The Prevention of Coronary Artery Disease

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Disclosures

- No disclosures
1) PREVENTION STRATEGIES
2) ADVANCEMENTS IN PREVENTION
3) DEFINE STRATEGIES FOR PUBLIC EDUCATION
Why prevention?

An ounce of prevention is worth a pound of cure.

-Benjamin Franklin
Statistics
Age-adjusted death rates for leading causes of death: United States 1958-2017

AFTER 4 DECADES OF DECLINE, HEART DISEASE DEATHS ROSE IN 2015 BY 1%
Decline in Deaths from Cardiovascular Disease in Relation to Scientific Advances

ATHEROSCLEROSIS

- Atherosclerosis
- Atherogenesis
- Increased permeability
- Inflammation: cell proliferation / fibrous cap
- Plaque -> symptoms -> Rupture -> Thrombosis


Strategies in CAD prevention

- PRIMARY VS SECONDARY PREVENTION
- PATIENT ASSESSMENT TOOLS
- ADDRESSING INTERVENTIONS THAT IMPROVE OUTCOMES
### Risk-Enhancing Factors

- **Family history of premature ASCVD** (males, age <55 y; females, age <65 y)
- **Primary hypercholesterolemia** LDL-C, 160–189 mg
- **Metabolic syndrome** (increased waist circumference, elevated triglycerides [>175 mg/dL], elevated blood pressure, elevated glucose, and low HDL-C [<40 mg/dL in men; <50 in women mg/dL] are factors; tally of 3 makes the diagnosis)
- **Chronic kidney disease**
- **Chronic inflammatory conditions** such as psoriasis, RA, or HIV/AIDS
- **History of premature menopause** (before age 40 y) and history of pregnancy-associated conditions that increase later ASCVD risk such as preeclampsia
- **High-risk race/ethnicities** (e.g., South Asian ancestry)

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Primary VS Secondary Prevention

Who are we dealing with, what have they gone through?

Secondary prevention; compliance with regime?

Sustaining the basics of prevention for ALL patients
Prevention and control

- Knowledge
- Plan of action
- Peace of mind

“What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?”
Prevalence for Cardiovascular Health Factors in U.S. Adults

Source: NHANES 2013 to 2014.
Cardiac risk factors

- **ASCVD Risk Estimator** help a clinician and patient build a customized risk lowering plan by estimating and monitoring change in 10 year ASCVD risk.
- **Estimate a patient's initial 10-year ASCVD risk** using the pooled cohort equation
- Receive an individualized, risk-based, intervention approach
- **Project the impact of specific interventions on a patient’s risk**
- Guide clinician-patient discussion around customizing an intervention plan

App should be used for primary prevention patients (those without ASCVD) only.

**Current Age**
55

**Sex**
- Male
- Female

**Race**
- White
- African American
- Other

**Systolic Blood Pressure (mm Hg)**
150

**Diastolic Blood Pressure (mm Hg)**
90

**Total Cholesterol (mg/dL)**
220

**HDL Cholesterol (mg/dL)**
30

**LDL Cholesterol (mg/dL)**
140

**History of Diabetes?**
- Yes
- No

**Smoker?**
- Current
- Former
- Never

**On Hypertension Treatment?**
- Yes
- No

**On a Statin?**
- Yes
- No

**On Aspirin Therapy?**
- Yes
- No

Do you want to refine current risk estimation using data from a previous visit?
- Yes
- No

Determine Therapy Impact
View Advice
Project Risk Reduction by Therapy

16.6% with Smoking Cessation

- Quit Smoking
- Start/Intensify Statin
- Start/Add Blood Pressure Medication
- Start/continue aspirin therapy

