National Guideline for Cardiovascular Risk Management

(Total cardiovascular risk assessment approach)

for Primary Health Care Providers

Directorate of Non Communicable Diseases

Ministry of Health

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Abbreviations

ASCVD	Atherosclerotic cardiovascular disease
ACEI	Angiotensin-converting enzyme inhibitors
BP	Blood Pressure
BMI	Body Mass Index
CVD	Cardio Vascular Disease
DM	Diabetes Mellitus
FBS	Fasting Blood Sugar
HEFH	Heterozygous familial hypercholesterolemia
HLC	Healthy Lifestyle Centre
ISH	International Society of Hypertension
LDL	Low density Lipoprotein
LP	Lipoprotein
OPD	Out Patient Department
PVD	Peripheral Vascular Disease
RBS	Random Blood Sugar
TIA	Transient Ischemic Attack
TSH	Thyroid Stimulating Hormone
WHO	World Health Organization

CHAPTER 1 - Cardiovascular Risk Management

(Total Cardiovascular Risk Assessment Approach)

Guidelines for Primary Health Care (PHC) providers
Ministry of Health

Risk assessment is often considered a first step in the clinical management of cardiovascular disease (CVD). CVD risk assessment can be done clinically as well as using scores and charts. Development of CVD is influenced by several risk factors such as tobacco use, an unhealthy diet, physical inactivity, elevated blood pressure, increased cholesterol levels and elevated blood glucose levels. According to these guidelines, management of cardiovascular risk of an individual is determined by circulating the total risk score category based on the individual risk factors detected during screening. The CVD risk assessment charts will reduce the premature mortality and morbidity by early detection of CVD risk in individuals and introducing timely interventions.

Total CVD risk is defined as the probability of a fatal or non-fatal cardiovascular event e.g., Stroke or Myocardial infarction occurring within 10 years. The CVD risk assessment is not only useful in early detection and prevention of CVDs but also when deciding on treatment interventions. Since the CVD risk assessment charts are cost-effective, it can be extremely useful to stratify the risk level and decide on prevention of CVDs at HLCs, OPD, Medical clinics and even in wards of primary health care institutions.

In 2019, the WHO updated the 2007 WHO/ISH cardiovascular risk prediction charts which were developed and presented for 14 global regions in to 21 global regions to maximize between region variability and minimize heterogenicity in mortality and major drivers of health outcomes within each region. Updated versions of CVD risk assessment charts **(Annexure 1)** are intended to allow the introduction of a total risk stratification approach for management of CVD. They are presented as non-laboratory and laboratory-based charts. New risk levels are < 5% (green), 5% to <10% (yellow), 10% to <20% (orange), 20% to <30% (red), and 30% (dark red) **(Annexure 2), (Annexure 3)**.

All individuals should get followed up according to their level of stratified risk. Follow up frequency will also depend on the capacity of health systems. Individuals are to be referred to specialist clinics if indicated. The Personal Medical Record provided will be used to document client's health status.

CHAPTER 2 - 2019 Cardiovascular Disease Risk charts

The updated cardiovascular risk charts are intended to allow the introduction of a total risk-stratification approach for management of CVD. They are presented as

1. **Laboratory**-based charts.
2. **Non-laboratory**-based charts.

Laboratory-based algorithms include information on age, sex, smoking status, systolic blood pressure, history or evidence of diabetes mellitus, and the total cholesterol value. In the non-laboratory-based algorithms, body mass index (BMI) is included information on diabetes mellitus and cholesterol.

CVD risk (laboratory based) charts

These are CVD risk charts that include information on age, sex, smoking status, systolic blood pressure, history or evidence of diabetes mellitus and the total cholesterol value. The laboratory-based CVD risk charts should be used for making treatment decisions. This is the indicated risk chart in a setting where laboratory facilities, human and financial resources are available. These charts will facilitate health providers to initiate an intervention or treatment regimen, and to implement an appropriate follow-up plan based on the patient's total risk status.

CVD risk (non- laboratory based) charts

Many low-resource settings have limited testing facilities for biochemical measurements (e.g., blood sugar and cholesterol assays). CVD risk (non-laboratory-based) charts can be used to predict total CVD risk without information on total cholesterol and diabetes. Only age, sex, smoking status, systolic blood pressure and body mass index (BMI) will be needed to predict cardiovascular risk. These non-laboratory-based CVD risk charts are aimed at stratification in low-resource communities and office settings and can be used for decisions regarding referral.

