Public Health England

Protecting and improving the nation's health

NHS Health Check programme:

Annotated Bibliography: April 27th 2020 – 31st August 2020

About Public Health England

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

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A review of NHS Health Check literature

1. Introduction

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

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

2. Methods

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

Previous searches had identified references from between January 1 1996 and April 27 2020. This search identifies references from April 27 2020 until August 31 2020. The cut-off date for internet searches was September 1 2020**.**

Table 1. Search strategies

Database	Search strategy
Ovid Medline	1. health check*.tw. 2. (diabetes adj3 screen*).tw. 3. (cardiovascular adj3 screen*).tw. 4. (population adj2 screen*).tw. 5. (risk factor adj3 screen*).tw. 6. (opportunistic adj3 screen*).tw. 7. medical check*.tw. 8. general check*.tw. 9. periodic health exam*.tw. 10. annual exam*.tw. 11. annual review*.tw. 12. NHSHC.tw. 13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 14. cardiovascular adj3 prevention.tw. 15. (primary care or general practice or primary healthcare).tw 16. 14 and 15 17. Cardiovascular Diseases/ AND Primary Prevention/ 18. 16 or 17 19. 13 or 18 20. limit 19 to dt=20200427-20200831
PubMed	1. health check* 2. diabetes screen* 3. cardiovascular screen* 4. population screen* 5. risk factor screen* 6. opportunistic screen* 7. medical check* 8. general check* 9. periodic health exam* 10. annual exam* 11. annual review* 12. NHSHC 13. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 14. Cardiovascular Diseases AND Primary Prevention[MeSH Terms] 15. "primary care"[Text Word] OR "general practice"[Text Word] OR "primary healthcare"[Text Word]) 16. (cardiovascular[Text Word] AND prevention[Text Word]) 17. #15 and #16 18. #14 or #17 19. #13 or #18 Filters: Publication date from 2020/04/27 to 2020/08/31

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=20200427-20200831

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="2020"

EBSCO CINAHL	S12 S10 AND S11 S11 S1 OR S2 OR S9 S10 EM 20200427-20200831 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: 2020 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*
APA PsycInfo	1. health check*.tw. 2. (diabetes adj3 screen*).tw. 3. (cardiovascular adj3 screen*).tw. 4. (population adj2 screen*).tw 5. (risk factor adj3 screen*).tw. 6. (opportunistic adj3 screen*).tw. 7. medical check*.tw. 8. general check*.tw. 9. periodic health exam*.tw. 10. annual exam*.tw. 11. annual review*.tw. 12. NHSHC.tw. 13. health screening/ or physical examination/ 14. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 15. (cardiovascular adj3 prevention).tw. 16. (primary care or general practice or primary healthcare).tw. 17. 15 and 16 18. CARDIOVASCULAR DISORDERS/ and PREVENTIVE MEDICINE/ 19. 17 or 18 20. 14 or 19 21. limit 20 to up=20200427-20200831

Cochrane Library (Wiley)	#1 "health check*" #2 (diabetes next/3 screen*) or (cardiovascular next/3 screen*) or (population next/2 screen*) or (opportunistic next/2 screen*) or ("risk factor" next/3 screen*) or "medical check*" or "general check*" or "periodic health exam*" or "annual exam*" or "annual review*" or NHSHC #3 cardiovascular adj3 prevention.tw. #4 (primary care or general practice or primary healthcare).tw #5 #3 and #4 #6 MeSH descriptor: [Cardiovascular Diseases] this term only #7 MeSH descriptor: [Primary Prevention] explode all trees #8 #6 and #7 #9 #5 or #8 #10 #1 or #2 or #9 with Cochrane Library publication date from Apr 2020 to Aug 2020
NICE Evidence	"*health check"* OR *cardiovascular prevention primary* Limited to 27/04/2020 to 31/08/2020
TRIP database	*(title:cardiovascular prevention primary from:2020) OR ("nhs health check" from:2020)*
Google Scholar	*"nhs health check" OR* *cardiovascular "health check" OR* *cardiovascular prevention primary care OR* *nhs health check program* Since 2020, sorted by date.
Google	"*nhs health check*" *cardiovascular prevention "primary care"* *cardiovascular "health check*" *CVD risk prediction* *nhs health check program* Limited to 27/04/2020 to 31/08/2020
Clinical trials.gov, ISRCTN, Prospero	*"health check",* Limited to 27/04/2020 to 31/08/2020

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 April 27th 2020 and August 31st 2020

Database	No. of hits	Exclusive(non duplicates)
Ovid Medline (August 31st 2020)	845	840
PubMed (August 31st 2020)	654	126
Ovid Embase (August 31st 2020)	1639	835
Ovid HMIC (July 2020)	16	14
EBSCO CINAHL (August 31st 2020)	551	472
EBSCO Global Health (August 31st 2020)	269	167
Ovid PsycInfo (August week 4 2020)	160	135
Cochrane Library (Issue 9 of 12, September 2020)	57	29
NICE Evidence (Apr 27th 2020 to Aug 31st 2020)	20	17
TRIP database (since 2019)	30	28
TOTAL	**4241**	**2663**

Table 2a. Citations added to internet sources between April 27 2020 and August 31 2020

Internet sources	No. of hits
Google Scholar (2020)	3
Google (Apr 27th 2020 to Aug 31st 2020)	1
Trials registers, Prospero (2020)	0
TOTAL	**4**

From these 2667 results, 4 were identified as being relevant to the NHS Health Check programme, 4 to general health checks and 61 to diabetes/cardiovascular disease risk screening.

Total relevant references = 69

- **NHS Health Checks = 4**
- **general health checks = 4**
- **diabetes/cardiovascular disease screening = 61**

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

Cross-sectional studies

Chattopadhyay, K., Biswas, M. & Moore, R. 2020. **NHS Health Check and healthy lifestyle in Leicester, England: analysis of a survey dataset**. Perspectives in Public Health 140(1) 27-37.
AIM: to explore the variations (in terms of uptake) in the NHS Health Check in Leicester and to determine its association with a healthy lifestyle.
METHOD: This cross-sectional study used data from the Leicester Health and Wellbeing Survey (2015).
RESULTS: The odds of having an NHS Health Check were found to be higher in Black and minority ethnic groups and in people of other religions. The odds were lower in people without a religion, residing in the fourth index of multiple deprivation quintile and in ex-smokers. No associations were found between having an NHS Health Check and describing a healthy lifestyle, following a healthy lifestyle, thinking of making lifestyle changes in the next 6 months, cutting down on/stopping smoking among current smokers, or amount of alcohol current drinkers would like to drink.
CONCLUSION: In Leicester, a few variations in having an NHS Health Check were found among different socio-economic, demographic and behavioural groups. No association was found between the NHS Health Check and a healthy lifestyle. The improvement work should focus on reducing these variations in having the NHS Health Check and bringing its benefits on promoting a healthy lifestyle.
View full text

Qualitative

Hyseni, L., Guzman-Castillo, M., Kypridemos, C., et al. 2020. **Engaging with stakeholders to inform the development of a decision-support tool for the NHS health check programme: qualitative study**. BMC Health Services Research 20(1) 394.
AIM: to report on Workshop 1 of a NHS Health Check Programme modelling tool (WorkHORSE), which specifically aimed to facilitate engagement with stakeholders; develop a shared understanding of current Health Check implementation; identify what is working well, less well, and future hopes; and explore features to include in the tool.
METHOD: This qualitative study identified key stakeholders across the UK via networking and snowball techniques. The stakeholders spanned local organisations (NHS commissioners, GPs, and academics), third sector and national organisations (Public Health England and The National Institute for Health and Care Excellence). We used the validated Hovmand "group model building" approach to engage stakeholders in a series of pre-piloted, structured, small group exercises. We then used Framework Analysis to analyse responses.
RESULTS: Fifteen stakeholders participated in workshop 1. Stakeholders identified continued financial and political support for the NHS Health Check Programme. However, many stakeholders highlighted issues concerning lack of data on processes and outcomes, variability in quality of delivery, and suboptimal public engagement. Stakeholders' hopes included maximising coverage, uptake, and referrals, and producing additional evidence on population health, equity, and economic impacts. Key model suggestions focused on developing good-practice template scenarios, analysis of broader prevention activities at local level, accessible local data, broader economic perspectives, and fit-for-purpose outputs.
CONCLUSION: A shared understanding of current implementations of the NHS Health Check Programme was developed. Stakeholders demonstrated their commitment to the NHS Health Check Programme whilst highlighting the perceived requirements for enhancing the service and discussed how the modelling tool could be instrumental in this process. These suggestions for improvement informed subsequent workshops and model development.
View full text

Lloyd-Williams, F., Hyseni, L., Guzman-Castillo, M., et al. 2020. **Evaluating stakeholder involvement in building a decision support tool for NHS health checks: co-producing the WorkHORSE study**. BMC Medical Informatics & Decision Making 20(1) 182.
AIM: to evaluate the involvement of stakeholders in co-producing the Working Health Outcomes Research Simulation Environment) WorkHORSE computer modelling tool and examine how they perceived their involvement in the model building process and ultimately contributed to the strengthening and relevance of the modelling tool.
METHODS: We identified stakeholders using our extensive networks and snowballing techniques. Iterative development of the decision support modelling tool was informed through engaging with stakeholders during four workshops. We used detailed scripts facilitating open discussion and opportunities for stakeholders to provide additional feedback subsequently. At the end of each workshop, stakeholders and the research team completed questionnaires to explore their views and experiences throughout the process.
RESULTS: 30 stakeholders participated, of which 15 attended two or more workshops. They spanned local (NHS commissioners, GPs, local authorities and academics), third sector and national organisations including Public Health England. Stakeholders felt valued, and commended the involvement of practitioners in the iterative process. Major reasons for attending included: being able to influence development, and having insight and understanding of what the tool could include, and how it would work in practice. Researchers saw the process as an opportunity for developing a common language and trust in the end product, and ensuring the support tool was transparent. The workshops acted as a reality check ensuring model scenarios and outputs were relevant and fit for purpose.
CONCLUSION: Computational modellers rarely consult with end users when developing tools to inform decision-making. The added value of co-production (continuing collaboration and iteration with stakeholders) enabled modellers to produce a "real-world" operational tool. Likewise, stakeholders had increased confidence in the decision support tool's development and applicability in practice.
View full text

Stone, T. J., Brangan, E., Chappell, A., et al. 2020. **Telephone outreach by community workers to improve uptake of NHS Health Checks in more deprived localities and minority ethnic groups: a qualitative investigation of implementation**. Journal of Public Health 42(2) e198-e206.
AIM: to examine the experiences of staff delivering a novel telephone outreach intervention (an outreach call with an invitation to an NHS Health Check appointment, lifestyle questions, and signposting to lifestyle services).
METHOD: Thematic analysis of semi-structured interviews with 10 community Telephone Outreach Workers (TOWs) making outreach calls, and 5 Primary Care Practice (PCP) staff they liaised with. Normalization Process Theory was used to examine intervention implementation.
RESULTS: Telephone outreach was perceived as effective in engaging patients in NHS Health Checks and could reduce related administration burdens on PCPs. Successful implementation was dependent on support from participating PCPs, and tensions between the intervention and other PCP priorities were identified. Some PCP staff lacked clarity regarding the intervention aim and this could reduce the potential to capitalize on TOWs' specialist skills.
CONCLUSION: To maximize the potential of telephone outreach to impact equity, purposeful recruitment and training of TOWs is vital, along with support and integration of TOWs, and the telephone outreach intervention, in participating PCPs.
View full text

References relating to general health checks (4)

Evidence summaries

Heneghan, C. & Mahtani, K. R. 2020. **Is it time to end general health checks?** BMJ Evidence-Based Medicine 25(3) 115-116.
AIM: to summarise a Cochrane review on the benefits and harms of health checks in healthy adults compared with no checks.
METHODS: a summary of an exisiting Cochrane review
RESULTS AND CONCLUSION: There is no convincing evidence to support the implementation of general health checks in primary care. They appear not to affect clinically important outcomes, and there is no high-quality evidence to suggest they are cost-effective, particularly when compared with routine primary care.
View full text

Cross-sectional studies

Chien, S. Y., Chuang, M. C. & Chen, I. P. 2020. **Why People Do Not Attend Health Screenings: Factors That Influence Willingness to Participate in Health Screenings for Chronic Diseases**. International Journal of Environmental Research & Public Health [Electronic Resource] 17(10) 17.
AIM: to investigate (1) the factors that affect people's willingness to participate in chronic disease screenings and (2) reasons why people have not undergone screening for a chronic disease in the past.
METHOD: Study participants (aged 30-65 of years age; n = 204) included individuals from four areas in northern of Taiwan that are considered to have a high chronic disease risk. To identify factors that influence willingness to attend health screenings, data were collected by questionnaire.
RESULTS: Over 50% of participants (58.33%; n = 119) indicated that they were unaware of community-based screenings for chronic diseases offered by Chang Gung Memorial Hospital, which is one of the top-rated medical centers in Taiwan. Factors that increase willingness to participate in health screenings for chronic diseases include: (1) the convenience of screening site locations; (2) affordability; and (3) other considerations related to healthcare providers and diagnostic facilities (e.g., reputation, degree of modernization, etc.). Conversely, factors that reduce willingness to participate in health screenings include: (1) a belief that one was currently healthy; (2) lack of time; (3) a belief that screening procedures were too complicated to understand; (4) physical pain or negative emotions such as fear, anxiety, embarrassment, pain, and discomfort and, (5) having had a negative experience during a previous health checkup.
CONCLUSION: Our findings demonstrate that health attitudes, sociodemographic factors, and other motivating and preventative factors affect peoples' willingness to participate in health screenings. The motivating factors and barriers for people to participate in health screening for chronic diseases are very heterogeneous. However, understanding the barriers and motivating factors to health screening would mean that interventions with the purpose of decreasing people's health risks and reducing deaths and disabilities caused by a chronic illness could be implemented.
View full text

Naqvi, R. & Gale, O. 2020. **Preventative health screening community events, a mechanism to target minority ethnic populations in improving primary care utilisation to improve health outcomes**. British Journal of General Practice 70(suppl 1).
AIM: To consider the benefit of community-based health screening checks to improve access and health outcomes in minority ethnic groups.