12.1% with Smoking Cessation, BP Medication

- Quit Smoking
- Start/Intensify Statin
- Start/Add Blood Pressure Medication
- Start/continue aspirin therapy
<table>
<thead>
<tr>
<th>Therapy(s)</th>
<th>Projected ASCVD Risk for this patient if Therapy Initiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statin*</td>
<td>17.0%</td>
</tr>
<tr>
<td>BP drug(s)**</td>
<td>16.6%</td>
</tr>
<tr>
<td>Stop smoking†</td>
<td>16.6%</td>
</tr>
<tr>
<td>Aspirin#</td>
<td>20.4%</td>
</tr>
<tr>
<td>Statin + Aspirin</td>
<td>15.3%</td>
</tr>
<tr>
<td>BP drug(s) + Aspirin</td>
<td>15.0%</td>
</tr>
<tr>
<td>Statin + BP drug(s)</td>
<td>12.5%</td>
</tr>
<tr>
<td>Statin + Stop smoking</td>
<td>12.4%</td>
</tr>
<tr>
<td>Stop smoking + Aspirin</td>
<td>14.9%</td>
</tr>
<tr>
<td>BP drug(s) + Stop smoking</td>
<td>12.1%</td>
</tr>
<tr>
<td>Statin + BP drug(s) + Aspirin</td>
<td>11.2%</td>
</tr>
<tr>
<td>BP drug(s) + Stop smoking + Aspirin</td>
<td>10.9%</td>
</tr>
<tr>
<td>Statin + BP drug(s) + Stop smoking</td>
<td>9.1%</td>
</tr>
<tr>
<td>Statin + Stop smoking + Aspirin</td>
<td>11.2%</td>
</tr>
<tr>
<td>Statin + BP drug(s) + Stop smoking + Aspirin</td>
<td>8.2%</td>
</tr>
</tbody>
</table>

*Projected Risk with the following therapies:
ASA = Start or continue taking aspirin
Ch = Manage cholesterol by starting or intensifying statin
BP = Start, add, or intensify blood pressure medication
Sm = Stop smoking for at least 2 years

*Start moderate intensity statin, or intensify statin from a moderate to a high intensity dose.
**Start blood-pressure lowering medication if not currently taking, or add BP-lowering med(s) to patient's existing regime.
†Stop smoking for two years
‡Start or continue taking aspirin.
NA = Not Applicable. Risk is not shown for therapy(s) that are not recommended. Guidelines do not recommend statin therapy for patients with 10-year ASCVD risk ≥5%. Guidelines do not typically recommend aspirin therapy for patients with 10-year risk <10%. ACC/AHA Guidelines do not specify antihypertensive drug therapy for SBP<130 mmHg (<130 mmHg w/diabetes).
Risk Stratification

- Measures 10 year risk for asymptomatic 40-75 year olds.
- Low risk <5%, Borderline 5.5-7.4%, Intermediate risk 7.5-19.9%, High risk >20%

- **Risk calculation limitations:** different racial/ethnic groups, chronic inflammatory conditions, family history, past history of preeclampsia, early menopause, erectile dysfunction, CKD, metabolic syndrome

- For Borderline or Intermediate risk- Consider coronary artery calcium measurement, **MESA score (Mutli Ethnic Study of Atherosclerosis)** and risk enhancing factors.

- For younger patients- consider calculating lifetime risk and risk enhancing factors.
Calcium Score

- Subclinical atherosclerosis
- Absence of CAC associated with low event rates

## MESA 10-Year CHD Risk with Coronary Artery Calcification

### 1. Gender
- Male
- Female

### 2. Age (45-85 years)
- Enter age in Years

### 3. Coronary Artery Calcification
- Enter Agatston score

### 4. Race/Ethnicity
- Choose One
  - Caucasian
  - Chinese
  - African American
  - Hispanic

### 5. Diabetes
- Yes
- No

### 6. Currently Smoke
- Yes
- No

### 7. Family History of Heart Attack
- Yes
- No
  (History in parents, siblings, or children)

### 8. Total Cholesterol
- Enter mg/dL or mmol/L

### 9. HDL Cholesterol
- Enter mg/dL or mmol/L

### 10. Systolic Blood Pressure
- Enter mmHg or kPa

### 11. Lipid Lowering Medication
- Yes
- No

### 12. Hypertension Medication
- Yes
- No

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[Retrieved from: https://www.mesa-nhlbi.org (2019)]
The Nurses Health Study

- Dietary quality
- Exercise (hr/week)
- BMI
- Smoking
- Alcohol consumption (g/day)

Estimated 82% of coronary events in this group were due to non compliance with low risk lifestyle patterns.

Nutritional epidemiology studies are notoriously difficult to conduct; scarcity of RCTs, most recommendations are from observational data.

Cut out the bad: avoid trans fat, minimize sweetened beverages, refined carbohydrates, processed meats, salt, saturated fat and dietary cholesterol.

Add in the good: high intake of vegetables and fruits, legumes, nuts, whole grains and fish, mono and polyunsaturated fats.

