GUIDELINES FOR THE MANAGEMENT OF

DIABETES

AND

HYPERTENSION

MOHCC-MSF NCD PILOT
MANICALAND PROVINCE
ZIMBABWE
Introduction

• Cardiovascular disease (CVD) is common especially above 60 years of age
• It includes coronary heart disease (e.g. myocardial infarction), cerebrovascular disease (e.g. stroke) and other manifestations
• There are many risk factors, some of which can be modified to prevent CVD. For example, early detection and management of Diabetes mellitus (DM) and Hypertension (HTN) can prevent CVD
• Some patients present with multiple risk factors and their cardiovascular risk can be assessed by using the WHO charts in annex
• The cardiovascular risk assessment will guide the prevention and treatment that we offer patients
• These are guidelines for diagnosis and management of DM and/or HTN in non pregnant adults at primary health care level

For the management of pregnant women with DM and or HTN, please refer to the doctor, and manage according to BEMNOC (Basic emergency newborn and obstetric care) guidelines
Content

• Facts about DM
• Classification of Diabetes Mellitus (DM)
• Reference ranges of blood glucose and glycated hemoglobin
• Glycemic targets or treatment goals in T2DM management
• Screening and diagnosis of symptomatic patients
• Screening and diagnosis of asymptomatic patients: when A1c is unavailable
• Screening and diagnosis of asymptomatic patients: when A1c is available
• At diagnosis: Minimum clinical and laboratory work up of patients with DM
• Management of T2DM
  • Management of T2DM: A1c not available
  • Management of T2DM: A1c 6.5 to 7.9%
  • Management of T2DM: A1c 8 to 9.9%
• Hypertension in diabetic patients
• Management of hypoglycemia at home
Facts about Diabetes Mellitus

- Diabetes mellitus is a metabolic disorder leading to chronic hyperglycemia
- Patients frequently present with concurrent hypertension (HTN)
- Patients have a higher risk of cardiovascular diseases (CVD) such as stroke
Classification of DM

Type 1 diabetes mellitus (T1DM)
- Secondary to lack of insulin production => insulin deficiency
- Typical onset in childhood but can present at ANY AGE!
- Requires daily injections of insulin

Type 2 diabetes mellitus (T2DM)
- Secondary to insulin resistance which may be accompanied by variable degrees of insulin secretory failure in advanced disease
- Is largely the result of excess body weight, unhealthy diet, physical inactivity and genetics
- Typical onset as adult

Pre-diabetes mellitus
- high blood sugar level not yet in diabetes range but risk factor for development of overt DM later on; can be addressed with diet and lifestyle changes

Gestational diabetes (GDM)
- Occurs during the 2\textsuperscript{nd} and 3\textsuperscript{rd} trimesters of pregnancy
- Women are at risk of developing T2DM later in life
- Due to insulin-resistance caused by placental hormones, usually glucose metabolism returns to normal after delivery
### Reference ranges of blood glucose and glycated hemoglobin

<table>
<thead>
<tr>
<th>RBS (mmol/L)</th>
<th>FBS (mmol/L)</th>
<th>A1c (%)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.9 – 11.0</td>
<td>3.9 – 6.0</td>
<td>&lt; 5.7</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>6.1 – 6.9</td>
<td>5.7 – 6.4</td>
<td>Pre-DM</td>
</tr>
</tbody>
</table>

- RBS – Random blood sugar
- FBS – Fasting blood sugar
  - Fasting = no caloric intake for at least eight hours
- A1c – Glycated hemoglobin. This test measures the average blood sugar for a period of 3 months prior to the date of test
Glycemic targets or treatment goals in type 2 diabetes management

- A1c is the gold standard to measure glycemic control
- In the absence of A1c, FBS can be used

**Treatment targets:**
- A1c: < 7% for most patients
  Consider A1c 7.0 to 7.9% for patients at high risk of hypoglycemia:
    - Elderly,
    - History of severe hypoglycemia
    - Multiple comorbidities
    - Long standing diabetes
    - Limited life expectancy
    - Advanced complications

- FBS: < 7 mmol/L
  Consider 7 to 8 mmol/L for high risk patients (see above)
Screening & Diagnosis of Symptomatic Patients

Symptoms of DM

- **Acute** (*Classic symptoms*): polydipsia, polyuria, unplanned weight loss, polyphagia, tiredness
- **Chronic**: Recurrent UTIs, recurrent candida infections, slow healing foot cuts or wounds, peripheral neuropathy

FBS or RBS on handheld device

- FBS ≥ 7.0 mmol/L or RBS ≥ 11.1 mmol/L
  - **Refer**
  - *DM type 1?*
  - Advanced type 2 DM?
  - Do baseline A1c!

