

Cardiovascular Risk Factors

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Objectives

- To know the risk factors, high risk groups and complications of CVDs
- To find the screening strategies for CVDs
- To implement CVD Prevention and control measures globally and in the local context

CVD includes four major areas:

- **Coronary heart disease (CHD)**, manifested by myocardial infarction (MI), angina pectoris, heart failure, and coronary death.
- **Cerebrovascular disease**, manifested by stroke and transient ischemic attack.
- **Peripheral artery disease**, manifested by intermittent claudication.
- **Aortic atherosclerosis** and **thoracic or abdominal aortic aneurysm**.

CardioVascular Risk Factors

Risk factors fall into three broad categories:

- 1. Major risk factors** – Research has shown that these factors significantly increase the risk of heart and blood vessel (cardiovascular) disease.
- 2. Modifiable risk factors** – Some major risk factors can be modified, treated or controlled through medications or lifestyle change.
- 3. Contributing risk factors** – These factors are associated with increased risk of cardiovascular disease, but their significance and prevalence haven't yet been determined.

Major Risk Factors that can't be Modified

❑ Increasing Age

- The majority of people who die of coronary heart disease are 65 or older. (Men > 45 and Females >55)

❑ Male gender

- Men have a greater risk of heart attack than women do, and men have attacks earlier in life.

❑ Heredity (including race)

- Children of parents with heart disease are more likely to develop heart disease themselves. family history of a premature MI (defined as MI before age 55 years in men and 65 years in women).

Major Risk Factors you can **Modify, Treat or Control**

Tobacco Smoke:

- The risk that smokers will develop coronary heart disease is much higher than that for nonsmokers.
- Cigarette smoking is a powerful independent risk factor for sudden cardiac death in patients with coronary heart disease.

Causing:

- ❖ Mechanical damage of endothelium and atherosclerosis.
- ❖ Increase coagulability state as increase in fibrinogen level.
- ❖ Polythyaemia (↑RBCs and Hb) and so increase blood viscosity.
- ❖ Increase LDL, decrease HDL and increase triglycerides.

High Blood Cholesterol

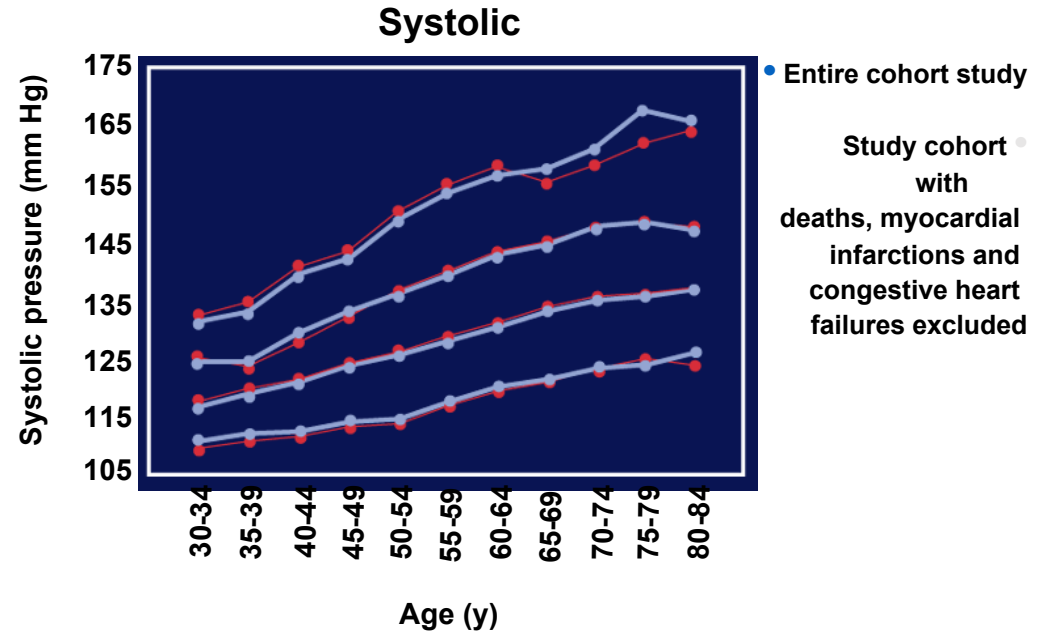
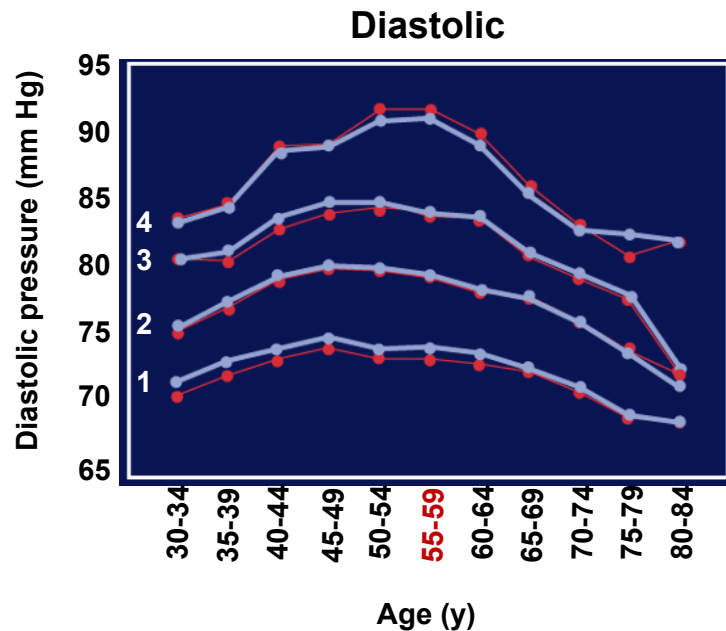
- **Low-density-lipoprotein (LDL) cholesterol** = “bad” cholesterol
A low LDL cholesterol level is considered good. Lifestyle factors, such as a diet high in saturated and trans fats, can raise LDL cholesterol.
- **High-density-lipoprotein (HDL) cholesterol** = “good” cholesterol
Higher levels are typically better. Low HDL cholesterol increases risk of heart disease. Genetic factors, Type 2 diabetes, smoking, being overweight and being sedentary can all result in lower HDL cholesterol.
- **Triglycerides**
Triglycerides are the most common type of fat in the body. A high triglyceride level combined with low HDL cholesterol or high LDL cholesterol is associated with atherosclerosis, which is the buildup of fatty deposits inside artery walls that increases the risk for heart attack and stroke.

