



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

## **Interventions package for**

*“Strengthening Primary Health Care (PHC) Service Delivery for the Management of Diabetes (DM) and Hypertension (HTN) in a selected number of PHC facilities in Seme, Kisumu County, Kenya.”*

**Date**

**Last updated on 20th October 2024**

**Drafted by  
Trainers**

**Japheth Ogol, Dr. Dickens Omondi and Prof. Josefien van Olmen**

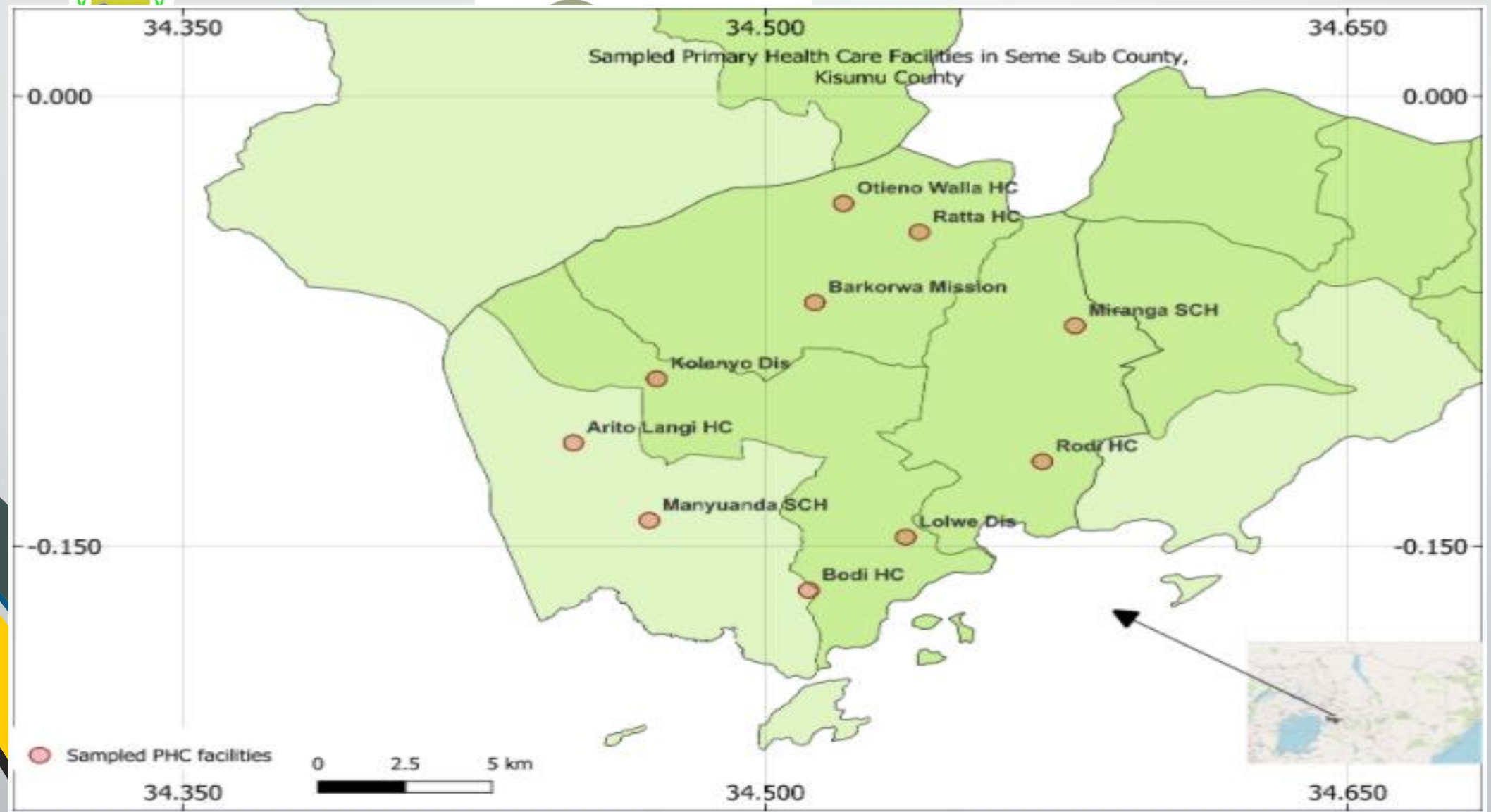
**Dr. Bernard Owino & Dr. Julius Gwadah**

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### **Partners**



# Study Areas:



**Target group:** These interventions are intended for *county and sub-county health service managers*, as well as *primary health care (PHC) workers* in primary health centers. This includes **Director Medical of health services, Director Public Health services, Health Education and Promotion Officers, NCD Screening coordinators, nurses, clinical officers, medical officers, and nutritionists**. Health workers need to be prepared to *assess, diagnose, manage and refer patients* appropriately *using standard protocols*.

**Note:** The presentation has been adapted from the 2024 Kenya DM and HTN guidelines as well as the WHO PEN protocols



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University of Science and Technology



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University of Science and Technology



**Belgium**  
partner in development

## **RECAP: Priority Interventions from the Co-Creation Workshop (May 16-18, 2024)**

- 1. Training PHC Workers on DM and HTN management;** Workshop Training; On-the-Job Training
- 2. Access to Treatment Guidelines and Protocols;** Distribute e-copies of DM, HTN, and WHO PEN protocols; Print and distribute standardized IEC materials
- 3. Continuous Mentorship and Supportive Supervision;** Ongoing mentorship at PHC facilities; Conduct Continuing Medical Education (CME) sessions

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### **Partners**





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## **Priority Interventions from the Co-Creation Workshop (May 16-18, 2024) (*Continue*)**

**4. Strengthen Documentation and Reporting;** Distribute Ministry of Health (MoH) registers; Ensure proper filling of MoH registers; Monthly reporting via KHIS; Quarterly data review meetings

**5. Community Outreach and Advocacy;** Organize community outreach and health advocacy campaigns; Educate on risk factors, signs, symptoms, and early detection

**6. Resource Availability;** Ensure availability of basic screening equipment like bp devices, glucometers, weighing scales and medications

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### **Partners**





# Outline

## I. Organization Details

## II. Intervention Package Program

- ☐ Session 1: Introduction to NCD focusing on DM & HTN
- ☐ Session 2: Orientation to NCD guidelines and protocols (Kenya HTN, DM and WHO-PEN)
- ☐ Session 3: Organising NCD Services in a PHC setting
- ☐ Session 4: Develop Service Delivery Model (SDM) - Group Work
- ☐ Session 5: Patient Counselling and Care
- ☐ Session 6: Monitoring and Evaluation systems
- ☐ Session 7: Mentoring, Support Supervision and Team based care
- ☐ Session 8: Closing
- ☐ Session 9: Intervention Assessment

## III. Resources



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# Agenda

Session	Day 1	Day 2	Day 3
Morning Pre-Break	Introduction to NCD focussing on DM and HTN	Kenya DM Guideline	-Patient Counselling, Care and Palliative -M&E systems  - Mentoring, Support Supervision and Team-based care
<b>Mobility Break</b>			
Morning Post-Break	Orientation to NCD guidelines and protocols- Kenya HTN Guideline	Kenya DM Guideline	Theory of Change Review and SDM finalization
<b>Lunch</b>			
Afternoon Pre-Break	Kenya HTN Guideline	-WHO PEN Guideline -Organising NCD Services in a PHC	Group Presentations
<b>Mobility Break</b>			
Afternoon Post-Break	Kenya HTN Guideline	Develop SDM - Group Work	Group Presentations and Next steps



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University of Science and Technology



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# Organizational Details

## Duration

- Training workshop- three days- 21st-23rd October 2024 (**8:00 a.m-5:00 p.m**)
- Other interventions- 1 year (October 2024- October 2025)

## Facilitators

- Facilitators who are oriented to NCD management in primary health care services with a good understanding of WHO-PEN, Kenya DM and HTN guidelines.
- Other resource persons on NCD management may also be considered for specific topics.

## Resources

- All participants will have **a copy of WHO PEN, Kenya DM, HTN and KEML guidelines.**
- **Facility readiness assessment results** for the selected PHC centres in Seme.



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# Organizational Details (*Continue*)

## Methods of delivery

- The interventions will be delivered as per the structure provided.
- For every intervention, there will be *standard slide set*, *group work questions and learning objectives* and *learning outcomes*.
- Training interventions will also generate the *model for improving DM & HTN services in PHC*.

## Materials

- Computer, projector and screen, 5-6 flip charts and marker pens, post-its, a *soft copy of the protocols for each participant*.

## Venue

- Venue of the training will be away from the hospital environment where participants are not distracted during the training.
- There will be a lecture hall where participants can sit as groups of 8 and each session can have a maximum of 40 participants.
- There will also be space for group work.



# Tips for Facilitators

## Facilitators to:

- Keep the sessions **interactive and interesting**
- Using the slides provided and adapting them with **local examples**, make an **interactive presentation** allowing for questions and answers
- Provide healthier dietary options, avoid sugary drinks and incorporate **physical activity in between sessions**.
- Start the morning session with **a recap of salient points of the previous day's discussions**.

## Important note

- This is an area where no one has all answers.
- The implementation of protocols will depend substantially on the context, resources and service delivery options available in the PHC centre.
- Adaptation is critical as one size will not fit all.
- For service delivery model for DM and HTN management, all the **experts to work together and arrive at a model which are feasible in PHC setting**.



# Tips for Participants

- Interact and discuss with each other and keep the sessions alive
- During group work, please focus on practical issues that you face in your day-to-day practice
- Share your “best practices”. Others may learn from your experiences



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University of Science and Technology



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partner in development

# DAY 1



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# **SESSION 1:**

## **Introduction to NCD focussing on DM and HTN**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Session 1: Objectives

1. **To provide an overview of diabetes and hypertension** to ensure participants have a solid foundation of knowledge about these conditions: **prevalence, risk factors, and complications** associated with these non-communicable diseases (NCDs).
2. **To identify and discuss gaps in facility readiness for managing diabetes and hypertension:** This involves presenting the results of facility readiness assessments, highlighting areas needing improvement, and discussing strategies to address these gaps.





# Introduction

- Noncommunicable diseases (NCDs), also known as chronic diseases, tend to be of **long duration** and are as the result of **a combination of genetic, physiological, environmental and behaviours factors**.
- There are various types of NCDs (***gauge participants if they know any***) but for the purpose of this training, we will focus on 2; ***Diabetes Mellitus*** (DM) and ***Hypertension*** (HPN).
- Noncommunicable diseases (NCDs) **kill 40 million people each year**, equivalent to **70% of all deaths globally**.
- Approximately **20% of the world's adults** are estimated to **have hypertension**.
- Diabetes disease alone account for **1.6 million deaths** while Hypertension accounts for **10.8 million deaths annually**.
- Each year, the people who die from a NCD fall between the ages of 30 and 69 years; **over 80% of these "premature" deaths** occur in **low- and middle-income countries**.



## Introduction (*continue*)

### Premature deaths from NCDs between the ages of **30 and 69** (2015)

WHO Region	Men	Women	Total	Percent
AFR	0.7 million	0.6 million	1.3 million	9%
AMR	1.1 million	0.8 million	1.9 million	13%
EMR	0.6 million	0.5 million	1.0 million	7%
EUR	1.5 million	0.8 million	2.4 million	15%
SEA	2.6 million	1.8 million	4.4 million	29%
WP	2.4 million	1.6 million	4.0 million	27%
Total	8.9 million	6.2 million	15.0 million	100%



# Introduction (*continue*)

- Prevalence of hypertension in Kenya is 24% (STEPS 2015)
  - Only 8% of these were currently on medication
  - 6.6% of those not on medication recorded severe hypertension
- These 2 groups of diseases (DM & HTN) are common 2 types of NCDs and account for over 31% of all premature NCD deaths globally.
- 1) Tobacco use, 2) physical inactivity, 3) harmful use of alcohol and 4) unhealthy diets are shared modifiable risk factors that increase the risk of dying for both DM and HTN. Effective preventive interventions address these
- Detection, screening and treatment of NCDs are key components of the response to NCDs.
- Several NCD management and prevention guidelines have been developed towards strengthening PHC service delivery (*gauge participants if they have access to and currently use any, for those who use, how?*)



# Introduction (*continue*)

- In 2008/9, a WHO Package of Essential Non-communicable (PEN) Disease Interventions for Primary Health Care in Low-Resource Settings in Kenya.
- Similarly, in 2024, Kenya developed and circulated a national clinical guideline for both diabetes (DM) and HTN guidelines to strengthen primary health care (PHC) for DM and hypertension (HTN) management.
- Both the WHO PEN and Kenya's DM and HTN management guidelines emphasize a chronic care approach due to its significant public health impact.



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University of Science and Technology



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partner in development

# Challenges of Providing NCD Services - Patient's Side

- *Gauge participants to mention practical challenges they normally experience:*
- No acute symptoms
- Going to clinic in the evening after work
- Clinic visits not useful because doctors refer patients to private hospital
- Prescription of expensive drugs
- Insurance do not cover regular medication
- Trying some other remedies



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# Challenges of providing NCD services

## - Health system side





# Facility Readiness Assessment Results (2024)

- **Knowledge Gap:** Only 50% of PHC workers have adequate knowledge of NCD management (Score: 2.2/4).
- **Training Deficiency:** 80% of PHC workers lack training in NCD management; only 21% trained in DM/HTN in the past 2 years.
- **Protocol Access:** Only 20% of facilities have visible provider guides/charts for DM/HTN.
- **Support Visits:** Only one-third of PHC workers receive monthly support visits; despite 75% of the PHC facilities receive technical support.
- **Referrals:** PHC facilities were unable to manage HTN and/or DM, as they referred nearly 80% of patients for further care. FGDs revealed a lack of standardized care packages, with participants highlighting the need for practical dietary and exercise guidance, better nutritional support, and access to essential drugs.



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# Facility Readiness Assessment (*Continue*)

- **Documentation:** Health Information System adaptability score is 3.0/5, indicating poor documentation practices.
- **Reporting:** 70% of facilities hold Quarterly Data Review Meetings, but only 43% discuss DM/HTN indicators.
- **Community Engagement:** Only 50% of facilities organized community outreach events in the last 6 months.
- **Equipment Shortage:** Only 20% of facilities have necessary supplies and equipment for DM/HTN management.



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Learning Outcome Session 1

- By the end of the session, the participants will be able to **understand** the definition and significance of Non-Communicable Diseases (NCDs), with regards to Diabetes Mellitus (DM) and Hypertension (HTN).
- **Identifying** the types, causes, signs and symptoms, prevalence, diagnosis, treatment, risk factors, as well as complications associated with DM and HTN.
- Identify **gaps** in the management of DM and HTN in their own facilities from facility assessment results and recognize the importance of early detection & management of DM and HTN in a primary health care (PHC) setting.



# Group Work (Quiz 1 and 2)

1. Considering that **only 20% of facilities have guidelines** including visible provider guides/charts for diabetes and hypertension management, **how can we improve access to these essential resources?**
2. With only **50% of facilities organizing community outreach events** in the last six months, **what strategies** can we implement to increase community engagement and raise awareness about diabetes and hypertension?
3. Given that **only 50% of primary healthcare workers** have adequate knowledge of NCD management, **what targeted training initiatives** can we implement to enhance their understanding and skills in managing diabetes and hypertension?
4. With 80% of patients being referred for further care due to inadequate management capabilities at our facilities, **what steps can we take to develop standardized care packages** that include practical dietary and exercise guidance for diabetes and hypertension patients?