METHOD: An open community health screening event (n = 43), to allow targeted screening within an ethnic minority population. Screening included BP, BMI, BM and cholesterol. Results were interpreted by a healthcare professional and counselling was provided regarding relevant risk factors. Post-event feedback was gathered to collate participant opinion and views.
RESULTS: Seventy-nine per cent of participants were from ethnic minority backgrounds: 64% were overweight or obese and 53% of participants were referred to primary care for urgent review following abnormal findings. All those referred would not have accessed healthcare without the event referral. All (100%) participants believed it improved health education and access to health care.
CONCLUSION: This study clearly demonstrates the value of targeted community-led screening and education events in public health promotion. There was a significant benefit in providing community-based screening. There is a need for a longitudinal analysis to determine the impact on health outcomes and long-term access to healthcare provision.
View abstract

Ongoing research

Schmidtke, KA 2020. **Behaviorally Enhanced Messages to Increase Medical Check-ups(BEM-IMC)**.
AIM: to evaluate if the opportunistic screening increased people's awareness of their hypertensive condition (Stage 1 screening) and to evaluate if the intervention increased the proportion of participants who sought further medical attention (Stage 2 RCT).
METHOD: Stage 1. The opportunistic screening for hypertension was conducted around the 2018 Beirut Marathon. Screening tents were set up at the marathon village during the four days leading up to the marathon (7-10 November), where runners collected necessary materials for the run and could take up the screening. An additional two tents were set up during the marathon day were spectators could take part. Participants indicated their consent for the screening before taking part. During their participation they completed surveys about their demographics and health information (including whether they were hypertensive). After they completed the survey, nurses and trained team members measured their blood pressure using calibrated equipment. Those participants whose measurements indicated hypertension were invited to participate in the RCT. Stage 2. For the RCT participants were randomly assigned to either a intervention or control group in a 1:1 fashion. Participants in the intervention group were sent a WhatsApp message 25 days after the marathon reminding them to seek help for their hypertensive condition. Participants in the control group were not sent this message. Then one month later the researchers called all these participants to ask wither they sought further medical attention. The main outcome was whether participants self-reported seeking further medical attention.
View details

References relating to diabetes and cardiovascular disease risk screening or CVD prevention (61)

Guidance

Agostino, J. W., Wong, D., Paige, E., et al. 2020. **Cardiovascular disease risk assessment for Aboriginal and Torres Strait Islander adults aged under 35 years: a consensus statement**. Medical Journal of Australia 212(9) 422-427.

AIM: To communicate the latest consensus advice of guideline developers, aligning recommendations on the age to commence Aboriginal and Torres Strait Islander CVD risk assessment across three guidelines.

METHOD: The consensus development process began with a formal review of evidence for the alignment of guidelines on Aboriginal and Torres Strait Islander absolute CVD risk, and included evidence on points of concordance and divergence between guidelines.The review also included a systematic review of literature related to Aboriginal and Torres Strait Islander or Māori absolute CVD risk assessment or management published since 2012. The findings from this review were discussed at a stakeholder roundtable in February 2018.

RESULTS AND CONCLUSION: In Aboriginal and Torres Strait Islander peoples without existing CVD:. CVD risk factor screening should commence from the age of 18 years at the latest, including for blood glucose level or glycated haemoglobin, estimated glomerular filtration rate, serum lipids, urine albumin to creatinine ratio, and other risk factors such as blood pressure, history of familial hypercholesterolaemia, and smoking status. Individuals aged 18-29 years with the following clinical conditions are automatically conferred high CVD risk: type 2 diabetes and microalbuminuria; moderate to severe chronic kidney disease; systolic blood pressure >= 180 mmHg or diastolic blood pressure >= 110 mmHg; familial hypercholesterolaemia; or serum total cholesterol > 7.5 mmol/L. Assessment using the National Vascular Disease Prevention Alliance absolute CVD risk algorithm should commence from the age of 30 years at the latest - consider upward adjustment of calculated CVD risk score, accounting for local guideline use, risk factor and CVD epidemiology, and clinical discretion. Assessment should occur as part of an annual health check or opportunistically. Subsequent review should be conducted according to level of risk. Changes in management as a result of this statement: From age 18 years (at the latest), Aboriginal and Torres Strait Islander adults should undergo CVD risk factor screening, and from age 30 years (at the latest), they should undergo absolute CVD risk assessment using the NVDPA risk algorithm.

View full text

Systematic reviews

Muthee, T., Kimathi, D., Richards, G., et al. 2020. **Factors influencing the implementation of cardiovascular risk scoring in primary care: a mixed-method systematic review**. Implementation Science 15 (57).

AIM: To synthesise the current knowledge of the factors influencing the implementation of cardiovascular risk scoring in primary care settings.

METHOD: We searched bibliographic databases and grey literature for studies of any design relating to the topic. Titles, abstracts and full texts were independently assessed for eligibility by two reviewers. This was followed by quality assessment and data extraction. We analysed data using an integrated and best fit framework synthesis approach to identify these factors. Quantitative and qualitative forms of data were combined into a single mixed-methods synthesis. The Consolidated Framework for Implementation Research was used as the guiding tool and template for this analysis.

RESULTS: Twenty-five studies (cross-sectional n = 12, qualitative n = 9 and mixed-methods n = 4) were included in this review. Twenty (80%) of these were conducted in high-income countries. Only four studies (16%) included patients as participants. This review reports on a total of eleven cardiovascular risk stratification tools. The factors influencing the implementation of cardiovascular risk scoring are related to clinical setting and

healthcare system (resources, priorities, practice culture and organisation), users (attributes and interactions between users) and the specific cardiovascular risk tool (characteristics, perceived role and effectiveness).
CONCLUSION: While these findings bolster the understanding of implementation complexity, there exists limited research in the context of low and middle-income countries. Notwithstanding the need to direct resources in bridging this gap, it is also crucial that these efforts are in concert with providing high-quality evidence on the clinical effectiveness of using cardiovascular risk scoring to improve cardiovascular disease outcomes of mortality and morbidity.
View full text

Abbate, M., Gallardo-Alfaro, L., Bibiloni, M. D. M., et al. 2020. **Efficacy of dietary intervention or in combination with exercise on primary prevention of cardiovascular disease: A systematic review**. Nutrition, Metabolism and Cardiovascular Diseases 30(7) 1080-1093.
AIM: To assess recently published research on the effectiveness of dietary and exercise intervention programmes, alone or combined, on reducing risk factors associated with CVD as well as preventing CV events
METHOD: Using the Medline database via PubMed, we searched for prospective studies published between January 2000 and January 2020 assessing the efficacy of dietary interventions alone or in combination with exercise on reducing CV risk factors or events in human adults at risk. Study quality was assessed using the American Dietetic Association Quality Criteria Checklist.
RESULTS: From 934 articles, 21 prospective experimental design studies (15 randomized controlled trials (RCTs), one cluster RCT, and five quasi-experimental intervention studies with a control group) met inclusion and exclusion criteria. Most interventions improved at least some markers of CV risk and the most improvement was time devoted to physical activity increased. A low-fat intervention diet seemed to be effective only when coupled with moderate intensity exercise and weight loss, while a Mediterranean diet (MedDiet) intervention without physical activity, decreased both systolic and diastolic blood pressure, major CV events rate and risk of developing type 2 diabetes.
CONCLUSION: The MedDiet appears to have the most beneficial effect on CV events and increased hours of physical training are strongly related to greater improvement of risk factors; nevertheless, adherence to intervention is fundamental as it directly relates to health outcomes.
View full text

Asmaa, S. A., Tracey, J. B., Julii, S. B., et al. 2020. **Omega-3 fatty acids for the primary and secondary prevention of cardiovascular disease**. The Cochrane database of systematic reviews 3 CD003177.
AIM: To assess the effects of increased intake of fish- and plant-based omega-3 fats for all-cause mortality, cardiovascular events, adiposity and lipids.
METHOD: We searched CENTRAL, MEDLINE and Embase to February 2019, plus ClinicalTrials.gov and World Health Organization International Clinical Trials Registry to August 2019, with no language restrictions. We handsearched systematic review references and bibliographies and contacted trial authors. We included randomised controlled trials (RCTs) that lasted at least 12 months and compared supplementation or advice to increase LCn3 or ALA intake, or both, versus usual or lower intake. Two review authors independently assessed trials for inclusion, extracted data and assessed validity. We performed separate random-effects meta-analysis for ALA and LCn3 interventions, and assessed dose-response relationships through meta-regression.
RESULTS: We included 86 RCTs (162,796 participants) in this review update and found that 28 were at low summary risk of bias. Trials were of 12 to 88 months' duration and included adults at varying cardiovascular risk, mainly in high-income countries. Most trials assessed LCn3 supplementation with capsules, but some used LCn3- or ALA-rich or enriched foods or dietary advice compared to placebo or usual diet. LCn3 doses ranged from 0.5 g a day to more than 5 g a day (19 RCTs gave at least 3 g LCn3 daily). Meta-analysis and sensitivity analyses suggested little or no effect of increasing LCn3 on all-cause mortality (risk ratio (RR) 0.97, 95% confidence interval (CI) 0.93 to 1.01; 143,693 participants; 11,297 deaths in 45 RCTs; high-certainty evidence), cardiovascular mortality (RR 0.92, 95% CI 0.86 to 0.99; 117,837 participants; 5658 deaths in 29 RCTs; moderate-certainty evidence), cardiovascular events (RR 0.96, 95% CI 0.92 to 1.01; 140,482 participants; 17,619 people experienced events in 43 RCTs; high-certainty evidence), stroke (RR 1.02, 95% CI 0.94 to 1.12; 138,888 participants; 2850 strokes in 31 RCTs; moderate-certainty evidence) or arrhythmia (RR 0.99, 95% CI

0.92 to 1.06; 77,990 participants; 4586 people experienced arrhythmia in 30 RCTs; low-certainty evidence). Increasing LCn3 may slightly reduce coronary heart disease mortality (number needed to treat for an additional beneficial outcome (NNTB) 334, RR 0.90, 95% CI 0.81 to 1.00; 127,378 participants; 3598 coronary heart disease deaths in 24 RCTs, low-certainty evidence) and coronary heart disease events (NNTB 167, RR 0.91, 95% CI 0.85 to 0.97; 134,116 participants; 8791 people experienced coronary heart disease events in 32 RCTs, low-certainty evidence).
CONCLUSION: Overall, effects did not differ by trial duration or LCn3 dose in pre-planned subgrouping or meta-regression. There is little evidence of effects of eating fish. Increasing ALA intake probably makes little or no difference to all-cause mortality (RR 1.01, 95% CI 0.84 to 1.20; 19,327 participants; 459 deaths in 5 RCTs, moderate-certainty evidence),cardiovascular mortality (RR 0.96, 95% CI 0.74 to 1.25; 18,619 participants; 219 cardiovascular deaths in 4 RCTs; moderate-certainty evidence), coronary heart disease mortality (RR 0.95, 95% CI 0.72 to 1.26; 18,353 participants; 193 coronary heart disease deaths in 3 RCTs; moderate-certainty evidence) and coronary heart disease events (RR 1.00, 95% CI 0.82 to 1.22; 19,061 participants; 397 coronary heart disease events in 4 RCTs; low-certainty evidence). However, increased ALA may slightly reduce risk of cardiovascular disease events (NNTB 500, RR 0.95, 95% CI 0.83 to 1.07; but RR 0.91, 95% CI 0.79 to 1.04 in RCTs at low summary risk of bias; 19,327 participants; 884 ca diovascular disease events in 5 RCTs; low-certainty evidence), and probably slightly reduces risk of arrhythmia (NNTB 91, RR 0.73, 95% CI 0.55 to 0.97; 4912 participants; 173 events in 2 RCTs; moderate-certainty evidence). Effects on stroke are unclear. Increasing LCn3 and ALA had little or no effect on serious adverse events, adiposity, lipids and blood pressure, except increasing LCn3 reduced triglycerides by ˜15% in a dose-dependent way (high-certainty evidence).This is the most extensive systematic assessment of effects of omega-3 fats on cardiovascular health to date. Moderate- and low-certainty evidence suggests that increasing LCn3 slightly reduces risk of coronary heart disease mortality and events, and reduces serum triglycerides (evidence mainly from supplement trials). Increasing ALA slightly reduces risk of cardiovascular events and arrhythmia.
View full text

Cai, X., Zhang, Y., Li, M., et al. 2020. **Association between prediabetes and risk of all cause mortality and cardiovascular disease: updated meta-analysis**. BMJ 370 m2297.
AIM: To evaluate the associations between prediabetes and the risk of all cause mortality and incident cardiovascular disease in the general population and in patients with a history of atherosclerotic cardiovascular disease.
METHOD: Prospective cohort studies or post hoc analysis of clinical trials were included for analysis if they reported adjusted relative risks, odds ratios, or hazard ratios of all cause mortality or cardiovascular disease for prediabetes compared with normoglycaemia. Data were extracted independently by two investigators. Random effects models were used to calculate the relative risks and 95% confidence intervals. The primary outcomes were all cause mortality and composite cardiovascular disease. The secondary outcomes were the risk of coronary heart disease and stroke. Design: updated meta-analysis. Electronic databases (PubMed, Embase, and Google Scholar) up to 25 April 2020.
RESULTS: A total of 129 studies were included, involving 10 069 955 individuals for analysis. In the general population, prediabetes was associated with an increased risk of all cause mortality (relative risk 1.13, 95% confidence interval 1.10 to 1.17), composite cardiovascular disease (1.15, 1.11 to 1.18), coronary heart disease (1.16, 1.11 to 1.21), and stroke (1.14, 1.08 to 1.20) in a median follow-up time of 9.8 years. Compared with normoglycaemia, the absolute risk difference in prediabetes for all cause mortality, composite cardiovascular disease, coronary heart disease, and stroke was 7.36 (95% confidence interval 9.59 to 12.51), 8.75 (6.41 to 10.49), 6.59 (4.53 to 8.65), and 3.68 (2.10 to 5.26) per 10 000 person years, respectively. Impaired glucose tolerance carried a higher risk of all cause mortality, coronary heart disease, and stroke than impaired fasting glucose. In patients with atherosclerotic cardiovascular disease, prediabetes was associated with an increased risk of all cause mortality (relative risk 1.36, 95% confidence interval 1.21 to 1.54), composite cardiovascular disease (1.37, 1.23 to 1.53), and coronary heart disease (1.15, 1.02 to 1.29) in a median follow-up time of 3.2 years, but no difference was seen for the risk of stroke (1.05, 0.81 to 1.36). Compared with normoglycaemia, in patients with atherosclerotic cardiovascular disease, the absolute risk difference in prediabetes for all cause mortality, composite cardiovascular disease, coronary heart disease, and stroke was 66.19 (95% confidence

interval 38.60 to 99.25), 189.77 (117.97 to 271.84), 40.62 (5.42 to 78.53), and 8.54 (32.43 to 61.45) per 10 000 person years, respectively. No significant heterogeneity was found for the risk of all outcomes seen for the different definitions of prediabetes in patients with atherosclerotic cardiovascular disease (all P>0.10).
CONCLUSION: Results indicated that prediabetes was associated with an increased risk of all cause mortality and cardiovascular disease in the general population and in patients with atherosclerotic cardiovascular disease. Screening and appropriate management of prediabetes might contribute to primary and secondary prevention of cardiovascular disease.
View full text