High Blood Pressure

- High blood pressure increases the heart's workload, causing the heart muscle to thicken and become stiffer.
- Causing **Mechanical damage of endothelium and atherosclerosis**
- When high blood pressure is present alongside obesity, smoking, high blood cholesterol levels or diabetes, the risk of heart attack or stroke increases even more.
- In patients **<50 years** of age, **diastolic blood pressure** was the strongest predictor of CHD risk.
- In patients **≥60 years** of age, **systolic pressure (pulse pressure)** was the strongest predictor.

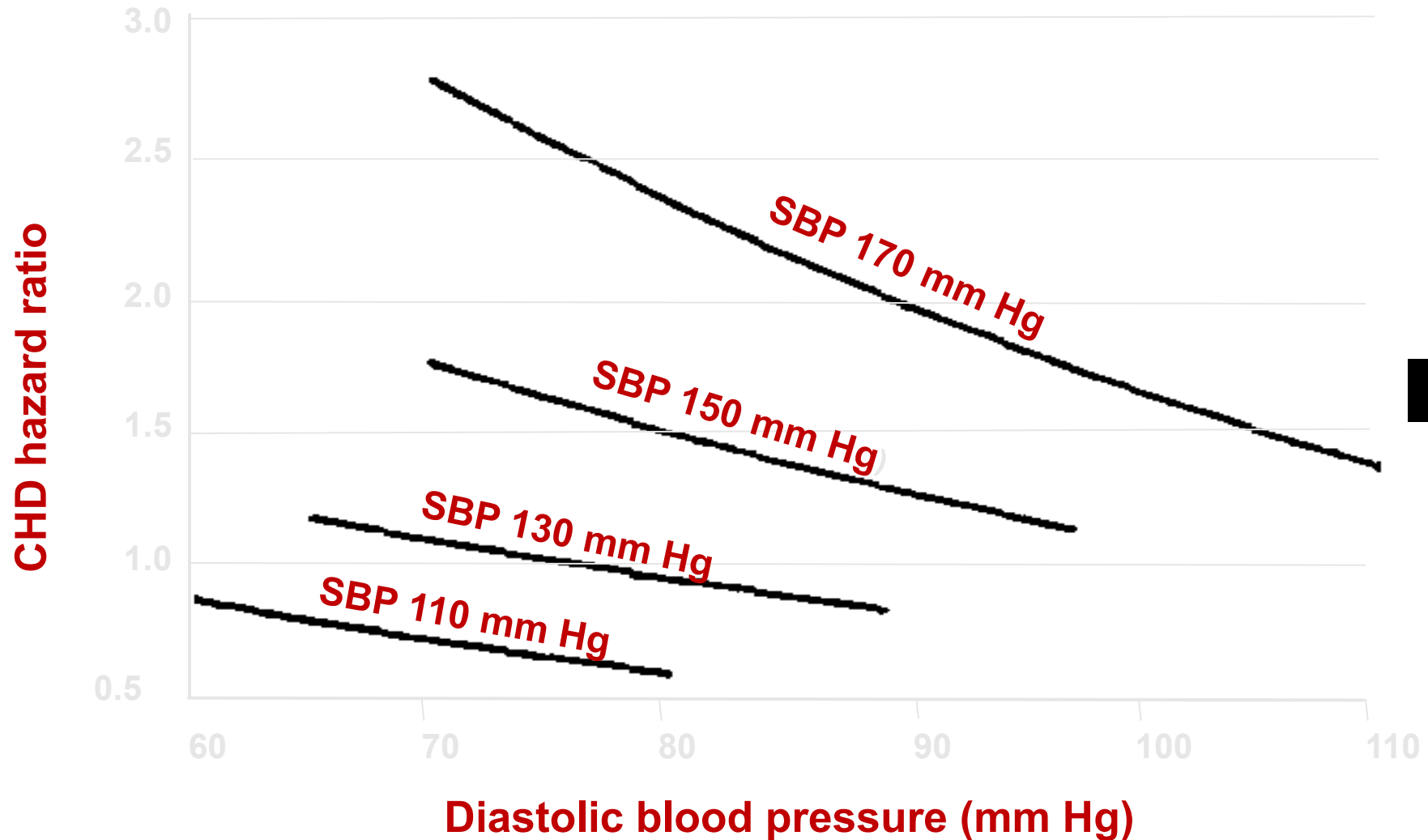
What happens to blood pressure with aging?

