Comprehensive Approach to Multiple Risk Factor Control

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Conflicts of Interest and Disclaimer Statement

- Conflicts of interest: None

- Statements made in this presentation do not necessarily represent the views of the CDC.
• The concept of risk and risk factors.
• Risk factor control and limitations in current approaches.
• Novel and emerging approaches; their promises and pitfalls.
• Hope and future perspectives.
Key Resources

Integrated Management of Cardiovascular Risk
Report of a WHO Meeting
Geneva, 9–12 July 2002

32 million heart attacks and strokes per year...only the tip of the iceberg

Undetected billions are at high cardiovascular risk...due to hypertension, diabetes, high lipids, tobacco use, physical inactivity and unhealthy diet

World Health Organization

Towards a WHO long-term strategy for prevention and control of leading chronic diseases

WHO CVD-Risk Management Package for low- and medium-resource settings
International Declarations on Heart Health

The Singapore Declaration:
Forging the Will for Heart Health
in the Next Millennium
Prevention and control of noncommunicable diseases: implementation of the global strategy
OUTLINE

• The concept of risk and risk factors.

• Risk factor control and limitations in current approaches.

• Novel and emerging approaches; their promises and pitfalls.

• Hope and future perspectives.
Risk Factors and Risk Markers

- Tobacco smoking
- Elevated LDL cholesterol
- Low HDL cholesterol
- High BP
- Diabetes
- Physical inactivity
- Obesity
- Poor diet
- Elevated homocysteine

- Elevated lipoprotein(a)
- Low socioeconomic status
- Elevated fibrinogen
- Markers of inflammation
- Psychological factors (e.g. stress, hostility)
- Social breakdown (loss of social support and cohesion)

Yusuf et al. Circulation 2001; 104: 2746-2753
Historical Background

- Ischemic heart disease rare in 19th century.
- Epidemic in developed countries by 1930s.
- Causes completely unclear, many believed CVD was part of normal ageing.
- Concepts of risk factors and prevention for CVD not really considered until 1950s.
- By late 1960s evidence of causality for risk factors & CVD considered unequivocal and prevention trials initiated.
Milestones from Framingham Heart Study

- **1960** Cigarette smoking found to increase the risk of heart disease.
- **1961** Cholesterol level, BP level, and ECG abnormalities found to increase CVD risk.
- **1967** Physical activity found to reduce CVD risk and obesity to increase the risk.
- **1970** High blood pressure found to increase stroke risk.
Milestones from Framingham Heart Study

• **1978** Psychosocial factors found to affect heart disease.

• **1988** High levels of HDL cholesterol found to reduce risk of death.

• **1994** Enlarged left ventricle (one of two lower chambers of the heart) shown to increase the risk of stroke.

• **1996** Progression from hypertension to heart failure described.
Why Do Risk Factors Matter?

• At population & individual levels:
  ─ Provide information on risk level.
  ─ Inform and guide health education and prevention priorities.
  ─ Guide CVD treatment and control.
  ─ Determine resource allocation and service organisation priorities.
  ─ Influence decision-makers.
### Leading Causes of Disease Burden

<table>
<thead>
<tr>
<th>Rank</th>
<th>High mortality</th>
<th>Developing countries Low mortality</th>
<th>Developed countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Underweight</td>
<td>Alcohol</td>
<td>Tobacco</td>
</tr>
<tr>
<td>2</td>
<td>Unsafe sex</td>
<td>Underweight</td>
<td>Blood pressure</td>
</tr>
<tr>
<td>3</td>
<td>Unsafe water</td>
<td>Blood pressure</td>
<td>Alcohol</td>
</tr>
<tr>
<td>4</td>
<td>Indoor smoke</td>
<td>Tobacco</td>
<td>Cholesterol</td>
</tr>
<tr>
<td>5</td>
<td>Zinc deficiency</td>
<td>Body mass index</td>
<td>Body mass index</td>
</tr>
<tr>
<td>6</td>
<td>Iron deficiency</td>
<td>Cholesterol</td>
<td>Low fruit and vegetable intake</td>
</tr>
<tr>
<td>7</td>
<td>Vitamin A deficiency</td>
<td>Iron deficiency</td>
<td>Physical inactivity</td>
</tr>
<tr>
<td>8</td>
<td>Blood pressure</td>
<td>Low fruit and vegetable intake</td>
<td>Illicit drugs</td>
</tr>
<tr>
<td>9</td>
<td>Tobacco</td>
<td>Indoor smoke from solid fuels</td>
<td>Underweight</td>
</tr>
<tr>
<td>10</td>
<td>Cholesterol</td>
<td>Unsafe water</td>
<td>Iron deficiency</td>
</tr>
</tbody>
</table>
Population Attributable Fractions (PAF) for Ischemic Heart Disease

