ICER was -\$57,153 for every extra CVD event prevented when using the non-lab algorithm. The approach guided by the non-lab Framingham strategy dominated the lab-based approach with respect to both costs and predictive ability. Consequently, the non-lab Framingham algorithm could potentially provide a highly effective screening tool at lower cost to address the high burden of CVD especially among AA and in resource-constrained settings where lab tests are unavailable
View [abstract](#)

Hoerger, T. J., Gregg, E. W. & Zhang, P. 2016. **Cost-effectiveness of the new U.S. preventive services task force recommendation on screening for abnormal blood glucose and type 2 diabetes.** *Diabetes* 65 (Supplement 1) A92. Conference abstract.

AIM: to estimate the long-term benefits and costs of detecting prediabetes and type 2 diabetes via periodic screening during regularly scheduled office visits.

METHODS: We used a simulation model of type 2 diabetes progression. Health care system costs (in 2012 \$U.S.) and quality-adjusted life-years (QALYs) are evaluated for patients' remaining lifetime. For the analysis, we applied intensive lifestyle intervention to persons with identified prediabetes and standard treatment to those with identified diabetes.

RESULTS: We estimate the incremental cost-effectiveness ratio (ICER) of the new recommendation relative to both no screening and the previous USPSTF recommendation. Relative to no screening, the new USPSTF recommendation had ICERs of \$29,000, \$25,000, \$33,000, and \$46,000 per QALY for those aged 40, 50, 60, and 70 years, respectively. The ICER for the previous USPSTF recommendation relative to no screening was \$32,000 per QALY. Relative to the previous recommendation, the new recommendation screens more people, detects more cases of abnormal glucose, and yields larger health benefits with a relatively attractive ICER. Results are sensitive to assumptions about the cost, effectiveness, and participation rate of the lifestyle intervention for persons with prediabetes. Assuming that the societal willingness to pay for QALYs is at least \$50,000 per QALY, the new USPSTF recommendation on screening for abnormal glucose and type 2 diabetes is cost-effective relative to no screening or the old USPSTF recommendation

No freely available abstract

Diagnostic test studies

Meijnikman, A. S., De Block, C. E. M., Verrijken, A., et al. 2018. **Predicting type 2 diabetes mellitus: a comparison between the FINDRISC score and the metabolic syndrome.** *Diabetology & metabolic syndrome* 10 12.

AIM: to compare the diagnostic accuracy of the metabolic syndrome (MetS) with the FINDRISC score to screen for type 2 diabetes mellitus T2DM in an overweight/obese population.

METHODS: Subjects 18 years or older visiting the obesity clinic of the Antwerp University Hospital were consecutively recruited between 2012 and 2014. Every patient underwent a standard metabolic work-up including a clinical examination with anthropometry. Glucose status was tested using OGTT and HbA1c. FINDRISC questionnaire and MetS were examined.

RESULTS: Of 651 subjects, 50.4% were diagnosed with prediabetes, whereas 11.1% was diagnosed with T2DM. FINDRISC score increased with worsening of glucose status 11 +/- 3, 13 +/- 4 and 15 +/- 5 in respectively, subjects without T2DM, prediabetes and T2DM. 312 subjects had the MetS. The aROC of the FINDRISC to identify subjects with T2DM was 0.76 (95% CI 0.72-0.82), sensitivity was 64% and specificity was 63% with 13 as cutoff point. Adding FPG or HbA1c to FINDRISC, the aROC increased significantly to 0.91(95% CI 0.88-0.95) and 0.93(95% CI 0.90-0.97), respectively (p < 0.001). The aROC of the MetS to identify subjects with diabetes was 0.72 (95% CI 0.65-0.78), sensitivity was 75% and specificity was 55%. The aROC of the FINDRISC + HbA1c was significantly higher than the MetS for predicting T2DM (p < 0.001).

View [full text](#)

Fernández-Alvira, J. M., Fuster, V., Pocock, S., et al. 2017. **Predicting Subclinical Atherosclerosis in Low-Risk Individuals.** *Ideal Cardiovascular Health Score and Fuster-BEWAT Score* 70(20) 2463-2473.