- FBS < 7.0 mmol/L, or RBS < 11.1 mmol/L
  - **No DM**
  - Look for other causes of the symptoms

*Consider diagnosis of T1DM:*
  - Acute classic symptoms and or
  - Age < 25 years and or
  - Ketonuria and or
  - BMI < 25
Screening & Diagnosis of Asymptomatic Patients

When A1c testing is unavailable

Screen high risk patients
- First degree family history of DM
- Hypertension
- Active TB
- Obesity (BMI ≥ 30 kg/m²)
- Cardiovascular disease (CVD): stroke, ischaemic heart disease, heart failure, peripheral artery disease
- Chronic Kidney Disease (CKD): CrCl < 60 ml/min

FBS on handheld device in mmol/L

FBS ≥ 7.0
- Repeat FBS in 1 week
- FBS ≥ 7.0
  - Diabetes confirmed!
  - Follow management cascade for confirmed T2DM

FBS < 7.0*
- No DM
- FBS < 7.0
- FBS 6.1 to 6.9
  - Impaired FBS
- FBS 3.9 to 6.0
  - Discrepancy between 1st and 2nd test
  - Refer
  - • Dietary & lifestyle counseling
  - • Re-screen after 6 months

* A normal RBS is not a good predictor of DM in asymptomatic patients

5/20/2020
Screening & Diagnosis of Asymptomatic patients

When A1c testing is available

Screen high risk patients

- First degree family history of DM
- Hypertension
- Active TB
- Obesity (BMI ≥ 30 kg/m²)
- Cardiovascular disease (CVD): stroke, ischaemic heart disease, heart failure, peripheral artery disease
- Chronic Kidney Disease (CKD): CrCl < 60 ml/min)

FBS or RBS on handheld device in mmol/L

- FBS ≥ 7.0 or RBS ≥ 11.1
- FBS < 7.0, or RBS < 11.1

Confirm with A1c

- A1c ≥ 6.5%
- A1c < 6.5%

Diabetes confirmed!

- ≥6.5%
- 5.7% to 6.4% Pre-DM
- < 5.7% No DM

See management cascade for confirmed DM type 2

- Dietary & lifestyle counseling
- Re-screen after 6 months

- Dietary & lifestyle counseling
- Re-screen after 1 year

No DM

- Dietary & lifestyle counseling
- Re-screen after 3 years

Recheck A1c and review

- Pre-DM
- No DM

Dietary & lifestyle counseling

Pre-DM

Re-screen after 6 months

< 5.7% No DM

Re-screen after 1 year

Dietary & lifestyle counseling

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At diagnosis: minimum clinical and laboratory work up of patients with DM

- **Symptoms and signs**: shortness of breath or cough, fatigue, leg swelling (oedema), irregular pulse or rapid heart rate, pallor
- Weight, height, BMI
- Urinalysis – document presence or absence of proteinuria
- Serum creatinine and creatinine clearance
- Fasting blood sugar
- Total cholesterol if available
- Assess cardiovascular risk
Management of T2DM

Key notes

• *First line* oral hypoglycemic agents (OHA) are biguanides e.g. metformin

• *Second line* OHA are sulphonylureas:
  – Gliclazide and Glimepiride should be **preferred** where resources permit
  – Glibenclamide should not be used ≥ 60 years of age and if creatinine clearance < 60 ml/min

• All patients presenting with *A1c of 10% or more* should be considered for insulin initiation

All serious adverse events must be reported to the MEDICAL RESEARCH COUNCIL OF ZIMBABWE and MEDICINES CONTROL AUTHORITY OF ZIMBABWE using the **SERIOUS ADVERSE EVENT REPORTING FORM**
MANAGEMENT OF T2DM

When A1c testing is not available

- Define treatment goal: FBS < 7 mmol/L
- Take sample for CrCL at day 1 of treatment initiation
- Counsel on diet & lifestyle

