Primary prevention and CVD risk prediction

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Declaration of interests

None
Traditional medical paradigm

Single risk factors viewed as ‘diseases’
SINGLE RISK FACTOR APPROACH TO CVD PREVENTION

“Risk factors viewed as diseases”

- Hypertension
- Hyperlipidaemia
- Diabetes
<table>
<thead>
<tr>
<th>Category</th>
<th>Systolic</th>
<th>Diastolic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optimal</td>
<td>&lt;120</td>
<td>&lt;80</td>
</tr>
<tr>
<td>Normal</td>
<td>&lt;130</td>
<td>&lt;85</td>
</tr>
<tr>
<td>High-normal</td>
<td>130-139</td>
<td>85-89</td>
</tr>
<tr>
<td>Grade 1 hypertension (mild)</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>Subgroup: borderline</td>
<td>140-149</td>
<td>90-94</td>
</tr>
<tr>
<td>Grade 2 hypertension (moderate)</td>
<td>160-179</td>
<td>100-109</td>
</tr>
<tr>
<td>Grade 3 hypertension (severe)</td>
<td>&gt;180</td>
<td>&gt;110</td>
</tr>
<tr>
<td>Isolated systolic hypertension</td>
<td>&gt;140</td>
<td>&lt;90</td>
</tr>
<tr>
<td>Subgroup: borderline</td>
<td>140-149</td>
<td>&lt;90</td>
</tr>
</tbody>
</table>

When a patient’s systolic and diastolic blood pressure fall into different categories, the higher category should apply.
Usual systolic blood pressure and risks of cardiovascular death in Asia and Australia
Absolute risk (%) of having a cardiovascular event in 10 years according to age, BP and other risk factors

Blood pressure (mmHg):
- Systolic
  - Men: 150, 160, 170*, 90
  - Women: 150, 160, 170*, 90
- Diastolic
  - Men: 90, 95, 100*, 90
  - Women: 90, 95, 100*, 90

Age (years):
- 40
  - None: *
  - One: *
  - Two: *
  - Three: *
  - Major: *
- 50
  - None: *
  - One: *
  - Two: *
  - Three: *
  - Major: *
- 60
  - None: *
  - One: *
  - Two: *
  - Three: *
  - Major: *
- 70
  - None: *
  - One: *
  - Two: *
  - Three: *
  - Major: *

* Treatment advised above these levels despite low absolute risk.
Prevention of coronary heart disease in clinical practice

Recommendations of the Task Force of the European Society of Cardiology, European Atherosclerosis Society and European Society of Hypertension

K. Pyörälä, G. De Backer, I. Graham, P. Poole-Wilson and D. Wood on behalf of the Task Force
(Members of the Task Force listed in the Appendix)
Table 3  Priorities of coronary heart disease prevention in clinical practice

1. Patients with established CHD or other atherosclerotic vascular disease
2. Asymptomatic subjects with particularly high risk (subjects with severe hypercholesterolaemia or other form of dyslipidaemia, diabetes or hypertension, subjects with a cluster of several risk factors)
3. Close relatives of:
   patients with early-onset CHD or other atherosclerotic vascular disease;
   asymptomatic subjects with particularly high risk
4. Other individuals met in connection with ordinary clinical practice
MULTIFACTORIAL RISK APPROACH TO CVD PREVENTION

- Aetiology of CVD is multifactorial.

- Absolute CVD risk of any one risk factor is determined by the multiplicative effects (total risk) of the other concomitant risk factors.

- Therefore the intensity of the prevention strategy should be guided by level of absolute multifactorial or total risk.

What is my patients total (multifactorial) risk of developing CVD?
The relationship of plasma total cholesterol level to 10-year risk of CHD events in men and women aged 50, with and without risk factors based on a risk function derived from the Framingham Study.
**Coronary Risk Chart**

**Women**

- **Non-smoker**
  - Age 70
  - Age 60
  - Age 50
  - Age 40
  - Age 30

**Smoker**

- Age 70
- Age 60
- Age 50
- Age 40
- Age 30

**Men**

- **Non-smoker**
  - Age 70
  - Age 60
  - Age 50
  - Age 40
  - Age 30

**Smoker**

- Age 70
- Age 60
- Age 50
- Age 40
- Age 30

**10-year risk**

- > 40%
- 20-40%
- 10-20%
- 5-10%
- < 5%

**Systolic blood pressure (mm Hg)**

- 180
- 160
- 140
- 120

**Cholesterol (mmol/l or mg/dl)**

- 5
- 6
- 7
- 8

- 5
- 6
- 7
- 8

- 200
- 250
- 300

- 200
- 250
- 300

**To find a person's absolute 10-year risk of a CHD event**, find the table for their sex, age and smoking status. Inside the table, find the cell nearest to their systolic blood pressure (mm Hg) and cholesterol (mmol/l or mg/dl).