AIM: to compare the effectiveness of ideal cardiovascular health score (ICHS) and Fuster-BEWAT Score (FBS) in predicting the presence and extent of subclinical atherosclerosis.

METHODS: A total of 3,983 participants 40 to 54 years of age were enrolled in the PESA (Progression of Early Subclinical Atherosclerosis) cohort. Subclinical atherosclerosis was measured in right and left carotids, abdominal aorta, right and left iliofemoral arteries, and coronary arteries. Subjects were classified as having poor, intermediate, or ideal cardiovascular health based on the number of favorable ICHS or FBS.

RESULTS: With poor ICHS and FBS as references, individuals with ideal ICHS and FBS showed lower adjusted odds of having atherosclerotic plaques, coronary artery calcium, higher number of affected territories and higher CACS level. Similar levels of significantly discriminating accuracy were found for ICHS and FBS with respect to the presence of plaques

View [full text](#)

Wang, Y., Yuan, Y., Zhang, Y., et al. 2017. **Serum 1,5-anhydroglucitol level as a screening tool for diabetes mellitus in a community-based population at high risk of diabetes.** *Acta Diabetologica* 54(5) 425-431.

AIM: to assess the value of serum 1,5-anhydroglucitol (1,5-AG) for the diagnosis and screening of diabetes mellitus in a community-based population at high risk of diabetes.

METHODS: In this diagnostic test, 1170 participants underwent a 75-g oral glucose tolerance test. Venous blood samples were collected for fasting blood glucose (FBG), 2-h postprandial blood glucose (PBG), and glycosylated hemoglobin A1c (HbA1c) measurements. Serum 1,5-AG levels were detected by the GlycoMark assay, and a receiver operating characteristic (ROC) curve was generated to assess their diagnostic value for diabetes.

RESULTS: A total of 298 adults were diagnosed with diabetes, indicating a prevalence of 25.47%. Partial Pearson correlation analysis adjusted for age and body mass index showed that serum 1,5-AG level was negatively correlated with FBG, PBG, and HbA1c (all $P < 0.01$). Areas under the curves (AUCs) for serum 1,5-AG, FBG, PBG, and HbA1c in identifying diabetes were 0.920, 0.874, 0.933, and 0.887, respectively. According to the ROC curve, the optimal cutoff value of serum 1,5-AG for diagnosing diabetes was 11.18 $\mu\text{g/ml}$, which yielded a sensitivity of 92.6% and a specificity of 82.3%, respectively. Comparisons between 1,5-AG and HbA1c showed that both the AUC and sensitivity of 1,5-AG were higher than those of HbA1c.

View [abstract](#)

Anderson, J. H., Kendall, S. C., Brunelle, R., et al. 2016. **Failure of fasting blood glucose screening to detect all persons with diabetes or prediabetes.** *Diabetes* 65 (Supplement 1) A221.

AIM: To examine the efficacy of using fasting blood glucose (FBG) as a screening tool

METHODS: data was analyzed from 22,498 subjects, in a de-identified Health and Wellness Screening Database, who had no prior diagnosis of glycemic disorders and had both FBG and hemoglobin A1c (A1c) measurements.

RESULTS: Subjects were 64% female, 82% Caucasian, 6% Hispanic, 5% African American, and 4% Asian. They ranged in age from 18 to 84, had an average BMI of 29, an average A1c of 5.5%, and an average FBG of 93 mg/dL. The correlation between FBG and A1c was 0.45. Of the demographic variables examined, increasing age was the factor most closely associated with elevated A1c. Interestingly, there were 297 subjects with an A1c $\geq 6.5\%$ but an FBG $< 126\text{mg/dL}$, identifying a need for additional evaluation for potential T2DM. Using stricter criteria, 135 of those subjects had an A1c $\geq 6.5\%$ but an FBG $< 100\text{mg/dL}$. Importantly, 4400 subjects had an A1c $\geq 5.7\%$ but $< 6.5\%$ with a FBG of $< 100\text{mg/dL}$, suggesting a need for further evaluation for pre diabetes, a condition where lifestyle management may have an effect in preventing or delaying complications. Conversely, 228 subjects had an A1c $< 6.5\%$ and an FBG $> 126\text{mg/dL}$ (98 of whom had an A1c $< 5.7\%$ and an FBG $> 126\text{mg/dL}$) suggesting they were not truly fasting, but resulting in a need for additional costs for retesting and evaluation.