Start Metformin 500 mg BD

1 month later: Check for side effects & CrCL results

CrCl ≥ 45 ml/min

Continue same treatment, recheck FBS 2 months later

FBS < 7mmol/L
Continue Metformin 500mg BD

FBS ≥ 7mmol/L
Increase Metformin to 1g BD

Check FBS 3 months later

CrCl < 45 ml/min

Refer

FBS ≥ 7mmol/L
Add Gliclazide 80 mg OD or Glibenclamide 5 mg OD
Continue Metformin 500mg BD

Check FBS 3 months later & side effects

FBS < 7mmol/L
Continue same treatment

FBS ≥ 7mmol/L
Tritrate Gliclazide to max 160 mg BD or Glibenclamide to max 15 mg OD*
Continue Metformin to 1g BD

Refer to doctor after max dose of orals

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MANAGEMENT OF DIABETES TYPE 2

When A1c is 6.5 to 7.9%

- Define treatment goal (CAUTION FOR HIGH RISK PATIENTS!)
- Take sample for CrCL at treatment initiation
- Counsel on diet & lifestyle
- Check treatment/diet compliance & side effects each visit

Start Metformin 500 mg BD

1 month later:
Check CrCl result

CrCl ≥ 45 ml/min
- Continue same treatment, recheck A1c 2 months later

A1c < 7%
- Continue Metformin 500 mg BD

A1c 7 to 7.9%
- Increase Metformin to 1g BD

CrCl < 45 ml/min
- Refer

A1c ≥ 8%
- Move on to dual therapy. See flowchart A1c ≥ 8%

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MANAGEMENT OF T2DM

When A1c is 8 to 9.9%

- Define treatment goal; (CAUTION FOR HIGH RISK PATIENTS!)
- Take sample for CrCL at treatment initiation. Counsel on diet & lifestyle

Start dual therapy: Metformin 500 mg BD AND Gliclazide 80 mg OD or Glibenclamide 5 mg OD

1 month later:
Check clinical tolerance & CrCL

CrCl ≥ 45 ml/min
Continue same treatment
Check A1c 2 months later

A1c < 7%
Continue same treatment

A1c ≥ 7%
Increase Metformin to 1 g BD. Continue Gliclazide or Glibenclamide as above
Check A1c 3 months later

A1c < 7%
Continue same treatment

A1c ≥ 7%
Increase Gliclazide to 80 mg BD or Glibenclamide to 10 mg OD
Continue Metformin to 1 g BD
Check A1c 3 months later

A1c < 7%
Continue last prescribed treatment

A1c ≥ 7%
Titrate Gliclazide to max 160 mg BD or Glibenclamide to max 15 mg OD
Continue Metformin to 1 g BD
Refer to doctor after max dose of orals

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Hypertension in diabetic patients

- Hypertension is a common problem in patients with diabetes
- The diabetes-hypertension co-morbidity increases the risk for cardiovascular morbidity and mortality
- Therefore all patients with DM and HTN must be put on treatment whatever is the stage of HTN
- See HTN diagnostic and treatment cascades (page 19 to 28)
Management of hypoglycemia at home

**Step 1:** First, eat or drink 10 to 15 grams of a fast-acting carbohydrate, such as:
- Four to six pieces of hard sweets (not sugar-free)
- ½ (125ml) cup of fruit juice
- 1 cup of milk
- ½ (125ml) cup of soft-drink (not sugar-free)
- 1 tablespoon honey (put it under your tongue so it gets absorbed into your bloodstream faster)

**Step 2:**
- Wait 15 minutes, re-check your blood glucose levels to see if your blood glucose level has risen above 3.9 mmol/L.
- If your blood glucose level has risen above 3.9 mmol/L go to Step 3.
- If your blood glucose level is still below 3.9 mmol/L, repeat Step 1.

**Step 3:** Eat a snack or meal with longer acting carbohydrate. Chose one among the following:
- A slice of bread with peanut butter or avocado
- A small sweet potato
- A fruit: banana, orange, apple, mango...
- A handful of peanuts, mutakura, nyimo
- 2-3 pieces of dried fruit
- 1 cup (125 ml) of natural yoghurt or mukaka wakakora
- A fist of sadza, pasta, rice
CHAPTER 2

MANAGEMENT OF HYPERTENSION (HTN)