**To find a person's relative risk**, compare their risk category with other people of the same age. The absolute risk shown here may not apply to all populations, especially those with a low CHD incidence. Relative risk is likely to apply to most populations.

**The effect of changing cholesterol, smoking status or blood pressure** can be read from the chart.

**The effect of lifetime exposure to risk factors** can be seen by following the table upwards. This can be used when advising younger people.

**Risk is at least one category higher** in people with overt cardiovascular disease. People with diabetes, familial hyperlipidaemia or a family history of premature cardiovascular disease are also at increased risk.

**Risks are shown for exact ages, blood pressures and cholesterol levels. Risk increases as a person approaches the next category.**

**The tables assume HDL cholesterol to be 1.0 mmol/l in men (39 mg/dl) and 1.1 mmol/l (43 mg/dl) in women. People with lower levels of HDL cholesterol and/or with triglyceride levels above 2.3 mmol/l (200 mg/dl) are at higher risk.**

**Cholesterol: 1 mmol/l = 38.67 mg/dl.**

*Figure 3* Coronary Risk Chart based on a risk function derived from the Framingham Study. 

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European CHD Risk Charts
SCORE: the European Risk Prediction System

Data from:

- 12 European cohort studies
- Wide geographic spread of countries at different levels of cardiovascular risks
- 3-million person-years of observation
- 7,934 fatal cardiovascular events
### SCORE

**Belgium, France, Greece, Italy, Luxembourg, Spain, Switzerland, Portugal**

**The rest of Europe**

- Gender
- Smoking status
- Age
- Systolic blood pressure
- Total cholesterol

#### 10 year risk of fatal CVD

<table>
<thead>
<tr>
<th>Gender</th>
<th>Smoking status</th>
<th>Age</th>
<th>Systolic blood pressure</th>
<th>Total cholesterol</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women</td>
<td>Non-smoker</td>
<td>60</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>Men</td>
<td>Non-smoker</td>
<td>65</td>
<td>130</td>
<td>250</td>
</tr>
</tbody>
</table>

Based on Conroy et al, Eur Heart J, 2003, 24:987-1003  Copyright©: 2003 European Society of Cardiology. All rights reserved.
ADVANTAGES OF A MULTIFACTORIAL RISK APPROACH TO CVD PREVENTION

• Concept of continuous risk replaces the dichotomous classification of risk factors
• Level of absolute (multifactorial) risk for which treatment is given is not fixed
• Treatment is targeted at those with the highest absolute CHD risk
• Benefit is greatest in those at high multifactorial risk
• Avoids treatment of single risk factors in those at low multifactorial risk
DISADVANTAGES OF A TOTAL RISK APPROACH TO TREATMENT IN PREVENTION OF CHD

• Concentrates treatment in the older population

  unless

the effect of lifetime exposure is taken into account.
SCORE

10-year risk of fatal CVD in populations at high CVD risk

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10 year risk of fatal CVD in high risk regions of Europe
Total CVD risk assessment

In young people project risk to age 60 yrs
Relative Risk Chart

Systolic Blood Pressure (mmHg)

<table>
<thead>
<tr>
<th></th>
<th>120</th>
<th>140</th>
<th>160</th>
<th>180</th>
</tr>
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<tbody>
<tr>
<td>Non-Smoker</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
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<tr>
<td></td>
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<tr>
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<th>120</th>
<th>140</th>
<th>160</th>
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<tbody>
<tr>
<td>Smoker</td>
<td>2</td>
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<tr>
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<tr>
<td></td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
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</table>

Cholesterol (mmol/L)

<table>
<thead>
<tr>
<th></th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<tbody>
<tr>
<td>Non-Smoker</td>
<td>4</td>
<td>5</td>
<td>6</td>
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</table>

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From SCORE to HeartScore®

- Same risk factors
- Same end-points
- Same colours

The electronic interactive version of SCORE:

HeartScore®

developed by the Research Centre for Prevention and Health, Glostrup University, Denmark
Summary

1. A new and unique tool
2. Scientific
3. Easily accessible
4. Interactive
5. Fast & simple to use
6. Tailored to the patient
7. Built to evolve

Risk estimation + practical management advice

Optimal CVD prevention
www.escardio.org/heartscore