## **SESSION 2:**

# **Orientation to NCD guidelines and protocols (Kenya HTN Guideline, Kenya DM Guideline and WHO PEN)**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Why do we need evidence based protocols?

*Gauge participants to mention reasons they are aware of:*

- Improving the **uniformity of practice**
- Improving the **efficiency of service delivery**
- Reducing the **probability of errors and increasing patient safety**
- **Delivering greater value** (improving patient outcomes and reducing costs)
- Providing a means to **compare outcomes and efficiency** of healthcare services over time and across healthcare organizations
- Providing greater opportunities for healthcare professionals within and between organizations **to learn from each other and**
- **Driving changes in clinical practice** within healthcare organizations.



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University of Science and Technology



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# Use of a standardized algorithms

Helps to;

- Improve treatment outcomes
- Increases ease of logistics in terms of drug inventory, drug forecasting, and quality monitoring
- Enables large reductions in cost of medication as it helps to forecast requirements
- Use of good quality generic medicines can be used as part of protocol
- Enables evaluation of impact
- Enables task-sharing, with the entire health care team able to support patients



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# **KENYA HYPERTENSION (HTN) GUIDELINE (2024)**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Objectives

**At the end of the training, the participants should be able to:**

- Understand hypertension
- Classify and describe types of hypertension
- Describe Causes of hypertension
- Measure and diagnose hypertension
- Describe Complications of hypertension
- Manage and treat hypertension
- Understand Hypertension in special groups



# What is Kenya HTN Guideline?

- The Kenya Hypertension Management Guidelines provide a framework for diagnosing and managing hypertension in adults.
- **Key components:**
  - Blood pressure measurement using proper techniques, with a diagnosis of hypertension made based on repeated readings.
  - Hypertension is usually classified into stages (e.g., Stage 1, Stage 2) based on blood pressure levels.
  - Recommendations often include dietary changes (like the Dietary Approaches to Stop Hypertension- **DASH diet**), regular physical activity, weight management, and reducing alcohol intake.
  - First-line medications may include thiazide diuretics, ACE inhibitors, calcium channel blockers, and ARBs, depending on patient characteristics and comorbidities.
  - Regular follow-up appointments to monitor blood pressure and adjust treatment as necessary.

# Hypertension

## Hypertension

- **Definition:**

- Persistently elevated **systolic blood pressure of  $\geq 140$**  and/or **diastolic of  $\geq 90$  mmHg** in **subjects aged 18 years and above**
- **Systolic blood pressure** is the pressure exerted when the heart contracts
- **Diastolic blood pressure** is the pressure exerted when the heart muscle relaxes



# PATHOPHYSIOLOGY



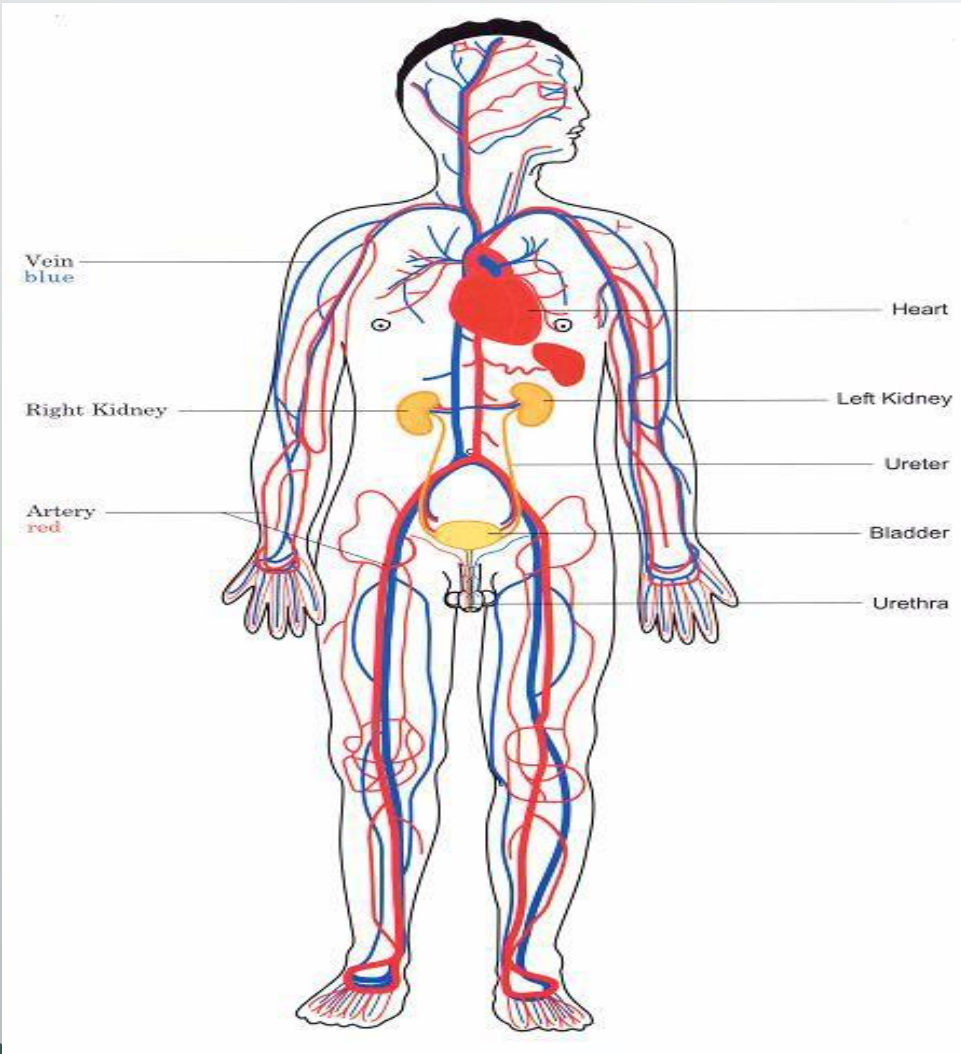
**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development



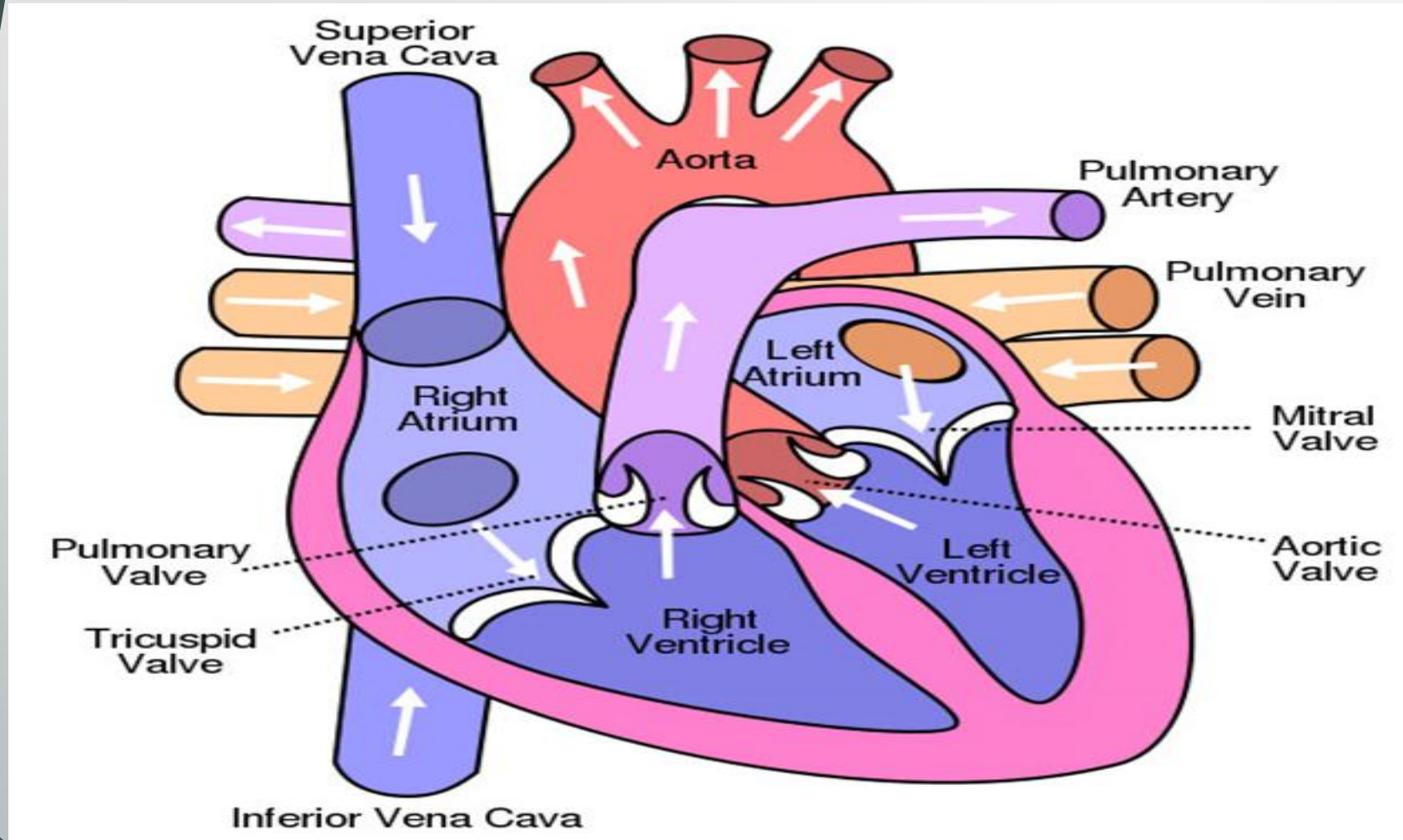
# Circulatory system



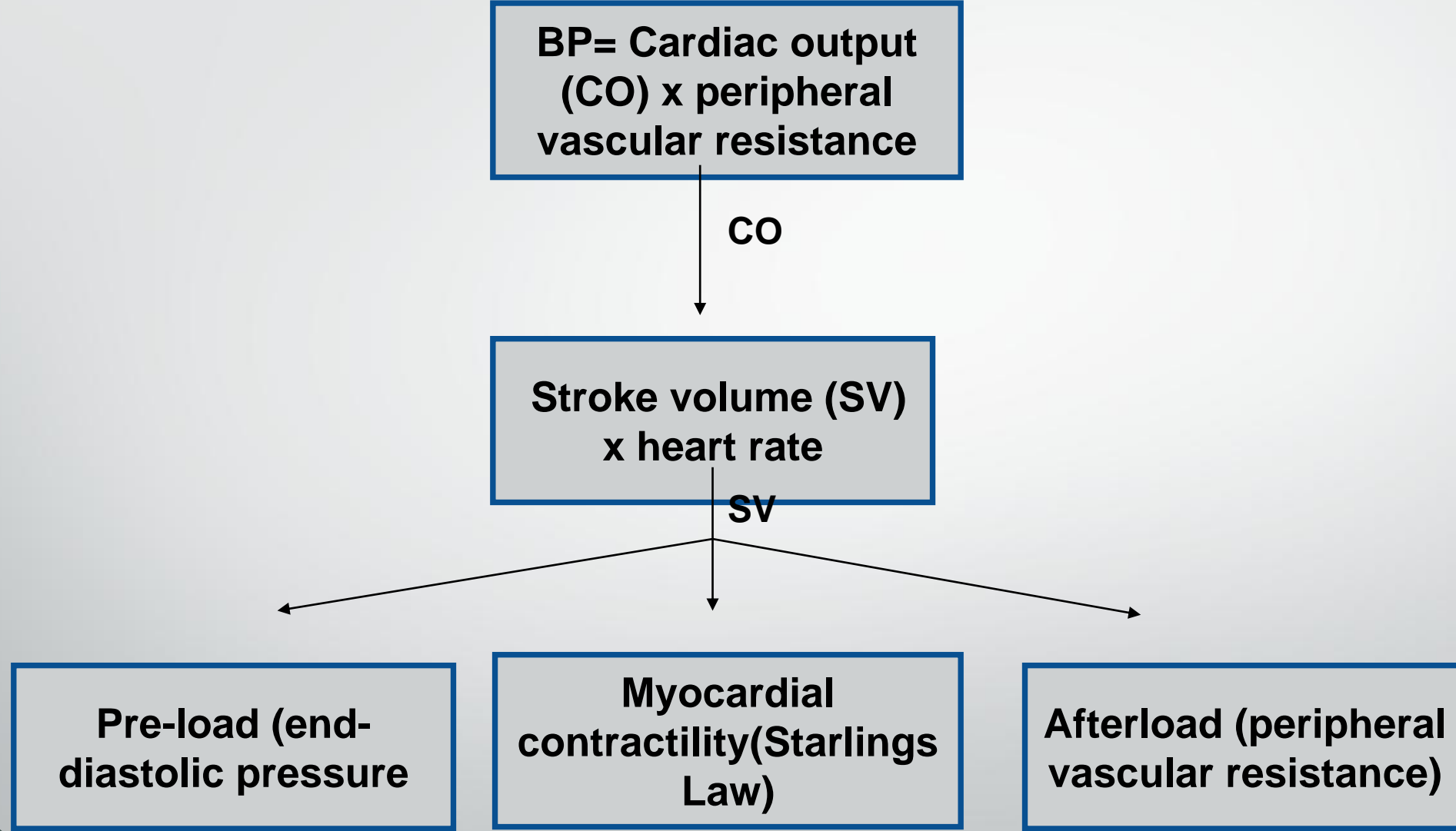
- Heart
- Arteries
- Veins



# The structure of the heart



# Physiology of blood pressure



# Physiology of blood pressure

- Cardiac output(CO) = amount of blood the heart pumps through the circulatory system in one minute
- Peripheral vascular resistance(PVR)= amount of resistance to blood flow in the arteries
  - Is determined by the diameter and stiffness of the arteries
- Blood pressure(BP) is determined by CO and the PVR
- The more blood the heart pumps and the narrower the arteries, the higher the BP
- High BP requires the heart to work harder to circulate blood through blood vessels



# Factors affecting blood pressure: **PVR**

- Vascular resistance is mainly determined by the structure (anatomic) and functional changes in small arteries and arterioles
- There are factors that reduce vascular diameter (constrictors) and those that enlarge it (dilators)
- Examples of vascular constrictors
  - *Angiotensin II, catecholamines, and alpha-adrenergic receptors*
- Examples of vascular Dilators:
  - *Prostaglandins, and Beta-adrenergic receptor activators*





# Factors affecting blood pressure:

## *Cardiac output*

- Cardiac output is affected by the following factors:-
  - *Heart rate*
  - *Stroke volume( amount of blood pumped out in one heart beat) – which depends on the following:-*
    - Myocardial contraction – the ability of heart muscle to contract and relax
    - Preload (the amount of blood returning to the heart)
    - Force of contraction which is increased by the sympathetic nervous system





# Classification of Hypertension

<b>Primary</b>	<b>Secondary</b>
Over 90% of cases	Less than 10%
No known causes	Hypertension with a specific cause
Develops gradually over time	Sudden onset; often severe and refractory
Multiple associated risk factors	May occur in younger persons