Content
• Blood pressure measurement – SOP
• Frequency of BP monitoring and practical considerations in checking BP
• Treatment goals for HTN
• HTN diagnostic cascade
• At diagnosis: Minimum clinical and laboratory work-up of patients with HTN
• HTN treatment cascades:
  • Stage 1 HTN: patients with HTN-only
  • Stage 1 HTN: patients with DM or high CVD risk
  • Stage 2 HTN
  • Stage 3 HTN
# BP Measurement
## Standard Operating Procedure

<table>
<thead>
<tr>
<th>Factor</th>
<th>Procedure</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| **General**                 | First consultation, take reading from the left arm of patient  
For diagnosis of HTN, take readings on 3 different visits over 2 weeks to 2 months. If ≥2 out of 3 of the BP readings are >140/90 then patient has HTN  
For BP > 180/110 (stage 3 HTN), let the patient rest one hour, repeat and if persistently > 180/110 refer to severe HTN management protocol | ▪ BP varies throughout day.  
▪ Be consistent, always take the BP from the same arm                                                  |
| **Type of blood pressure machine** | Use an automated BP machine with correctly fitting cuff  
▪ Manual devices subject to human error. Small cuffs give high readings.                                                                                     |                                                                                                       |
| **What the patient/client should do** | Stop talking during the procedure and be relaxed  
Sit with back supported. Avoid crossed legged position.  
Client’s arm at level of heart, arm resting on table.  
Avoid distended bladder (Discomfort and pain raise BP. A full bladder can be painful).              | ▪ Unsupported back raises BP by 6mmHg, talking by 8 to 15mmHg  
▪ Crossed legs raises BP by 2 to 8 mmHg.  
▪ Hanging arms raise BP by 10 to 12mmHg.                                                            |
| **What the health care provider should do** | Remove restrictive clothing from arm. Instruct client to relax arm in use  
Place BP cuff with bladder midline over brachial artery.  
Stop talking during BP measurement.  
Press Start button for the reading to be taken.  
If BP >140/90, take at least 2 BP readings and record the lowest value  
Note the circumstances under which BP is measured: ▪ fever, presenting complaint, stress  
▪ If patient is on antihypertensive medications, record 2 previous documented BP values, date and circumstances | ▪ Stress, caffeine, antihypertensive medications and physical activity affect blood pressure |
Treatment goals for hypertension

- Aim for sustained long-term BP control
- Avoid aggressive treatment.
- Acute changes in BP put the patient at risk of complications
- **Treatment goal for all patients:** < 140/90 mmHg
Systolic BP ≥140 or Diastolic BP ≥ 90

Stage 1 HTN:
- SBP 140-159 or DBP 90-99 on 3 separate measurements over 2 weeks to 2 months
- Manage according to HTN treatment cascade for patients with stage 1 HTN-only

Stage 2 HTN:
- SBP 160-179 or DBP 100-109 on 3 separate measurements over 2 weeks to 2 months
- See stage 1 HTN treatment cascade for patients with DM or CVD risk

Stage 3 HTN:
- SBP ≥ 180 or DBP ≥ 110
- See stage 3 HTN treatment cascade

With:
- Stroke
- Heart Failure
- Coronary artery disease
- CrCl <60 or persistent proteinuria
- High cholesterol
- Unexplained chest pain
- Start HCT 25 mg and REFER

With:
- DM or high *CVD Risk (2 or more of: smoking, obesity, sedentary lifestyle, high cholesterol)
- Patient education and counseling

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At diagnosis: minimum clinical and laboratory work up of patients with HTN

- **Symptoms and signs**: shortness of breath or cough, fatigue, leg swelling (oedema), irregular pulse or rapid heart rate, pallor

- Weight, height, BMI

- Urinalysis – document presence or absence of proteinuria

- Serum creatinine and creatinine clearance

- Fasting blood sugar

- Total cholesterol if available

- Assess cardiovascular risk
BP still above target despite good adherence: add Amlodipine 5 mg daily and manage as Stage 2 hypertension

If BP still above target: START HCT 25 mg OD
Reinforce lifestyle changes
Review in 4 weeks with CrCl

CrCl ≥ 45 ml/min

CrCl < 45 ml/min

Refer to Secondary Level
If BP still above target:
• Consider withholding HCT. Reduced efficacy of HCT
• Start Amlodipine 5 mg daily

BP ≥ 140/90 mmHg and <160/100mmHg
• No diabetes mellitus
• No cor-mobidities
• Program Target: BP < 140/90 for ALL PATIENTS