ARIC trial observed 18% increase in mortality rate with low carbohydrate with high animal protein and fat diets and 23% increase in mortality with high carbohydrate diets.
Benefits of Mediterranean Diet

Lower risk of

- Death from CV Disease, CVA, Cancer
- DM, Alzheimer’s, Arthritis
- Parkinson’s
- Macular degeneration, erectile dysfunction, female sexual dysfunction

Mediterranean and DASH are only diets shown to reduce cardiovascular morbidity and mortality.

PREDIMED NEJM 2013;368:1279-1290 and sub studies
Ophthmology 2017; 124:82-89
MEDITA Study Diabetes Care 2016;39:e143-e144
## Exercise & Physical Activity

![Image: Exercise? I thought you said extra fries.]

<table>
<thead>
<tr>
<th>Intensity</th>
<th>METs</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary behavior*</td>
<td>1–1.5</td>
<td>Sitting, reclining, or lying; watching television</td>
</tr>
<tr>
<td>Light</td>
<td>1.6–2.9</td>
<td>Walking slowly, cooking, light housework</td>
</tr>
<tr>
<td>Moderate</td>
<td>3.0–5.9</td>
<td>Brisk walking (2.4–4 mph), biking (5–9 mph), ballroom dancing, active yoga, recreational swimming</td>
</tr>
<tr>
<td>Vigorous</td>
<td>≥6</td>
<td>Jogging/running, biking (≥10 mph), singles tennis, swimming laps</td>
</tr>
</tbody>
</table>

*Sedentary behavior* is defined as any waking behavior characterized by an energy expenditure ≤1.5 METs while in a sitting, reclining, or lying posture. Standing is a sedentary activity in that it involves ≤1.5 METs, but it is not considered a component of sedentary behavior.

MET indicates metabolic equivalent; and mph, miles per hour.
Overweight & Obesity

- BMI 25-29.9 Kg/m² (overweight) and BMI 30 Kg/m² (obese) → higher rates of ASCVD, AF and HF
- Sustained weight loss of 5% → moderate improvement in BP, LDL-c, TG, glucose/delays development of type 2 DM

Comprehensive and structured lifestyle programs to include:
- Counselling, Self monitoring of weight and food intake, calorie restriction, aerobic exercise (150mins/week initially, 200-300 mins/week for weight regain or maintenance)
- Aim: 5-10% weight loss from baseline over 6 months

2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease
Smoking Cessation

- **Tobacco use is the leading cause of preventable disease, disability and death in the US**
- Reduction to low levels of smoking does not eliminate the risk of ASCVD
- Language is important - Screen with “Have you smoked/used any tobacco product in the last 30 days?” vs “Do you smoke?” – more reporting accuracy.

Firm but compassionate and non-judgemental “The most important thing you can do for your health is to quit tobacco use, I can help” (>6 month quit rate)
- Benefits of quitting are immediate
- Behavioral and several pharmacological options are available
Stages of Change (Prochaska & Diclemente 1983)

- **Stage 1**: Precontemplation
- **Stage 2**: Contemplation
- **Stage 3**: Preparation
- **Stage 4**: Action
- **Stage 5**: Maintenance
Type 2 Diabetes Mellitus (T2DM)

- 12% of US adults are diabetic—90-95% of them are T2DM, another 80 million have prediabetes
- T2DM is a major independent risk factor for ASCVD and is heavily reliant upon dietary pattern, levels of physical activity and body weight to develop
- Aggressive management of all ASCVD risk factors in diabetic patients has been shown to reduce ASCVD event.
- Both lifestyle and medication interventions are frequently required.
- 2 classes of medication specifically reduce ASCVD risk in recent RCTs; SGLT-2 inhibitors and GLP-1R agonists.
HbA1c<6.5% consistent with T2DM

YES

Dietary counseling regarding key aspects of a heart-healthy diet (Class I)

At least 150 minutes/week of moderate to vigorous physical activity (Class I)

Aggressive treatment of other CVD risk factors

Consideration of metformin as first-line pharmacologic therapy to improve glycemic control and reduce CVD risk (Class IIa)

HbA1c<7.0% after lifestyle therapies and metformin?

NO

Does the patient have other CVD risk factors?