- Systolic pressure increases with age
- Diastolic pressure increases with age but peaks between 55 and 60 years then starts to decrease.
- Arterial stiffness: cause of elevated systolic and lower diastolic pressure with aging



BP values over lifetime period in population studies

Pulse Pressure and Coronary Risk



High Blood Pressure

- **Systolic blood pressure** and isolated systolic hypertension are major CHD risk factors at all ages and in both genders.
- The **Framingham study** found that the relative importance of systolic, diastolic, and pulse pressure (the difference between the systolic and diastolic blood pressures) changes with age.

Physical Inactivity

- An **inactive lifestyle** is a risk factor for coronary heart disease.
- Regular, moderate to vigorous physical activity helps reduce the risk of cardiovascular disease.
- Physical activity can help control blood cholesterol, diabetes and obesity. It can also help to lower blood pressure in some people.

Obesity

- People who have excess body fat – especially if a lot of it is at the **waist** (**central obesity**) – are more likely to develop heart disease and stroke, even if those same people have no other risk factors.

Diabetes

- Diabetes seriously increases your risk of developing cardiovascular disease.
- Even when glucose levels are under control, diabetes increases the risk of heart disease and stroke.
- The risks are even greater if blood sugar is not well-controlled.

Contributing Factors to Heart Disease Risk

Stress

- Individual response to stress may be a contributing factor for heart attacks. Increase in adrenaline and BP.

Alcohol

- Drinking too much alcohol can raise blood pressure, and increase your risk for cardiomyopathy, stroke, cancer and other diseases.
- It can also contribute to high triglycerides, and produce irregular heartbeats.