This study suggests that almost 4700 subjects (20% of the group) with potential diabetes or prediabetes would have failed to be detected in a screening program that used only a FBG with the standard cut point of 126 mg/dL.

View [abstract](#)

Ongoing research

Anand V. 2018. **Communicating cardiovascular disease risk in UK primary care.** *UK Clinical Trials Gateway*

AIM: to investigate the effects of GPs using heart age to communicate the risk of CVD to patients

METHODS: It is a feasibility or pilot study. Participants are randomly allocated into two groups to see a GP. One group receive their QRISK2 score (usual care) and the other group (whose consultation is audio-recorded) also receive their heart age. All participants receive a follow-up health check and blood test after 3 months.

View [trial details](#)

Hongbo, L., Xun, T., Peng, S., et al. 2018. **Using big data to improve cardiovascular care and outcomes in China: a protocol for the CHinese Electronic health Records Research in Yinzhou (CHERRY) Study.** *BMJ open* 8(2) 019698.

AIM: to provide a framework to establish a uniquely integrated Electronic health Records (EHR) database in China for scientific research.

METHODS: The CHinese Electronic health Records Research in Yinzhou (CHERRY) Study will extract individual participant data within the regional health information system of an eastern coastal area of China to establish a

longitudinal population-based ambispective cohort study for cardiovascular care and outcomes research. A total of 1 053 565 Chinese adults aged over 18 years were registered in the health information system in 2009, and there were 23â€‰%394 deaths from 1 January 2009 to 31 December 2015. The study will include information from multiple epidemiological surveys; EHRs for chronic disease management; and health administrative, clinical, laboratory, drug and electronic medical record (EMR) databases. Follow-up of fatal and non-fatal clinical events is achieved through records linkage to the regional system of disease surveillance, chronic disease management and EMRs (based on diagnostic codes from the International Classification of Diseases, tenth revision). The CHERRY Study will provide a unique platform and serve as a valuable big data resource for cardiovascular risk prediction and population management, for primary and secondary prevention of cardiovascular events in China.
View [full text](#)

Sabo, S., Denman Champion, C., Bell, M. L., et al. 2018. **Meta Salud Diabetes study protocol: a cluster-randomised trial to reduce cardiovascular risk among a diabetic population of Mexico.** *BMJ Open* 8(3) e020762.

AIM: to develop, test and scale-up CVD risk-reduction interventions in diabetics through a national primary care health system.

METHODS: The Meta Salud Diabetes (MSD) research project is a parallel two-arm cluster-randomised clinical behavioural trial based in 22 health centres in Sonora, Mexico. MSD aims to evaluate the effectiveness of the MSD intervention for the secondary prevention of CVD risk factors among a diabetic population (n=320) compared with the study control of usual care. The MSD intervention consists of 2-hour class sessions delivered over a 13-week period providing educational information to encourage sustainable behavioural change to prevent disease complications including the adoption of physical activity. MSD is delivered within the context of Mexico's national primary care health centre system by health professionals, including nurses, physicians and community health workers via existing social support groups for individuals diagnosed with chronic disease. Mixed models are used to estimate the effect of MSD by comparing cardiovascular risk, as measured by the Framingham Risk Score, between the trial arms. Secondary outcomes include hypertension, behavioural risk factors and psychosocial factors. TRIAL REGISTRATION NUMBER: NCT0280469

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Abargouei AS, Sarafzadegan N, Soltan S et al. 2017. **Community-wide programs for the prevention of cardiovascular disease: a systematic review and meta-analysis of trials.** *PROSPERO*.