Caldeira, D., Alves, M., David, C., et al. 2020. **Aspirin in the primary prevention of cardiovascular disease on diabetic patients: Systematic review and meta-analysis**. Primary Care Diabetes 14(3) 213-221.
AIM: To systematically review all randomized controlled trials evaluating the clinical impact of aspirin use in diabetic patients for primary prevention.
METHOD: We searched for randomized controlled trials (RCTs) evaluating the impact of aspirin in patients with diabetes in primary prevention, in MEDLINE, EMBASE, CENTRAL (November/2018). The primary outcomes were all-cause mortality and the composite outcome of major adverse cardiovascular events (MACE). A meta-analysis was performed deriving risk ratios (RR) and 95% confidence intervals (CI).
RESULTS: All-cause mortality was not significantly reduced with RR 0.96 (95% CI 0.90-1.03; 7RCT; 27,595 patients). Regarding MACE, there was an 8% risk reduction (RR 0.92, 95% CI 0.84-0.999; I² = 0%; 8RCT; 29,814 patients). The risks of major bleeding (RR 1.30, 95% CI 1.10-1.53; 2RCTs, 18,019 patients), and major GI bleeding (RR 1.39, 95% CI 1.08-1.80; 2RCTs, 18,019 patients) were significantly increased. The risks of cardiovascular mortality, myocardial infarction, stroke and amputation were not significantly different from control arm.
CONCLUSION: Aspirin use among diabetic patients in primary prevention appears was associated with increased risk of major bleeding, a modest decrease of MACE and lack of mortality benefit.
View full text

Cho, L., Davis, M., Elgendy, I., et al. 2020. **Summary of Updated Recommendations for Primary Prevention of Cardiovascular Disease in Women: JACC State-of-the-Art Review**. Journal of the American College of Cardiology 75(20) 2602-2618.
AIM: To update American College of Cardiology (ACC)/American Heart Association guideline specifically for the prevention of CVD in women since 2011.
METHOD: The ACC CVD in Women Committee undertook a review of the recent guidelines and major studies to summarize recommendations pertinent to women.
RESULTS: In this update, the authors address special topics, particularly the risk factors and treatments that have led to some controversies and confusion.
CONCLUSION: Specifically, sex-related risk factors, hypertension, diabetes, hyperlipidemia, anticoagulation for atrial fibrillation, use of aspirin, perimenopausal hormone therapy, and psychosocial issues are highlighted.
View full text

De Caterina, R., Aimo, A. & Ridker, P. M. 2020. **Aspirin Therapy for Primary Prevention: The Case for Continuing Prescribing to Patients at High Cardiovascular Risk-A Review**. Thrombosis and Haemostasis 120(2) 199-206.
AIM: to discuss evidence from the three latest trials published in 2018 and provide further rationale for a decisional strategy based on risk stratification and to propose an algorithm that could be used in clinical practice to assist physicians in deciding whether or not an individual patient should consider use of aspirin in primary prevention.
METHOD: a review (not systematic) of recent trials
RESULTS AND CONCLUSION: Based on a meta-regression of the benefits and harm of aspirin therapy in primary prevention as a function of the 10-year risk of MACE, we favor a nuanced approach still, however, based on the evaluation of cardiovascular risk, acknowledging differences between patients and emphasizing an individualized assessment of both benefits and harm. After optimal control of cardiovascular risk factors, and

when patients are less than 70 years of age, clinicians should assess the risk of MACE and base decision on such stratification, considering the risk of bleeding and patient preferences. Clinicians would then advise the use of aspirin in primary prevention patients at the highest risk of MACE who do not have a prohibitive risk of bleeding, and in the majority of cases after initiation of properly titrated statin therapy
View full text

Lea, M., Robyn, M., Jacki, M., et al. 2020. **Primary Prevention of Cardiovascular Disease in Minority Indigenous Populations: A Systematic Review**. Heart, lung & circulation.
AIM: The aim of this review is to evaluate primary prevention measures and programs that aim to reduce CVD risk in minority Indigenous populations around the world.
METHOD: A search of PubMed, the Cochrane Library and the Elsevier Scopus Database was initially conducted using the terms "cardiovascular disease", "population groups", "primary prevention", "health services, indigenous", "indigenous health", "risk assessment" and "risk management". Results were then assessed per inclusion/exclusion criteria. A second reviewer independently evaluated the publications and review process to ensure agreement.
RESULTS: The initial search produced 37 publications; 19 met the inclusion criteria and were incorporated into a comparative table. Most were descriptive, mixed-methods, audit or intervention studies. Heterogeneity of study design prevented statistical analysis.
CONCLUSION: Addressing CVD risk in minority Indigenous populations is a multifactorial challenge; there is substantial room for improvement in routine risk assessment and management. Holistic approaches need to embrace local cultural perceptions of health and wellbeing. Validated risk reduction tools, individualised management plans, polypills and computer based decision support tools are promising to improve outcomes for those at risk.
View full text

Peer, N., Balakrishna, Y. & Durao, S. 2020. **Screening for type 2 diabetes mellitus**. Cochrane Database of Systematic Reviews 5 CD005266.
AIM: To assess the effects of screening for type 2 diabetes mellitus.
METHOD: We searched CENTRAL, MEDLINE, LILACS, the WHO ICTRP, and ClinicalTrials.gov from inception. The date of the last search was May 2019 for all databases. We applied no language restrictions. We included randomised controlled trials involving adults and children without known diabetes mellitus, conducted over at least three months, that assessed the effect of diabetes screening (mass, targeted, or opportunistic) compared to no diabetes screening. Two review authors independently screened titles and abstracts for potential relevance and reviewed the full-texts of potentially relevant studies, extracted data, and carried out 'Risk of bias' assessment using the Cochrane 'Risk of bias' tool. We assessed the overall certainty of the evidence using the GRADE approach.
RESULTS: We screened 4651 titles and abstracts identified by the search and assessed 92 full-texts/records for inclusion. We included one cluster-randomised trial, the ADDITION-Cambridge study, which involved 20,184 participants from 33 general practices in Eastern England and assessed the effects of inviting versus not inviting high-risk individuals to screening for diabetes. The diabetes risk score was used to identify high-risk individuals; it comprised variables relating to age, sex, body mass index, and the use of prescribed steroid and anti-hypertensive medication. Twenty-seven practices were randomised to the screening group (11,737 participants actually attending screening) and 5 practices to the no-screening group (4137 participants). In both groups, 36% of participants were women; the average age of participants was 58.2 years in the screening group and 57.9 years in the no-screening group. Almost half of participants in both groups were on antihypertensive medication. The findings from the first phase of this study indicate that screening compared to no screening for type 2 diabetes did not show a clear difference in all-cause mortality (hazard ratio (HR) 1.06, 95% confidence interval (CI) 0.90 to 1.25, low-certainty evidence). Screening compared to no screening for type 2 diabetes mellitus showed an HR of 1.26, 95% CI 0.75 to 2.12 (low-certainty evidence) for diabetes-related mortality (based on whether diabetes was reported as a cause of death on the death certificate). Diabetes-related morbidity and health-related quality of life were only reported in a subsample and did not show a substantial difference

between the screening intervention and control. The included study did not report on adverse events, incidence of type 2 diabetes, glycosylated haemoglobin A1c (HbA1c), and socioeconomic effects.
CONCLUSION: We are uncertain about the effects of screening for type 2 diabetes on all-cause mortality and diabetes-related mortality. Evidence was available from one study only. We are therefore unable to draw any firm conclusions relating to the health outcomes of early type 2 diabetes mellitus screening. Furthermore, the included study did not assess all of the outcomes prespecified in the review (diabetes-related morbidity, incidence of type 2 diabetes, health-related quality of life, adverse events, socioeconomic effects).
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Sameer, A.-G. 2020. **The association between olive oil consumption and primary prevention of cardiovascular diseases**. Journal of family medicine and primary care 7(5) 859-864.
AIM: To review the effects of Mediterranean diet on the cardiovascular events as reported in randomized controlled trials (RCTs).
METHOD: A systematic research is conducted on MEDLINE via Ovid, Embase, PubMed, Google Scholar, Web of Science, and Informit. Databases of studies conducted between 2000 and 2017 were included in the analysis. All the collected studies were screened, and at the end, seven RCTs met the inclusion criteria. All the characteristics of trails such as study design, interventions, follow-up duration, and primary and secondary outcomes were recorded. RevMan was used to evaluate risk reduction in each trial individual using forest plot and fixed effects.
RESULTS: Four studies were included in the review, having a total of 25,195 participants. The effects of Mediterranean diet were found in cardiovascular events (627), coronary events (251), and all-cause death (887). The analysis revealed that there is a statistically significant relationship between Mediterranean diet and reduction in cardiovascular events at P = 0.02. However, other parameters did not show any statistically significant results that need further investigation.
CONCLUSION: The individual RCT provides evidence of protective effects of the Mediterranean diet on cardiovascular events. However, the quality and quantity of data available in those trails are not reliable and limited. Therefore, the results of those trails must be cautiously interpreted.
View full text

Vargas, G., Azarbal, J. & Tota-Maharaj, R. 2020. **A Comparative Review of Established Diets for Prevention of Cardiovascular Disease and Newer Dietary Strategies**. Current Problems in Cardiology 100582.
AIM: to evaluate the clinical evidence of established dietary patterns with regards to reducing cardiovascular risk, as well as to discuss the existing literature regarding newer dietary strategies.
METHOD: a review (not systematic) of relevant literature
RESULTS AND CONCLUSION: The plant-based and Mediterranean diets have been emphasized in the most recent American Heart Association guideline for the Prevention of Heart Disease,23 largely due to the wealth of prevailing evidence from large population-based studies demonstrating cardiovascular benefit. Conversely, there are less clear guidelines regarding implementation of the ketogenic and intermittent fasting diets, and their potential long-term benefits or cardiovascular risks. Our team of researchers has found evidenced-based medicine which would suggest that there are potential health benefits to the ketogenic, and intermittent fasting diets. Further research is required, and caution is advised before prescribing these diets to patients in the long-term, due to the potential to exacerbate cardiovascular risk factors
View full text

Trials

Byrne, J. L., Dallosso, H. M., Rogers, S., et al. 2020. **Effectiveness of the Ready to Reduce Risk (3R) complex intervention for the primary prevention of cardiovascular disease: a pragmatic randomised controlled trial**. BMC Medicine 18(1) 198.
AIM: To look at primary prevention strategies that improve longer-term adherence to statins and healthy lifestyle behaviours to reduce risk in people at risk of cardiovascular disease.
METHOD: Pragmatic randomised controlled trial recruited between May 2016 and March 2017 from primary care practices, England. Participants (n = 212) prescribed statins for primary prevention of cardiovascular

disease with total cholesterol level >= 5 mmol/l were randomised: 105 to the intervention group and 107 to the control group, stratified by age and sex. The 3R intervention involved two facilitated, structured group education sessions focusing on medication adherence to statins, lifestyle behaviours and cardiovascular risk, with 44 weeks of medication reminders and motivational text messages and two supportive, coaching phone calls (at approximately 2 weeks and 6 months). The control group continued with usual clinical care. Both groups received a basic information leaflet. The primary outcome was medication adherence to statins objectively measured by a biochemical urine test. Self-reported adherence and practice prescription data provided additional measures. Secondary outcomes included cholesterol profile, blood pressure, anthropometric data, cardiovascular risk score, and self-reported lifestyle behaviours and psychological measures (health/medication beliefs, quality of life, health status). All outcomes were assessed at 12 months.
RESULTS: Baseline adherence to statins was 47% (control) and 62% (intervention). No significant difference between the groups found for medication adherence to statins using either the urine test (OR 1.02, 95% CI 0.34 to 3.06, P = 0.968) or other measures. This may have been due to the higher than expected adherence levels at baseline. The adjusted mean difference between the groups (in favour of the intervention group) for diastolic blood pressure (- 4.28 mmHg (95% CI - 0.98 to - 1.58, P = 0.002)) and waist circumference (- 2.55 cm (95% CI - 4.55 to - 0.55, P = 0.012)). The intervention group also showed greater perceived control of treatment and more coherent understanding of the condition.
CONCLUSIONS: The 3R programme successfully led to longer-term improvements in important clinical lifestyle indicators but no improvement in medication adherence, raising questions about the suitability of such a broad, multiple risk factor approach for improving medication adherence for primary prevention of CVD.
View full text

Persell, S. D., Liss, D. T., Walunas, T. L., et al. 2020. **Effects of 2 Forms of Practice Facilitation on Cardiovascular Prevention in Primary Care: A Practice-randomized, Comparative Effectiveness Trial**. Medical care 58(4) 344-351.
AIM: To compare practice facilitation implementing point-of-care (POC) QI strategies alone versus facilitation implementing point-of-care plus population management (POC+PM) strategies on preventive cardiovascular care.
METHOD: DESIGN: Two arm, practice-randomized, comparative effectiveness study. PARTICIPANTS: Small and mid-sized primary care practices. INTERVENTIONS: Practices worked with facilitators on QI for 12 months to implement POC or POC+PM strategies. MEASURES: Proportion of eligible patients in a practice meeting "ABCS" measures: (Aspirin) Aspirin/antiplatelet therapy for ischemic vascular disease, (Blood pressure) Controlling High Blood Pressure, (Cholesterol) Statin Therapy for the Prevention and Treatment of Cardiovascular Disease, and (Smoking) Tobacco Use: Screening and Cessation Intervention, and the Change Process Capability Questionnaire. Measurements were performed at baseline, 12, and 18 months.
RESULTS: A total of 226 practices were randomized, 179 contributed follow-up data. The mean proportion of patients meeting each performance measure was greater at 12 months compared with baseline: Aspirin 0.04 (95% confidence interval: 0.02-0.06), Blood pressure 0.04 (0.02-0.06), Cholesterol 0.05 (0.03-0.07), Smoking 0.05 (0.02-0.07); P<0.001 for each. Improvements were sustained at 18 months. At 12 months, baseline-adjusted difference-in-differences in proportions for the POC+PM arm versus POC was: Aspirin 0.02 (-0.02 to 0.05), Blood pressure -0.01 (-0.04 to 0.03), Cholesterol 0.03 (0.00-0.07), and Smoking 0.02 (-0.02 to 0.06); P>0.05 for all. Change Process Capability Questionnaire improved slightly, mean change 0.30 (0.09-0.51) but did not significantly differ across arms.
CONCLUSION: Facilitator-led QI promoting population management approaches plus POC improvement strategies was not clearly superior to POC strategies alone.
View abstract

van der Aalst, C. M., Denissen, S., Vonder, M., et al. 2020. **Screening for cardiovascular disease risk using traditional risk factor assessment or coronary artery calcium scoring: the ROBINSCA trial**. European heart journal cardiovascular Imaging 25 25.
AIMS: Screening for a high cardiovascular disease (CVD) risk followed by preventive treatment can potentially reduce coronary heart disease-related morbidity and mortality. ROBINSCA (Risk Or Benefit IN Screening for