CHAPTER 3 - OVERVIEW of CVD Risk Assessment

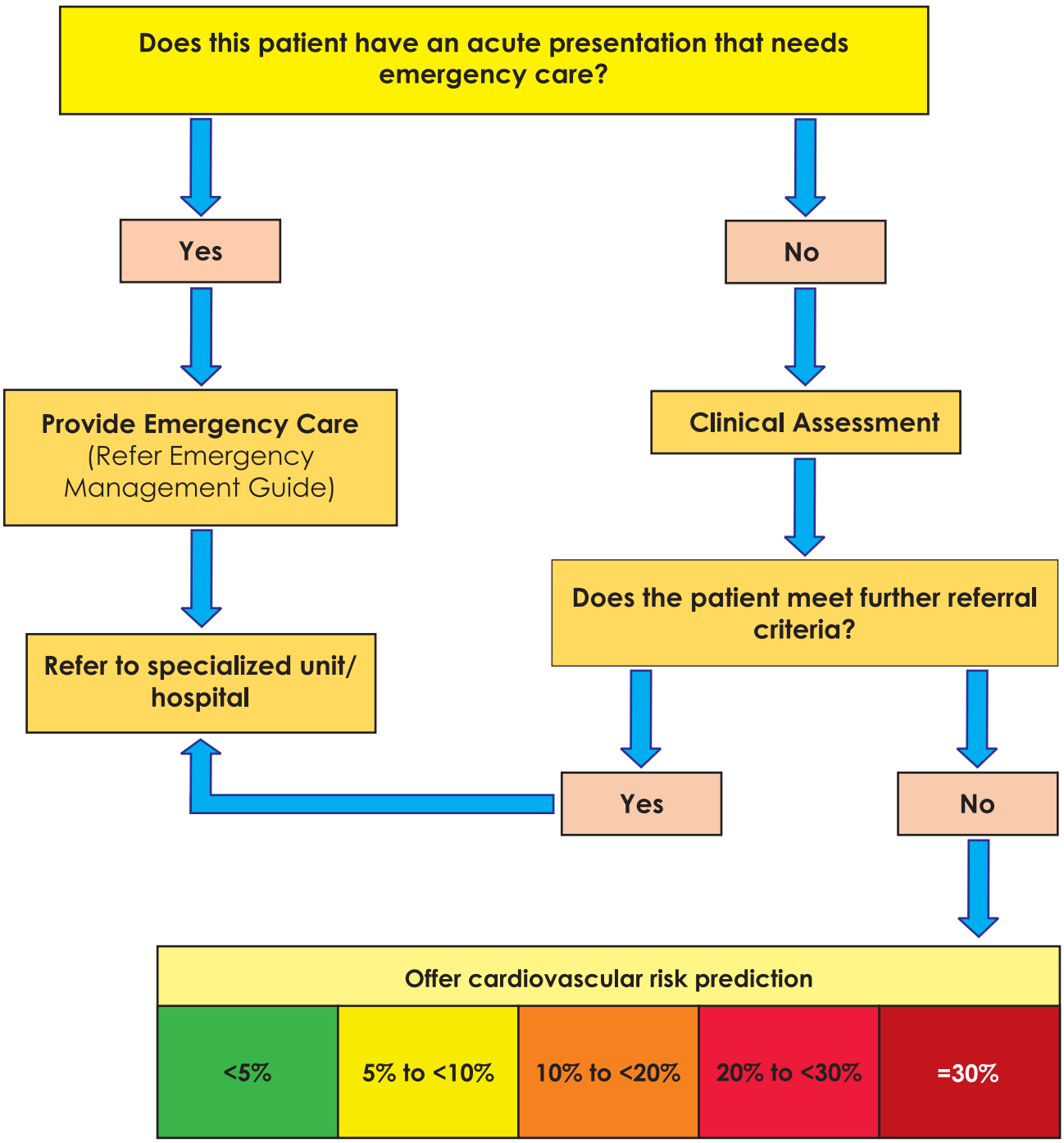


Figure 1 Overview of CVD Risk Assessment

CHAPTER 4 - Take a history, perform a clinical examination and do basic investigations.

❖ Please record the information on history, examination and investigations in the relevant section / cage of the PMR.