Further management of diabetes per primary care provider or endocrinology

YES

NO

Reinforce the importance of diet and physical activity and continue current management

Consideration may be given to an SGLT-2 inhibitor or a GLP-1R agonist to improve glycemic control and reduce CVD risk (Class IIb)
Hypertension

- Stage 2 Hypertension - >140/90 mm Hg → BP lowering medication with nonpharmacological therapy
- Stage 1 Hypertension – 130-139/80-89 mm Hg with
  a) < 10% 10y CVD risk → Nonpharmacological therapy reassess in 3-6 months
  b) > 10% 10y CVD risk → BP lowering medication and nonpharmacological therapy
- Elevated BP - 120-129/<80 mm Hg → nonpharmacological therapy
- Normal BP -<120/80 mm Hg → Promote optimal lifestyle habits
## Nonpharmacological Interventions

<table>
<thead>
<tr>
<th>Nonpharmacological Intervention</th>
<th>Approx. impact on SBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight loss of 1 kg</td>
<td>-1 mm Hg</td>
</tr>
<tr>
<td>DASH dietary pattern</td>
<td>-11 mm Hg</td>
</tr>
<tr>
<td>Sodium in diet to &lt;1500mg/d</td>
<td>-5/6 mm Hg</td>
</tr>
<tr>
<td>Potassium in diet to 3500-5000 mg/d</td>
<td>-4/5 mm Hg</td>
</tr>
<tr>
<td>Aerobic exercise 90-150 min/wk 65-75% HR reserve</td>
<td>-5/8 mm Hg</td>
</tr>
<tr>
<td>Dynamic resistance exercise 90-150 min/week- 6 exercises x 3 sets x 10 reps/set</td>
<td>-4 mm Hg</td>
</tr>
<tr>
<td>Isometric resistance 4x 2min handgrip, x3/week</td>
<td>-5 mm Hg</td>
</tr>
<tr>
<td>Moderate Alcohol: Men&lt;2 drinks/day, women 1 or less/day</td>
<td>-4 mm Hg</td>
</tr>
</tbody>
</table>
High Blood Cholesterol

• Statin Benefit Groups:

High Risk:
• 1) Clinical ASCVD
• 2) Age >21, LDL-c >190mg/dL
• 3) Age 40-75, Diabetic, LDL-c 70-189mg/dL

Primary prevention:
• 4) Age 40-75, Not Diabetic, >7.5% 10 year ASCVD risk, LDL-c 70-189mg/dL, upon clinician-patient discussion
2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease
Residual Risk Beyond Statin Treatment

Adapted from Libby P. J Am Coll Cardiol. 2005;46(7):1225-1228.
The Use of Aspirin

- A review of the evidence shows:
  - The absolute rates for vascular events in Primary prevention is low vs secondary prevention. Significant reductions in vascular mortality are not seen in this group with aspirin.
  - Yet the bleeding complications are comparable between primary and secondary prevention.
  - Therefore the benefit is NOT uniformly clear in primary prevention and therapy must be individualized in discussion with patients.
  - www.aspiringuide.com
Other factors...

- Sleep
- Psychosocial stress
- Depression
- Dental Hygiene/ Peridontitis*
- Environmental pollution

Advances in ASCVD Prevention
• Promotion of lifelong healthy lifestyle
• Team based care approach
• Risk Estimation
• Healthy Diet
• Exercise
• Management of Diabetes, Weight, Hypertension and elevated LDL-C
• Smoking Cessation
• Infrequent use of Aspirin
2019 ESC/EAS Guidelines for management of dyslipidemias to reduce cardiovascular risk

The Task Force for the management of dyslipidemias of the European Society of Cardiology (ESC) and European Atherosclerosis Society (EAS)

Authors/Task Force Members: François Mach* (Chairperson) (Switzerland), Colin Baigent* (Chairperson) (United Kingdom), Alberico L. Catapano* (Chairperson) (Italy), Konstantinos C. Koskinas (Switzerland), Manuela Casula* (Italy), Lina Badimon (Spain), M. John Chapman¹ (France), Guy G. De Backer (Belgium), Victoria Delgado (Netherlands), Brian A. Ference (United Kingdom), Ian M. Graham (Ireland), Alison Halliday (United Kingdom), Ulf Landmesser (Germany), Borislava Milhaylova (United Kingdom), Torje R. Pedersen (Norway), Gabriele Riccardi* (Italy), Dimitrios J. Richter (Greece), Marc S. Sabatine (United States of America), Marja-Riitta Taskinen* (Finland), Lale Tokgozoglu* (Turkey), Olov Wiklund* (Sweden)

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The full title of this document is: European Society of Cardiology Guidelines for the management of dyslipidemias: lipid modification to reduce cardiovascular risk. The ESC guidelines have been published in both English and French.