CArdiovascular disease) is a population-based randomized controlled screening trial that investigates the effectiveness of CVD screening in asymptomatic participants using the Systematic COronary Risk Evaluation (SCORE) model or coronary artery calcium (CAC) scoring. This study describes the distributions in risk and treatment in the ROBINSCA trial.
METHODS AND RESULTS: Individuals at expected elevated CVD risk were randomized into screening arm A (n = 14 478; SCORE, 10-year fatal and non-fatal risk); or screening arm B (n = 14 450; CAC scoring). Preventive treatment was largely advised according to current Dutch guidelines. Risk and treatment differences between the screening arms were analysed. A total of 12 185 participants (84.2%) in arm A and 12 950 (89.6%) in arm B were screened. In total, 48.7% were women, and median age was 62 (interquartile range 10) years. SCORE screening identified 45.1% at low risk (SCORE < 10%), 26.5% at intermediate risk (SCORE 10-20%), and 28.4% at high risk (SCORE >= 20%). According to CAC screening, 76.0% were at low risk (Agatston < 100), 15.1% at high risk (Agatston 100-399), and 8.9% at very high risk (Agatston >= 400). CAC scoring significantly reduced the number of individuals indicated for preventive treatment compared to SCORE (relative reduction women: 37.2%; men: 28.8%).
CONCLUSION: We showed that compared to risk stratification based on SCORE, CAC scoring classified significantly fewer men and women at increased risk, and less preventive treatment was indicated.
View full text

Rains, S. A., Hingle, M. D., Surdeanu, M., et al. 2019. **A Test of The Risk Perception Attitude Framework as a Message Tailoring Strategy to Promote Diabetes Screening**. Health communication 34(6) 672-679.
AIM: To text the risk perception attitude (RPA) framework as a message tailoring strategy to encourage diabetes screening.
METHOD: Participants (N = 602) were first categorized into one of four RPA groups based on their diabetes risk and efficacy perceptions and then randomly assigned to receive a message that matched their RPA, mismatched their RPA, or a control message. 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.
RESULTS AND CONCLUSION: 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 full text

Cohort studies

Al-Shamsi, S. 2020. **Performance of the Framingham coronary heart disease risk score for predicting 10-year cardiac risk in adult United Arab Emirates nationals without diabetes: a retrospective cohort study**. BMC Fam Pract 21(1) 175.
AIM: To examine the clinical performance of the FRS model for predicting 10-year CHD risk in adult United Arab Emirates (UAE) nationals without diabetes.
METHOD: This 10-year retrospective cohort study included patients from the primary care clinics and outpatient specialty departments of a large tertiary care hospital in Al-Ain, UAE. They were aged 30-79 without a baseline history of cardiovascular disease and diabetes. The FRS for each subject was calculated. Follow-up data on hard CHD (hCHD) events (myocardial infarction or coronary death) for each participant were collected from the baseline visit in 2008 until December 31, 2019. The area under the time-dependent receiver operating characteristic (ROC) curve (AUROC) was used to assess the FRS model discrimination. Calibration was measured by using the Hosmer-Lemeshow $\chi(2)$ test and the calibration curve. The optimal cutoff-point for hCHD risk prediction was determined by ROC curve analysis.
RESULTS: A total of 554 participants were included. The mean age was 48.0 ± 12.8 years and 45% were men. The mean predicted FRS of the study cohort was 5.2% and approximately 7% were classified as high-risk (≥ 20% threshold) by the FRS model. During a median follow-up of 10.2 years (interquartile range, 7.8-11.0 years), 26 hCHD events occurred. The FRS model displayed reasonably good discrimination (time-dependent AUROC value: 0.83) and calibration in predicting hCHD (Hosmer-Lemeshow $\chi(2)$ statistic 11.2, P = 0.191). Applying the

20% high-risk threshold, the FRS model had a sensitivity of only 37% in identifying patients at high-risk for an hCHD event over 10 years. While a 7.5% optimal cutoff-point improved the sensitivity to 74%.
CONCLUSION: The FRS can be used in the prediction of coronary risk among UAE nationals without diabetes, however, the recommended hCHD risk threshold for statin eligibility may be too high. Lowering the cutoff-point to 7.5% could improve the identification of patients for preventive treatment.
View full text

Journath, G., Hammar, N., Vikstrom, M., et al. 2020. **A Swedish primary healthcare prevention programme focusing on promotion of physical activity and a healthy lifestyle reduced cardiovascular events and mortality: 22-year follow-up of 5761 study participants and a reference group**. British Journal of Sports Medicine 17 17.
AIM: To evaluate long-term risk of first cardiovascular (CV) events, CV deaths and all-cause deaths in community-dwelling participants of a cardiovascular disease (CVD) prevention programme delivered in a primary care setting.
METHOD: Individuals who visited a primary healthcare service in Sollentuna (Sweden) and agreed to participate in the programme between 1988 and 1993 were followed. They had at least one CV risk factor but no prior myocardial infarction and received support to increase physical activity using the programme Physical Activity on Prescription and to adopt health-promoting behaviours including cooking classes, weight reduction, smoking cessation and stress management. Participants (n=5761) were compared with a randomly selected, propensity score-matched reference group from the general population in Stockholm County (n=34 556). All individuals were followed in Swedish registers until December 2011.
RESULTS: In the intervention group and the reference group there were 698 (12.1%) and 4647 (13.4%) first CV events, 308 (5.3%) and 2261 (6.5%) CV deaths, and 919 (16.5%) and 6405 (18.5%) all-cause deaths, respectively, during a mean follow-up of 22 years. The HR (95% CI) in the intervention group compared with the reference group was 0.88 (0.81 to 0.95) for first CV events, 0.79 (0.70 to 0.89) for CV deaths and 0.83 (0.78 to 0.89) for all-cause deaths.
CONCLUSION: Participation in a CVD prevention programme in primary healthcare focusing on promotion of physical activity and healthy lifestyle was associated with lower risk of CV events (12%), CV deaths (21%) and all-cause deaths (17%) after two decades. Promoting physical activity and healthy living in the primary healthcare setting may prevent CVD.
View full text

Kakar, A., Tripathi, S., Gogia, A., et al. 2020. **Stratification of risk groups for developing diabetes among healthy nondiabetic population using skin autofluoroscence spectroscopic screening**. Current Medicine Research and Practice 10(2) 41-43.
AIM: To study the complex cascade of events which leads to cellular malfunction in response to high levels of glucose culminates upon formation of advanced glycation end products (AGEs). Accumulation of AGEs in vivo can induce insulin resistance and impair beta-cells of islets of Langerhans, resulting in impaired glucose regulation and development of diabetes. Therefore, AGE is an early risk factor for diabetes. Skin autofluorescence (SAF) spectroscopic screening is the emission of light in the UV-visible, near-IR spectral range when biological substrates are excited with light at suitable wavelength. Material(s) and
METHOD: In this study, we estimated the subcutaneous AGE level in 197 nondiabetic healthy subjects and then stratified the population into risk groups for developing diabetes based on the result.
RESULTS: In our study, a majority of the healthy population (82% subjects) were in the moderate group, followed by 7% and 3% in the mild and severe groups, respectively. Only 8% of the population screened was in the normal group. In subjects older than 50 years, 95.7% had AGE levels in moderate risk.
CONCLUSION: Autofluoroscence is an easy tool for early diagnosis; however, larger studies are required.
View abstract

Nordstrom, A., Bergman, J., Bjork, S., et al. 2020. **A multiple risk factor program is associated with decreased risk of cardiovascular disease in 70-year-olds: A cohort study from Sweden**. PLoS Medicine / Public Library of Science 17(6) e1003135.
AIM: The present cohort study evaluated the risk of CVD in a primary prevention program for community-dwelling 70-year-olds.
METHOD: In 2012-2017, we included 3,613 community-dwelling 70-year-olds living in Umea, in the north of Sweden, in a health survey and multidimensional prevention program (the Healthy Ageing Initiative [HAI]). Classic risk factors for CVD were evaluated, such as blood pressure, lipid levels, obesity, and physical inactivity. In the current analysis, each HAI participant was propensity-score-matched to 4 controls (n = 14,452) from the general Swedish population using national databases. The matching variables included age, sex, diagnoses, medication use, and socioeconomic factors.
RESULTS: The primary outcome was the composite of myocardial infarction, angina pectoris, and stroke. The 18,065 participants and controls were followed for a mean of 2.5 (range 0-6) years. The primary outcome occurred in 128 (3.5%) HAI participants and 636 (4.4%) controls (hazard ratio [HR] 0.80, 95% CI 0.66-0.97, p = 0.026). In HAI participants, high baseline levels of blood pressure and lipids were associated with subsequent initiation of antihypertensive and lipid-lowering therapy, respectively, as well as with decreases in blood pressure and lipids during follow-up. In an intention-to-treat approach, the risk of the primary outcome was lower when comparing all 70-year-olds in Umea, regardless of participation in HAI, to 70-year-olds in the rest of Sweden for the first 6 years of the HAI project (HR 0.87, 95% CI 0.77-0.97, p = 0.014). In contrast, the risk was similar in the 6-year period before the project started (HR 1.04, 95% CI 0.93-1.17, p = 0.03 for interaction). Limitations of the study include the observational design and that changes in blood pressure and lipid levels likely were influenced by regression towards the mean.
CONCLUSIONS: In this study, a primary prevention program was associated with a lower risk of CVD in community-dwelling 70-year-olds. With the limitation of this being an observational study, the associations may partly be explained by improved control of classic risk factors for CVD with the program.
View full text

Parsa, N., Zibaeenezhad, M. J., Trevisan, M., et al. 2020. **Magnitude of the Quality Assurance, Quality Control, and Testing in the Shiraz Cohort Heart Study**. BioMed Research International 1-7.
AIM: To determine the conclusive integrity in the Shiraz Cohort Heart Study (SCHS) project, management began quality assurance (QA) and quality control (QC) of the collected data throughout the study end-points.
METHOD: The QA is a focused process that prevents and detects data collection errors and verification of intended requirements in the SCHS. The QC is a subset of QA intended to capture errors in processing data through testing and preventive processes to identify problems, defects, or intended requirements.
RESULTS: SCHS involved 10,000 males and females aged 40-70 over a 10-year follow-up period with cardiovascular diseases (CVDs) in the city of Shiraz, Iran. The study measured events and access to preventive care in Shiraz city. The SCHS identified unique barriers to select national study models in developing standardized measures related to variations in ethnicity, religion, cross-cultural considerations, and others. A suggested response to this problem was to develop a mechanism to standardize elements of the questionnaire, study design, and method of administration. This action was based on the geographically normal distribution of the Family Physician Health and Medical Services in Shiraz.
CONCLUSION: Important QA and QC decisions were developed and adopted in the construction of the SCHS and follow-up to ensure conclusive integrity. Available:
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Peng, Y. & Wang, Z. 2020. **Do the 2017 blood pressure cut-offs improve 10-year cardiovascular disease mortality risk prediction?** Nutrition, Metabolism and Cardiovascular Diseases.
AIM: To examine whether the application of new BP cut-offs could improve 10-year CVD mortality prediction among US adults.
METHOD: This population-based cohort study linked data from the US National Health and Nutrition Examination Survey (1988-1994 and 1999-2004) and National Death Index (up to December 31, 2015). We constructed original and modified, using new BP cut-offs, Systematic COronary Risk Evaluation models to

predict 10-year CVD mortality. We measured model discrimination and calibration using the Harrell's C statistic and calibration plots, respectively. We calculated the net reclassification index to evaluate the reclassification. In addition, we compared the sensitivity, specificity, predictive values (PVs), and likelihood ratios (LRs).
RESULTS: Among 28,964 adults (aged >= 20 years), 1493 have died of CVD within ten years of follow-up. The modified models had improvements in calibration and reclassification instead of discrimination compared to the original models. The modified models have higher sensitivity and negative PV; however, they have lower specificity, positive PV, positive LR, and negative LR.
CONCLUSION: The modified models failed to improve the discrimination of 10-year CVD mortality. However, they could increase the calibration and reclassification and capture more participants with high CVD risk. More studies are needed on the potential use of the new BP cut-offs in the CVD primary prevention.
View full text

Perini, W., Snijder, M. B., Agyemang, C., et al. 2020. **Eligibility for cardiovascular risk screening among different ethnic groups: The HELIUS study**. European Journal of Preventive Cardiology 27(11) 1204-1211.
AIM: To determine ethnic differences in the age to initiate cardiovascular risk screening, with and without implementation of ethnic-specific modification of estimated cardiovascular risk.
METHOD: We included 18,031 participants of Dutch, South-Asian Surinamese, African Surinamese, Ghanaian, Turkish and Moroccan background from the HELIUS study (Amsterdam). Eligibility for cardiovascular risk screening was defined as being eligible for blood pressure-lowering treatment, based on a combination of systolic blood pressure, estimated cardiovascular risk, and ethnic-specific conversion of estimated cardiovascular risk as recommended by European cardiovascular disease prevention guidelines. Age-specific proportions of eligibility were determined and compared between ethnic groups via logistic regression analyses.
RESULTS: Dutch men reached the specified threshold to initiate cardiovascular risk screening (according to Dutch guidelines) at an average age of 51.5 years. Among ethnic minority men, this age ranged from 39.8 to 52.4. Among Dutch women, the average age threshold was 53.4. Among ethnic minority women, this age ranged from 36.8 to 49.1. Age-adjusted odds of eligibility were significantly higher than in the Dutch among all subgroups, except among Moroccan men. Applying ethnic-specific conversion factors had minimal effect on the age to initiate screening in all subgroups.
CONCLUSION: Most ethnic minority groups become eligible for blood pressure-lowering treatment at a lower age and may therefore benefit from lower age-thresholds to initiate cardiovascular risk screening.
View full text