- History
- Age, gender, occupation
- Does the patient have chest pain and / or breathlessness on exertion, pain in calf on walking?
- Does the patient have a history of heart disease, stroke, TIA, diabetes/ pre diabetes or kidney disease?
- If yes, whether being followed up at a specialist unit?
- Is there a family history of IHD, premature cardiovascular diseases and diabetes in first degree relatives (male relative: <55 years, female relative: <65 years)
- What are the medicines that the patient is currently taking?
- Has she/he smoked any tobacco products such as cigarettes, cigars, pipes, within 1 year?
- Does the patient consume alcohol in a regular manner?
- Is the patient engaged in regular physical activity (≥ 30 minutes per day at least 5 days a week?)

Examinations

- Waist circumference
- BMI
- Blood pressure
- If BP is ≥ 140/90 mmHg (in all individuals with or without diabetes)
  In all individuals two readings should be taken. Two BP measurements should be recorded 1-2 minutes apart and if there is a substantial difference between the two readings, a third BP measurement should be taken. Record the average of the last two blood pressure measurements as the patient's blood pressure

Investigations

- FBS/RBS
- Total Cholesterol/Lipid profile
- Urine albumin

CHAPTER 5 - Illustration of WHO CVD risk charts

Illustration of how to use the WHO CVD risk (laboratory - based) chart.