# Staging of Hypertension

BP (mmHg)					
Normal	High Normal(pre-HTN)	Stage 1: Mild HTN	Stage 2: Moderate HTN	Stage 3: Severe HTN	
<b>SBP 120 – 129</b> <b>or</b> <b>DBP 80 – 84</b>	SBP 130 – 139 or DBP 85 – 89	SBP 140 – 159 or DBP 90 – 99	SBP 160 – 179 or DBP 100 – 109	<b>SBP &gt; 180</b> <b>or</b> <b>DBP &gt; 110</b>	



# Other types of Hypertension

- **Isolated systolic hypertension:** elevated systolic BP with normal diastolic BP, **mostly seen in elderly patients**
- **White coat hypertension:** Consistently elevated BP in the clinic setting, but reverts to normal BP out of the clinic
- **Resistant hypertension:** defined as BP  $\geq 140/90$  mmHg despite treatment with at least 3 drugs (including a diuretic) in adequate doses and after exclusion of false hypertension



# Risk factors for Hypertension

## 1. Age

- The risk of hypertension increases with age

## 2. Race

- Hypertension is particularly common among blacks, often developing at an earlier age than it does in caucasians

## 3. Family history

- Hypertension tends to run in families

## 4. Overweight or obesity

- The more a person weighs the more blood is required to supply oxygen and nutrients to the tissues

## 5. Physical inactivity

- People who are inactive tend to have higher resting heart rates



# Risk factors for Hypertension (*Continue*)

## 6. Tobacco use

- cause arteries to narrow, increasing blood pressure. Secondhand smoke also can increase blood pressure

## 7. High dietary salt (sodium)

- Too much sodium in the diet can cause the body to retain fluid, which increases blood pressure

## 8. Low dietary potassium

- Potassium helps balance the amount of sodium in the cells

## 9. Low dietary vitamin D

## 10. High/chronic alcohol consumption

- Over time, heavy drinking can damage the heart

## 11. Stress

- High levels of stress can lead to a temporary increase in BP



# Causes of Hypertension

- In more than 90% of cases, the cause of **hypertension** is **unknown: primary or essential hypertension**.
- This type of high blood pressure tends to develop gradually over many years
- In about 5% of cases, a specific cause can be found: referred to as **secondary hypertension**
- Appears suddenly and causes higher blood pressure than does primary hypertension





# Causes of Secondary hypertension

- Excessive alcohol use
- Renal disease (renal vascular; renal parenchymal; polycystic kidneys)
- Adrenal disease (pheochromocytoma, Cushing's and Conn's syndromes, 11-alpha-hydroxylase, 17 hydroxylase deficiency)
- Thyroid (Hyper-and hypothyroidism)
- Coarctation of the aorta
- Obstructive sleep apnoea
- Drugs (anabolic steroids; estrogen; NSAIDs; sympathomimetics)
- Herbal remedies, such as herbal supplements
- Metabolic syndrome



# Symptoms of Hypertension

- Nearly **one-third of people with high blood pressure are unaware**
- The only way to know if the BP is high is through **regular checkups**
- If the blood pressure is extremely high, there may be certain symptoms to look out for, including:
  - *Severe headache*
  - *Fatigue or confusion*
  - *Vision problems*
  - *Chest pain*
  - *Difficulty breathing*
  - *Irregular heartbeat*
  - *Blood in the urine*
  - *Palpitations (pounding in the chest, neck, or ears)*



# History relevant to hypertension

- Aim of history and physical examination is to look for possible causes, complications and associated risk factors
- Note any presenting complaint
- In the History of Presenting Illness explore for the following:
  - *Headache/ confusion*
  - *Blurred vision*
  - *Epistaxis*
  - *Focal weakness*
  - *Oedema*
  - *Weight gain*
  - *Chest pain/ cough/ palpitation/ dyspnoea/ orthopnoea/ PND*
- Social history of cigarette smoking and alcohol use
- Family history of cardiovascular disease
- Past medical history (elevated cholesterol, diabetes and current medication)



# Physical examination relevant to hypertension

## Measurement

- Body weights (kg)
- Height (m)
- Body mass index (BMI) in kg/m<sup>2</sup>
- Waist circumference (cm)
- Abdominopelvic
- Musculoskeletal
- Thyroid



# Physical examination relevant to hypertension

Measurements	When to measure	Interpretation
Blood pressure	Every visit	
Body weight Height <i>Body mass index (BMI)</i> = <i>Body weight (kg /ht (m<sup>2</sup>)</i>	Every visit	BMI >18.5-25 kg/m <sup>2</sup> =optimal BMI >25 kg/m <sup>2</sup> =overweight BMI >30 kg/m <sup>2</sup> =obese Overweight and obesity are associated with increased cardiovascular risk. Patients should receive lifestyle advice about maintenance of a healthy body weight.
Waist circumference	Every visit	Cut-off values for normal: Men <94cm: Women:<80 cm Increased waist circumference is associated with increased cardiovascular risk. Patients should receive lifestyle advice on maintenance of a healthy body weight.

# Baseline Investigations

- Urine dipstick (look for presence of glucose, protein and blood)
- Urea/ electrolytes/ creatinine
- Fasting blood glucose
- Random total cholesterol
- Electrocardiogram (ECG)
- Other investigations as guided by history and physical examination



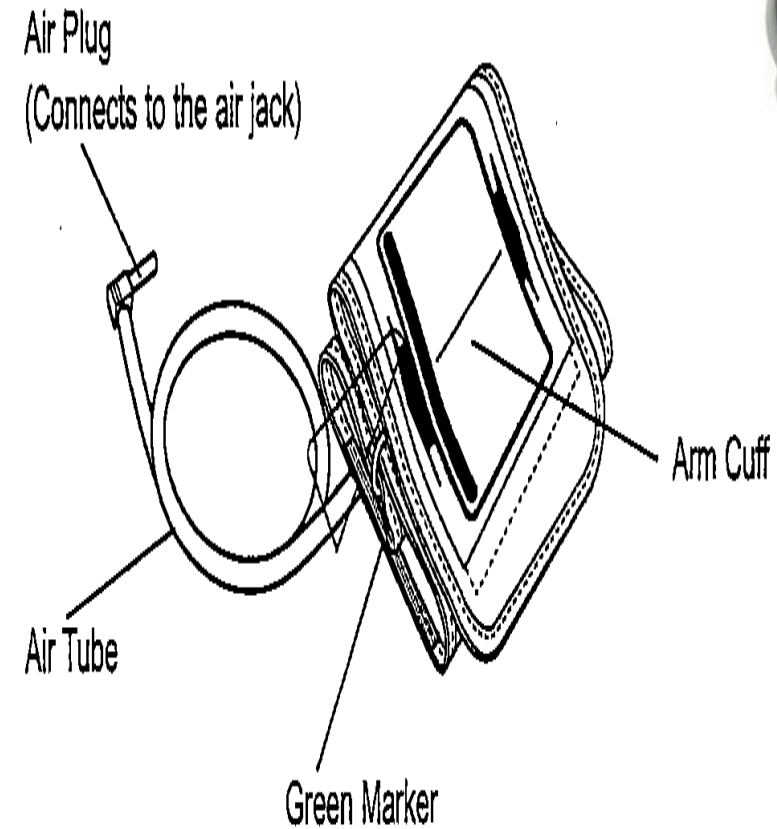
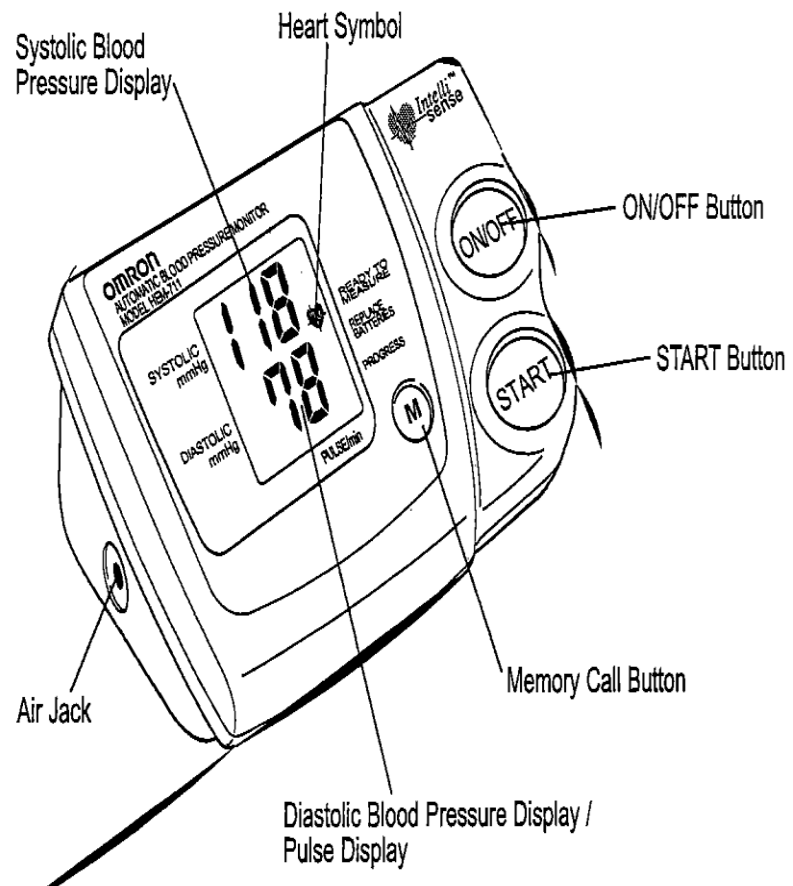


# **Management of Hypertension**

## **Measurement of BP and Diagnosis of Hypertension**



# KNOW YOUR UNIT



# Mercury sphygmomanometer



**Manual blood  
pressure machine**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# BP cuff sizes

- The bladder inside the sphygmomanometer cuff should be the correct size for the patient.
- The bladder width should be approximately 40% of the circumference of the arm (12cm for a normal arm, or 15cm for an arm with mid upper circumference >33cm)
- **The bladder length should be long enough to wrap 80% to 100% around the arm**



# Quality control in BP Measurement

- The BP measuring device must be known to be accurate. A manual device (sphygmomanometer) requires regular maintenance and calibration at least once a year. Digital machines must be validated
- The patient should not smoke or consume any caffeine-containing beverage (e.g., coffee, tea) in the 30 minutes before BP measurement
- Very high and very low BP readings taken from a digital machine should be confirmed using a manual machine



# Blood pressure measurement (Digital)


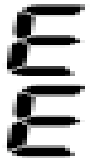


**Table 1: Measurement of Blood Pressure**

- Patient should **sit quietly for 5 minutes** before measurement
- Use correct size cuff and bladder
- Measure BP while patient is sitting on a chair with back support and with the arm supported at the level of the heart. The patient's arm must be relaxed
- Take 2 measurements at least 2-3 minutes apart
- BP in both arms should be measured at the first visit and the arm with the highest BP should be used for future measurements
- Elderly patients, diabetics and other patients complaining of symptoms suggestive of postural hypotension (e.g. dizziness, unsteadiness or fainting when changing posture) should also have their BP measured while standing, so that BP can be compared to sitting BP





# Possible Errors (digital machine)

SYMBOL	CAUSE	CORRECTION
	Cuff under-inflated.	Remove the arm cuff. Read, "Taking a Measurement". Wait 2-3 minutes. Take another measurement.
	Cuff over-inflated.	
	Movement during measurement.	Remove the arm cuff. Wait 2-3 minutes. Take another measurement and remain still until the measurement is complete.
 Blinking or Steady	Batteries are worn.	Replace the four batteries. Refer to "Battery Installation".



# Blood pressure measurement

Action
Introduction
Consent and Explanation
Wash hands
Allow patient to rest for 3 minutes if seated, 1 minute if standing
Ensure upper arm is supported at heart level with palm facing upward
Ensure that tight or restrictive clothing is removed from the arm.
Check that the cuff is the correct size
Wrap cuff snugly around the arm with the centre of the bladder covering the brachial artery.
Inflate cuff until radial pulse can no longer be felt to provide estimation of systolic pressure.
Deflate cuff completely and wait 15-30 seconds before continuing.
Inflate cuff to a pressure 30mmHg higher than the estimated systolic pressure
Place diaphragm of stethoscope over brachial artery (Do not tuck stethoscope under cuff)
Deflate cuff at 2-3mmHg per second or per heartbeat
Note when the first Koroktof sound is heard. This is the systolic pressure.
Continue to deflate the cuff slowly until the sounds disappear. This is diastolic pressure.
Fully deflate cuff, remove and clean after use



# Complications of Hypertension



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Objectives

**By the end of this module the participants should be able to:**

1. Describe the mechanisms of complications (Atherosclerosis/LVH)
2. To identify acute and chronic complications of hypertension
3. Institute measures to prevent complications and their progression
4. Appropriately manage and refer patients with complications in a timely manner



# Complications of hypertension: Mechanisms

- Hypertension affects **the heart and the blood vessels**
- Effects on the arteries are due to atherosclerosis, while effects in the heart are due to ventricular hypertrophy
- High blood pressure requires the heart to work harder than normal to circulate blood through the blood vessels which leads to **left ventricular hypertrophy (LVH)**
- LVH a characteristic of hypertensive heart disease, is an important cause of heart failure in our environment
- Hypertension contributes to **15-25% of heart failure**, a condition associated with repeated hospitalizations and high in-hospital mortality



# Common Complications

- Ischaemic Heart Disease
- Heart Failure
- Stroke and TIA
- Peripheral Vascular Disease
- Kidney Failure





# Atherosclerosis and hypertension

- **Definition:** Atherosclerosis is the **progressive hardening and narrowing of the arteries**
- Occurs when fat, cholesterol, and other substances build up in the walls of arteries to form hard structures called **plaques**
- Ruptured or eroded plaques lead to clot formation in arteries resulting in blockage
- Atherosclerosis is the most frequent underlying cause of Ischaemic heart disease, stroke and peripheral arterial disease



# Risk Factors , Atherosclerotic Disease, Acute coronary syndrome



Adapted from Pepine CJ. *Am J Cardiol.* 1998;82(suppl 10A):23S-27S. Schiffrin EL et al. *Am J Hypertens.* 2002;15:115s-122s.