Timm, L., Harcke, K., Karlsson, I., et al. 2020. **Early detection of type 2 diabetes in socioeconomically disadvantaged areas in Stockholm - comparing reach of community and facility-based screening**. Glob Health Action 13(1) 1795439.
AIM: To determine the difference in population reach and participant characteristics between community- and facility-based screening for detection of type 2 diabetes and persons at high risk of developing diabetes.
METHOD: Finnish diabetes risk score (FINDRISC) is a risk assessment tool used by two diabetes projects to conduct community- and facility-based screenings in disadvantaged suburbs of Stockholm. In this study, descriptive and limited inferential statistics were carried out analyzing data from 2,564 FINDRISC forms from four study areas. Community- and facility-based screening was compared in terms of participant characteristics and with population data from the respective areas to determine their reach.
RESULTS: Our study found that persons born in Africa and Asia were reached through community screening to a higher extent than with facility-based screening, while persons born in Sweden and other European countries were reached more often by facility-based screening. Also, younger persons were reached more frequently through community screening compared with facility-based screening. Both types of screening reached more women than men.
CONCLUSION: Community-based screening and facility-based screening were complementary methods in reaching different population groups at high risk of developing type 2 diabetes. Community screening in particular reached more hardtoreach groups with unfavorable risk profiles, making it a critical strategy for T2D prevention.More men should be recruited to intervention studiesscreening initiatives to achieve gender balance.
View full text

van der Ende, M. Y., Waardenburg, I. E., Lipsic, E., et al. 2020. **The effect of feedback on cardiovascular risk factors on optimization of primary prevention: The PharmLines initiative**. International Journal of Cardiology: Hypertension 6 (no pagination) (100042).
AIM: To determine whether population based single assessment of cardiovascular disease (CVD) risk and feedback to individuals and general practitioners results in initiation of preventive cardiovascular pharmacotherapy in those at risk.
METHOD: The population based cohort study Lifelines was linked to the IADB.nl pharmacy database to assess information on the initiation of preventive medication (N = 48,770). At the baseline visit, information on cardiovascular risk factors was collected and reported to the participants and their general practitioners. An interrupted-time-series-analysis was plotted, in which the start year of blood pressure and lipid lowering medication was displayed in years before or after the baseline visit. Subsequently, predictors of the initiation of pharmacotherapy were determined and possible reduction in cardiovascular events that could be achieved by optimal treatment of individuals at risk.
RESULTS: Before the Lifelines baseline visit, 34% (out of 1,527, 95% Confidence interval (CI) 32%-36%) and 30% (out of 1,991, 95%CI 28%-32%) of the individuals at risk had a blood pressure or lipid lowering drug prescription, respectively. In those at risk, the use of blood pressure lowering medication, increased substantially during the year of the baseline visit. Treating individuals at increased risk (>=5% 10-year risk) with lipid or blood pressure lowering medication (N = 8515 and N = 6899) would have prevented 162 and 183 CVD events, respectively, in the upcoming five years.
CONCLUSION: Primary prevention of CVD in the general population appears suboptimal. Feedback of cardiovascular risk factors resulted in a substantial increase of blood pressure lowering medication and extrapolated health benefits.
View full text

Wainwright, M. K., Earle, M., Kosog, K., et al. 2020. **The effect of place of service on diabetic screening adherence in the homeless population**. Journal of Community Health 45(1) 73-80.
AIM: To examine the association between place of service and adherence to select diabetes screening measures in a homeless population.
METHOD: At a Midwestern metropolitan federally qualified health center (FQHC), 508 participants with diabetes and also experiencing homelessness were studied throughout calendar year 2018. Diabetes measures included controlled blood pressure, diabetic foot exam and hemoglobin A1C screening. Patients were seen at one of three locations: FQHC only, shelter only and both shelter and FQHC.
RESULTS: After controlling for primary insurance, insurance status, homeless status, age group, ethnicity, primary language, race, sex and poverty level, a stepwise binary logistic regression demonstrated significant model improvement in A1c screening ($p \leq 0.001$) and controlled blood pressure ($p=0.009$) when place of service was added as a predictor. Specifically, results showed significant negative associations in screening adherence for shelter as compared to FQHC for both controlled blood pressure (OR=0.40; 95% CI=0.20-0.79; $p=0.009$) and A1c screening (OR=0.06; 95% CI=0.03-0.16; $p \leq 0.001$).
CONCLUSION: Our results support the hypothesis that FQHC care results in higher rates of adherence than shelter only or FQHC and shelter combined care. The study addresses the gap in literature surrounding place of service and patient adherence. Recommendations for future research are included.
View full text

Walli-Attaei, M., Joseph, P., Rosengren, A., et al. 2020. **Variations between women and men in risk factors, treatments, cardiovascular disease incidence, and death in 27 high-income, middle-income, and low-income countries (PURE): a prospective cohort study**. The Lancet 396(10244) 97-109.
AIM: To compare treatments and outcomes between women and men in HICs, middle-income countries, and low-income countries from community-based population studies.
METHOD: In the Prospective Urban Rural Epidemiological study (PURE), individuals aged 35-70 years from urban and rural communities in 27 countries were considered for inclusion. We recorded information on participants' sociodemographic characteristics, risk factors, medication use, cardiac investigations, and

interventions. 168 490 participants who enrolled in the first two of the three phases of PURE were followed up prospectively for incident cardiovascular disease and death.
RESULTS: From Jan 6, 2005 to May 6, 2019, 202 072 individuals were recruited to the study. The mean age of women included in the study was 50.8 (SD 9.9) years compared with 51.7 (10) years for men. Participants were followed up for a median of 9.5 (IQR 8.5-10.9) years. Women had a lower cardiovascular disease risk factor burden using two different risk scores (INTERHEART and Framingham). Primary prevention strategies, such as adoption of several healthy lifestyle behaviours and use of proven medicines, were more frequent in women than men. Incidence of cardiovascular disease (4.1 [95% CI 4.0-4.2] for women vs 6.4 [6.2-6.6] for men per 1000 person-years; adjusted hazard ratio [aHR] 0.75 [95% CI 0.72-0.79]) and all-cause death (4.5 [95% CI 4.4-4.7] for women vs 7.4 [7.2-7.7] for men per 1000 person-years; aHR 0.62 [95% CI 0.60-0.65]) were also lower in women. By contrast, secondary prevention treatments, cardiac investigations, and coronary revascularisation were less frequent in women than men with coronary artery disease in all groups of countries. Despite this, women had lower risk of recurrent cardiovascular disease events (20.0 [95% CI 18.2-21.7] versus 27.7 [95% CI 25.6-29.8] per 1000 person-years in men, adjusted hazard ratio 0.73 [95% CI 0.64-0.83]) and women had lower 30-day mortality after a new cardiovascular disease event compared with men (22% in women versus 28% in men; p<0.0001). Differences between women and men in treatments and outcomes were more marked in LMICs with little differences in HICs in those with or without previous cardiovascular disease.
CONCLUSION: Treatments for cardiovascular disease are more common in women than men in primary prevention, but the reverse is seen in secondary prevention. However, consistently better outcomes are observed in women than in men, both in those with and without previous cardiovascular disease. Improving cardiovascular disease prevention and treatment, especially in LMICs, should be vigorously pursued in both women and men.
View full text

Wells, S., Pylypchuk, R., Mehta, S., et al. 2020. **Performance of CVD risk equations for older patients assessed in general practice: a cohort study**. N Z Med J 133(1517) 32-55.
AIM: To investigate how well the New Zealand PREDICT-CVD risk equations, derived in people aged 30-74 years and US Pooled Cohort Equations (PCEs) derived in people aged 40-79 years, perform for older people.
METHOD: The PREDICT cohort study automatically recruits participants when clinicians use PREDICT software to conduct a CVD risk assessment. We identified patients aged 70 years and over, without prior CVD, renal disease or heart failure who had been risk assessed between 2004 and 2016. Equation performance was assessed in five-year age bands using calibration graphs and standard discrimination metrics.
RESULTS: 40,161 patients (median 73 years; IQR 71-77) experienced 5,948 CVD events during 185,150 person-years follow-up. PREDICT-CVD equations were well calibrated in 70-74 year olds but underestimated events for women from 75 years and men from 80 years. Discrimination metrics were also poor for these age groups. Recalibrated PCEs overestimated CVD risk in both sexes and had poor discrimination from age 70 years for men and from age 75 years for women.
CONCLUSION: While PREDICT-CVD equations performed better than PCEs, neither performed well. Multimorbidity and competing risks are likely to contribute to the poor performance and new CVD risk equations need to include these factors.
View abstract

Karakonstantis, S., Kassotaki, I., Korela, D., et al. 2019. **In-hospital screening for diabetes mellitus with HbA1c in an internal medicine department was not useful; a prospective pilot study**. Romanian journal of internal medicine = Revue roumaine de medecine interne 57(4) 315-321.
AIM: To evaluate a screening protocol based on HbA1c to identify inpatients with undiagnosed diabetes mellitus in an internal medicine department.
METHOD: We conducted a prospective study of all admissions in the internal medicine department of a 412-bed community hospital in Greece during a 6-month period. Candidates for screening based on the American Diabetes Association's recommendations were screened with HbA1c. Patients with very poor health status and patients with conditions that may interfere with HbA1c measurement or interpretation were excluded.

RESULTS: Of 463 patients (median age 74) only a small proportion (14.9%) were candidates for screening with HbA1c. Known diabetes mellitus, a low admission glucose, severe anemia or blood loss and poor health status were the most common reasons of exclusion. Among the 55 screened patients, 7 had diabetes (based on HbA1c >= 6.5%). However, in only 1 of them HbA1c was above target considering the patients' health status. Categorical agreement (no diabetes, prediabetes, diabetes) between morning glucose and HbA1c was low. However, the concordance between a morning glucose < 125 mg/dl and HbA1c < 6.5% was > 90%.
CONCLUSION: In settings similar to ours (very elderly patients, high rate of conditions that confound the use of HbA1c and high rate of patients with poor health status), untargeted screening of inpatients with HbA1c is unlikely to be cost-effective. A morning glucose during hospitalization may be a better first step for screening.
View full text

Cross-sectional

Asgari, S., Lotfaliany, M., Fahimfar, N., et al. 2020. **The external validity and performance of the no-laboratory American Diabetes Association screening tool for identifying undiagnosed type 2 diabetes among the Iranian population**. Primary care diabetes 07.
AIM: To assess the American Diabetes Association (ADA) risk score as a self-assessment screening tool for undiagnosed type 2 diabetes (T2DM) in Iran.
METHOD: In a national survey of risk factors for non-communicable diseases, we included 3458 Iranian adults. The discrimination and validity were assessed using the area under the curve (AUC), sensitivity, specificity, Youden's index, positive and negative predictive values (PPV and NPV). The frequency of high-risk Iranian population who need a glucose test and those who need intervention were also estimated.
RESULTS: The AUC was 73.7% and the suggested ADA score of >=5 yielded a sensitivity of 51.6%, specificity 82.4%, NPV 98.3%, and PPV 7.9%. This threshold results in classifying 18.6% of the Iranians, equals to 8.5 million, as high-risk and 1.5% of the population, about 700,000, would need intervention. However, our study suggested score >=4 that identified 34% of the population as high-risk and 2% of the population would need intervention.
CONCLUSION: Our findings support the ADA suggested threshold for identifying high-risk individuals for undiagnosed T2DM; however, a lower threshold is also recommended for higher sensitivity. The ADA screening tool could help the public health system for low-cost screening.
View full text

Bekbergenova, Z., Derbissalina, G., Umbetzhanova, A., et al. 2020. **[Evaluation of the Clinical Effectiveness of the Screening Program of Cardiovascular Diseases]**. Georgian Medical News (300) 54-59.
AIM: To evaluate the clinical effectiveness of the current CVD screening program in Nur-Sultan.
METHOD: A cross-sectional study, sociological survey and a clinical examination of patients with identified CVD who underwent screening of circulatory system diseases in primary health care organizations (PHC) were conducted.
RESULTS: The study included 124 patients, three of whom died due to cardiovascular complications. The average age of patients during the examination is 54.3 [95% CI: 52.64; 55.96], of which 38% are men and 62% are women. The fact of smoking - 64 (52+/-8%), alcohol - (37,2+/-11,6), family history - 66 (54,5+/-8,1), daily physical activity - 34 (28.1+/-14.3). The mean systolic blood pressure (BP) is 144.3 [95% CI: 141.61; 146.99] and diastolic blood pressure 90.2 [95% CI: 89.02; 91.38] mmHg Most respondents have varying degrees of obesity. The average BMI is 31.8 [95% CI: 30.93; 32.67]. The average waist size is 89.1 [95% CI: 86.88; 91.52], while the waist size in women exceeds 80 cm - 91.9 [95% CI: 89.03; 94.77] and the waist size in men 86.1 [95% CI: 82.31; 89.89]. The average values of total cholesterol. 5.9 [95% CI: 5.85; 5.95]. We interviewed patients for complaints, examined outpatient records, and an survey log: chest pains or cardiac rupture during exercise were noted in 25 people (20,7+/-17.5) , improvement of subjective state-in 29 (24+/-15.9), regular receipt of basic therapy in 59 (48.8+/-9.1), calling an ambulance team in 43 (35.5+/-12), urgent hospitalization during the year - 31 (25.6+/-15.2) and 7 patients (5,8+/-36%) participated in school of cardiovascular disease.
CONLCUSION: The revealed low effectiveness of the screening program for cardiovascular diseases makes it necessary to review the comprehensive training program for doctors, nurses, PHC and the population.
View abstract

Dadwani, R. S., Skandari, M. R., GoodSmith, M. S., et al. 2020. **Alternative type 2 diabetes screening tests may reduce the number of U.S. adults with undiagnosed diabetes**. Diabetic Medicine 24 24.
AIM: To evaluate the U.S. population-level impact of two alternatives for initial type 2 diabetes screening [opportunistic random plasma glucose (RPG) > 6.7 mmol/l and a 1-h 50-g glucose challenge test (GCT) > 8.9 mmol/l] compared with American Diabetes Association (ADA)-recommended tests.
METHOD: Using a sample (n = 1471) from the National Health and Nutrition Examination Survey (NHANES) 2013-2014 that represented 145 million U.S. adults at high risk for developing type 2 diabetes, we simulated a two-test screening process. We compared ADA-recommended screening tests [fasting plasma glucose (FPG), 2-h 75-g oral glucose tolerance test (OGTT), HbA_{1c}] vs. initial screening with opportunistic RPG or GCT (followed by FPG, OGTT or HbA_{1c}). After simulation, participants were entered into an individual-level Monte Carlo-based Markov lifetime outcomes model. Primary outcomes were representative number of U.S. adults correctly identified with type 2 diabetes, societal lifetime costs and quality-adjusted life years (QALYs).
RESULTS: In NHANES 2013-2014, 100 individuals had undiagnosed diabetes [weighted estimate: 8.4 million, standard error (se): 1.1 million]. Among ADA-recommended screening tests, FPG followed by OGTT (FPG-OGTT) was most sensitive, identifying 35 individuals with undiagnosed diabetes (weighted estimate: 3.2 million, se: 0.9 million). Four alternative screening strategies performed superior to FPG-OGTT, with RPG followed by OGTT being the most sensitive overall, identifying 72 individuals with undiagnosed diabetes (weighted estimate: 6.1 million, se: 1.0 million). There was no increase in average lifetime costs and comparable QALYs.
CONCLUSIONS: Initial screening using opportunistic RPG or a GCT may identify more U.S. adults with type 2 diabetes without increasing societal costs.
View full text