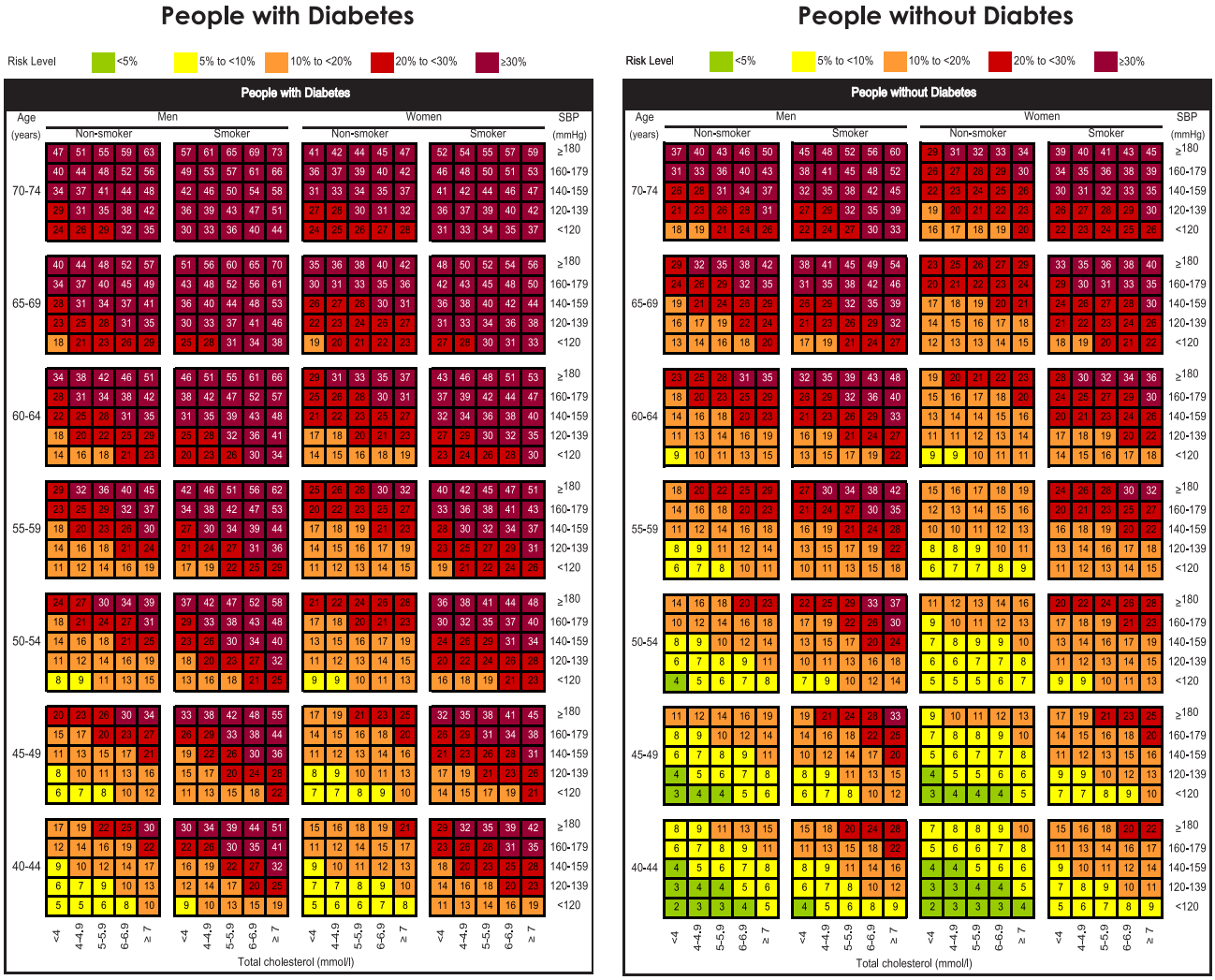
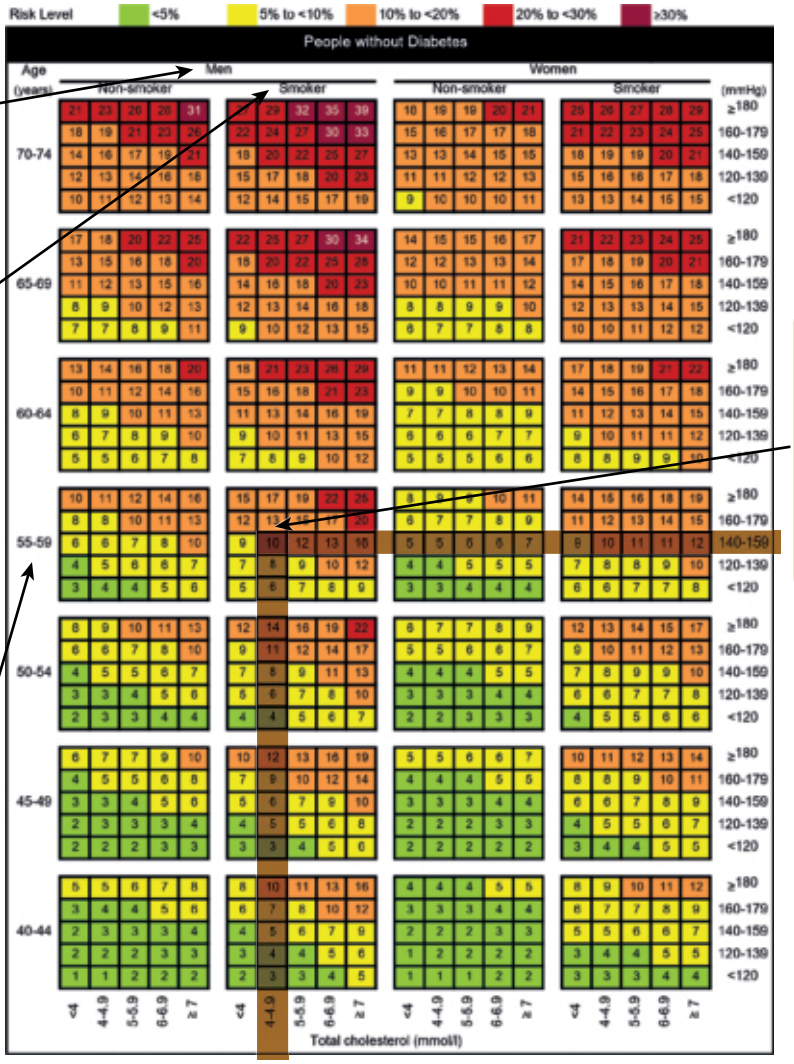


Figure 2: Illustration of how to use the WHO CVD risk (laboratory based) chart.

Source: Risk based CVD management WHO

Illustration of how to use the WHO CVD risk (laboratory-based) chart

STEP 1: Select the section of the chart for people with or without diabetes.



STEP 2: Select the table for men or women, as appropriate.

STEP 3: Select the column for non-smoker or smoker.

STEP 4: Select the relevant age group.

STEP 5: Within the selected box, find the cell where the person's systolic blood pressure and serum cholesterol intersect.