- **High Blood Pressure**: World PAF = 47%, Sub-Saharan Africa PAF = 43%
- **High Cholesterol**: World PAF = 45%, Sub-Saharan Africa PAF = 15%
- **Low Fruit & Vegetable Intake**: World PAF = 43.9%, Sub-Saharan Africa PAF = 31.6%
- **Physical Inactivity**: World PAF = 19%, Sub-Saharan Africa PAF = 20%
- **Overweight and Obesity**: World PAF = 15%, Sub-Saharan Africa PAF = 8%
- **Smoking**: World PAF = 12%, Sub-Saharan Africa PAF = 5%
- **Alcohol Use**: World PAF = 1%, Sub-Saharan Africa PAF = 2%
Population Attributable Fraction of Stroke Mortality for Various Risk Factors in Sub-Saharan Africa

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Comprehensive Prevention

Spectrum of Preventive Strategies

Mass Strategy

High Risk Strategy
Concepts of Prevention Strategies

• Mass strategy: Often, public health model; predominantly population-wide approaches; socio-ecological models.

• High risk strategy: Typically, identifies high risk persons for the specific prevention interventions; Often, individual approaches; biomedical model.
Basic Principles in Risk Factor Control

- No threshold in risk reduction:
  - the lower the level of the risk factors, the lower the risk.

- A given change in a risk factor decreases risk of disease by a constant proportion of the existing risk regardless of the starting level of the risk factor.

Expected Effects of BP Lowering

Mean usual DBP (mm Hg)

Relative Risk

- 5mmHg lower BP
- one third lower risk

- Relative Risk:
  - 0.5
  - 1.0
  - 2.0
  - 4.0
  - 8.0

- Mean usual DBP (mm Hg):
  - 70
  - 80
  - 90
  - 100
Rationale for Comprehensive or Integrated Strategies for Risk Reduction

• Most patients have more than one RF.
• Efficient use of resources and staff.
• Additive effects of risk reduction.
• Convenience for patient and families.
• Potential for reinforcement and improved adherence in the integrated approaches.
Additive effects of risk factors

MRFIT Screenees’ Cohort
Additive effects of treatments

Three successive 25% RR reductions
Expenditure on Public Health & Prevention, 2003

The graph shows the percentage of current health expenditure for various countries and regions in 2003. The United States is highlighted at 3.9%, which is among the highest expenditures compared to other countries listed. The chart includes data for countries such as Canada, Netherlands, Hungary, Germany, Finland, Poland, Mexico, Australia, China, and several others, with percentages ranging from 0.6% to 8.0%. The horizontal axis represents the percentage of current health expenditure, while the vertical axis lists the countries and regions.
NGC Search Results

Your search criteria:

Keyword: cardiac cardiovascular heart

Your search found 339 related guidelines, which are listed below by relevance. Use the "Limit Search" button to sort by publication date.

To view a guideline summary, click on a title below.
<table>
<thead>
<tr>
<th>Resource Availability</th>
<th>Scenario One</th>
<th>Scenario Two</th>
<th>Scenario Three</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human resources</td>
<td>Non physician health worker</td>
<td>Medical doctor or specially trained nurse</td>
<td>Medical doctor with access to full specialist care</td>
</tr>
<tr>
<td>Equipment</td>
<td>Stethoscope</td>
<td>Stethoscope</td>
<td>Stethoscope</td>
</tr>
<tr>
<td></td>
<td>Blood pressure measurement device</td>
<td>Blood pressure measurement device</td>
<td>Blood pressure measurement device</td>
</tr>
<tr>
<td></td>
<td>Measuring tape or weighing scale</td>
<td>Measuring tape or weighing scale</td>
<td>Measuring tape or weighing scale</td>
</tr>
<tr>
<td>Optional: test tubes, holder, burner, solution or test strips for checking urine glucose</td>
<td>Test tubes, holder, burner, solutions or test strips for checking urine glucose and albumin</td>
<td>Electrocardiograph Ophthalmoscope Urine analysis Blood analysis: fasting blood sugar, electrolytes, creatinine, cholesterol and lipoproteins</td>
<td></td>
</tr>
</tbody>
</table>
# Characteristics of the three scenarios in the WHO CVD-Risk Management Package

| Generic drugs | Essential: thiazide diuretics | Optional: metformin (for refill) | Thiazide diuretics Beta blockers Angiotensin converting enzyme inhibitors Calcium channel blockers (sustained release formulations) (Reserpine and methyldopa if the above antihypertensives are unavailable) Aspirin Metformin (for refill) | Thiazide diuretics Beta blockers Angiotensin converting enzyme inhibitors Calcium channel blockers (sustained release formulations) (Reserpine and methyldopa if the above antihypertensives are unavailable) Aspirin Insulin Metformin Glibenclamide Statins (if affordable) Angiotensin receptor blocker (if affordable) |
Scenario One