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Ischaemic heart disease

## Typical Chest Pain

### Angina

- Retrosternal
- Exertional
- Relieved by Rest

### Myocardial Infarction (Heart attack)

- Chest pain Prolonged
- Severe
- Unrelieved by Rest

**Action: give 300mg of aspirin to chew and refer for ECG and further management**





# Heart Failure

## Cardiac symptoms

- Chest discomfort
- Easy fatigability
- Weakness  
appetite
- Palpitations

## Respiratory symptoms

- Shortness of breath on exertion
- Inability to lie flat in bed
- Sudden shortness of breath at night
- Cough or Wheezing

## Systemic Symptoms

- Leg or Ankle swelling
- Abdominal swelling or bloating
- Weight gain despite poor

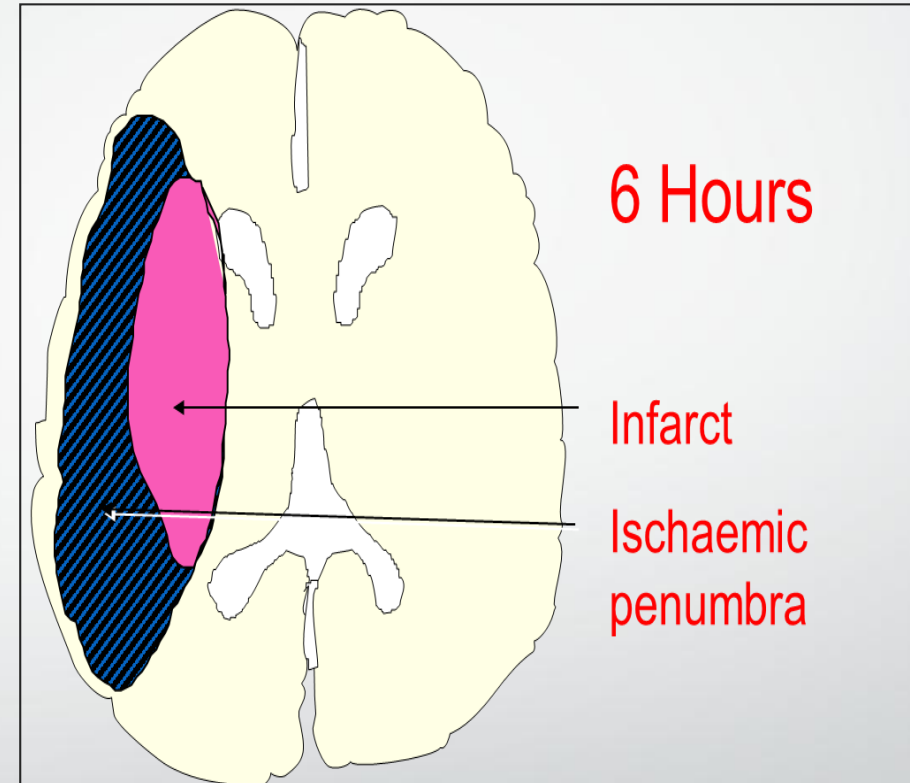
**Action: Stabilize and consult/refer to a physician for further management**





# Stroke and TIA

- TIA is a 'stroke' that resolves within 24hrs.
- Stroke is loss of neurological function in part of the body.
- The blood supply to parts of the brain is cut off which stops oxygen and nutrients reaching there.
- Results in damage or kills brain cells and stops parts of the brain working properly.



**Action: Stabilize and consult/refer to a physician for further management**





# Signs and symptoms of a stroke

- Dropping eyes, mouth, arms, legs
- Blurred vision
- Slurred speech
- Confusion
- Weakness, numbness or paralysis
- Loss of consciousness
- Dizziness
- Sudden severe headache





# Act **FAST** incase of a stroke

**Stroke –**  
there's treatment if you act **FAST**.



**F**ace  
Face look uneven?



**A**rm  
One arm hanging down?



**S**peech  
Slurred speech?



**T**ime



Transfer to county  
referral hospital



Jaramogi Oginga Odinga  
University of Science and Technology



Belgium  
partner in development



# Kidney failure

## ■ Manifest as

- Worsening kidney function: reduced urine output, or abnormal creatinine/urea and electrolytes
- Edema
- Hematuria
- Red blood cell (RBC) cast formation on urine microscopy.
- Proteinuria on urinalysis

### **Action:**

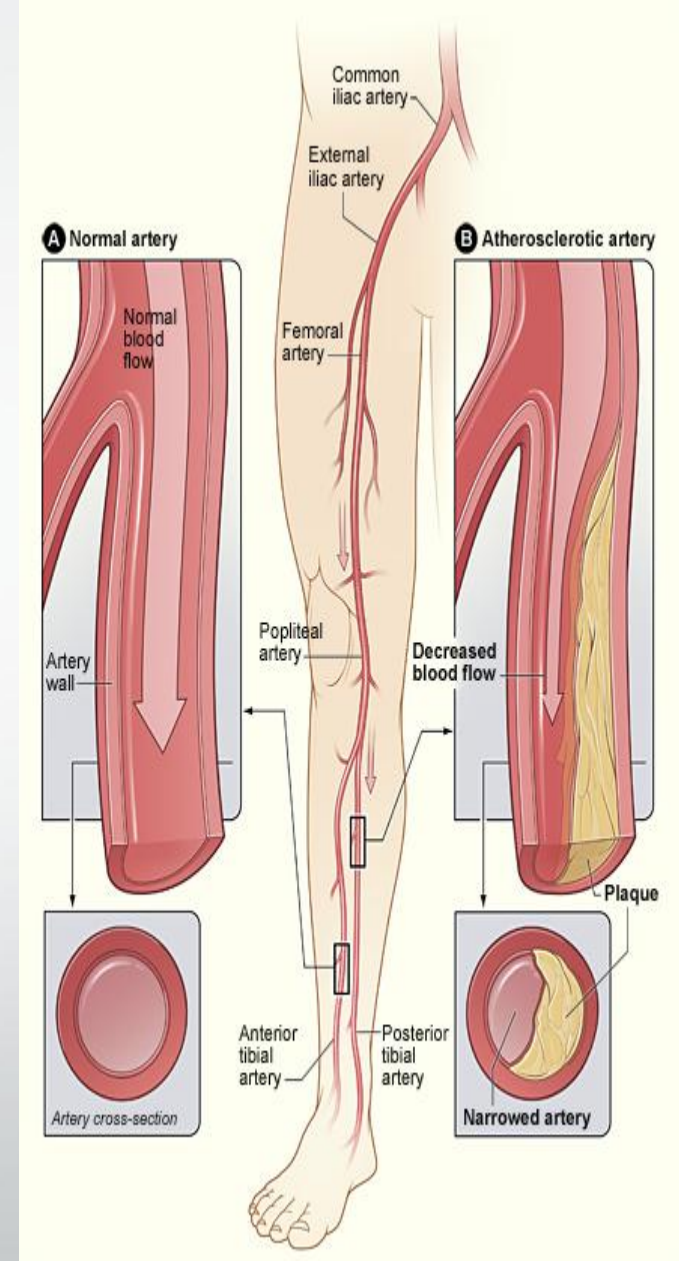
**Stabilize and consult/refer to a physician for further management**



# Peripheral Vascular Disease

## Definition:

- Also known as PAD.
- Occlusive disease of the arteries of the lower extremity.
- Most common cause:
  - Atherosclerosis
  - Others: arteritis, aneurysm + embolism
- Has both ACUTE and CHRONIC presentation





# Pathophysiology of PVD/PAD:

- Arterial narrowing  $\rightarrow$  Decreased blood flow = Pain
- Pain results from an imbalance between supply and demand of blood flow that fails to satisfy ongoing metabolic requirements





# Chronic PAD History:

## 1. Intermittent claudication

- “Reproducible pain on exercise which is relieved by rest”
- Pain can also be reproduced by elevating the leg
- “my legs get sore at night and feel better when I hang them over the edge of the bed”

## 2. Other Symptom/Signs:

- A burning or aching pain in the feet (especially at night)
- Cold skin/feet
- Increased occurrence of infection
- Non-healing Ulcers
- Asymptomatic

## 3. Critical Stenosis = >60%, impending acute ischemic limb:

- rest pain
- ischemic ulceration
- gangrene



# Treatment of PAD:



## 1. RISK FACTOR MODIFICATION:

- a) Smoking Cessation
- b) Rigorous glycemic control
- c) BP reduction
- d) Lipid Lowering Therapy



## 2. EXERCISE:

- a) Claudication exercise rehabilitation program
- b) 45-60mins 3x weekly for 12 weeks
- c) 6 months later +6.5mins walking time (before pain)



## 3. MEDICAL MANAGEMENT:

- a) Antiplatelet therapy e.g. Aspirin/Clopidogrel
- b) Phosphodiesterase Inhibitor e.g. Cilostazol
- c) Foot Care





# Preventing complications

- Appropriate treatment of hypertension
- Early identification and treatment of other risk factors;
  - Manage abnormal cholesterol with lifestyle and drugs where appropriate.
  - Manage diabetes to target HbA1c
  - Appropriate use of Aspirin where indicated
  - Look for target organ dysfunction as per protocol
  - Lifestyle management as per the protocol
- Timely referrals

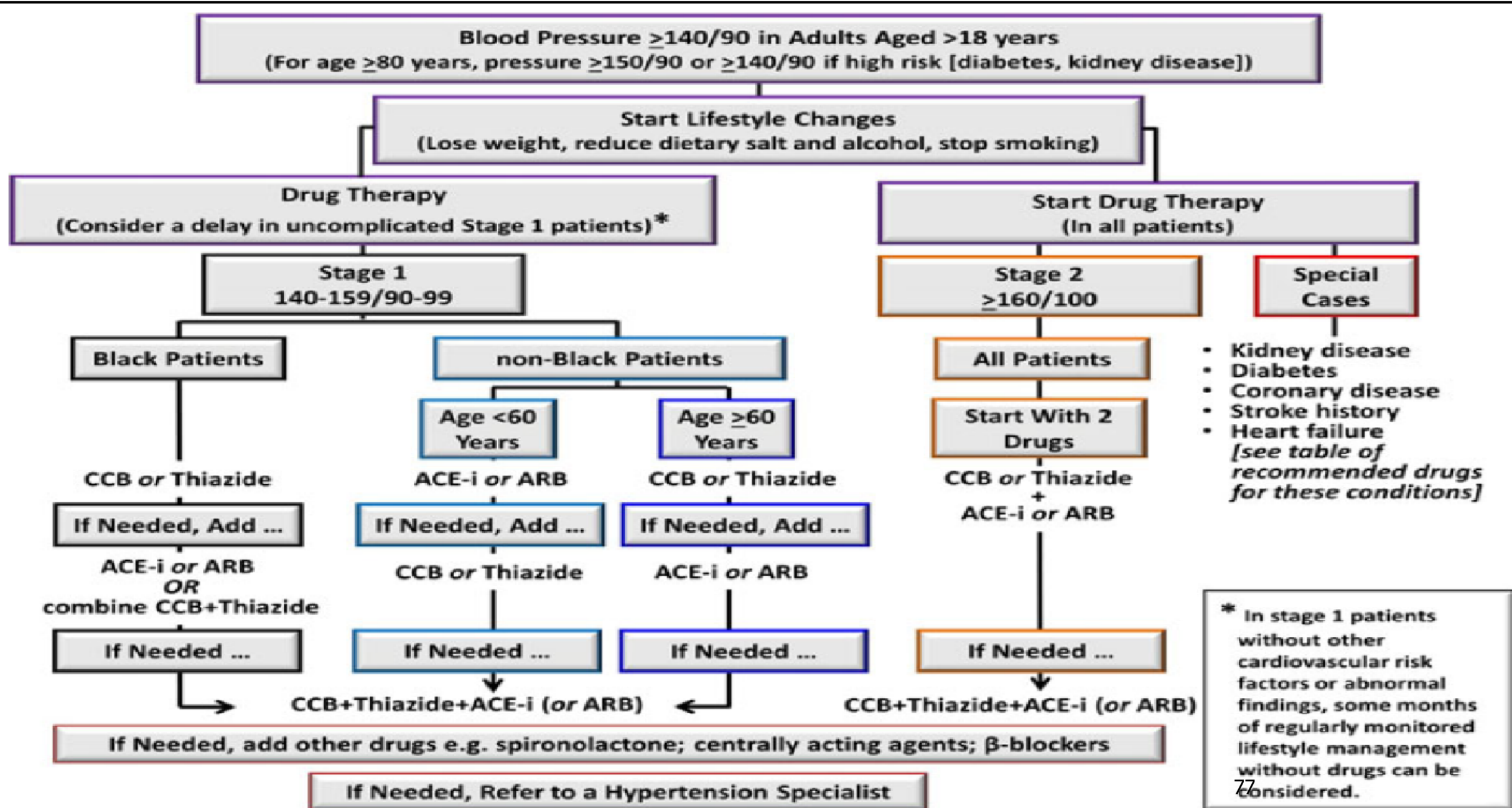


# Group Work (Continue- Quiz 3 and 4)

1. Considering that **only 20% of facilities have guidelines** including visible provider guides/charts for diabetes and hypertension management, **how can we improve access to these essential resources?**
2. With only **50% of facilities organizing community outreach events** in the last six months, **what strategies** can we implement to increase community engagement and raise awareness about diabetes and hypertension?
3. Given that **only 50% of primary healthcare workers** have adequate knowledge of NCD management, **what targeted training initiatives** can we implement to enhance their understanding and skills in managing diabetes and hypertension?
4. With 80% of patients being referred for further care due to inadequate management capabilities at our facilities, **what steps can we take to develop standardized care packages** that include practical dietary and exercise guidance for diabetes and hypertension patients?



# HTN Management Protocol



# Training on Blood Glucose Monitoring Equipment

## Key Areas:

- Proper use and calibration of glucose meters.
- Interpretation of blood glucose readings.
- Patient education on self-monitoring techniques and frequency.



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University of Science and Technology



**Belgium**  
partner in development



# Blood Pressure Monitoring Devices



- Types of blood pressure monitors (manual vs. automatic).
- Techniques for accurate blood pressure measurement.
- Understanding and interpreting blood pressure readings and guidelines for treatment adjustments.



# Patient Education and Self-Management Tools

- Use of mobile health applications and digital tools for tracking health metrics.
- Instruction on dietary management and lifestyle modifications.
- Development of personalized action plans for managing DM and HTN.





# Medical Equipment



**BP apparatus**



**Weighing machine**



**Glucometer**



**Height measuring tape**

- BP apparatus
- Glucometer
- Weighing machine
- Height measuring tape



# Requirement of Equipment and supplies

## Involves;

- Preparing a list of supplies and medicines needed
- Checking the amount received in the previous year, identify surpluses and shortages.
- According to estimate of the patient load for the coming year, you can calculate your requirement accordingly.
- Remember to follow the drugs recommended in the PEN protocol guidelines diabetes, hypertension, COPD /asthma.



# When to initiate antihypertensive therapy I

## Confirmed BP values indicating hypertension treatment is warranted

Patient	Initial confirmed BP	
	SBP	DBP
<b>All adult patients</b>	≥140 mmHg	≥ 90 mmHg
<b>Age 80 years and older</b>	≥150 mmHg	≥ 90 mmHg

**N/B:** Hypertension diagnosis is based on: the average of two or more seated blood pressure readings during each of two or more outpatient visits



# When to initiate antihypertensive therapy II

Diagnosis of hypertension (at facility level)			
	Reading 1	Reading 2	Reading 3
Stage 1 (no multiple risk factors, no end organ damage)	Visit 1	Visit 2 (a month after visit 1)	Visit 3 (a month after visit 2)
Stage 1 with multiple risk factors and/or organ damage	Visit 1		
Stage 2	Visit 1		
HTN urgency/emergency	Visit 1		
All screened patients with multiple risk factors and/or end organ damage should be referred to a Regional facility of higher “Interval between readings should be at least 30 minutes apart and should follow the procedure described above in table 1.			
Classification of hypertension : Stage 1 (Mild) hypertension: SBP 140-159 and/or DBP 90-99 mmHg Stage 2 (Moderate to severe) hypertension: SBP 160 and/or DBP 100 mmHg			
When to initiate antihypertensive therapy Hypertension confirmed on at least 3 separate occasions within a 2 month period			



# Antihypertensive Medication - Drugs

## Group discussion:

Identify drugs available within PHC setting, their dosage recommendations for HTN

- *Groups to discuss how they normally do titration of the antihypertensives:*



# Titration of Antihypertensives

- Introduce one drug at a time. Review patient after 2 weeks and adjust dose every 4-6 weeks depending on BP control.
- Titrate to maximum dosage before adding another drug
- If inadequate response to two agents, consider consultation with or referral to a clinician experienced in the management of refractory hypertension





# Referral Protocol

*Gauge participants to mention what information details to they normally write in a referral form*

How to refer:

Write a summary that includes the following information:

1. Patient's details
2. The patient's presenting symptoms
3. Duration of symptoms
4. Clinical findings
5. Results of laboratory tests (if available)
6. Working diagnosis
7. List of medications given
8. Reason for referral
9. Name, designation, signature and contact, details (address/telephone) of the person, who is referring the patient



# Indications for immediate physician consult (1)

- Hypertensive patients aged 18 years or younger
- BP  $\geq$ 180 mmHg systolic and/or 110 mmHg diastolic BP
- Secondary cause of hypertension is suspected
- All pregnant women
- Pre-existing diabetes
- New diagnosis of diabetes mellitus
- Heart failure
- Abnormal results on urine dipsticks or blood tests



# Indications for immediate physician consult (2)

- Patients not reaching goal BP after a 4-6 week trial of maximal tolerable doses of 2 antihypertensive drugs
- Associated clinical condition: coronary heart disease, heart failure, chronic kidney disease, stroke or transient ischaemic attack (TIA), peripheral arterial disease
- Consider referral for patients aged 80 years or older with a first diagnosis of hypertension



# Myths and misconceptions

- Stage 1 Hypertension can be cured (Yes)
- Only occurs in overweight and obese
- Disease for the rich affluent
- If no symptoms, no hypertension
- Can't get it if it's not in your family
- It's a result of curse
- For elderly



# Myths and misconceptions (Continue)

- Its for the stressed out
- It's only diagnosed during post-mortem
- It is a communicable disease
- Herbal remedies cure it
- Hypertensive medicine is addictive or develop dependence
- Only source of salt is table salt
- Overweight is healthy and sign of doing well



# Hypertension in Special Groups



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development



# Objectives

- To identify special groups with hypertension
- To institute appropriate management strategies for hypertension in special groups.