Source: Risk based CVD management WHO

Illustration of how to use the WHO CVD risk (non-Laboratory based)

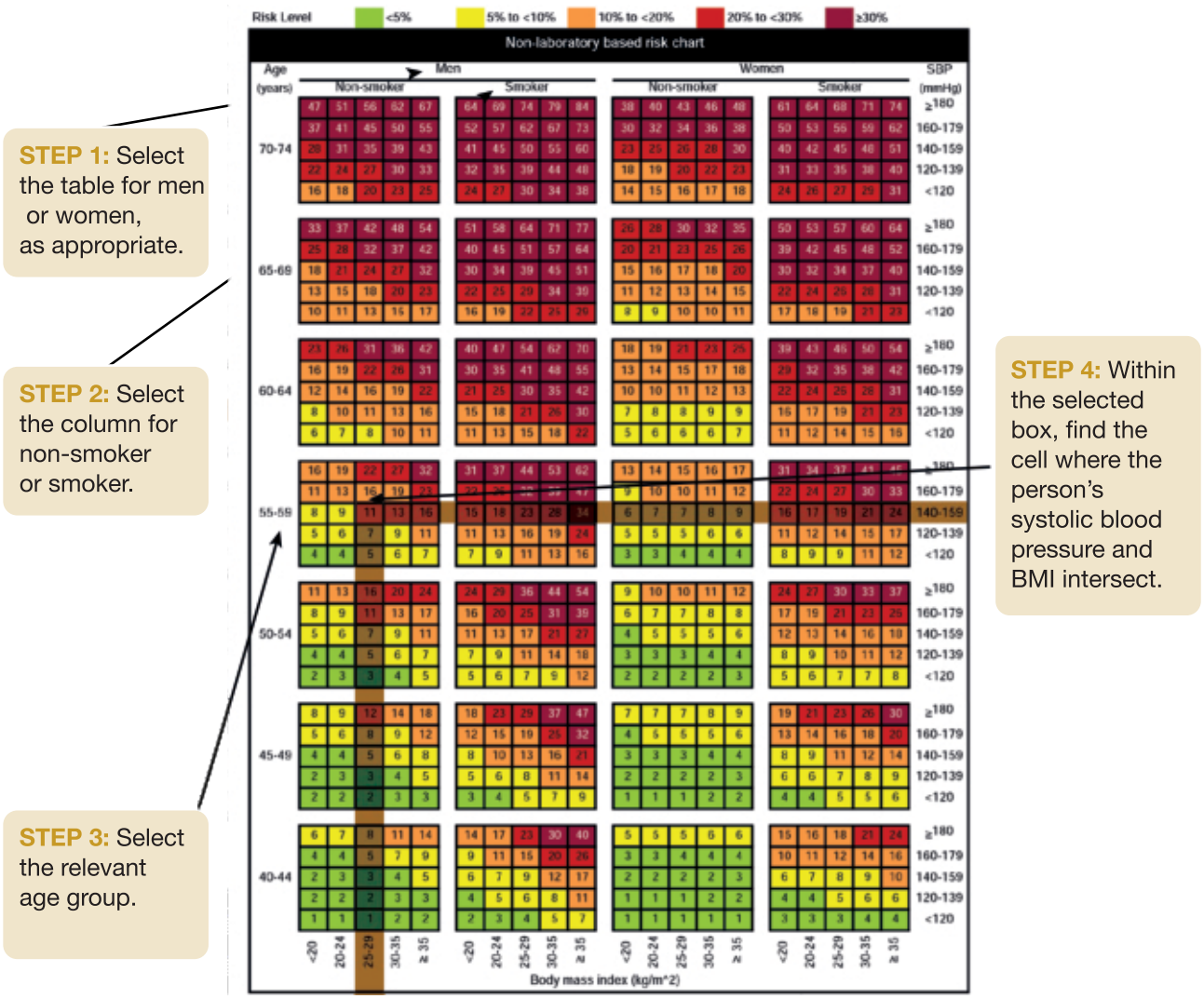


Figure 3 Illustration of how to use the WHO CVD risk (non-Laboratory based)

Source: Risk based CVD management WHO

CHAPTER 6 – ELIGIBITY

People who are not eligible to be screened using this chart:

- Age <35 years, ≥ 75years
- Other Medical conditions*

  When can treatment decisions be made without risk stratification using risk charts
- Documented ASCVD (Stroke/ TIA/ Myocardial Infarction/ Peripheral vascular disease)
- Total blood cholesterol level - ≥8 mmol/L (≥ 309 mg/dL)
- Diabetic Nephropathy, Retinopathy, Neuropathy
- Systolic BP> 160mmHg
- Chronic Kidney Disease (stage 3 to 5)

All patients in the above categories need to be treated or referred to specialist care accordingly and they need not be risk stratified using charts for treatment decisions. Appropriate lifestyle modification should be provided to all.