Greiner, B., Mercer, H., Raymond, C., et al. 2020. **A recommendation for earlier screening of type 2 diabetes mellitus within the US population: A cross-sectional analysis of NHIS data**. Diabetes Research & Clinical Practice 108376.
AIM: to analyse the epidemiology of US citizens diagnosed with type 2 diabetes (T2D) prior to 40 years.
METHOD: A cross-sectional analysis of the 2017 National Health Information Survey (NHIS)– a multistage survey with complex sampling procedures, commonly used to estimate health conditions of the US adults.
RESULTS: The overall sample size was 25,461 representing an adult US population size of N = 235,483,332. From this weighted sample, an estimated 8.12% (95%CI: 7.72–8.55) reported being diagnosed with T2D. The results of our investigation showed that 24.53% (95%CI: 22.15–27.08) of individuals with T2D were diagnosed before age 40–more than 4.6 million people. More than two-thirds of individuals with T2D diagnoses were white, with similar diagnosis rates through age-group progression among races (Table 1). Men had lower rates of diabetes before age 40 compared to women with differing patterns of onset (X2: F(1.87, 472.45) = 3.3813; p < .05).
CONCLUSION: Our study showed that 1/4 of patients with type 2 diabetes were diagnosed prior to 40 years. Therefore, we recommend lowering the screening age for diabetes.
View abstract

Kim, H. & Cho, Y. 2020. **Factors Associated with Metabolic Syndrome among Middle-Aged Women in their 50s: Based on National Health Screening Data**. International Journal of Environmental Research & Public Health 17(9) 26.
AIM: to identify the risk factors associated with metabolic syndrome among middle-aged women in their 50s to provide a strategy for managing the metabolic syndrome of those whose prevalence is rapidly increasing.
METHOD: Secondary data from the 2012 Korean National Health Insurance Service Medical check-up cohort database were analyzed. Participants included 36,582 middle-aged women in their 50s from the cohort who received a general medical check-up. The risk factors were estimated using logistic regression analysis. Metabolic syndrome was identified in 14.6% of the surveyed persons among middle-aged women in their 50s.
RESULTS: Working women, low household income levels, country residents, high body mass index (BMI), total cholesterol of over 240 mg/dl, non-drinker, non-exerciser, history of diabetes or hypertension, and family history of diabetes were associated with increased risk of metabolic syndrome.

CONCLUSION: It is necessary to prepare a strategy to increase access to health care services so that socioeconomic vulnerability does not lead to negative health behavior such as obesity and lack of physical activity. In particular, we recommend active interventions at workplaces for the working women who have a higher risk of metabolic syndrome.
View full text

Mao, T., Chen, J., Guo, H., et al. 2020. **The Efficacy of New Chinese Diabetes Risk Score in Screening Undiagnosed Type 2 Diabetes and Prediabetes: A Community-Based Cross-Sectional Study in Eastern China**. Journal of Diabetes Research 2020 7463082.
AIM: to evaluate the performance of NCDRS in detecting undiagnosed diabetes and prediabetes among the community residents in eastern China.
METHOD: We applied NCDRS in 7675 community residents aged 18-65 years old in Jiangsu Province. The results showed that the participants with undiagnosed diabetes reported the highest NCDRS value, followed by those with prediabetes ($P < 0.001$).
RESULTS: The best cut-off points of NCDRS for detecting undiagnosed diabetes and prediabetes were 27 (with a sensitivity of 78.0% and a specificity of 57.7%) and 27 (with a sensitivity of 66.0% and a specificity of 62.9%). The AUCs of NCDRS for identifying undiagnosed diabetes and prediabetes were 0.749 (95% CI: 0.739~0.759) and 0.694 (95% CI: 0.683~0.705).
CONCLUSION: These results demonstrate the excellent performance of NCDRS in screening undiagnosed diabetes in the community population in eastern China and further provide evidence for using NCDRS in detecting prediabetes.
View abstract

Misialek, J. R., Van't Hof, J. R., Oldenburg, N. C., et al. 2020. **Aspirin Use and Awareness for Cardiovascular Disease Prevention Among Hispanics: Prevalence and Associations with Health Behavior Beliefs**. Journal of Community Health 45(4) 820-827.
AIM: To examine regular aspirin use and specific attitudes and social norms toward CVD and aspirin use within an urban Hispanic population in Minnesota.
METHOD: A sample of primary prevention Hispanics aged 45–79 years were surveyed about CVD history and risk factors, aspirin use, demographic characteristics, and health beliefs and social norms in relation to CVD and aspirin. Relative risk estimation using Poisson regression with robust error variance was used to examine associations with aspirin use.
RESULTS: In this sample of 152 Hispanics (55% women), the mean age was 53 years, 70% had a regular healthcare provider, and 22% used aspirin. Aspirin discussions with a regular healthcare provider were strongly associated with aspirin use (adjusted risk ratio 3.02, 95% CI 1.20–7.60). There was a positive association between health beliefs and social norms that affirm preventive behaviors and aspirin use (adjusted linear risk ratio 1.23, 95% CI 1.04–1.45) while uncertainty about the role of aspirin for individual use and in the community was negatively associated with aspirin use (adjusted linear risk ratio 0.85, 95% CI 0.70–1.03).
CONCLUSION: This growing population may benefit from health education about CVD risk and the role of aspirin in prevention.
View abstract

Nagarathna, R., Tyagi, R., Battu, P., et al. 2020. **Assessment of risk of diabetes by using Indian Diabetic risk score (IDRS) in Indian population**. Diabetes Research & Clinical Practice 162 N.PAG-N.PAG.
AIM: To screen the Indian population for Type 2 Diabetes Mellitus (DM) based on Indian Diabetes Risk Score. Our main question was; Does Indian Diabetic risk score (IDRS) effectively screen diabetic subjects in Indian population.
METHOD: Multi-centric nationwide screening for DM and its risk in all populous states and Union territories of India in 2017. It is the first pan India DM screening study conducted on 240,000 subjects in a short period of 3 months based on IDRS. This was a stratified translational research study in randomly selected cluster populations from all zones of rural and urban India. Two non-modifiable (age, family history) and two modifiable

(waist circumference & physical activity) were used to obtain the score. High, moderate and low risk groups were selected based on scores.
RESULTS: In this study 40.9% subjects were detected to be high risk, known or newly diagnosed DM subjects in urban and rural regions. IDRS could detect 78.1% known diabetic subjects as high risk group. Age group 50-59 (17.4%); 60-69 (22%); 70-79 (22.8%); >80 (19.2%) revealed high percentage of subjects. ROC was found to be 0.763 at CI 95% of 0.761-0.765 with statistical significance of $p < 0.0001$. At >50 cut off, youden index showed the sensitivity of 78.05 and specificity of 62.68. Regression analysis revealed that IDRS and Diabetes are significantly positively associated.
CONCLUSION: Data reveals that IDRS is a good indicator of high risk diabetic subjects.
View full text

Petersen, J., Kontsevaya, A., McKee, M., et al. 2020. **Primary care use and cardiovascular disease risk in Russian 40-69 year olds: a cross-sectional study**. Journal of Epidemiology & Community Health 74(9) 692-967.
AIM: To compare characteristics of CVD-free participants with and without recent primary care contact to ascertain their CVD risk and health status.
METHODS: A total of 2774 participants aged 40-69 years with no self-reported CVD history were selected from a population-based study conducted in Arkhangelsk and Novosibirsk, Russian Federation, 2015-2018. A range of co-variates related to socio-demographics, health and health behaviours were included. Recent primary care contact was defined as seeing primary care doctor in the past year or having attended a general health check under the 2013 Dispansarisation programme.
RESULTS: The proportion with no recent primary care contact was 32.3% (95% CI 29.7% to 35.0%) in males, 16.3% (95% CI 14.6% to 18.2%) in females, and 23.1% (95% CI 21.6% to 24.7%) overall. In gender-specific age-adjusted analyses, no recent contact was also associated with low education, smoking, very good to excellent self-rated health, no chest pain, CVD 10-year SCORE risk 5+%, absence of hypertension control, absence of hypertension awareness and absence of care-intensive conditions. Among those with no contact: 37% current smokers, 34% with 5+% 10-year CVD risk, 32% untreated hypertension, 20% non-anginal chest pain, 18% problem drinkers, 14% uncontrolled hypertension and 9% Grade 1-2 angina. The proportion without general health check attendance was 54.6%.
CONCLUSION: Primary care and community interventions would be required to proactively reach sections of 40-69 year olds currently not in contact with primary care services to reduce their CVD risk through diagnosis, treatment, lifestyle recommendations and active follow-up.
View full text

Sakuma, H., Nakagawa, N., Horiuchi, K., et al. 2020. **Comparison between unattended automated office blood pressure and conventional office blood pressure under the environment of health checkup among Japanese general population**. Journal of Clinical Hypertension, 00:1–7.
AIM: to identify the clinical significance of automated office blood pressure (AOBP) as compared to conventional office blood pressure (CBP) under the environment of a health checkup.
METHOD: There were 491 participants (333 females, mean age of 62.5 years) who were at least 20 years old, including 179 participants who were previously diagnosed with hypertension.
RESULTS: Mean AOBPs were 131.8 +/- 20.9/76.6 +/- 11.7 mm Hg, and CBPs were 135.6 +/- 21.6/77.3 +/- 11.5 mm Hg. There was a difference of 3.9 mm Hg in systolic blood pressure (SBP) and 0.8 mm Hg in diastolic BP between AOBP and CBP. In all participants, SBP and pulse pressure, as well as the white coat effect (WCE), increased with age. The cutoff value used was 140/90 mm Hg for CBP and 135/85 mm Hg for AOBP, and the prevalence of WCE and masked hypertension effect (MHE) was 12.4% and 14.1%, respectively.
CONCLUSION: Even in a health checkup environment of the general population, there was a difference between the AOBP and CBP, and the WCE was observed more strongly in the elderly with a history of hypertension, suggesting that a combination of AOBP with CBP may be useful in detecting WCE and MHE in all clinical scenarios including health checkups, and help solve the "hypertension paradox" not only in Japan but in all over the world.
View full text

Sande, A. R., Guru, S., Guru, R., et al. 2020. **Gingival Crevicular Blood Glucose Levels: Is it a Reliable Tool for Screening Diabetes in a Dental Office?** Journal of Contemporary Dental Practice 21(4) 421-425.
AIM: To evaluate whether the blood oozing during routine periodontal examination can be used for evaluating blood glucose levels.
METHOD: A total of 100 patients reporting to Department of Oral Medicine and Radiology, within the age group of 25-55 years were enrolled. In fasting condition, gingival crevicular blood (GCB), finger-stick blood (FSB) was measured using a glucometer and venous blood (VB) glucose values were measured in the laboratory with glucose oxidase method. All the parameters thus recorded were then subjected to statistical analysis.
RESULTS: When compared, the GCB glucose values, VB glucose values and the FSB glucose values measured with glucometer in the diabetic and nondiabetic group were found to be highly statistically significant ($p = 0.000$).
CONCLUSION: Gingival crevicular blood collected during diagnostic periodontal examination can provide a valid and acceptable source for measuring blood glucose levels using a glucometer. In addition, the technique described is quick, safe, easy to perform and more acceptable to the patients.
View abstract

Stol, D. M., Hollander, M., Damman, O. C., et al. 2020. **Mismatch between self-perceived and calculated cardiometabolic disease risk among participants in a prevention program for cardiometabolic disease: a cross-sectional study**. BMC Public Health 20(1) 740.
AIM: To assess the impact of communicating an individualized CMD risk score through an ORS on perceived risk and to identify risk factors and demographic characteristics associated with risk perception among high-risk participants of a prevention program for CMD.
METHOD: A cross-sectional analysis of baseline data from a randomized controlled trial conducted in a primary care setting. Seven thousand five hundred forty-seven individuals aged 45-70 years without recorded CMD, hypertension or hypercholesterolemia participated. The main outcome measures were: 1) differences in cognitive and affective risk perception between the intervention group - who used an ORS and received an individualized CMD risk score- and the control group who answered questions about CMD risk, but did not receive an individualized CMD risk score; 2) risk factors and demographic characteristics associated with risk perception.
RESULTS: No differences were found in cognitive and affective risk perception between the intervention and control group and risk perception was on average low, even among high-risk participants. A positive family history for diabetes type 2 (β0.56, CI95% 0.39-0.73) and cardiovascular disease (β0.28, CI95% 0.13-0.43), BMI ≥25 (β0.27, CI95% 0.12-0.43), high waist circumference (β0.25, CI95% 0.02-0.48) and physical inactivity (β0.30, CI95% 0.16-0.45) were positively associated with cognitive CMD risk perception in high-risk participants. No other risk factors or demographic characteristics were associated with risk perception.
CONCLUSIONS: Communicating an individualized CMD risk score did not affect risk perception. A mismatch was found between calculated risk and self-perceived risk in high-risk participants. Family history and BMI seem to affect the level of CMD risk perception more than risk factors such as sex, age and smoking. A dialogue about personal CMD risk between patients and health care professionals might optimize the effect of the provided risk information.
View full text

Su, N., Teeuw, W. J., Loos, B. G., et al. 2020. **Development and validation of a screening model for diabetes mellitus in patients with periodontitis in dental settings**. Clinical Oral Investigations 15 15.
AIM: To identify predictors in patient profiles and to develop, internally validate, and calibrate a screening model for diabetes mellitus (DM) in patients with periodontitis in dental settings.
METHOD: The study included 204 adult patients with periodontitis. Patients' socio-demographic characteristics, general health status, and periodontal status were recorded as potential predictors. The diabetic status was considered the outcome, classified into no DM, prediabetes (pre-DM), or DM. Multinomial logistic regression analysis was used to develop the model. The performance and clinical values of the model were determined.
RESULTS: Seventeen percent and 47% of patients were diagnosed with DM and pre-DM, respectively. Patients' age, BMI, European background, cholesterol levels, previous periodontal treatment, percentage of the

number of teeth with mobility, and with gingival recession were significantly associated with the diabetic status of the patients. The model showed a reasonable calibration and moderate to good discrimination with area under the curve (AUC) values of 0.67 to 0.80. The added predictive values for ruling in the risk of DM and pre-DM were 0.42 and 0.11, respectively, and those for ruling it out were 0.05 and 0.17, respectively.
CONCLUSIONS: Predictors in patient profiles for screening of DM and pre-DM in patients with periodontitis were identified. The calibration, discrimination, and clinical values of the model were acceptable.
View full text