Contributing Factors to Heart Disease Risk

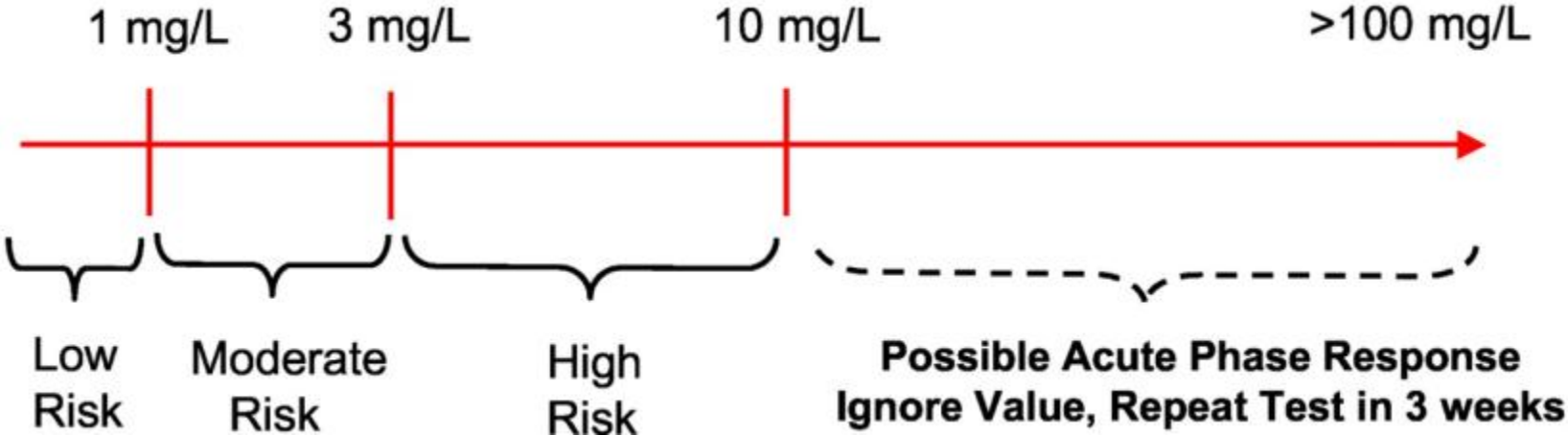
■ **Prothrombotic Markers**

- **Homocystinaemia (more among smokers)**
- **High fibrinogen (more among smokers)**

■ **Proinflammatory Markers**

- **High sensitive C-Reactive Protein**

Clinical interpretation of **hs-CRP** for cardiovascular risk prediction.



Ridker P M Circulation 2003;108:e81-e85



Contributing Factors to Heart Disease Risk

Microalbuminuria

- ❑ Microalbuminuria reflects vascular damage and appears to be a marker of early arterial disease.
- ❑ (MA) -- urinary albumin excretion (UAE) between the ranges of (30-300 mg/day) -- is an indication of increased cardiovascular risk and endothelial dysfunction, and an independent marker for cardiovascular morbidity and mortality in individuals with and without diabetes.

Screening for CV Diseases

- **Purpose of screening** — The primary purpose of screening for CHD is to identify patients whose **prognosis could be improved with an intervention** (in this case, medical therapy for risk factors or coronary HD).
- Screening for CHD should be distinguished from estimation of risk for CHD (or overall cardiovascular disease [CVD]).
- By definition, both are performed in asymptomatic persons, and both aim to improve outcomes with interventions, if indicated.
- However, screening for CHD (or CVD) identifies existing disease, while estimating the risk of CHD (or CVD) does not directly identify existing disease but rather the likelihood of any future event related to CHD (or CVD).

Screening for CV Diseases

- We do not screen most asymptomatic adults for CHD. However, American Heart Association recommends nearly all patients aged 20 years or older without established CVD should undergo periodic cardiovascular risk assessment every **three to five years**.
- (LDL) cholesterol and/or (HDL) cholesterol, glucose level, BP, life-style, ...are required.

ACC/AHA pooled cohort hard CVD risk calculator (2013)

- Age (validated only in patients 40 to 79 years of age)
- Gender
- Total cholesterol (mg/dL)
- HDL cholesterol (mg/dL)
- Systolic blood pressure (mmHg)
- Blood pressure treatment (yes or no)
- Diabetes mellitus (yes or no)
- Current smoking (yes or no)

A 63-year-old man, known case of HTN,
On medication. No H/O DM or smoking.
Risk assessment was done.
If Calculated Risk $\geq 7.5\%$
So considered high.

CV Risk Assessment:
10 year risk score is
>7.5%, high due to ??

Calculators

MedCalc 3000 Index

ACC/AHA 2013 Cardiovascular Risk Assessment

Input:

Race African American
 White

Sex Female
 Male

Age

Total Chol

HDL Chol

Sys BP

On BP Med No
 Yes

Diabetes No
 Yes

Smoker No
 Yes

Results:

Ten Year Risk

Decimal Precision:

Notes

- In this calculator, **mcg** is the abbreviation for **micrograms**.
- This calculator helps predict the 10-year risk of the following *hard* ASCVD events:
 - First occurrence of nonfatal myocardial infarction
 - CHD death

Powered by MEDCALC 3000

A 48-year-old man, known case of HTN, DM and smoker. 10 year risk score is shown. As it is high $>7.5\%$ even reaching higher levels.