*Gauge participants to mention special groups they know:*

93



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Special groups

## ■ Special groups include:

- Persons under 18 yrs
- Pregnant women
- Persons Living with HIV/AIDs
- Elderly
- Diabetes and chronic kidney disease

## ■ These groups present unique opportunities and challenges in Kenya



# Hypertension in pregnancy

■ Hypertension complicates 5 to 7% of all pregnancies

- Preeclampsia (a form of hypertension) is characterized by new-onset hypertension, proteinuria and multisystem involvement
- Is responsible for Substantial maternal and fetal morbidity
- Is a marker for future cardiac and metabolic disease
- Preeclampsia and eclampsia are hypertensive emergencies and should be referred immediately



# Hypertension in pregnancy: Classification

- Chronic hypertension
- Preeclampsia – eclampsia
- Preeclampsia superimposed on chronic hypertension
- Gestational hypertension



# Who are at risk of preeclampsia?

- Hypertensive disease during a previous pregnancy
- Chronic kidney disease
- Autoimmune disease [SLE, APL syndrome]
- Type 1 or type 2 diabetes
- Chronic hypertension

■ **ACTION: Any woman with the above risks; GIVE ASPIRIN 75mg FROM 12 WEEKS GESTATION and refer to high risk ANC**



# Moderate risk for preeclampsia

- First pregnancy
- Age 35 years or older
- Pregnancy interval of more than 10 years
- BMI of 35 kg/m<sup>2</sup> or more at first visit
- Family history of pre-eclampsia
- Multiple pregnancy.

***ACTION: Patients with  $\geq 2$  risk factors: Aspirin 75mg/day and refer to a high-risk ANC***





# Effects of chronic hypertension on pregnancy

- Premature birth
- Intrauterine growth retardation
- Fetal demise
- Placental abruption
- Caesarian section

Incidence of these events depend on severity and duration of hypertension and associated target organ damage



# Effects of pregnancy on hypertension/cardiovascular system

- Increase in *blood volume* and decrease in *oncotic pressure*-may lead to heart failure
- Physiologic decrease in blood pressure; from 12 wks, peaks at 16-18wks: masks detection of chronic hypertension
- Progression to preeclampsia and eclampsia
- Increase risk of Peripartum cardiomyopathy
- Renal failure; especially if baseline creatinine >124 mmol/L



# Management of pregnancy with chronic hypertension

## ■ Pre-pregnancy advice

- Stop ACE-Inhibitors, ARB's
- Stop thiazides
- Keep sodium intake low
- Start alternative antihypertensive drugs based on their side effect profile and teratogenicity
  - ✓ Limited data on risk for the baby / mother with other drug classes



# Drugs in pregnancy

- Methyldopa – safe in pregnancy and is time tested
- Labetalol: safe in pregnancy: may lead to small for gestational age (SGA) when used in mild hypertension
  - *No difference in outcomes when compared to methyldopa*
  - *Limited experience with B-Blockers*
- Calcium channel blockers: safe: limited experience
- In emergency: IV labetalol, oral methyldopa, oral Nifedipine are indicated. **IV magnesium sulphate is indicated in preeclampsia**
- Avoid diuretics and oral hydralazine
- Refer patients immediately



# Hypertension in special cases

## ■ Remember

- all persons under age 18 yrs,
- elderly over 80 yrs with newly diagnosed hypertension,
- people with diabetes and hypertension and
- hypertension in pregnancy

should be immediately and appropriately referred



# Practical session (activity)

**Separate the participants into two groups: 1) County/Sub county team members and 2) Healthcare Providers and Facility Incharges**

- Participants in each group to measure blood pressure among themselves
- Planning and Forecasting
- In your Facility/Sub county/County what is the average number of patients of-
  1. Diabetes Mellitus
  2. Hypertension Calculate the drug requirement for the next year for these two diseases.
- Time : 45min





# NCD Managerial Activities

As a **PHC worker/County/Sub county Manager**, you will be expected to plan, forecast and place demands for resources to implement NCD activities:

- Ensure availability of equipment and materials for diagnosis
- Availability of medicines
- Availability of equipment
- Establish referral chain
- Health information system
- Training and supervision



# Estimate requirement of resources

- Firstly, look at the patient profile attending health centres in the previous years to estimate the number of patients who will need treatment.
- Secondly, additional number of patients should be added to the previous year's numbers.
- If you are planning special activities in the coming year remember to include the requirements likely to be needed.



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Estimate requirement of Infrastructure

- Identify existing and additional infrastructure required
- If NCD activities can be carried out within the existing health centre, no additional infrastructure will be required.
- However if there is any additional requirement, for example, a separate room for screening or counselling, it should be included in the plan



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University of Science and Technology



**Belgium**  
partner in development

# Estimate requirement of Equipment and supplies including medicines

- Prepare a list of supplies and medicines needed
- Check the amount received in the previous year, identify surpluses and shortages.
- Then according to your estimate of the patient load for the coming year, you can calculate your requirement accordingly.
- Remember to follow the drugs recommended in the protocol guidelines for diabetes, and hypertension.



# Forecasting demand for medicines Key messages

- This session provides a step-by-step approach for **county/ sub county/ health facilities** to decide when to order and how much to order.
- There should be a balanced approach to prevent the overstocking of medicines that could expire before they are used
- Methods of forecasting of medicine requirement (Discussion points)
- What is the mechanism of drug procurement in your **county/ sub county/ health facilities**?
- Discuss the problems challenges and potential solutions to tackle the problems of supplies in your **county/ sub county/ health facilities**



# Step 1:

- Compile a list of essential medicines and technologies relevant to the NCD management in your **county/ sub county/ health facilities**
- Compile a list of medicines supplied by the agency in charge of medicines supply.
- Quantities cannot be calculated until you know which products are to be ordered.
- Develop a detailed list of products, including information on;
  - *product generic name, or INN*
  - *dosage form (tablet, dispersible tablet, test strip)*
  - *strength or concentration*
  - *basic units (tablet, pack)*
  - *pack sizes available/to be stocked*





# Step 2

- Determine how often your county/ sub county/ health facilities receives deliveries
- The delivery of supplies may not be regular, but somewhat ad-hoc.
- Capture the most likely interval.
- In most cases a monthly delivery schedule is recommended, as it achieves a good balance between not having to order too far into the future and not making too frequent collection/delivery trips.
- The reorder factor is a number that will help calculate how much of each item you need to order.



# Step 3

- Estimate the quantity of medicines needed to start NCD services.
- Effective forecasting for NCD medicines and technologies starts with the number of current patients on treatment.
- If a county/ sub county/ health facility is starting NCD services, quantities of medications are determined by the recommended treatment guidelines.



# Group presentations

- 1) County/Sub county team members
- 2) Healthcare Providers and Facility Incharges

■ Time : 20min



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Lifestyle Recommendations

## Lifestyle Recommendations

Weight reduction	Attain and maintain BMI<25kg/m <sup>2</sup>
Dietary salt reduction	<6gNaCl/d
Adapt DASH-type dietary plan	Diet rich in fruits, vegetables, and low fat dairy products with reduced content of saturated and total fat and reduced salt
Moderation of alcohol consumption	For those who drink alcohol, consume ≤2 drinks/day in men and ≤1 drink/day in women
Physical activity	Regular aerobic activity, e.g., brisk walking for 30 min/day
Cessation of tobacco use	Support with tobacco cessation
Stress management	Behavioural intervention with stress management
<b>Note:</b> BMI, Body Mass Index; DASH, Dietary Approaches to stop Hypertension (trial)	



# Healthy Diet

## Make healthy dietary choices:

- Include fresh fruit and vegetables, and fish;
- Limit sugar intake (especially limit consumption of soft drinks)
- Limit salt intake to less than 1 teaspoonful a day
- Alcohol cessation
- Low fat intake
- High fibre intake including whole grain cereals



# Weight loss and maintenance of a healthy weight

- Encourage weight loss in overweight and obese patients
  - Even small amounts of weight loss can be beneficial to health
- Reduce the number of calories consumed:
  - (food and drink): reduce portion sizes and replace sweetened drinks, alcoholic drinks and fruit juice with water
- Increase activity, by participating in regular exercise
- In some patients (especially elderly patients) it may be more realistic to maintain current weight and to avoid gaining additional weight.
- All patients should be advised to *maintain* a healthy body weight.
- At every visit, discuss with patient body weight (BMI)
- Set targets for the next visit





# Dietary salt intake

- Should not exceed 1 teaspoon full (6g) per day.
- Avoid adding salt to food on the table
- Processed foods often contain high amounts of salt. E.g. bread, processed meats such as bacon, sausages, cheese, margarine, packet soups, tomato sauce, tomato paste, processed spices and other food additives



# Challenges cited in changing lifestyle

- Socio-economic status
- Societal pressure
- Stress
- Negative emotions
- Complex or confusing advice
- Poor urban planning
- *Gauge participants to suggest others.....*



# DAY 2

## KENYA DM GUIDELINES (2024)



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# MEDICAL NUTRITION THERAPY IN DIABETES

” LET FOOD BE THY MEDICINE  
LET MEDICINE BE THY FOOD

HIPPOCRATES



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# What is is Kenya DM Guideline?

- **Initial Development in 2006:** aimed to address both Type 1 and Type 2 diabetes, emphasizing early detection and management.
- **Revisions and Updates in 2010:** Emphasized the importance of lifestyle changes in diabetes management, including diet and physical activity.
- **Integration with NCD Strategies in 2013:** it was integrated into broader NCD management frameworks to address the interconnected nature of chronic diseases.
- **Further Updates in 2018:** The guidelines were updated to include more detailed protocols for pharmacological treatments, patient education, and self-management.
- **Current Guidelines 2022:** Most recent guidelines focus on a holistic approach to diabetes management, incorporating mental health, community engagement, and the use of technology in care.



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# INTRODUCTION

## Definition:

- Chronic metabolic disorder of multiple etiology in which the body cannot metabolize carbohydrate, fats and proteins
- Because of defects in insulin secretion and/or action.





# Introduction (Continue)

- Dietary modification is an important aspect of Disease management.
- The principle of healthy eating in the context should take into account.
  - *socio - economic,*
  - *cultural and*
  - *psychological influences of food choices.*
- Affordability, Availability and Acceptability.
- The multi disciplinary team is instrumental in emphasizing the role and importance of Nutrition in the care process and not as a less necessary part of management
- Dietary counseling is best given by a Dietitian or Nutritionist



# Classification of DM

## 1. Type 1 DM

- It is due to insulin deficiency and is formerly known as:
  - ☐ Type I
  - ☐ Insulin Dependent DM (IDDM)
  - ☐ Juvenile onset DM

## 2. Type 2 DM

- It is a combined insulin resistance and relative deficiency in insulin secretion and is frequently known as:
  - ☐ Type II
  - ☐ Noninsulin Dependent DM (NIDDM)
  - ☐ Adult onset DM



# Classification of DM (Continue)

## 3. Gestational Diabetes Mellitus (GDM):

- Gestational Diabetes Mellitus (GDM) developing during some cases of pregnancy but usually disappears after pregnancy.

## 4. Secondary DM:

- Results from another medical condition or due to the treatment of a medical condition that causes abnormal blood glucose levels
  - ☐ Cushing syndrome (e.g. steroid administration)
  - ☐ Hyperthyroidism



# ETIOLOGY

## **Etiology of Type 1 Diabetes:**

- Autoimmune disease
- Selective destruction of cells by T cells
- Several circulating antibodies against cells
- Cause of autoimmune attack: unknown
- Both genetic & environmental factors are important



# ETIOLOGY (Continue)

## **Etiology of Type 2 Diabetes:**

- Response to insulin is decreased
- Glucose uptake (muscle, fat)
- Glucose production (liver)
- The mechanism of insulin resistance is unclear
- Both genetic & environmental factors are involved
- Post insulin receptor defects



# EPIDEMIOLOGY

## Type 1 DM:

- It is due to pancreatic islet  $\beta$ -cell destruction predominantly by an autoimmune process.
- Usually develops in childhood or early adulthood
- accounts for upto 10% of all DM cases.
- Develops as a result of the exposure of a genetically susceptible individual to an environmental agent.





# EPIDEMIOLOGY (Continue)

## Type 2 DM:

- It results from insulin resistance with a defect in compensatory insulin secretion.
- Insulin may be low, normal or high!
- About 30% of the Type 2 DM patients are undiagnosed (they do not know that they have the disease) because symptoms are mild.
- accounts for up to 90% of all DM cases



# RISK FACTORS

## For Type 1 DM

- Genetic predisposition
- In an individual with a genetic predisposition, an event such as virus or toxin triggers autoimmune destruction of  $\beta$ -cells probably over a period of several years.