*Heterozygous Familial Hypercholesterolemia (HEFH) is this known patient or tell them how to suspect i.e. when cholesterol is high + personal or family history of premature ASCVD+ tell-tale marks of tendon xanthomata It is a very important entity),

CHAPTER 7 - Predict the 10-year cardiovascular risk.

WHO CVD risk prediction charts indicate 10-year risk of a fatal or non-fatal major cardiovascular event (Myocardial Infarction or stroke), according to age, sex, blood pressure, smoking status, total cholesterol and presence or absence of diabetes mellitus.

Document (record under risk category) and communicate to the patient his/her cardiovascular risk status

- Use WHO Cardiovascular Risk Prediction Chart.
- Categorize cardiovascular risk as,
    - <5% (Green)
    - 5% to <10% (Yellow)
    - 10% to <20% (Orange)
    - 20% to <30% (Red)
    - ≥30% (Dark Red)
    - Upper age limit for the CVD risk assessment is 70 – 74 years
    - Considering inadequacy of data individuals from age cohort of <35 years and > 74 years were not included in to this CVD risk assessment charts.
    - According to new charts published in 2019, CVD risk can be interpreted by absolute risk as a percentage in the selected box

- Communicate to the patient the benefits of minimizing the risk and what could be done to minimize the risk to <5%.

CHAPTER 8 – Cardiovascular Risk Management

Provide cardiovascular risk management as per the risk status.

Risk <5%

- **Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol.**
- **Risk <5% denotes the green areas of the WHO Cardiovascular Risk Prediction Chart.**
- **Level of risk: LOW**
- **Follow -up for CVD risk in 12 months.**
- **Irrespective of the risk level, If BP ≥ 140/90 mmHg, manage according to the National Guidelines on Management of Hypertension for Primary Health Care.**

Risk 5% to<10%

- **Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol.**
- **Risk 5% to <10% denotes the yellow areas of the WHO CVD Risk Prediction Chart.**
- **CVD risk follow up every 9 months .**
- **Irrespective of the risk level, If BP repeatedly ≥ 140/90 mmHg, manage according to the National Guidelines on Management of Hypertension for Primary Health Care.**

Risk 10% to < 20%

- **Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol.**
- **If BP is persistently > 140/90 mmHg, manage according to the Guidelines on Hypertension for Primary Health Care**
- **CVD risk follow up every 6 months.**

Risk 20% to < 30%

- Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol.
- If BP is persistently > 140/90 mmHg, manage according to the National guidelines on management of Hypertension for primary health care
- Give a statin to modify CVD risk
- CVD risk follow up every 3 months
- If there is no reduction in CV risk after 6 months follow up, refer to next level of healthcare

Risk ≥30%

- **Counsel on diet, physical activity, smoking cessation and avoiding harmful use of alcohol.**
- **If BP is persistently > 140/90 mmHg, manage according to the National Guideline s on Management of Hypertension for Primary Health Care**
- **Give a statin to lower cholesterol, CVD risk follow up every 3 months**
- **If there is no reduction in CV risk after 6 months follow up, refer to next level of healthcare**

CHAPTER 9 – REFERAL

Refer the patient to a specialist clinic if the history and examination reveal any one of the following:

- Persistently raised BP ≥ 140/90 in people less than 40 years to exclude secondary causes of hypertension
- Persistently raised BP ≥ 140/90 for any patient in spite of optimum treatment with the combination of 3 drugs including a diuretic (thiazides or thiazide like diuretics, calcium channel blockers, ACEIs**) (maximum recommended or tolerable doses)
- Total cholesterol ≥ 7mmol/L (240mg/dL) in individuals less than 35 years
- Known heart disease, stroke, TIA, PVD or kidney disease who are not being followed up by specialist clinic (this is to obtain a plan of management which can be continued at the primary level
- Angina, shortness of breath on exertion, Intermittent claudication
- Proteinuria (confirmed on two tests)
- DM with two consecutive fasting blood glucose > 7.2 mmol/L (130 mg/dL) despite good compliance with life style modification and drug therapy with maximum tolerated doses of metformin + sulphonylurea
- DM with foot ulcers
- DM with recent deterioration of vision or no eye examination in past 2 years
  Consider renal function test if blood pressure is persistently ≥ 160/100 mmHg
- ** Caution: ACE inhibitors are contraindicated in pregnancy. Woman of reproductive age who are receiving ACE inhibitors should be on a reliable family planning method and if planning pregnancy ACE inhibitors should be substituted with an alternative antihypertensive drug