This patient should be given high intensity statin and even Aspirin for primary prevention beside Life style modification and stop smoking

Calculators

MedCalc 3000 Index

ACC/AHA 2013 Cardiovascular Risk Assessment

Input:

Race African American
 White

Sex Female
 Male

Age 48 yr

Total Chol 168 mg/dL

HDL Chol 30 mg/dL

Sys BP 138 mmHg

On BP Med No
 Yes

Diabetes No
 Yes

Smoker No
 Yes

Results:

Ten Year Risk 21.87 %

Decimal Precision: 2

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Notes

- In this calculator, **mcg** is the abbreviation for **micrograms**.
- This calculator helps predict the 10-year risk of the following *hard* ASCVD events:
 - First occurrence of nonfatal myocardial infarction
 - CHD death

3/15/21

Powered by MEDCALC 3000

The same patient, if non-smoker and his HDL-C is within accepted range, 10 year risk score will drop from 21.87 to 7.05%

Calculators

MedCalc 3000 Index

ACC/AHA 2013 Cardiovascular Risk Assessment

Input:

Race African American
 White

Sex Female
 Male

Age 48 yr

Total Chol 168 mg/dL

HDL Chol 40 mg/dL

Sys BP 138 mmHg

On BP Med No
 Yes

Diabetes No
 Yes

Smoker No
 Yes

Results:

Ten Year Risk 7.05 %

Decimal Precision: 2

Notes

- In this calculator, **mcg** is the abbreviation for **micrograms**.
- This calculator helps predict the 10-year risk of the following *hard* ASCVD events:
 - First occurrence of nonfatal myocardial infarction
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3/15/21
Powered by MEDCALC 3000

Programs from the American Heart Association that promote seven ideal cardiovascular health metrics, including

- Not smoking
- Being physically active
- Having a normal blood pressure
- Having a normal blood glucose level
- Having a normal total cholesterol level
- Being normal weight
- Eating a healthy diet

Counselling a patient at High Risk of CVD

- ❑ Start with estimating the risk of CVD
- ❑ Ask about Family H. of premature CVD

Always consider:

LIFESTYLE MODIFICATION

- Lifestyle modification including activities such as **smoking cessation**, **increase in physical activity**, or **improvement in diet** are of proven benefit and should be the primary interventions in all.

Counselling a patient at High Risk of CVD

☐ Encourage Exercise

☐ Of even moderate degree has a protective effect against CHD and all-cause mortality.

Like Brisk walking for at least 150 minutes /week.

☐ Exercise may have a variety of beneficial effects including an elevation in serum HDL cholesterol, a reduction in blood pressure, less insulin resistance, and weight loss.

☐ Men who engaged in moderately vigorous sports activity have been reported to have a 23 percent lower risk of death than those who were less active.

Counselling a patient at High Risk of CVD

Smoking Cessation

Always ask about H/O smoking

Offer counselling to quit smoking

Counselling a patient at High Risk of CVD

Healthy Diet:

- **Fruits and vegetables** – There is growing evidence suggesting that fruit and vegetable consumption is inversely related to the risk of CHD and stroke.
- Higher intake of red meat and high-fat dairy products has also been associated with higher risks of CHD.
- **Fiber** – High fiber intake is also associated with a reduction in the risk of CHD and stroke compared with low fiber intake.

Counselling a patient at High Risk of CVD

Use of Statins:

- Due to the evidence of benefit from statin therapy across a broad range of risk, we believe it is reasonable to **start statin** therapy in patients whose **10-year risk of CVD ≥ 7.5 percent**.
- Statin therapy lowers the risk of death by 15 to 20 percent and lowers the risk of nonfatal cardiovascular events by an even greater degree.
- the reduction in major vascular events with statin therapy is directly proportional to the absolute reduction in LDL-C.

Counselling a patient at High Risk of CVD

- Control Blood Pressure
- Control Diabetes
- Reduction of weight among obese and overweight persons

Counselling a patient at High Risk of CVD

□ Antiplatelet therapy

- For patients with established and stable atherosclerotic CVD, **aspirin** is recommended.
- Long-term antiplatelet therapy with aspirin reduces the risk of subsequent myocardial infarction (MI), stroke, and cardiovascular death among patients with a wide range of manifestations of occlusive CVD.
- In patients who are unable to take aspirin and in those with a history of gastrointestinal bleeding, **clopidogrel** is a reasonable alternative.

Counselling a patient at High Risk of CVD

□ Antioxidant vitamins

- Antioxidant vitamins, the randomized evidence has not demonstrated clinical benefits on CVD in secondary or primary prevention regarding **vitamin E** and or **vitamin C**.

Conclusion

□ Risk factors for CVD:

Age, Gender, Smoking, Hypertension, Hypercholesterolaemia, Obesity, FH of premature CVD

Contributing factors: High levels of Homocystine, Fibrinogen, HS-CRP and Microalbuminuria

□ Prevention:

Dealing with risk factors and importantly Life-Style Modification