# RISK FACTORS (**Continue**)

## For Type 2 DM

- Family History
- Obesity
- Habitual physical inactivity
- Previously identified impaired glucose tolerance (IGT) or impaired fasting glucose (IFG)
- Hypertension
- Hyperlipidemia





**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Clinical Manifestations

## Type 1 DM:

- Polyuria
- Polydipsia
- Polyphagia
- Weight loss
- Weakness
- Dry skin
- Ketoacidosis

## Type 2 DM:

- Patients can be asymptomatic
- Polyuria
- Polydipsia
- Polyphagia
- Fatigue
- Weight loss
- Most patients are discovered while performing urine glucose screening





# Clinical Manifestations (Continue)





# DM - Management

## Goals of Therapy:

- Reduce symptoms
- Promote well-being
- Prevent acute complications
- Delay onset and progression of long-term complications

## Lines of therapy:

- Non-pharmacological treatment
- Pharmacological treatment



# Acute Complication: Hypoglycemia

- Hypoglycemia occurs due to too much insulin (or oral agents) in relation to glucose availability
- Brain requires constant glucose supply thus hypoglycemia affects mental function

## Clinical manifestations:

- Confusion, irritability
- anxiety, tachycardia, tremors
- Diaphoresis, tremor, hunger, weakness, visual disturbances
- If untreated → loss of consciousness, seizures, coma, death

## Treatment for hypoglycemia

- Ingest simple CHO (fruit juice, soft drink), or commercial gel or tablet
- Avoid sweets with fat (slows sugar absorption)
- Then eat usual meal snack or meal and recheck
- if not alert enough to swallow
  - ☐ Glucagon 1m IM or SQ (glycogen → glucose)
  - ☐ Then complex CHO when alert



# Acute Complication: Diabetic Ketoacidosis (DKA)

## • Causes:

- ☐ Infection
- ☐ Stressors (physiological, psychological)
- ☐ Stopping insulin
- ☐ Undiagnosed diabetes

## Clinical manifestations:

- Dehydration
- Deep difficult breathing (d/t metabolic acidosis)
- Fruity breath (d/t acetone)
- Abdominal pain, N & V, cardiac dysrhythmias

## Treatment

- Replace fluid and electrolytes
- Insulin (First IV bolus, then infusion)
- correct precipitating cause (e.g., infection, etc.)



# Non-pharmacological treatment

- Nutritional therapy:
  - ☐ Diet
  - ☐ Exercise
- Stop smoking
- Avoid precipitating factors



# Nutritional Therapy

- **Overall goal of nutritional therapy**

□ Assist people to **make changes in nutrition and exercise habits** that will lead to improved metabolic control.

## **Type 1 DM**

- Diet based on usual food intake, balanced with insulin and exercise patterns
- In most cases, high carbohydrate, low fat, and low cholesterol diet taken

## **Type 2 DM**

- Calorie reduction



# Nutritional Therapy (**Continue**)

## Food composition

- Meal plan developed with dietitian.
- Nutritionally balanced.
- Does **not prohibit the consumption** of any one type of food.





# Nutritional Therapy (Continue)

## Exercise

- Essential part of diabetes management
  - ☐ Increases insulin sensitivity
  - ☐ Lowers blood glucose levels
  - ☐ Decreases insulin resistance
- Take small carbohydrate snacks during exercise to prevent hypoglycemia (Gauge participants to mention examples)
- Exercise after meals
- Monitor blood glucose levels before, during, and after exercise



# Concept of Medical Nutrition Therapy (MNT)

- Healthy diet
- Calories
- Macro and Micro nutrients
- Calorie balance
- Nutrition assessment, Screening
- Nutrition diagnosis
- Nutrition intervention and treatment Counselling
- Nutrition Counselling
- Nutrition support



# Goals of Medical Nutrition Therapy

1. To promote and support healthful eating patterns; a variety of nutrient-dense foods in appropriate portion sizes, in order to improve overall health and specifically to: achieve and maintain:
  - Blood glucose levels in the normal range
  - Lipid profile that reduces risk for cardiovascular disease
  - Blood pressure levels in the normal range
2. To prevent (or slow) the rate of development of chronic complications by modifying nutrient intake and lifestyle



## Goals of Medical Nutrition Therapy (**Continue**)

3. To maintain the pleasure of eating by only limiting food choices when indicated
4. To address individual nutrition needs, taking into consideration personal and cultural preferences, health literacy and numeracy, access to healthful food choices and willingness to and ability to change



# Importance of Nutritional Assessment

- To identify clients with specific nutrition needs
- To measure changes in nutritional status in order to develop optimal nutritional care approaches.
- To identify nutritional problems early for prompt action to prevent them from worsening
- To Inform drug administration to suit the individual and meal pattern
- To enable individualized diet prescriptions



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Methods of Nutritional Assessment

There are 5 methods used in nutritional assessment

1. Historical data
2. Anthropometric measurements
3. Biochemical assessment
4. Clinical assessment
5. Dietary assessment





# Methods of nutrition assessment (**Continue**)

## 1. Historical Data

Provide an insight into

- *any relevant medical history or*
- *circumstances that may directly or indirectly impact on the client's nutrition needs and health status.*

Important historical data includes;

- Medical history
- Drug history
- Diet history

**Gauge the participants to mention tools required or used for historical data assessment**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Methods of nutrition assessment (**Continue**)

## 2. Anthropometric Data

- This is the measurement of body size, weight and proportions
- Information from the measurements is then used to calculate indicators of nutritional status.
- Anthropometric measurements include:
  - Height and weight (BMI)
  - Circumferences – waist, hip, MUAC
  - Skin fold thickness.

**Demonstrate how this is conducted with practical example**



# BMI Classifications

BMI level	Condition	Action
< 16	Severely malnourished	Rehabilitation with therapeutic foods, counselling on intake issues and possible metabolic issues. (Referral)
16.0–18.5	Moderate/ mild	Nutritional counselling. (Supplementary feeding may be used).
18.5–25.0	Normal/ recommended	Nutritional counselling, resistance exercises to build muscles.
25–30	Overweight	Nutritional counselling to reduce energy intake, aerobic physical activity to reduce weight
30+	Obese	Counselling to change lifestyle and reduce energy intake, aerobic physical activity to reduce weight, pharmacological intervention if necessary

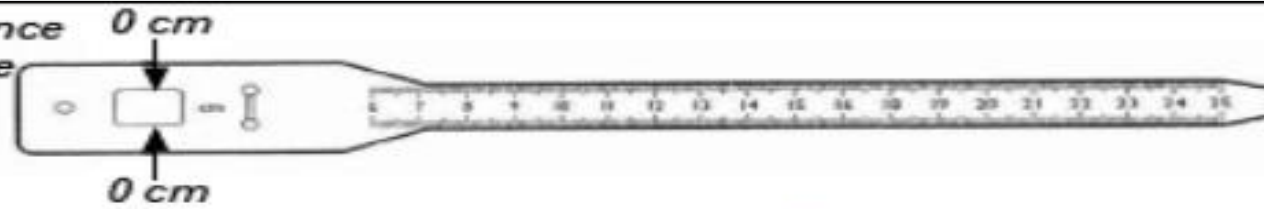


# Mid Upper Arm Circumference

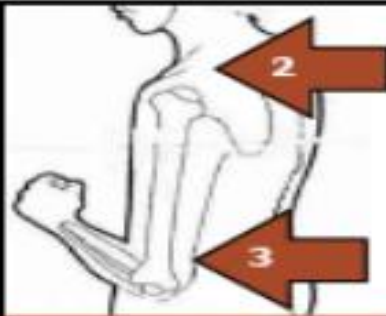
- Circumference of the left upper arm measured at the mid-point between the tip of the shoulder and the tip of the elbow, taken with the arm hanging down. Relatively independent of height.
- Measures the muscle mass and subcutaneous fat stores
- It is used for bedridden patients, children, pregnant mothers and lactating mothers.
- There are different tapes for measuring adults and children.



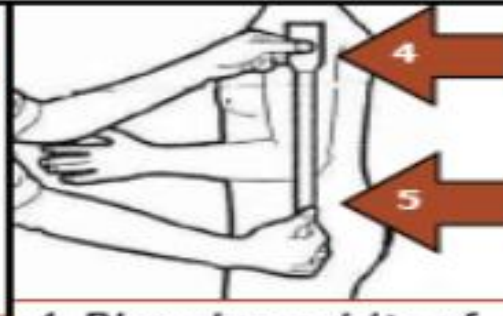
Arm circumference  
'insertion tape'



1. Locate tip of shoulder



2. Tip of shoulder  
3. Tip of elbow



4. Place tape at tip of shoulder  
5. Pull tape past tip of bent elbow



6. Mark midpoint



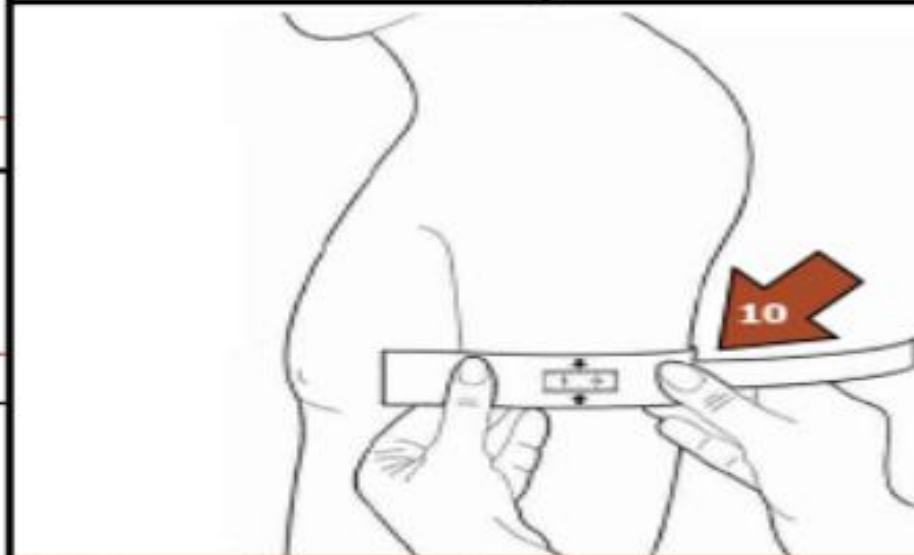
7. Correct tape tension



8. Tape too tight



9. Tape too loose



10. Correct tape position for arm circumference

# MUAC Levels (**Adults**)

MUAC level (adults)	Nutrition condition
<ul style="list-style-type: none"><li>• <math>\geq 23</math> cm</li><li>• <b>Nutritionally normal</b></li></ul>	Education and counselling
<ul style="list-style-type: none"><li>• 18.5–23.0 cm</li><li>• <b>Mild acute malnutrition</b></li></ul>	Nutritional education/counselling
<ul style="list-style-type: none"><li>• 16.0–18.5cm</li><li>• <b>Moderate acute malnutrition</b></li></ul>	Nutritional education/counselling
<ul style="list-style-type: none"><li>• <math>&lt;16.0</math>cm</li><li>• <b>Severe acute malnutrition</b></li></ul>	Irrespective of clinical signs, admission (referral) for therapeutic rehabilitation





# MUAC Levels (**Children**)

MUAC level (children)	Nutrition condition
<b><math>\geq 13.5</math> cm</b> <b>Nutritionally normal</b>	Education and counselling of caregivers
<b>12.5–13.5 cm</b> <b>Mild acute malnutrition</b>	Nutritional education/counselling
<b>11.0–12.5 cm</b> <b>Moderate acute malnutrition</b>	Admission for supplementary feeding if available.
<b><math>&lt;11.0</math> cm</b> <b>Severe acute malnutrition</b>	Irrespective of clinical signs, admission (referral) for stabilization/therapeutic rehabilitation



# Waist Circumference

- Is an indicator of intra-abdominal fatness and a good indicator of abdominal fat
- A high waist circumference is associated with an increased risk for type 2 diabetes, high cholesterol, high blood pressure and cardiovascular disease.

Sex	Normal	Increased risk
Males	90 – 94 cm	>102 cm
Females	80 – 84 cm	>88 cm



# Methods of nutrition assessment (**Continue**)

## 3. Biochemical Data

- Blood sugar levels
- HbA1c
- Blood lipids
- Serum protein
- Serum creatinine
- Serum potassium
- Serum sodium
- Urinary ketones



# Methods of nutrition assessment (**Continue**)

## 4. Clinical Data

Signs and symptoms of diabetes, heart diseases and related co-morbidities.

- Diagnosis and treatment information
- Problems relating to intake, e.g. chewing, swallowing, nausea, appetite
- Gastrointestinal problems.
- Blood pressure



# Methods of nutrition assessment (**Continue**)

## 5. Dietary Data

Dietary history

- Obtaining a diet history involves interviewing the client on the past and/or current food practices

Components of the diet history are:

- *Collecting data*
- *Recording data*
- *Analyzing data*
- *Integrating the information to develop client profile.*



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Meal Planning

## From Pyramids to Plates to Patterns: Perspectives on Meal Planning

Melinda D. Maryniuk, Guest Editor

[+ Author Affiliations](#)

Corresponding author: [melinda.maryniuk@joslin.harvard.edu](mailto:melinda.maryniuk@joslin.harvard.edu)

Diabetes Spectrum 2017 May; 30(2): 67-70.

<https://doi.org/10.2337/ds16-0080>



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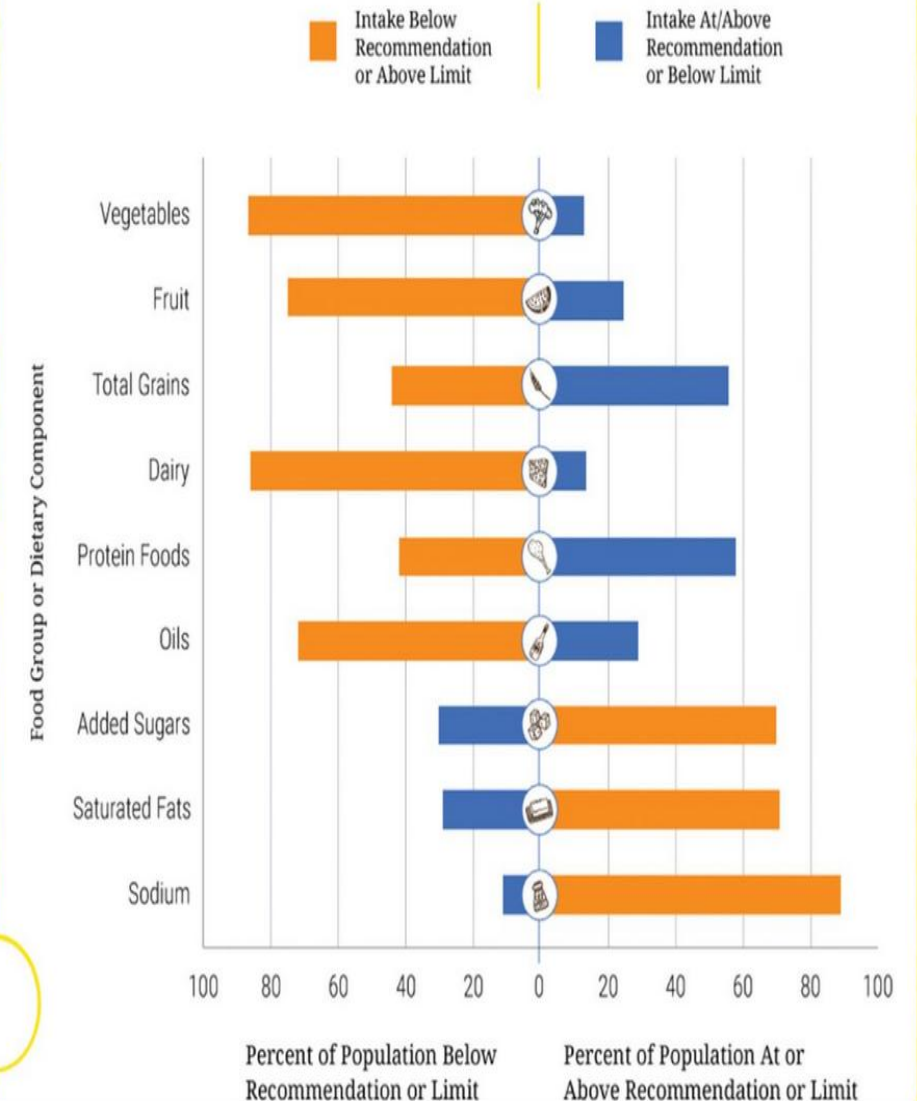
Article

Figures & Tables

Info & Metrics

[P](#)

There is wide agreement that nutrition is a cornerstone of diabetes management and that an individualized medical nutrition therapy program, preferably provided by a registered dietitian, is recommended for all individuals with diabetes (1,2). However, the debate can get heated when the discussion turns to exactly what defines the meal plan for diabetes, particularly as it relates to the recommended level of carbohydrate (3). At least in type 2 diabetes, there is insufficient evidence to suggest that any particular macronutrient distribution is superior (4).