Working Group: Atherogenic Dyslipidaemia, Atherosclerosis and Vascular Biology; Cardiovascular Pharmacology, in Cardiology, Thrombosis.

The content of these European Society of Cardiology (ESC) Guidelines has been published for personal and educational use only. It is not to be used for any commercial purposes and its use is subject to the terms of the royalty-free licence. The ESC guidelines are intended to be used in the context of clinical decision-making. The ESC guidelines are not intended to replace sound clinical judgement. The ESC guidelines are not intended to replace sound clinical judgement.
• All persons are recommended **diet with low saturated fat, high in fiber and fish**;

• target body mass index 20-25 kg/m\(^2\); waist <37 inches in men and 31.4 inches in women;

• **3.5-7 hours of moderate physical activity per week** or 30-60 minutes most days.

• Goal for **diabetes is a hemoglobin A1c of <7% as in US (ADA <6.5%)**, and

• **BP <140/90 mm Hg**, while the US goal is <130/80 mm Hg.
In the European guideline

- **Very high-risk** includes documented ASCVD diabetes with end-organ damage, or three major risk factors, severe chronic kidney disease, heterozygous familial hypercholesterolemia with ASCVD or another major risk factor, or a SCORE ≥10% (e.g., annual CV death ≥1%) in which the LDL-C target is ≥50% reduction in **LDL-C with goal <55 mg/dl**.

- **High risk** is a very high single risk factor (total cholesterol >310 mg/dl, LDL-C >190 mg/dl, BP 180/110 mm Hg), diabetes >10 years or with one major risk factor, moderate CKD (eGFR 30-59), or SCORE 5-9% in which target **LDL-C is <70 mg/dl**
In the European guideline

- In very high or high-risk patients with triglycerides between 135-499 mg/dl despite statin treatment, n-3 polyunsaturated fatty acids (PUFAs) (icosapent ethyl 2 x 2 g/day) should be considered in combination with statins.

- US guideline: Recognizes the value of n-3 PUFAs in high-risk persons defined as ASCVD or diabetes, but suggests either icosapent ethyl or combination EPA/DHA 2 x 2 g/day.
Fish Oil/ Omega 3

- The REDUCE-IT trial
- Age >45 with established CVD
- Age >50 with Type 2 DM + 1 or more risk factor
- Fasting TG 150–499 mg/dL
- Stable dose of statins with LDL-C of 41–100 mg/dL
- 4g Highly purified fish oil- icosapent ethyl, daily
- Study duration 4.9 years
Primary End Point:
CV Death, MI, Stroke, Coronary Revasc, Unstable Angina

Hazard Ratio, 0.75
(95% CI, 0.68–0.83)
RRR = 24.8%
ARR = 4.8%
NNT = 21 (95% CI, 15–33)
P=0.0000001

Conclusions
Compared with placebo, icosapent ethyl 4g/day significantly reduced total cardiovascular events by 30%, including:
- 25% reduction in first cardiovascular events
- 32% reduction in second cardiovascular events
- 31% reduction in third cardiovascular events
- 48% reduction in fourth or more cardiovascular events

Analysis of first, recurrent, and total events demonstrates the large burden of ischemic events in statin-treated patients with baseline triglycerides > ~100 mg/dL and the potential role of icosapent ethyl in reducing this residual risk.
Triglycerides

- Icosapent ethyl 4g/day REDUCE IT

- VOLANESORSEN
- Antisense oligonucleotide
- Blocks production of apoC III
- Profound triglyceride lowering

**LDL PSCK9 Inhibitors**

- Paraprotein Convertase subtilisin kexin type 9
- 2 human monoclonal antibodies antagonize PCSK9
- Lead to reduction in LDL

Sabatine Evolocumab and clinical outcomes in patients with CVD NEJM 2017:376:1717-22
Schwartz Alirocumab and CV outcomes after ACS NEJM 2018: 379:2097-107
Lipoprotein a Lp(a)

- Lp(a) is an LDL like particle with a molecule of Apolipoprotein B-100 linked by a disulphide bridge to Apolipoprotein (a)
- Lp(a) is thought to speed up the process of atherosclerosis by binding LDL, calcium and other components into atherosclerotic plaque on the blood vessel wall
- Relative indication for measurement is FH of premature ASCVD >50mg/dl or >125nmol/L constitutes elevated risk
- **Specific antisense oligonucleotide** inhibits apolipoprotein (a)
  - Dramatically lowers Lp(a) by 80%