Welsh, C., Welsh, P., Celis-Morales, C. A., et al. 2020. **Glycated Hemoglobin, Prediabetes, and the Links to Cardiovascular Disease: Data From UK Biobank**. Diabetes Care 43(2) 440-445.
AIM: To investigate whether HbA1c may simultaneously improve cardiovascular disease (CVD) risk assessment, using QRISK3, American College of Cardiology/American Heart Association (ACC/AHA), and Systematic COronary Risk Evaluation (SCORE) scoring systems.
METHOD: UK Biobank participants without baseline CVD or known diabetes (n = 357,833) were included. Associations of HbA1c with CVD was assessed using Cox models adjusting for classical risk factors. Predictive utility was determined by the C-index and net reclassification index (NRI). A separate analysis was conducted in 16,596 participants with known baseline diabetes.
RESULTS: Incident fatal or nonfatal CVD, as defined in the QRISK3 prediction model, occurred in 12,877 participants over 8.9 years. Of participants, 3.3% (n = 11,665) had prediabetes (42.0-47.9 mmol/mol [6.0-6.4%]) and 0.7% (n = 2,573) had undiagnosed diabetes (≥48.0 mmol/mol [≥6.5%]). In unadjusted models, compared with the reference group (<42.0 mmol/mol [<6.0%]), those with prediabetes and undiagnosed diabetes were at higher CVD risk: hazard ratio (HR) 1.83 (95% CI 1.69-1.97) and 2.26 (95% CI 1.96-2.60), respectively. After adjustment for classical risk factors, these attenuated to HR 1.11 (95% CI 1.03-1.20) and 1.20 (1.04-1.38), respectively. Adding HbA1c to the QRISK3 CVD risk prediction model (C-index 0.7392) yielded a small improvement in discrimination (C-index increase of 0.0004 [95% CI 0.0001-0.0007]). The NRI showed no improvement. Results were similar for models based on the ACC/AHA and SCORE risk models.
CONCLUSION: The near twofold higher unadjusted risk for CVD in people with prediabetes is driven mainly by abnormal levels of conventional CVD risk factors. While HbA1c adds minimally to cardiovascular risk prediction, those with prediabetes should have their conventional cardiovascular risk factors appropriately measured and managed.
View full text

Zhang, Y., Cong, H., Man, C., et al. 2020. **Risk factors for cardiovascular disease from a population-based screening study in Tianjin, China: a cohort study of 36,215 residents**. Annals of Translational Medicine 8(7) 444.
AIM: To examine the risk factors, occurrence and development of CVD.
METHOD: A total of 36,215 participants were collected from participants of the Early Screening and Comprehensive Intervention Program for High Risk Population of Cardiovascular Disease in Tianjin on July 31, 2017. We analyzed the relationship between CVD risk and personal information, personal and family medical history, biochemical index, and physical fitness index using Pearson's chi-squared test with and without Yates's correction for continuity, and Fisher's exact test. CVD risk-related factors were examined through logistic regression and decision tree analysis.
RESULTS: A personal history of hypertension and apoplexy had a contingency coefficient with CVD risk of more than 0.3. A higher risk of CVD was also found to be associated with biochemical markers of cholesterol, low-density lipoprotein cholesterol, and blood sugar. Logistic regression analysis revealed 12 indicators to be influencing factors of CVD, including age, systolic blood pressure (SBP), diastolic blood pressure (DBP), and the number of people aged >90 in the family. Hypertension, SBP, BMI, cholesterol, and blood glucose were associated with five or more other indicators.
CONCLUSION: The prevalence of CVD risk factors in Tianjin residents is relatively high. Family disease history and individual physical fitness indicators need to be taken into account during CVD screening and intervention, to reduce the risk of CVD.
View full text

Qualitative

Alzubaidi, H., Namara, K. M., Saidawi, W., et al. 2020. **Pharmacists' experiences and views on providing screening services: An international comparison**. Research In Social & Administrative Pharmacy 30 30.
AIM: To explore and compare the views and experiences of pharmacists participating in the UAE PHARMACSCREEN trial, with those of community pharmacists who participated in the Australian CARS trial.
METHOD: In-depth, face-to-face interviews were conducted with pharmacists who delivered the screening programs in Australia (n = 10) and UAE (n = 12) to explore their views and experiences. The interview guide was similar in both studies to ensure consistency and comparability of collected data. Interviews were transcribed verbatim and thematically analyzed.
RESULTS: Two common themes emerged: pharmacists' experiences with the screening program, and barriers and facilitators to service delivery. Both groups held very positive views about the screening intervention, particularly referencing the professional satisfaction it generated and broad participant satisfaction with pharmacy-based screening. Despite country and health system differences, pharmacists reported many similar barriers (e.g., staffing levels, pharmacy coordination) and enablers (e.g., implementation support, adequate staffing, point-of-care tests, no cost to patient) to implementation. The context for screening delivery emerged as a key theme for UAE interviews only, where issues such as local population needs, regulatory factors, pharmacist roles and expectations, and training needs were quite prominent.
CONCLUSION: Pharmacists' positive experiences with the screening programs is a testimony to the strong emerging evidence supporting pharmacists-delivered screening. Despite differences in health care systems, similar enablers and barriers were identified. The adaptation and successful implementation of international screening models requires a country-specific adaptation process.
View abstract

Coorey, G., Peiris, D., Neubeck, L., et al. 2020. **A realist evaluation approach to explaining the role of context in the impact of a complex eHealth intervention for improving prevention of cardiovascular disease**. BMC Health Services Research 20(1) 764.
AIM: To examine the contextual factors influencing behaviour change within a multi-feature eHealth intervention with personalised data integration from the primary care electronic health record (EHR) using a realist evaluation approach.
METHOD: Realist evaluation of qualitative data from the Consumer Navigation of Electronic Cardiovascular Tools (CONNECT) randomised trial (N = 934). Thirty-six participants from the intervention group (N = 486) who had completed 12 months of study follow-up were interviewed. Coding of transcripts was structured around configurations of contexts, mechanisms, and outcomes of intervention use. Contextual narratives were derived from thematic analysis of the interviews.
RESULTS: Mechanisms favouring positive health behaviour occurred when participants responded to four interactive features of the intervention. Facilitating mechanisms included greater cognitive engagement whereby participants perceived value and benefit, and felt motivated, confident and incentivised. Participants moved from being unconcerned (or unaware) to more task-oriented engagement with personal CVD risk profile and prevention. Increased personalisation occurred when modifiable CVD risk factors became relatable to lifestyle behaviour; and experiences of feeling greater agency/self-efficacy emerged. Use and non-use of the intervention were influenced by four overarching narratives within the individual's micro-level and meso-level environments: illness experiences; receptiveness to risk and prevention information; history of the doctor-patient relationship; and relationship with technology.
CONCLUSION: Intervention-context interactions are central to understanding how change mechanisms activate within complex interventions to exert their impact on recipients. Intervention use and non-use were context-dependent, underscoring the need for further research to target eHealth innovations to those most likely to benefit.
View full text

DeBiase, C., Giblin-Scanlon, L., Boyd, L. D., et al. 2020. **Knowledge, Attitudes and Practices of Dental Hygienists Regarding Diabetes Risk Assessments and Screenings**. Journal of Dental Hygiene 94(2) 37-44.
AIM: to determine the knowledge, attitudes, practices, and barriers faced by clinical dental hygienists regarding diabetes risk assessment and screenings.
METHOD: A mixed method design was used with a convenience sample of dental hygienists in clinical practice (n=316). A 32 item, electronic survey was validated at item-level, and participants were recruited through multiple dental hygiene Facebook groups. Descriptive statistics were used to analyze the data. The survey also included two open-ended attitude questions that were interpreted using thematic analysis to pinpoint common patterns within the data.
RESULTS: Dental hygienists had high knowledge scores regarding diabetes and oral health, although many were unaware of their states' specific statutes and regulations for screening practices. Nearly all (95.9%), were likely to educate and refer patients (82%), although fewer than half (40.9%), were likely to perform chairside screening for diabetes. Emergent themes for barriers to screening were time, money, patient acceptance/willingness, lack of education, not having the proper tools, and states' rules and regulations.
CONCLUSION: Despite high knowledge scores regarding diabetes and oral health, there is a gap in regards to dental hygienists' willingness to perform diabetes screenings in a clinical setting. Dental hygienists should be capable of integrating chairside diabetes screening practices into the process of care with proper training
View abstract

Kapanen, A. I., Conklin, A. I., Gobis, B., et al. 2020. **Pharmacist-led cardiovascular risk prevention in Western Canada: a qualitative study**. International Journal of Pharmacy Practice.
AIM: To descrive the experiences and perceptions of participants who received individual health consultations in a novel CVD risk management programme that included medication management.
METHOD: A qualitative study design using free-text responses was adopted. Data (5658 words) came from evaluation surveys completed by 119 programme participants were iteratively coded and thematically analysed.
RESULTS: We identified four themes characterising participant experiences of pharmacist-led CVD prevention. Theme one was labelled self-efficacy because personalised health information and advice on CVD risk factor management empowered participants to make improvements for their health. Participants expressed a range of positive responses about the longer consultations, supportive communication and safe setting of their pharmacist-led encounters; hence, Theme two is labelled pharmacists' interpersonal skills. The wider context of the programme included a number of enabling factors (Theme three) that either supported or limited participant engagement in the programme. A number of changes to behaviour and health measures were identified and participant suggestions to expand and continue the programme further contributed to perceptions of positive programme impact (Theme four).
CONCLUSION: This study raises questions about how external resources and broader determinants might enable, or hinder, future programme success and sustainability. It also highlights the need for greater understanding and communication of the importance of primary prevention and the role of pharmacists in CVD risk reduction and workplace health promotion.
View abstract

Diagnostic

Basit, A., Fawwad, A., Abdul Basit, K., et al. 2020. **Glycated hemoglobin (HbA1c) as diagnostic criteria for diabetes: the optimal cut-off points values for the Pakistani population; a study from second National Diabetes Survey of Pakistan (NDSP) 2016-2017**. BMJ Open Diabetes Research & Care 8(1).
AIM: To examine glycated hemoglobin (HbA1c) cut-off values as diagnostic tool in diabetes and prediabetes with its concordance to oral glucose tolerance test (OGTT) in Pakistani population.
METHODOLOGY: Data for this substudy was obtained from second National Diabetes Survey of Pakistan (NDSP) 2016-2017. With this survey, 10 834 individuals were recruited and after excluding known subjects with diabetes, 6836 participants fulfilled inclusion criteria for this study. Demographic, anthropometric and biochemical parameters were obtained. OGTT was used as standard diagnostic tool to screen population and HbA1c for optimal cut-off values. Participants were categorized into normal glucose tolerance (NGT), newly diagnosed diabetes (NDD) and prediabetes.

RESULTS: Out of 6836 participants, 4690 (68.6%) had NGT, 1333 (19.5%) had prediabetes and 813 (11.9%) had NDD by OGTT criteria with median (IQR) age of 40 (31-50) years. Optimal HbA1c cut-off point for identification of diabetes and prediabetes was observed as 5.7% ((AUC (95% CI)=0.776 (0.757 to 0.795), p<0.0001)) and 5.1% ((AUC (95% CI)=0.607 (0.590 to 0.624), p<0.0001)), respectively. However, out of 68.6% NGT subjects identified through OGTT, 24.1% and 9.3% participants were found to have prediabetes and NDD, respectively by using HbA1c criteria. By using both OGTT and HbA1c criteria, only 7.9% and 7.3% were observed as prediabetes and diabetes, respectively.
CONCLUSION: Findings from second NDSP demonstrated disagreement between findings of OGTT and HbA1c as diagnostic tool for Pakistani population. As compared with international guidelines, HbA1c threshold for prediabetes and NDD were lower in this part of world. HbA1c as diagnostic tool might require ethnic or regional-based modification in cut-off points, validated by relevant community-based epidemiological surveys.
View full text

Gamston, C. E., Kirby, A. N., Hansen, R. A., et al. 2020. **Comparison of 3 risk factor-based screening tools for the identification of prediabetes**. Journal of the American Pharmacists Association 60(3) 481-484.
AIM: To compare risk factor-based screening tools for identifying prediabetes.
METHOD: Participants in an employer-based wellness program were tested for glycosylated hemoglobin (A1C) at a regularly scheduled appointment, and prediabetes risk factor information was collected. The likelihood of having prediabetes and the need for laboratory testing were determined based on 3 risk factor-based screening tools: the Prediabetes Screening Test (PST), Prediabetes Risk Test (PRT), and 2016 American Diabetes Association guidelines (ADA2016). The results from the screening tools were compared with those of the A1C test. The predictive ability of the PST, PRT, and ADA2016 were compared using logistic regression. Results were validated with data from a secondary population.
RESULTS: Of the 3 risk factor-based tools examined, the PRT demonstrated the best combination of sensitivity and specificity for identifying prediabetes. From July 2016 to March 2017, 740 beneficiaries of an employer-sponsored wellness program had their A1C tested and provided risk factor information. The population prevalence of prediabetes was 9.3%. Analysis of a second independent population with a prediabetes prevalence of more than 50% of confirmed PRT's superiority despite differences in the calculated sensitivity and specificity for each population.
CONCLUSION: Because PRT predicts prediabetes better than PST or ADA2016, it should be used preferentially.
View abstract

Jahangiry, L., Shamizadeh, T., Sarbakhsh, P., et al. 2020. **Diagnostic validity of the pre-diabetes scale among at-risk rural Iranian adults for screening for pre-diabetes**. Journal of Diabetes and Metabolic Disorders.
AIM: To assess the diagnostic validity of the American Diabetes Association (ADA) screening questionnaire for identifying pre-diabetes in the Iranian rural population.
METHOD: This study was conducted in Ahar County, East Azarbaijan, Iran. The participants (n = 440) were randomly recruited via trained community health care workers. The ADA questionnaire including six items (age, gender, having family members with diabetes, obesity, hypertension, and physical activity) is the screening tool used to identify people at high risk for developing type 2 diabetes. The World Health Organization (WHO) forward/backward translation protocol was used for translating the assessment tool. The diagnosis of pre-diabetes was defined based on the fasting blood glucose (FBG, as a gold standard) cut-points of 100 mg/dl to 125 mg/dl. We assessed the criterion validity and diagnosis characteristics of the ADA questionnaire in the diagnosis of pre-diabetes using the measures of sensitivity, specificity, and receiver operating characteristics (ROC) curves. In addition, the optimal cut-point of the ADA questionnaire for the diagnosis of pre-diabetes was computed using Youden's index.
RESULTS: A total of 440 adults ages 30-65 years (Mage = 48.8 years, SDage = 11.2 years) were included in the study. Around half of the participants were women (50%), illiterate (51.4%), and married (85.2). In the pre-diabetes diagnosis scale, the present cut-point yielded a sensitivity of 98.7 (95% CI:96.6-99.6), specificity of 53.1 (95% CI: 44.6-61.5), positive predictive value (PPV) of 81.4 (95% CI:77-85.3), positive predictive value