Current eating patterns in the United States. Percentage of the U.S. population ≥1 year of age who are below, at, or above each dietary goal or limit. The center (0) line is the goal or limit. For most, those represented by the orange sections of the bars, shifting toward the center line will improve their eating pattern (8).



# Components of A Healthy Diet

*Gauge participants to mention what what components they know:*

A healthy diet should provide:

- Carbohydrates: 45-60% Cater for the activity levels
- Fats: 20-30% (decrease saturated & trans fatty acids, increase monounsaturated)
- Protein: 15-20% (0.8 g/kg/day)
- Dietary fibre: minimum 20g/1000 kcal
- Vitamins and minerals (Recommended daily intake)
- Antioxidants & flavonoids
- Adequate water



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Tools for Meal Planning

- 1) Plate Model
- 2) Hand jive portion guide
- 3) Carbohydrate Counting
- 4) Glycemic Index & Glycemic Load
- 5) Food Exchange and food groups
- 6) Ketogenic Diets
- 7) Low carbohydrate diets

***Gauge to know what PHC facilities have from the above tools and illustrate how they are used***

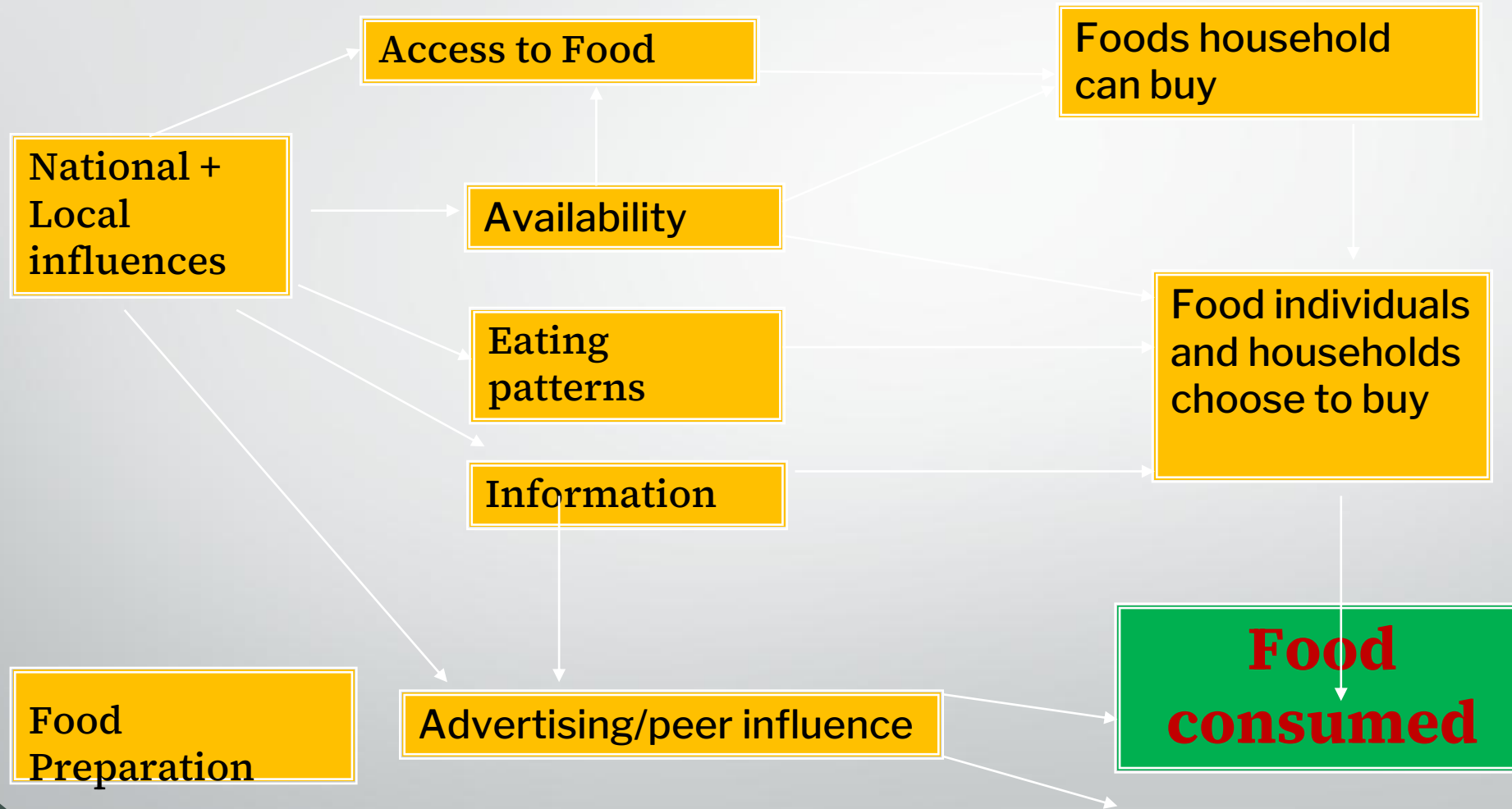


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University of Science and Technology

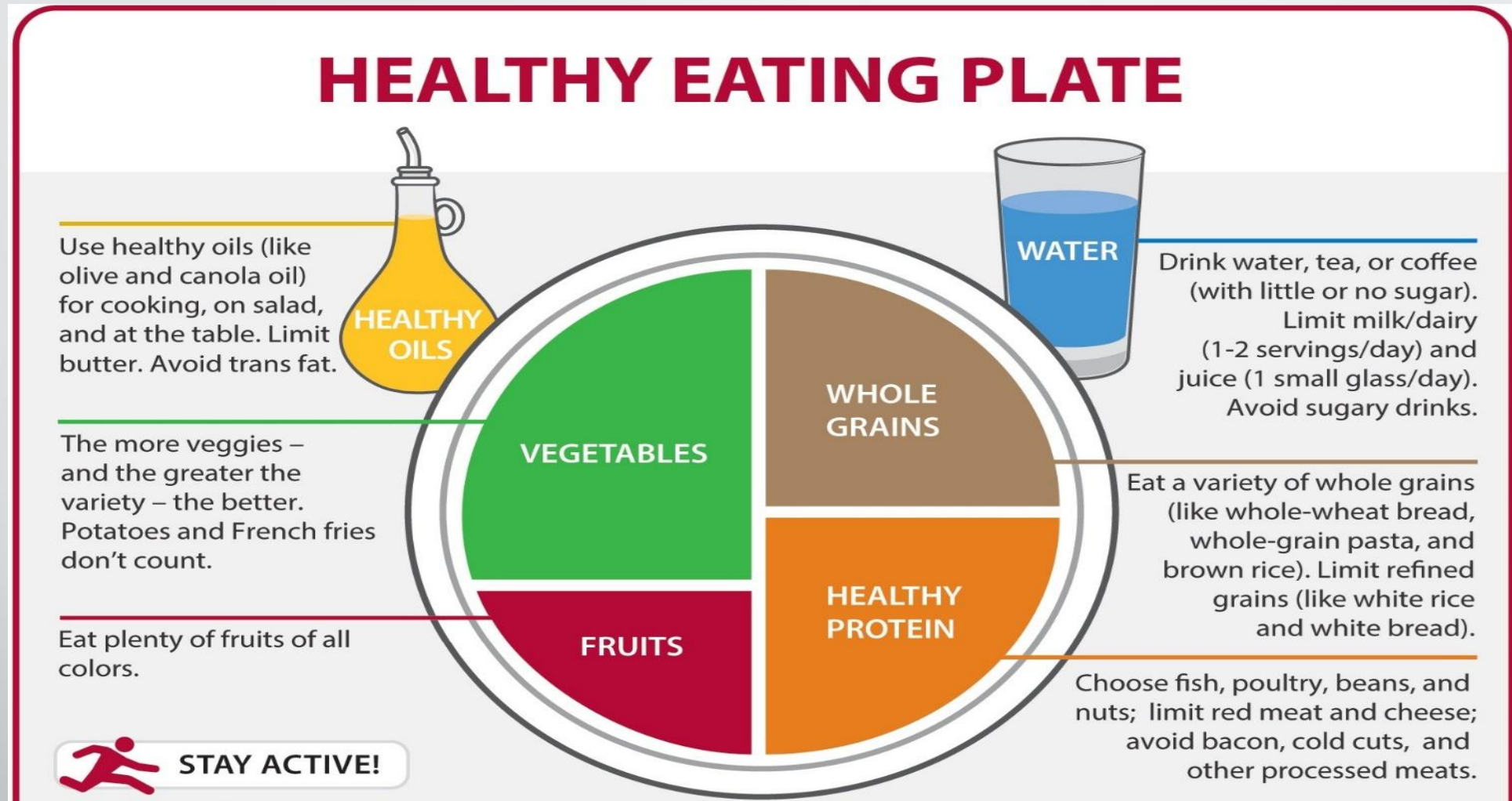


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partner in development

# Factors which influence food choice



# 1. The Plate Method



# Principles Governing Meal Planning

- **Nutritional adequacy** – Providing adequate amounts of all the essential nutrients, energy and fibre
- **Caloric control** – Managing the amount of energy consumed without over- or under-eating
- **Nutrient density** – Choosing foods that give a good variety of nutrients for a small number of calories
- **Variety and Balance** – Selecting foods from each of the food groups in proportion to each other thus preventing nutritional risks
- **Individuality** – Using the information from the assessment to meet individual needs
- **Flexibility** – Allowing clients to choose foods within a practical and creative setting
- **Aesthetically acceptable** – Pleasing to the eye
- **Economically feasible** – Within the family budget





# What Do You Think Of This Meal ????



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University of Science and Technology





## 2. Handy Portion Guide

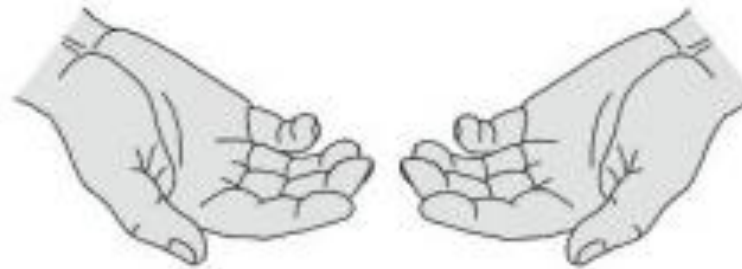
### Handy portion guide

Your hands can be very useful in estimating appropriate portions. When planning a meal, use the following portion sizes as a guide:



#### **FRUITS\*/GRAINS & STARCHES\*:**

Choose an amount the size of your fist for each of Grains & Starches, and Fruit.



#### **VEGETABLES\*:**

Choose as much as you can hold in both hands.



#### **MEAT & ALTERNATIVES\*:**

Choose an amount up to the size of the palm of your hand and the thickness of your little finger.



#### **FATS\*:**

Limit fat to an amount the size of the tip of your thumb.

**MILK & ALTERNATIVES\*:** Drink up to 250 mL (8 oz) of low-fat milk with a meal.

\* Food group names taken from *Beyond the Basics: Meal Planning for Healthy Eating, Diabetes Prevention and Management* © Canadian Diabetes Association, 2005. Please refer to this resource for more details on meal planning.

## 4. Glycemic Index and Load

- The glycaemic index is a value assigned to foods based on how slowly or how quickly those foods cause increases in blood glucose levels.
- *It ranks the carbohydrates on a scale from 0 to 100 according to the extent to which they raise blood sugar (glucose) levels after eating.*
- Foods low on the glycaemic index (GI) scale tend to release glucose slowly and steadily.
- Foods high on the glycaemic index release glucose rapidly.



# High Glycemic Foods

- Glucose
- Baked potatoes
- French Fries
- Rice Flour
- Mashed Potatoes
- Potato Chips
- Honey
- Cooked Carrots
- Corn Flakes
- Cooked Broad beans
- Pumpkin
- Watermelon
- White bread
- Refined sweetened cereal
- Chocolate bars
- Boiled peeled Sugar (Sucrose)
- potatoes
- Cola soda
- Cookies
- Corn
- White rice
- Noodles
- Raisins



# Low Glycemic Foods

- Whole wheat or bran bread
- Brown rice
- Sweet potatoes
- Whole wheat pasta
- Fresh peas
- Whole wheat sugar free cereal
- Oatmeal
- Whole grain pasta
- Kidney beans
- Fresh unsweetened fruit juice
- Raw carrots
- Dairy products
- Dried beans
- Brown or yellow lentils
- Chick peas
- Fresh fruit
- Green vegetables, tomatoes, eggplant, zucchini, garlic, onions etc
- Green beans
- Sugar free marmalade
- Green Lentils
- Split peas
- Dark Chocolate (>70% cocoa)
- Fruits (Banana, Grapes, Orange)



# 5. Food Groups/Servings

Food group	Number of servings	What is a serving?
Starches and breads	6-11	1 Slice bread 1/2 cup cooked rice, cereal 1/4 cup dry cereal, 1/2 cup pasta 3 biscuits (eat whole-grain, fortified or enriched starches, bread, and cereals)
Vegetables	3-5	1/2 cup vegetables cooked 1 cup vegetables raw
Fruits	2-4	1 cup fruit juice (fresh, frozen or canned without sugar) 1 medium piece fresh fruit
Milk and milk products	2-3	1 cup skim / low fat milk / 3/4 cup plain or artificially sweetened yogurt
Meat and meat substitutes	2-3	57-85 g cooked lean meat fish or poultry 28.5 g meat is equivalent to: - 1 egg 28.5 g cheese 1/4 cup fish (Omena, tuna, salmon or cottage cheese)
Fat	Use sparingly	1 teaspoon margarine 1 teaspoon salad dressing 1 teaspoon oil or mayonnaise 1 tablespoon peanut-butter



## 6. Amount of KCAL Contributed by Each Food Group

No.	List	Amount (gm/ml)	Total Kcal	Typical meal			
				(Breakfast	Total Cal	Lunch	Total cal
1	Starch	25gms	80	4 slices bread	320	2 Chapos	320
2	<b>Milk</b>						
	Non-fat	250ml	90				
	Low -fat	250ml	120				
	Whole	250ml	150	1 glass	150	1 glass	150
3	<b>Meat</b>						
	Lean	30g	55				
	Medium fat	30g	75				
	High fat	30g	100			180gm	600
4	Egg	1	75	2 eggs	150		
5	Vegetables	100 - 150g	25			1 cup	25
6	Fruits	Varies	60	1	60	1	60
7	Fat	1 tsp	45	1 tsp bb	45	2 tsp	90
8	Sugar	1 tsp	20	2 tsp	40	1 Soda	300
	<b>Total Kilo Calories</b>				<b>765</b>		<b>1545</b>



# CHF AND DIET

- Emphasis on weight Management and fluid intake
- Sodium intake not more than 2000mg.
- Fresh fruits, vegetables and whole grains but with reduced fat options
- Minimized intake of Saturated Fats and Cholesterol
- Mediterranean diet supports heart health –Plant based
- Omega 3 FA to lower inflammation, TGs, risk of stroke, risk of clotting

## DIET AND HTN

### DASH DIET

- Useful in Lowering LDL and Blood pressure
- Fruits, vegetables, low fat and low sodium (2300mg or 1500mg of sodium )
- Reduced saturated fat
- Higher in potassium, calcium, magnesium
- Takes into account the use of nuts, legumes and seeds
- Flexible as long as no other disease condition is present



# Ramadhan

- Ramadhan is a religious practice and patients have a right to fast though it may not be safe always
- About 79% of patients with type 2 diabetes will fast during Ramadhan
- Evidence based management is still limited and Sketchy
- Challenges may include: Hypoglycemia, hyperglycemia, dehydration and thrombosis
- Follow correct steps to offer all round diabetes self care guidance
  - Pre Ramadhan assessment
  - Ramadhan focused Diabetes Education
  - Medication and diet adjustment
  - Post Ramadhan assessment and return to usual care



# Commercial 'Diabetic' Foods

- There are many commercially prepared diabetic food substances in the market.
- They are not necessary because:
  - *They are expensive.*
  - *They are high in trans fatty acids.*
  - *They contain sugars other than glucose/sucrose.*
  - *They do not have a role in a healthy eating plan.*
- Before using these foods, please consult with a dietician.