• Refer to counselor for educational session and prescribe lifestyle management:
• Low salt diet
• Regular exercises (minimum 30 min/day for 5-7 days per week of moderate intensity exercises)
• Stop smoking
• Aim for weight reduction to chive BMI < 25
• REVIEW AFTER 6 MONTHS
STAGE 1 HTN TREATMENT CASCADE
PATIENTS WITH DM OR HIGH CVD RISK

BP ≥ 140/90 mmHg AND < 160/100
- Take sample for creatinine clearance (CrCl) and start treatment
- Ideal target BP for DM-HTN: <130/80 mmHg
- Program Target: BP < 140/90 mmHg

START HCT 25 mg OD.
Review in 4 weeks with CrCl

CrCl ≥ 45 ml/min
If BP still above target: confirm adherence and add AMLODIPINE 5 mg OD. Review in 4 weeks
If BP still above target: confirm adherence and increase AMLODIPINE to 10 mg OD. Review in 4 weeks
Refer

CrCl < 45 ml/min
Consider withholding HCT. Reduced efficacy of HCT
Start AMOLDIPINE 5 mg OD. Review in 4 weeks
If BP still above target: confirm adherence and increase AMLODIPINE to 10 mg OD. Review in 4 weeks
Refer

SECONDARY CARE LEVEL
If BP still above target: Consider adding enalapril, atenolol or spironolactone depending on CrCl and provider experience
If BP still above target, consider start of ATENOLOL
BP ≥ 160-179/100 -109 mmHg AND < 180/110
- Sample for creatinine clearance (CrCl)
- Start treatment
- Target: BP < 140/90 FOR ALL PATIENTS

START HCT 25 mg OD AND Amlodipine 5 mg OD
Review in 4 weeks with CrCl

CrCl ≥ 45 ml/min
- If BP still above target despite adherence: increase AMLODIPINE to 10 mg OD. Review in 4 weeks
- If BP still above target: confirm adherence and add ENALAPRIL 10 mg OD. Review in 4 weeks
- If BP still above target: confirm adherence and increase ENALAPRIL to 20 mg OD or 20 mg OD. Review in 4 weeks
- If BP still above target: confirm adherence and consider start of SPIRONOLACTONE or ATENOLOL

CrCl < 45 ml/min
- Refer to secondary level
- If BP still above target: Increase AMOLDIPINE to 10 mg OD, Review in 4 weeks
- If BP still above target: Consider adding enalapril, atenolol or spironolactone depending on CrCl and provider experience
STAGE 3 HTN TREATMENT CASCADE

HTN Stage 3
SBP ≥ 180 and/or
DBP ≥ 110

Target organ damage
Signs & symptoms?
New/progressive/
worsening?

NO

Hypertensive urgency:
Marked confirmed
elevated BP but no
damage to the body's
organs (stable patient)

Known hypertensive:
Reinstitute/
intensify oral
medication
and Refer

New hypertensive:
Start HCT 25 mg
and Amlodipine 5 mg
and Refer

YES

Hypertensive emergency:
Marked confirmed elevated BP
with symptoms and signs
indicative of impairment of one
or more organ systems (brain,
eyes, heart, aorta, or kidneys)

Start HCT 25 mg and
Amlodipine 5 mg
and refer
urgently to hospital

Signs & symptoms: pale & cool
skin, sweating, fatigue, very
fast or very slow pulse, SOB,
headache, confusion, acute
chest pain, seizure

Review patients after 3 days. If follow up BP < 180/110 titrate medication
upwards and encourage review with the doctor. If persistently high,
emphasize need for referral!
Appendix

I - IX
## Appendix I

T2DM: Follow up schedule for examinations and laboratory tests

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>3 monthly</th>
<th>6 monthly</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Symptom screen including TB</strong></td>
<td>X</td>
<td>Every clinical visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>HbA1c</strong></td>
<td>X</td>
<td>Until at goal</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>BP</strong></td>
<td>X</td>
<td>Every clinical visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Weight and BMI</strong></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Fasting blood glucose</strong></td>
<td>X</td>
<td>Where no A1c testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Foot exam</strong></td>
<td>X</td>
<td>Every clinical visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Creatinine Clearance</strong></td>
<td>X</td>
<td>If baseline CrCl &lt; 60 ml/min</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td><strong>Doctor consultation</strong></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
# Appendix II