CHAPTER 10 – TREATMENT

Offer drug treatment and arrange long term follow up for the following patients regardless of their risk category:

- All individuals with persistently raised (confirm with two more visits 1- 2 weeks apart) systolic BP ≥ 160 mmHg and /or diastolic BP ≥ 100 mmHg
  - First line drugs: thiazides or thiazide like diuretics, ACE inhibitors/ ARBs, calcium channel blockers (Caution: ACE inhibitors/ARBs are contraindicated in pregnancy. Therefore, women of reproductive age receiving ACE inhibitors/ARBs should be on a reliable family planning method and if planning pregnancy, ACE inhibitors/ARBs should be substituted with an alternative antihypertensive drug.)

- All individuals who have total cholesterol level at or above 8 mmol/L or 309 mg/dL
  - Request TSH to exclude hypothyroidism
  - Commence a statin (atorvastatin 20 – 40 mg)

    Caution: Statins are contraindicated in pregnancy and in lactation. Therefore, women of reproductive age receiving statins should be on a reliable family planning method and if planning pregnancy it should be discontinued at least for 3 months

- In all individuals who have total cholesterol level at or above 6 mmol/L (240 mg/dL) and < 8 mmol/L (309 mg/dL) consider doing a lipid profile.

  If LDL cholesterol level is at or above 5mmol/l (190 mg/dL), start a statin (atorvastatin 20-40 mg). Start statins and recheck lipid profile in 8-12 weeks and adjust statin therapy to achieve the LDL target / percentage reduction appropriate for the risk category. (Refer to Dyslipidemia guidelines)

CHAPTER 11 - Important Practical points

1. Management of Hypertension and Diabetes:

- For management of hypertension refer to the National guidelines on Management of Hypertension for Primary Health Care
- For management of diabetes refer to the National Guidelines on Management of Diabetes for Primary Health Care

2. Consider drug treatment for BP lowering and or lipid lowering following categories:

- All patients with established diabetes and CVD (coronary heart disease, myocardial infarction, transient ischemic attacks, cerebrovascular disease or peripheral vascular disease), renal disease. If stable, should continue the treatment already prescribed and be considered as having HIGH risk > 20%.
- People with albuminuria, retinopathy, left ventricular hypertrophy.
- All individuals with persistent raised BP ≥ 160/100 mmHg.
- All individuals with total cholesterol at or above 8 mmol/L (309 mg/dL)

3. Follow up visits:

- Ask about: new symptoms, adherence to advice on tobacco and alcohol use, physical activity, healthy diet, medications etc.
- Assess (physical examination)
- Estimate cardiovascular risk.
- Refer if necessary.
- Counsel all and treat as shown in protocol.