1. Protocol for CVD-Risk Assessment and Management
2. Protocol for counselling on diet and physical activity
3. Protocol for counselling on cessation of tobacco use
4. Patient record card

The health care facility should be tobacco-free and support a tobacco-free environment

Scenario Three

1. Protocol for CVD-Risk Assessment
2. Protocol for CVD-Risk Management
3. Protocol for CVD-Risk Management in Diabetics
4. Protocol for counselling on diet and physical activity
5. Protocol for counselling on cessation of tobacco use
6. Patient record card
A Comprehensive Approach to Multiple Risk Reduction

CVD PREVENTION

POPULATION BASED
Address the bulk of the distribution through small shifts (Population Attributable Risk)
Widespread Effect = Large Benefits

HIGH RISK
Address individuals at the highest ‘absolute’ risk of a CVD event (Comprehensive Cardiovascular Risk)
High Impact = Cost-Effective use of resources

Modified, courtesy of Dr. Srinath Reddy
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High Tech Scans: Not an African Solution

PET/CT Scan

Magnetic Resonance Imaging (MRI)

Magnetic Resonance Imaging (MRI)

Electrocardiogram (EKG)

Nuclear Stress Testing

Nuclear Stress Testing

Echocardiogram (Echo)

Echocardiogram (Echo)

CT Scan

CT Scan
Super Foods for Men and Women

http://www.rd.com/content/openContent.do?contentId=12897
The Polypill Promise

1. Aspirin (81 mg)
2. Statin (standard dose)
3. ACE-Inhibitor (half-dose)
4. Beta-blocker (half-dose)
5. Diuretic (half-dose)
6. Folic acid (standard dose)

Could prevent 80% of CVD events if taken by everyone > age 55

Polypill: Risk Factors Targeted

- LDL cholesterol
- Blood pressure
- Homocysteine
- Platelet function

A Strategy to Reduce CVD by > 80%

A single Polypill per day composed of six active ingredients, to be taken, without medical examination, by:

all aged 55 or more; anyone under 55 with a history of CVD; anyone with diabetes or CVD, regardless of age

The Polymeal Promise

- Wine, fish, dark chocolate, fruits, vegetables, garlic, almonds
- Would reduce CVD events by 76%
- Benefits of Polymeal (persons > age 50)

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ in total life expectancy</td>
<td>6.6</td>
<td>4.8</td>
</tr>
<tr>
<td>↑ in life expectancy (-CVD)</td>
<td>9.0</td>
<td>8.1</td>
</tr>
<tr>
<td>↓ in life expectancy (+CVD)</td>
<td>2.4</td>
<td>3.3</td>
</tr>
</tbody>
</table>

The Polymeal Suggestion

• For those people earnestly seeking to prevent CVD, the Polypill can be combined with the Polymeal.

• “Redundant cardiologists could be retrained as Polymeal chefs and wine advisers”.

Proportion of Population that Uses Traditional Medicine

Uganda  Tanzania  Benin  Rwanda  Ethiopia
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Macroeconomic and Economic Consequences of CVD

The Millennium Villages Project
Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania, and Uganda
A Heart-Healthy & Stroke-Free World

• Work together through partnerships
• Use both high risk approach and the population-based strategies
• Create environments supportive of health promotion & disease prevention
• Use evidence-based policy development and community mobilization

Modified from: O’Connor et al. Ad hoc Working Group of the Conference of Principal Investigators of Heart Health
Key Issues Addressed in a Integrated Program

- Tobacco Use
- High Blood Pressure
- Primary Health Care Access
- Poor Nutrition
- Physical Inactivity

- Mortality
- Morbidity
- Quality of life
- Best practices
Towards a Culture of Prevention

“Today no one disputes that prevention is better and cheaper than reacting to crises after the fact. And yet our political and organizational cultures and practices remain oriented far more towards reaction than prevention.”

Kofi Annan, September 9, 1999