**HTN: Follow up schedule for examinations and lab tests**

<table>
<thead>
<tr>
<th>Test/Screening</th>
<th>Baseline</th>
<th>3 monthly</th>
<th>6 monthly</th>
<th>Yearly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom screen including TB</td>
<td>X</td>
<td>Every clinical visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td>X</td>
<td>Every clinical visit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight and BMI</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Screening for DM with questionnaire</td>
<td>X</td>
<td>If positive symptom screen, do FBS</td>
<td>If positive symptom screen, do FBS</td>
<td>If positive symptom screen, do FBS</td>
</tr>
<tr>
<td>Fasting blood glucose</td>
<td>X</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Urinalysis</td>
<td>X</td>
<td>If baseline abnormal</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Creatinine Clearance</td>
<td>X</td>
<td>If baseline CrCl &lt; 60 ml/min</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Doctor’s consultation</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
# Appendix III: Staging of kidney function

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cr Cl</th>
<th>Description</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&gt;90</td>
<td>Normal function</td>
<td>Observation, control of BP</td>
</tr>
<tr>
<td>2</td>
<td>60–89</td>
<td>Mildly reduced</td>
<td>Observation, control of BP and risk factors</td>
</tr>
<tr>
<td>3</td>
<td>30–59</td>
<td>Moderately reduced</td>
<td>Observation, control of BP and risk factors</td>
</tr>
<tr>
<td>4</td>
<td>15–29</td>
<td>Severely reduced;</td>
<td>Planning for end-stage renal failure</td>
</tr>
<tr>
<td>5</td>
<td>&lt;15</td>
<td>End stage</td>
<td>Dialysis referral if resources available</td>
</tr>
</tbody>
</table>

**Chronic Kidney Disease (CKD)** = CrCl <60ml/min measured on at least two occasions ≥3months apart
### Appendix IV: Medication adjustment according to kidney function (Creatinine clearance in ml/min)

<table>
<thead>
<tr>
<th>Medication</th>
<th>CrCl ≥ 60</th>
<th>CrCl 60-30</th>
<th>CrCl &lt; 30</th>
<th>CrCl &lt; 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enalapril</td>
<td>10mg to 40mg</td>
<td>5mg to 40mg</td>
<td>2.5mg to 40mg</td>
<td>Avoid</td>
</tr>
<tr>
<td>Atenolol</td>
<td>25mg to 100mg OD</td>
<td>Reduce dose, max of 50mg/day</td>
<td>Reduce dose, max of 25mg/day</td>
<td></td>
</tr>
<tr>
<td>Furosemide</td>
<td>20mg to 80mg BD</td>
<td>No dose adaptation</td>
<td>No dose adaptation</td>
<td></td>
</tr>
<tr>
<td>Amlodipine</td>
<td>5mg to 10mg OD</td>
<td>No dose adaptation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCT</td>
<td>25mg OD</td>
<td>Reduced efficacy. Consider alternative</td>
<td>Avoid at CrCl &lt;10</td>
<td></td>
</tr>
<tr>
<td>Spironolactone</td>
<td>12.5mg to 50mg OD</td>
<td>Avoid</td>
<td>Avoid</td>
<td></td>
</tr>
<tr>
<td>Metformin</td>
<td>500mg to 1g BD</td>
<td>ClCr &lt;45, avoid initiation, if already on metformin, max dose should be ≤ 1g OD</td>
<td>Avoid</td>
<td></td>
</tr>
<tr>
<td>Glibenclamide</td>
<td>5mg to 10mg OD</td>
<td>Avoid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gliclazide</td>
<td>80mg OD to 320mg, split into BD if ≥ 160 mg</td>
<td></td>
<td>Avoid</td>
<td></td>
</tr>
<tr>
<td>Atorvastatin</td>
<td>10mg to 80mg</td>
<td>10mg to 80mg</td>
<td>Max dose with Protease Inhibitors = 20mg OD</td>
<td></td>
</tr>
</tbody>
</table>
Appendix V
Criteria for prescribing **Aspirin** for the prevention of CVD

Dose of aspirin: 75 to 150 mg (depending on availability)

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secondary prevention</strong> (Previous CVD event such as MI, heart failure, stroke, peripheral vascular disease, unexplained chest pain, atrial fibrillation)</td>
<td>Any patient with previous CVD event (independently of age)</td>
</tr>
</tbody>
</table>

**Note**: Aspirin should not be used in the routine primary prevention of atherosclerotic CVD due to lack of net benefit *(ref. AHA 2019)*