- Tsimikas Antisense Therapy targeting apoprotein a Phase I study *Lancet*; 2015;386:1472-83
Inflammation hsCRP

- FOURIER trial
- Elevated risk subjects on PCSK9
- Moderate ARR (1.5%) despite LDL 30

- CANTOS Trial
- Interleukin 1Beta antagonist CANAKINUMAB
- Reduction in risk of recurrent events

Ridker Anti inflammatory therapy with Canakinumab for atherosclerotic disease NEJM 2017; 377:119-31
Non invasive imaging

- Advances in detecting subclinical atherosclerosis
- 3 decades of data from CAC score
- Identify plaque – leads to more aggressive pharmacological therapies and lifestyle changes
- Imaging of other vascular beds?
  - Carotid Intima-media thickness
  - Sharing scans with patients and providers lead to decreased risk of CVD 1 year later compared to standard information

VIPVIZA Visualization of asymptomatic atherosclerotic disease for optimum CV prevention Lancet 2019;393:133-42
Preventive Cardiology as a Subspecialty of Cardiovascular Medicine

JACC Council Perspectives

Vulnerable plaque

- Thin capped fibro atheromatous plaque with large necrotic or lipid rich core most associated with culprit lesion
- Most plaque ruptures occur without symptoms
- Among patients without clinical heart disease who died of non cardiac causes (trauma, suicide) 13-31% had evidence of non clinical atherosclerotic plaque rupture
CENTRAL ILLUSTRATION: Prevention Based on Detection of Subclinical Atherosclerosis Should Result in Reduced Coronary Events

Patient Centered Approach to ASCVD Prevention

- Focus is on patient centered care:
- **Shared decision making**
- Assessment of social determinants of CVD risk in primary prevention (Centers for Medicare/Medicaid top 5: housing instability, food insecurity, transportation difficulties, utility assistance needs, interpersonal safety)
- **Team based approach**- sustained contact is key
- **The EUROACTION study**: nurse co-ordinated multidisciplinary prevention programs across a variety of settings were found to be more successful than usual care, across a variety of settings

Public Education
AHA Life's Simple 7

- Manage Blood Pressure
- Control Cholesterol
- Reduce Blood Sugar
- Get Active
- Eat Better
- Lose Weight
- Stop Smoking
Compliance with Life's Simple 7 predicts mortality

Yang et al. JAMA 2012; 307:1273-83
HOPE 4:
Heart Outcomes Prevention and Evaluation 4 Study

Study Profile

4904 Individuals Screened
15 communities Malaysia and 15 Colombia

1900 Eligible Individuals
1371 Consented

Control
16 Communities Randomized
727 participants

Intervention
14 Communities Randomized
644 participants

97% with Primary Outcome at 12 Mos
Barriers

**Patient:**
- Conflicting knowledge/beliefs, high costs
- Challenging to implement treatment plans

**Health Care Provider:**
- Limited time and resources of physicians
- Treatment inertia
- Low use of ≥2 antihypertensives and statin

**Health System:**
- Fragmented care
- Availability of medications
- Costs/Travel/Access to care

Intervention

**Task Sharing with NPHW:**
- Community-based identification and treatment of HTN and CV risk factors
- Tablets with counselling and simplified management algorithms
- Supervised by primary care physicians

**Provision of Free CV Medications:**
- Combination antihypertensives (2 of ACEI/ARB/CCB/HCTZ)
- Statin (atorvastatin 20mg or rosuvastatin 10mg)

**Enhancing Adherence**
- Family/friends (Treatment Supporters)
Change in: (1) SBP

- Δ 11.1 mmHg
- Δ 11.4 mmHg

(2) LDL

- Δ 0.4 mmol/L

P<0.0001
Conclusion

- A comprehensive model of care led by NPHWs, guided by algorithms on a tablet, involving primary care physicians and family, along with the provision of free antihypertensive drugs and a statin, substantially improved CVD risk and blood pressure.

- **Success** of the HOPE 4 NPHW-led strategy:
  1. Simultaneously addressed multiple barriers to CVD risk
  2. Community-based intervention adapted to local context
  3. Reinforcing adherence with treatment supporters
  4. Comprehensive intervention with computer-based algorithms
Approaches to CV health improvement

- Individual focused therapies
- Healthcare system approaches
- Population approaches
Thank you! Questions?