AIM : to determine if community based programs for the prevention of cardiovascular disease are effective in reducing the cardiovascular disease mortality and morbidity

METHODS: We will systematically search the related publications in PubMed, EMBASE, Scopus and Google scholar for relevant studies without restriction on language or publication period. We will include community based controlled clinical trials which have evaluated the effectiveness of these types of programs on biochemical precursors of CVD, including lipid levels, ratio of high density lipoprotein to low density lipoprotein, and triglyceride levels; physiologic precursors of CVD, including cholesterol, blood pressure, and body mass index; behaviors associated with the risk of CVD, including smoking, diet, physical activity, and alcohol consumption; knowledge, attitudes, and intentions regarding CVD; and risk of mortality. Primary outcome(s): risk of morbidity and mortality from CVD.

View [abstract](#)

Khaing W, Vallipakorn SA, Thakkinstian A at al. 2017. **The effect of education and income on cardiovascular outcomes: a systematic review and meta-analysis.** *PROSPERO*

AIM: :To study the association of education status and income with cardiovascular outcomes

METHODS: We will search MEDLINE and Scopus database from inception to 30th July 2016 to identify relevant studies. We will also hand-search the reference lists of all included studies and previous systematic reviews to identify any further eligible studies not captured in the initial database literature search. Types of study to be included: Cohort studies (both prospective and retrospective). The interested outcomes are cardiovascular outcomes including Coronary Artery Diseases (ST elevation myocardial infarct, Non ST elevation myocardial infarct, coronary artery stenosis, cardiac syndrome X), Cardiovascular Events (acute coronary syndrome, heart failure, coronary revascularization, hospitalization due to cardiac causes), Cardiovascular Death and Stroke (both ischemic and hemorrhagic stroke) which were defined according to original studies.

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Lassale C, Florigo MT. 2017. **HDL-cholesterol functionality and CVD outcomes: a systematic review and meta-analysis.** *PROSPERO*.

AIM: to determine whether the functional characteristics of high density lipoproteins are associated with the development of stable or unstable angina, fatal or non-fatal stroke, fatal or non-fatal myocardial infarction, death from any of these causes or all-cause death.

METHODS: Electronic sources to be searched: MEDLINE, Scopus, Web of Science and EMBASE. Inclusion criteria: Cohort studies, nested case control studies and clinical trials. Participants (men and women) aged 18 years and above. Primary outcome(s): fatal and non-fatal cardiovascular disease events: stable or unstable angina; ischemic stroke; hemorrhagic stroke; transient ischemic attack; non-fatal myocardial infarction.

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Byrne P, Cullinan J, Smith A, Smith SM. 2017. **Statins for the primary prevention of cardiovascular disease: an overview of systematic reviews.** *PROSPERO*.

AIM: to synthesise the evidence from existing systematic reviews regarding the effectiveness of statins in the primary prevention of CVD

METHODS: We will search the Cochrane Database of Systematic Reviews, MEDLINE, Embase, PubMed, Scopus and PROSPERO. In this overview we will include any systematic review of RCTs which examines the effectiveness of statins for the primary prevention of CVD. Inclusion: men and women aged over 18 without established CVD. Primary outcomes: All-cause mortality. Fatal and non-fatal CHD, CVD and stroke events; Combined endpoints (fatal and non-fatal CHD, CHD and stroke events)

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Haththotuwa R, Machin A, Corp N et al. 2017. **Systematic review of understanding and perceptions of cardiovascular risk in younger women and their perceptions of factors influencing behaviour change in primary prevention of cardiovascular disease.** *PROSPERO*.