(NPV) of 95.0 (95% CI:87.7-98.6), and accuracy of 83.9 (95% CI:81.4-89.2) with an area under curve (AUC) of 0.84 (95% CI: 0.80 - 0.89).
CONCLUSION: The Persian version of the ADA questionnaire had good sensitivity and fair specificity for pre-diabetes diagnosis among rural adults at high risk for developing type 2 diabetes. The study provided evidence for the ADA questionnaire as a valid and reliable tool for identifying pre-diabetes in a rural area. Identifying rural residents in the early stage of developing diabetes with a simple and accurate instrument without the need for a FBG test contributes to controlling the disease in areas with limited access to health services.
View full text

Thirunavukkarasu, U., Umapathy, S., Janardhanan, K., et al. 2020. **A computer aided diagnostic method for the evaluation of type II diabetes mellitus in facial thermograms**. Physical and Engineering Sciences in Medicine 10.
Almost 50% of individuals around the globe are unaware of diabetes and its complications. So, an early screening of diabetes is very important at this current situation. To overcome the difficulties such as pain and discomfort to the subjects obtained from the biochemical diagnostic procedures; an infrared thermography is the diagnostic technique which measures the skin surface temperature noninvasively. Thus, the aim of our proposed study was
AIM: To evaluate the type II diabetes in facial thermograms and to develop a computer aided diagnosis (CAD) system to classify the normal and diabetes.
METHOD: The facial thermograms (n = 160) including male (n = 79) and female (n = 81) were captured using FLIR A 305sc infrared thermal camera.
RESULTS: The Haralick textural features were extracted from the facial thermograms based on gray level co-occurrence matrix algorithm. The T_{ROI}, T_{MAX}, and T_{TOT} are the statistical temperature parameters exhibited a significant negative correlation with HbA1c (r = - 0.421, - 0.411, - 0.242, p < 0.01 (T_{ROI}); r = - 0.259, p < 0.01(T_{MAX}) and - 0.173, p < 0.05 (T_{TOT})). An optimal regression equation has been constructed by using the significant facial variables and standard HbA1c values. The model has achieved sensitivity, specificity, and accuracy rate as 91.42%, 88.57%, and 90% respectively. The anthropometrical variables, extracted textural features and temperature parameters were fed into the classifiers and their performances were compared. The Support Vector Machine outperformed the Linear Discriminant Analysis (84.37%) and k-Nearest Neighbor (81.25%) classifiers with the maximum accuracy rate of 89.37%.
CONCLUSION: The developed CAD system has achieved 89.37% of accuracy rate for the classification of diabetes. Thus, the facial thermography could be used as the basic non-invasive prognostic tool for the evaluation of type II diabetes mellitus.
View abstract

Grammer, T. B., Dressel, A., Gergei, I., et al. 2019. **Cardiovascular risk algorithms in primary care: Results from the DETECT study**. Scientific reports 9(1) 1101.
AIM: To evaluate the correlation, discrimination and calibration of ten commonly used risk equations in primary care in 4044 participants of the DETECT (Diabetes and Cardiovascular Risk Evaluation: Targets and Essential Data for Commitment of Treatment) study.
METHOD: The risk equations correlate well with each other. All risk equations have a similar discriminatory power. Absolute risks differ widely, in part due to the components of clinical endpoints predicted: The risk equations produced median risks between 8.4% and 2.0%. With three out of 10 risk scores calculated and observed risks well coincided.
RESULTS: At a risk threshold of 10 percent in 10 years, the ACC/AHA atherosclerotic cardiovascular disease (ASCVD) equation has a sensitivity to identify future CVD events of approximately 80%, with the highest specificity (69%) and positive predictive value (17%) among all the equations.
CONCLUSION: Due to the most precise calibration over a wide range of risks, the large age range covered and the combined endpoint including non-fatal and fatal events, the ASCVD equation provides valid risk prediction for primary prevention in Germany.
View full text

Modelling

2020. **The Expected 30-Year Benefits of Early Versus Delayed Primary Prevention of Cardiovascular Disease by Lipid Lowering**. Circulation.
AIM: To determine the optimal time for initiation of lipid lowering in younger adults as a function of expected 30-year benefit.
METHOD: Data from 3148 National Health and Nutrition Examination Survey (2009–2016) participants, age 30 to 59 years, not eligible for lipid-lowering treatment recommendation under the most recent US guidelines, were analyzed. We estimated the absolute and relative impact of lipid lowering as a function of age, age at initiation, and non–high-density lipoprotein cholesterol (HDL-C) level on the expected rates of atherosclerotic cardiovascular disease over the succeeding 30 years. We modeled expected risk reductions based on shorter-term effects observed in statin trials (model A) and longer-term benefits based on Mendelian randomization studies (model B).
RESULTS: In both models, potential reductions in predicted 30-year atherosclerotic cardiovascular disease risk were greater with older age and higher non–HDL-C level. Immediate initiation of lipid lowering (ie, treatment for 30 years) in 40- to 49-year-old patients with non–HDL-C ≥160 mg/dL would be expected to reduce their average predicted 30-year risk of 17.1% to 11.6% (model A; absolute risk reduction [ARR], 5.5%) or 6.5% (model B; ARR 10.6%). Delaying lipid lowering by 10 years (treatment for 20 years) would result in residual 30-year risk of 12.7% (A; ARR 4.4) or 9.9% (B; ARR 7.2%) and delaying by 20 years (treatment for 10 years) would lead to expected mean residual risk of 14.6% (A; ARR 2.6%) or 13.9% (B; ARR 3.2%). The slope of the achieved ARR as a function of delay in treatment was also higher with older age and higher non–HDL-C level.
CONCLUSION: Substantial reduction in expected atherosclerotic cardiovascular disease risk in the next 30 years is achievable by intensive lipid lowering in individuals in their 40s and 50s with non–HDL-C ≥160 mg/dL. For many, the question of when to start lipid lowering might be more relevant than whether to start lipid lowering.
View full text

Collins, B., Kypridemos, C., Cookson, R., et al. 2020. **Universal or targeted cardiovascular screening? Modelling study using a sector-specific distributional cost effectiveness analysis**. Preventive Medicine 130 105879-105879.
AIM: To build on a previous analysis, we explicitly examined the distribution of health opportunity costs and we looked at new redesign options co-designed with stakeholders.
METHOD: We simulated four plausible scenarios: (a) no CVD screening, (b) 'current' basic universal CVD screening as currently implemented, (c) enhanced universal CVD screening with 'increased' population-wide delivery, and (d) 'universal plus targeted' with top-up delivery to the most deprived fifth. We also compared assumptions around whether displaced health spend would come from programmes that might benefit the poor more and how much health these programmes would generate.
RESULTS: The main outcomes were net health benefit and change in the slope index of inequality (SII) in QALYs per 100,000 person years. 'Universal plus targeted' dominated 'increased' and 'current' and also reduced health inequality by -0.65 QALYs per 100,000 person years. Results are highly sensitive to assumptions about opportunity costs and, in particular, whether funding comes from health care or local government budgets.
CONCLUSION: By analysing who loses as well as who gains from expenditure decisions, distributional cost effectiveness analysis can help decision makers to redesign prevention programmes in ways that improve health and reduce health inequality.
View full text

Yang, T., Zhang, L., Yi, L., et al. 2020. **Ensemble Learning Models Based on Noninvasive Features for Type 2 Diabetes Screening: Model Development and Validation**. JMIR Medical Informatics 8(6) e15431.
AIM: To build prediction models based on the ensemble learning method for diabetes screening to further improve the health status of the population in a noninvasive and inexpensive manner.
METHOD: The dataset for building and evaluating the diabetes prediction model was extracted from the National Health and Nutrition Examination Survey from 2011-2016. After data cleaning and feature selection,

the dataset was split into a training set (80%, 2011-2014), test set (20%, 2011-2014) and validation set (2015-2016). Three simple machine learning methods (linear discriminant analysis, support vector machine, and random forest) and easy ensemble methods were used to build diabetes prediction models. The performance of the models was evaluated through 5-fold cross-validation and external validation. The Delong test (2-sided) was used to test the performance differences between the models.
RESULTS: We selected 8057 observations and 12 attributes from the database. In the 5-fold cross-validation, the three simple methods yielded highly predictive performance models with areas under the curve (AUCs) over 0.800, wherein the ensemble methods significantly outperformed the simple methods. When we evaluated the models in the test set and validation set, the same trends were observed. The ensemble model of linear discriminant analysis yielded the best performance, with an AUC of 0.849, an accuracy of 0.730, a sensitivity of 0.819, and a specificity of 0.709 in the validation set.
CONCLUSION: This study indicates that efficient screening using machine learning methods with noninvasive tests can be applied to a large population and achieve the objective of secondary prevention.
View full text

Ongoing research

Abushanab D, Marquina C, Bailey C et al. 2020. **Cost-Effectiveness of Non-statin Lipid Modifying Agents for Primary and Secondary Prevention of Cardiovascular Morbidity and All-Cause Mortality in Patients with Type 2 Diabetes Mellitus: A Systematic Review**. PROSPERO.
AIM: 1. What is the existing evidence in relation to the cost-effectiveness of non-statin lipid modifying agents for primary and secondary prevention of cardiovascular morbidity and all-cause mortality in patients with type 2 diabetes mellitus? 2. What is the quality of evidence of the cost-effectiveness evaluations of non-statin lipid modifying agents among type 2 diabetes patients?
METHOD: a systematic review
RESULTS: Ongoing
View protocol

Lord H, Fernandez R and MacPhail C. 2020. **Perceptions of Aboriginal and Torres Strait Islander Australians towards cardiovascular primary prevention programs**. PROSPERO
AIM: What are the perceptions of Aboriginal and Torres Strait Islander Australians to participation in cardiovascular prevention programs?
METHOD: a systematic review
RESULTS: Ongoing
View protocol

Klimis, H., Thiagalingam, A. & Chow, C. K. 2020. **Text messages for primary prevention of cardiovascular disease: The TextMe2 randomised controlled trial protocol**. BMJ Open 10 (4) (no pagination)(e036767).
AIM: to evaluate the effectiveness of a lifestyle-focused text messaging programme for primary CVD prevention.
METHODS: Single-blind randomised controlled trial with 6 months' follow-up in 246 patients with moderate-high absolute cardiovascular risk and without coronary heart disease recruited from a rapid access cardiology clinic. Participants will be randomised to receive either usual care or TextMe2 (text message-based prevention programme). The TextMe2 programme provides support, motivation and education on five topics: diet, physical activity, smoking, general cardiovascular health and medication adherence, and is delivered in four text messages per week over 6 months. The primary outcome is change in the proportion of patients who have three or more of five key modifiable risk factors that are uncontrolled (low-density lipoprotein >2.0 mmol/L, systolic blood pressure >140 mm Hg, body mass index >24.9 kg/m 2, physical activity (less than the equivalent of 150 min of moderate intensity each week), current smoker). Secondary outcomes are changes in single biomedical risk factors, behavioural risk factors, quality of life, depression/anxiety scores, medication adherence, cardiovascular health literacy and hospital readmissions/representations.
RESULTS: Analysis will be according to the intention-to-treat principle and full statistical analysis plan developed prior to data lock.
View full text

Mearns, H., Otiku, P. K., Shelton, M., et al. 2020. **Screening strategies for adults with type 2 diabetes mellitus: a systematic review protocol**. Systematic Reviews 9(1) 156.
AIM: to collate evidence from non-randomised studies to investigate the effect of screening for adults with type 2 diabetes on outcomes including diabetes-related morbidity, mortality (all-cause and diabetes-related) and harms.
METHOD: This systematic review will follow Effective Practice and Organisation of Care (EPOC) guidelines for the synthesis of non-randomised studies. We will search PubMed/MEDLINE, Scopus, Web of Science, CINAHL, Academic Search Premier and Health Source Nursing Academic (from inception onwards). We will include non-randomised trials, controlled before-after studies, interrupted time-series studies, repeated measures studies and concurrently controlled prospective cohort studies. The primary outcome will be diabetes-related morbidity (microvascular complications of diabetic retinopathy, nephropathy or neuropathy or macrovascular complications of non-fatal myocardial infarction, peripheral arterial disease or non-fatal stroke). The secondary outcomes will be mortality (all-cause and diabetes-related) and harms of screening strategies to patients (including psychological harms or adverse events following treatments) or to health care system (including resource allocation for false-positives or overdiagnosis). Two reviewers will independently screen all citations and full-text articles.
RESULTS: Data will be abstracted by one reviewer and checked by a second. The risk of bias of individual studies will be appraised using the ROBINS-I tool. GRADE will be used to determine the quality of the scientific evidence. If feasible, we will conduct random effects meta-analysis where appropriate. If necessary, analyses will be conducted to explore the potential sources of heterogeneity (e.g. age, sex, socio-economic status, rural versus urban or low-middle income versus high-income country). We will disseminate the findings via publications and through relevant networks.
View protocol

Uthman, O. A., Al-Khudairy, L., Nduka, C. U., et al. 2020. **Determining optimal strategies for primary prevention of cardiovascular disease: Systematic review, cost-effectiveness review and network meta-analysis protocol**. Systematic Reviews 9 (1) (no pagination)(105).
AIM: to synthesise evidence for the comparative effectiveness and cost-effectiveness of different interventions for the primary prevention of CVD.
METHOD: We will systematically search databases (for example, MEDLINE (Ovid), Embase (Ovid), Cochrane Library) and the reference lists of previous systematic reviews for randomised controlled trials that assess the effectiveness and cost-effectiveness of any form of intervention aimed at adult populations for the primary prevention of CVD, including but not limited to lipid lowering medications, blood pressure lowering medications, antiplatelet agents, nutritional supplements, dietary interventions, health promotion programmes, physical activity interventions or structural and policy interventions. Interventions may or may not be targeted at high-risk groups. Publications from any year will be considered for inclusion. The primary outcome will be all cause mortality. Secondary outcomes will be cardiovascular diseases related mortality, major cardiovascular events, coronary heart disease, incremental costs per quality-adjusted life years gained. If data permits, we will use network meta-analysis to compare and rank effectiveness of different interventions, and test effect modification of intervention effectiveness using subgroup analyses and meta-regression analyses.
RESULST: The results will be important for policymakers when making decisions between multiple possible alternative strategies to prevent CVD.
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