5/20/2020
Appendix VI
Criteria for prescribing Statins for the prevention of CVD

**Note:** Statins to be prescribed at district level, refills at primary health care level

<table>
<thead>
<tr>
<th>Risk category</th>
<th>Beneficiaries</th>
<th>Dose of Atorvastatin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary prevention</strong></td>
<td>High Risk patients only: DM &gt; 40 yrs old</td>
<td>40 mg daily</td>
</tr>
<tr>
<td><em>(To prevent the occurrence of a cardio-vascular event in people who have not yet had one)</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Secondary prevention</strong></td>
<td>Any patient with previous CVD event</td>
<td>40 to 80 mg daily</td>
</tr>
<tr>
<td><em>(Previous CVD event such as MI, heart failure, stroke, atrial fibrillation, peripheral vascular disease)</em></td>
<td></td>
<td>If on Protease Inhibitor, 10-20mg daily</td>
</tr>
</tbody>
</table>
Appendix VII
WHO cardiovascular disease risk laboratory based charts
Southern Sub-Saharan Africa: People without DM
Botswana, Lesotho, Namibia, Swaziland, South Africa, Zimbabwe.

[Image of chart showing cardiovascular risk levels based on age, gender, smoking status, total cholesterol, and SBP.]
Appendix VIII
WHO cardiovascular disease risk laboratory based charts
Southern Sub-Saharan Africa: People with DM
Botswana, Lesotho, Namibia, Swaziland, South Africa, Zimbabwe.
Appendix IX:
WHO cardiovascular disease risk non-laboratory based charts
Southern Sub-Saharan Africa
Botswana, Lesotho, Namibia, Swaziland, South Africa, Zimbabwe.
## Appendix X

### Body Mass Index (BMI) Chart for Adults

| HEIGHT in feet/_inches and centimeters | WEIGHT 4'8" | 4'9" | 4'10" | 4'11" | 5'0" | 5'1" | 5'2" | 5'3" | 5'4" | 5'5" | 5'6" | 5'7" | 5'8" | 5'9" | 5'10" | 5'11" | 6'0" | 6'1" | 6'2" | 6'3" | 6'4" | 6'5" |
|---------------------------------------|-------------|------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Underweight (<18.5) | 255 (115.7) | 240 (108.9) | 235 (106.6) | 230 (104.3) | 225 (102.1) | 220 (99.8) | 215 (97.5) | 210 (95.3) | 205 (93.0) | 200 (90.7) | 195 (88.5) | 190 (86.2) | 185 (83.9) | 180 (81.6) | 175 (79.4) | 170 (77.1) | 165 (74.8) | 160 (72.6) | 155 (70.3) | 150 (68.0) | 145 (65.8) | 140 (63.5) | 135 (61.2) | 130 (59.0) | 125 (56.7) | 120 (54.7) | 115 (52.2) | 110 (49.9) | 105 (47.6) | 100 (45.4) | 95 (43.1) | 90 (40.8) | 85 (38.6) | 80 (36.3) |
| Obese (>30) | 260 (117.9) | 255 (115.7) | 250 (113.4) | 245 (111.1) | 240 (108.9) | 235 (106.6) | 230 (104.3) | 225 (102.1) | 220 (99.8) | 215 (97.5) | 210 (95.3) | 205 (93.0) | 200 (90.7) | 195 (88.5) | 190 (86.2) | 185 (83.9) | 180 (81.6) | 175 (79.4) | 170 (77.1) | 165 (74.8) | 160 (72.6) | 155 (70.3) | 150 (68.0) | 145 (65.8) | 140 (63.5) | 135 (61.2) | 130 (59.0) | 125 (56.7) | 120 (54.7) | 115 (52.2) | 110 (49.9) | 105 (47.6) | 100 (45.4) | 95 (43.1) | 90 (40.8) | 85 (38.6) | 80 (36.3) |
| Overweight (25-30) | 48 47 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 |
| Normal (18.5-25) | 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 |
| Underweight (<18.5) | 49 48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 |

Note: BMI values rounded to the nearest whole number. BMI categories based on CDC (Centers for Disease Control and Prevention) criteria.

www.vertex42.com  BMI = Weight[kg] / (Height[m] x Height[m])  BMI = Weight[lb] / (Height[in] x Height[in])  © 2009 Vertex42 LLC
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