AIM: to determine what is younger women's understanding and perception of their own cardiovascular risk in primary prevention of cardiovascular disease

METHODS: MEDLINE (Ovid) 1946 to Nov 2017, EMBASE (Ovid) 1974 to 28 Nov 2017, CINAHL (EBSCO), PsycINFO (EBSCO), ASSIA. Reference checking of articles and previous reviews. Types of study: Qualitative; Nursing Methodology Research; Phenomenological research; Grounded theory; Mixed methods. Inclusion criteria: Women aged 18-55 years AND Without prior history of cardiovascular disease AND with high cardiovascular risk OR a cardiovascular risk factor (hypertension, high cholesterol, obesity or smoking). Primary outcomes: In primary prevention of cardiovascular disease, what are younger women's 1. understanding and perception of their own cardiovascular risk. 2. perceptions of motivators and barriers influencing their own likelihood of changing behaviour

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Krass, I., Carter, R., Mitchell, B., et al. 2017. **Pharmacy Diabetes Screening Trial: protocol for a pragmatic cluster-randomised controlled trial to compare three screening methods for undiagnosed type 2 diabetes in Australian community pharmacy.** *BMJ Open* 7(12) e017725.

AIM: the Pharmacy Diabetes Screening Trial aims to compare the clinical effectiveness and cost-effectiveness of three screening models for type 2 diabetes in a previously undiagnosed population.

METHODS : The Pharmacy Diabetes Screening Trial is a pragmatic cluster randomised controlled trial to be conducted in 363 community pharmacies across metropolitan, regional and remote areas of Australia, randomly allocated by geographical clusters to one of three groups, each with 121 pharmacies and 10 304 screening participants. The three groups are: group A: risk assessment using a validated tool (AUSDRISK); group B: AUSDRISK assessment followed by point-of-care glycated haemoglobin testing; and group C: AUSDRISK assessment followed by point-of-care blood glucose testing. The primary clinical outcome measure is the proportion of newly diagnosed cases of type 2 diabetes. Primary outcome comparisons will be conducted using the Cochran-Mantel-Haenszel test to account for clustering. The secondary clinical outcomes measures are the proportion of those who (1) are referred to the general practitioner (GP), (2) take up referral to the GP, (3) are diagnosed with pre-diabetes, that is, impaired glucose tolerance or impaired fasting glucose and (4) are newly diagnosed with either diabetes or pre-diabetes. The economic outcome measure is the average cost (direct and indirect) per confirmed new case of diagnosed type 2 diabetes based on the incremental net trial-based costs of service delivery and the associated incremental longer term health benefits from a health funder perspective..

TRIAL REGISTRATION NUMBER: ACTRN12616001240437

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Carrington MJ and Zimmet P 2017. **Nurse health and lifestyle modification versus standard care in 40 to 70 year old regional adults: study protocol of the Management to Optimise Diabetes and mEtabolic syndrome Risk reduction via Nurse-led intervention (MODERN) randomized controlled trial.** *BMC health services research* 17(1) 813.

AIM: to determine whether a nurse-implemented health and lifestyle modification program is more beneficial than standard care to reduce cardio-metabolic abnormalities and future risk of CVD and diabetes in individuals with MetS.

METHODS: MODERN is a multi-centre, open, parallel group randomized controlled trial in regional Victoria, Australia. Participants were self-selected and individuals aged 40 to 70 years with MetS who had no evidence of CVD or other chronic disease were recruited. Those attending a screening visit with any 3 or more risk factors of central obesity, dyslipidemia (high triglycerides or low high density lipoprotein cholesterol) elevated blood pressure and dysglycemia were randomized to either nurse-led health and lifestyle modification (intervention) or standard care (control). The intervention included risk factor management, health education, care planning and scheduled follow-up commensurate with level of risk. The primary cardio-metabolic end-point was achievement of risk factor thresholds to eliminate MetS or minimal clinically meaningful changes for at least 3 risk factors that characterise MetS over 2 year follow-up. Pre-specified secondary endpoints to evaluate between group variations in cardio-metabolic risk, general health and lifestyle behaviours and new onset CVD and type 2 diabetes will be evaluated. Key outcomes will be measured at baseline, 12 and 24 months via questionnaires, physical examinations, pathology and other diagnostic tests. Health economic analyses will be undertaken to establish the cost-effectiveness of the intervention. The MODERN trial will provide evidence for the potential benefit of independent nurse-run clinics in the community and their cost-effectiveness in adults with MetS.

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