Annexure 1 Comparison between 2017 and 2019 CVD risk charts

<table>
<tr><td>Parameter</td><td>2007 WHO/ISH risk prediction charts</td><td>2019 WHO CVD risk charts</td></tr>
<tr><td>Presentation</td><td>➢ For 14 WHO epidemiological subregions</td><td>➢ For 21 global regions</td></tr>
<tr><td>Types of charts</td><td>Two sets:
1. One set can be used in settings where blood cholesterol can be measured.
2. The other set is for settings in which blood cholesterol cannot be measured.</td><td>Two sets:
1. Laboratory based charts
2. Non-laboratory-based charts</td></tr>
<tr><td>Variables</td><td>1. With individual cholesterol value:
• Age
• Sex
• Smoking
• Systolic blood pressure
• Presence or absence of diabetes
• Total cholesterol
2. Without individual cholesterol value
• Age
• Sex
• Smoking
• Systolic blood pressure
• Presence or absence of diabetes
• National average cholesterol value</td><td>Laboratory based
• Age
• Sex
• Smoking
• Systolic blood pressure
• Presence or absence of diabetes
• Total cholesterol
Non laboratory based:
• Age
• Sex
• Smoking
• Systolic blood pressure
• BMI</td></tr>
<tr><td>Risk levels and color codes</td><td><table><tr><td></td><td>2007</td><td></td></tr><tr><td></td><td>Green</td><td><10%</td></tr><tr><td></td><td>Yellow</td><td>10% to <20%</td></tr><tr><td></td><td>Orange</td><td>20% to <30%</td></tr><tr><td></td><td>Red</td><td>30% to <40%</td></tr><tr><td></td><td>Dark red</td><td>>40%</td></tr></table></td><td><table><tr><td></td><td>2019</td><td></td></tr><tr><td></td><td>Green</td><td><5%</td></tr><tr><td></td><td>Yellow</td><td>5% to <10%</td></tr><tr><td></td><td>Orange</td><td>10% to <20%</td></tr><tr><td></td><td>Red</td><td>20% to <30%</td></tr><tr><td></td><td>Dark red</td><td>≥30%</td></tr></table></td></tr>
<tr><td>Difference in interpretation of risk levels</td><td>Green was <10%</td><td>Green is <5% and corresponding changes in other risk levels</td></tr>
</table>

Source: Risk based CVD management WHO

Annexure 2 Laboratory based CVD management chart

Action

Select the regional chart covering your country:

- REGION NAME is printed at the top of the charts.
- Countries included in each region can be found in Annex 1.

Have the following information ready:

- age
- sex
- smoker* or non-smoker
- presence or absence of diabetes†
- systolic blood pressure
- total blood cholesterol‡

Using the charts

STEP 1: Select the section of the chart as relevant for people with or without diabetes.

STEP 2: Select the table for men or women, as appropriate.

STEP 3: Select smoker or non-smoker column.

STEP 4: Select age-group.

STEP 5: Within the selected box find the cell where the person's systolic blood pressure and total blood cholesterol intersect.

STEP 6: The colour of the cell indicates the 10-year risk of a fatal or non-fatal CVD event. The value within the cell is the risk percentage. Colour coding is based on the grouping.

Green	<5%
Yellow	5% to <10%
Orange	10% to <20%
Red	20% to <30%
Deep red	≥30%

STEP 7: Record CVD risk percentage in person's chart.

STEP 8: Counsel, treat and refer according to risk level

Source: Risk based CVD management WHO

ANNEXURE 3 Non-laboratory-based CVD management chart

<table>
<tr><th colspan="4">Action</th></tr>
<tr><td colspan="4">Select the regional chart covering your country:
• REGION NAME is printed at the top of the charts.
• Countries included in each region can be found in Annex 1.</td></tr>
<tr><td colspan="4">Have the following information ready:
• age
• sex
• smoker* or non-smoker
• systolic blood pressure
• BMI (body mass index) = weight (kg) ÷ height (m)^2</td></tr>
<tr><td colspan="4">Using the charts</td></tr>
<tr><td colspan="4">STEP 1: Select the table for men or women, as appropriate.</td></tr>
<tr><td colspan="4">STEP 2: Select smoker or non-smoker column.</td></tr>
<tr><td colspan="4">STEP 3: Select age-group.</td></tr>
<tr><td colspan="4">STEP 4: Within the selected box find the cell where the person's systolic blood pressure and body mass index (BMI) intersect.</td></tr>
<tr><td rowspan="5">STEP 5: The colour of the cell indicates the 10-year risk of a fatal or non-fatal CVD event. The value within the cell is the risk percentage. Colour coding is based on the grouping.</td><td></td><td>Green</td><td><5%</td></tr>
<tr><td></td><td>Yellow</td><td>5% to <10%</td></tr>
<tr><td></td><td>Orange</td><td>10% to <20%</td></tr>
<tr><td></td><td>Red</td><td>20% to <30%</td></tr>
<tr><td></td><td>Deep red</td><td>≥30%</td></tr>
<tr><td colspan="4">STEP 6: Record CVD risk percentage in person's chart.</td></tr>
<tr><td colspan="4">STEP 7: Counsel, treat and refer according to risk level</td></tr>
</table>

Source: Risk based CVD management WHO

References

- World Health Organization (2020). WHO | HEARTS Technical Package. [online] Available at: https://www.who.int/publications/i/item/hearts-technical-package [Accessed 12 Aug. 2021].