# Myths and misconceptions

- Eating of sugar or sweets
- Salt intake in HTN
- Potassium salt for HTN
- People likely to be affected by type 2 more than type 1
- Type of diabetes is defined by the level of blood sugars
- Eggs & cholesterol
- Brown foods help in managing diabetes
- Eating of meat or fat
- People with diabetes must walk around with sweets



# DM Medication

## Group discussion:

Identify drugs available within PHC setting, their dosage, administration recommendations for DM Management



**This session was handled by Prof.  
Josefien van Olmen of Belgium**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development



# Learning Outcome Session 2

- By the end of the session, the participants will be able to utilize NCD guidelines and protocol (Kenya HTN, DM and WHO PEN) to improve management of Diabetes and hypertension in their facilities and enhance standardized care by use of algorithms.
- Adopt best practices in DM and HTN management across PHC settings in order to develop practice standard.



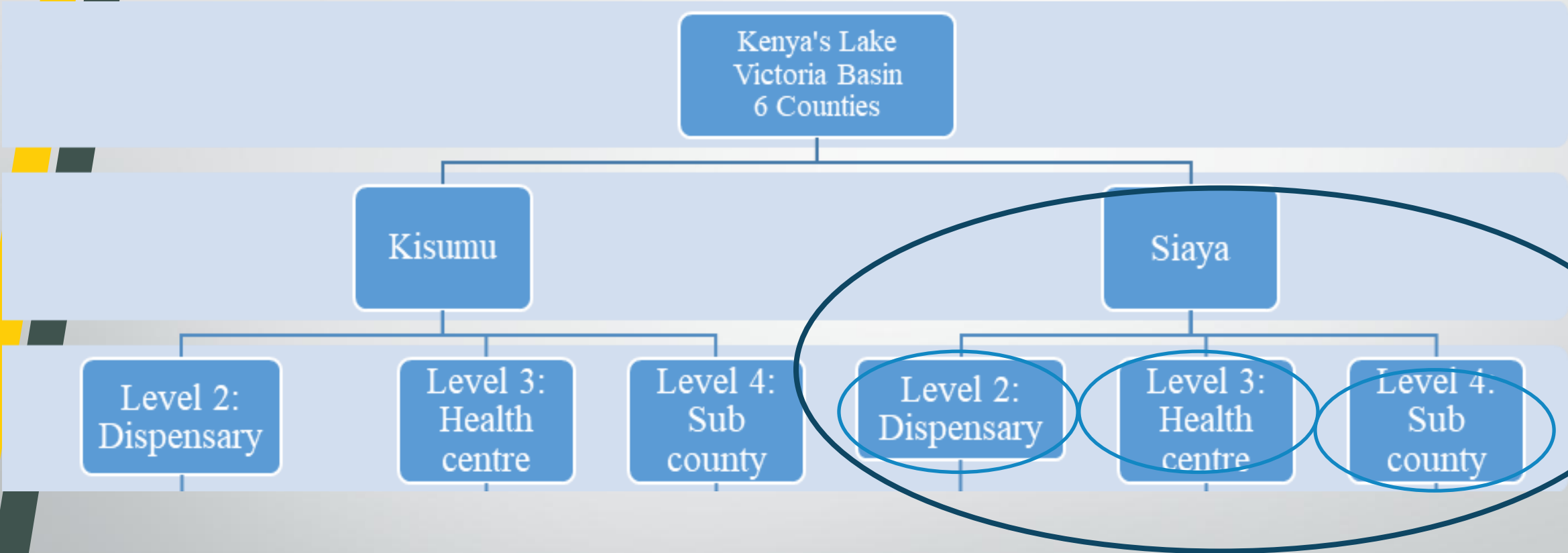
# Sections on how to organise yourself



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development



## **Session: Some theory**

- identify key parameters that have to be included to enable the effective NCD service delivery model.
- Understand how NCD could be integrated into existing health programs and how services could be improved.

## **Workshop: Develop your own Service Delivery Model (SDM)**

- develop and use service delivery model in your health facility
- Develop *clear and specific* strategies for
  - patient flow
  - resource utilization
  - management of follow-up.



# The theory

Primary Health Care  
Community Engagement  
Cost-Effectiveness

<https://www.who.int/publications/i/item/9789241598996>



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University of Science and Technology



## Implementation tools

**Package of Essential  
Noncommunicable (PEN) disease  
interventions for primary health care  
in low-resource settings**



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## KENYA NATIONAL GUIDELINES FOR THE MANAGEMENT OF CARDIOVASCULAR DISEASES

2024



# What can WHO PEN offer you?

## Clinical tools

- Integrated **clinical protocol and other tools** for addressing cardiovascular risk, diabetes and prevention of renal disease
- Protocol for **early referral**
- Guidance on **self care** of NCDs

## Management tools

- Tool for rapid assessment of capacity in primary care
- Tools for costing primary care programs



## 2 Technical and operational outline: Integration of Essential NCD Interventions into primary care in low-resource settings

### 2.1 Planning and implementation at district and national levels

### 2.2 Prevention and management of major NCDs in primary care

### 2.3 Measurement of quality, equity, performance and impact

- |    |   |
|----|---|
| 1  | Tool for assessment of gaps, capacity and utilization of primary care |
| 2  | Tool for assessment of population coverage of NCD care                |
| 3  | Templates to collect Health Information                               |
| 4  | Evidence based protocols for essential NCD interventions for PHC      |
| 5  | Core lists of essential technologies and medicines                    |
| 6  | Tools for cardiovascular risk prediction                              |
| 7  | Tools for auditing and costing  |
| 8  | Tools for monitoring and evaluation                                   |
| 9  | Training material   |
| 10 | Aids for self care  |



# Step 1. Know the essential interventions



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Essential clinical interventions for primary care

## Primary prevention of heart attacks and strokes:

- Tobacco cessation (level 1), Regular physical activity 30 minutes a day (level 1), Reduced intake of salt <5 g per day (level 1), Fruits and vegetables at least 400g per day (Level 2)
- Aspirin, statins and antihypertensives for people with 10 year cardiovascular risk >30% (Level 1)
- Antihypertensives for people with blood pressure  $\geq 160/100$
- Antihypertensives for people with persistent blood pressure  $\geq 140/90$  and 10 year cardiovascular risk >20% unable to lower blood pressure through life style measures (Level 1)



## Healthy behaviour & essential medication

### Secondary prevention (post myocardial infarction):

- Tobacco cessation (Level 1), healthy diet and regular physical activity (Level 2).
- Aspirin, angiotensin-converting enzyme inhibitor, beta-blocker, statin (Level 1):

### Secondary prevention (post stroke):

- Tobacco cessation, healthy diet and regular physical activity (Level 2).
- Aspirin, antihypertensive (low dose thiazide, angiotensin-converting enzyme inhibitor), and statin (Level 1)

### Secondary prevention (Rheumatic heart disease):

- Regular administration of antibiotics to prevent streptococcal pharyngitis and recurrent acute rheumatic fever (Level 1)



### **Type 2 diabetes:**

- Oral hypoglycemic agents for type 2 diabetes, if glycemic targets are not achieved with modification of diet, maintenance of a healthy body weight and regular physical activity (Level 1)
- Metformin as initial drug in overweight patients (Level 1) and non overweight (Level 4).
- Other classes of antihyperglycemic agents, added to metformin if glycemic targets are not met (Level 3)
- Reduction of cardiovascular risk for those with diabetes and 10 year cardiovascular risk >20% with aspirin, angiotensin converting enzyme inhibitor and statins (Level 1)

### **Prevention of foot complications through examination and monitoring (Level 3)**

- Regular (3-6 months) visual inspection and examination of patients' feet by trained personnel for the detection of risk factors for ulceration (assessment of foot sensation, palpation of foot pulses inspection for any foot deformity, inspection of footwear) and referral as appropriate

### **Prevention of onset and delay in progression of chronic kidney disease.**

- Optimal glycemic control in people with type 1 or type 2 diabetes (Level 1)
- Angiotensin converting enzyme inhibitor for persistent albuminuria (Level 1)

### **Prevention of onset and delay of progression of diabetic retinopathy:**

- Referral for screening and evaluation for laser treatment for diabetic retinopathy (Level 1)
- Optimal glycemic control (Level 1) and blood pressure control (Level 1)

### **Prevention of onset and progression of neuropathy:**

- Optimal glycemic control (Level 1)



# Essential equipment & tools at your facilities



**Jaramogi**  
University of

Technologies	Tools
Thermometer Stethoscope Blood pressure measurement device* Measurement tape Weighing machine <del>Peak flow meter**</del> <del>Spacers for inhalers</del> Glucometer Blood glucose test strips Urine protein test strips Urine ketones test strips	WHO/ISH risk prediction Evidence based clinical protocols Flow charts with referral Patient clinical record Medical information regi Audit tools
<b>Add when resources permit:</b> Nebulizer Pulse oximeter Blood cholesterol assay Lipid profile Serum creatinine assay Troponin test strips Urine microalbuminuria test strips Tuning fork Electrocardiograph(if training to read and interpret electrocardiograms is available) Defibrillator	



# Essential medicines in the district



## For Primary Care facilities with Physicians

(for PC facilities with only non-physician health workers most of the medicines below are required for refill of prescriptions issued by physicians at a higher level of care)

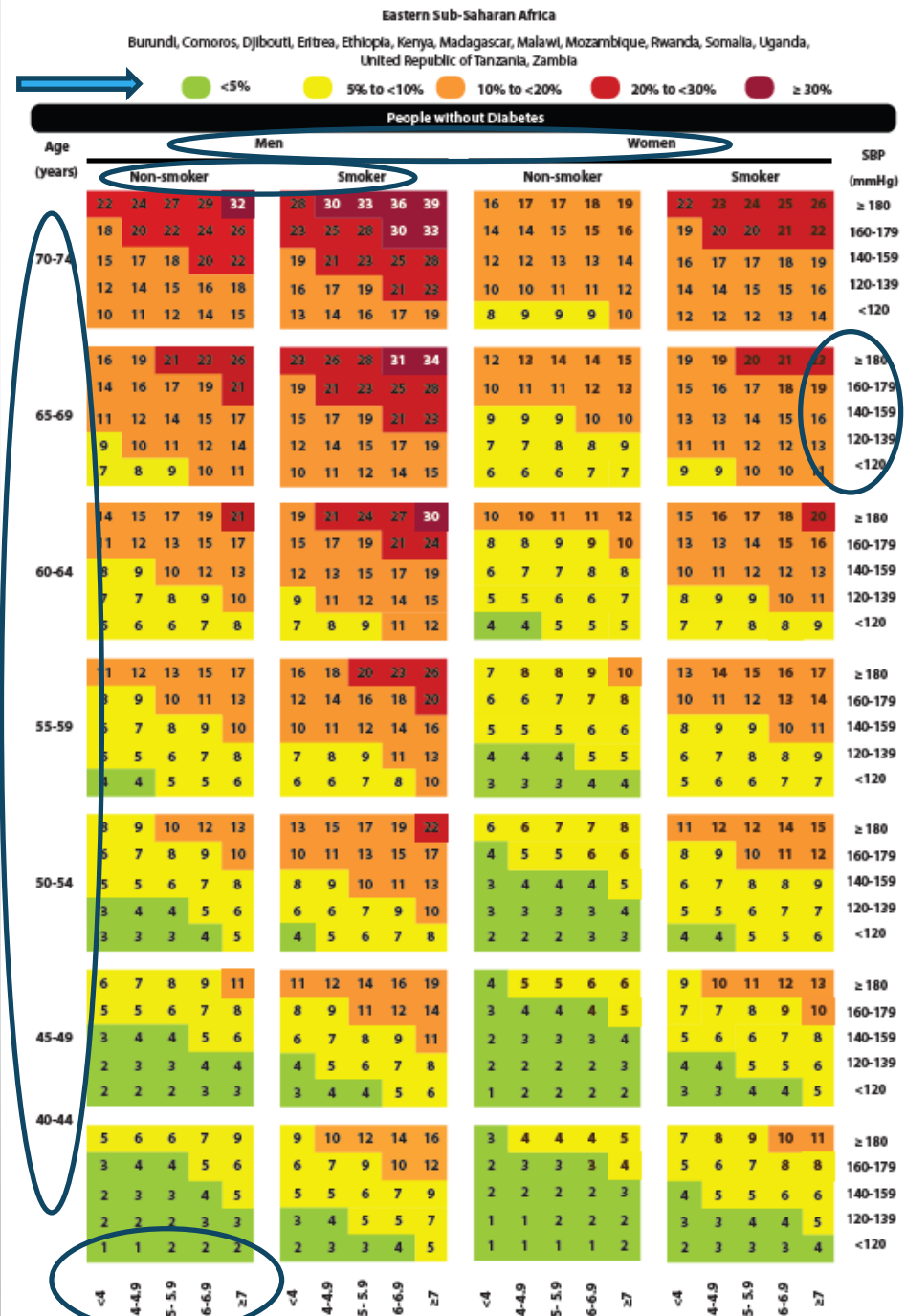
Thiazide diuretic	Ibuprofen
Calcium channel blocker (amlodipine)	Codeine
Beta-blocker (atenolol)	Morphine
Angiotensin inhibitor (enalapril)	Penicillin
Statin (simvastatin)	Erythromycin
Insulin	Amoxicillin
Metformin	Hydrocortisone
Glibenclamide	Epinephrine
Isosorbide dinitrate	Heparin
Glyceryl trinitrate	Diazepam
Furosemide	Magnesium sulphate
Spironolactone	Promethazine
Salbutamol	Senna
Prednisolone	Dextrose infusion
Beclometasone	Glucose injectable solution
Aspirin	Sodium chloride infusion
Paracetamol	Oxygen

Address the right  
people: risk  
prediction chart



**Jaramogi Oginga Odinga**  
University of Science and Technology

## WHO Cardiovascular Disease Risk Laboratory-based Charts



## Step 2. Ensure readiness of your facilities



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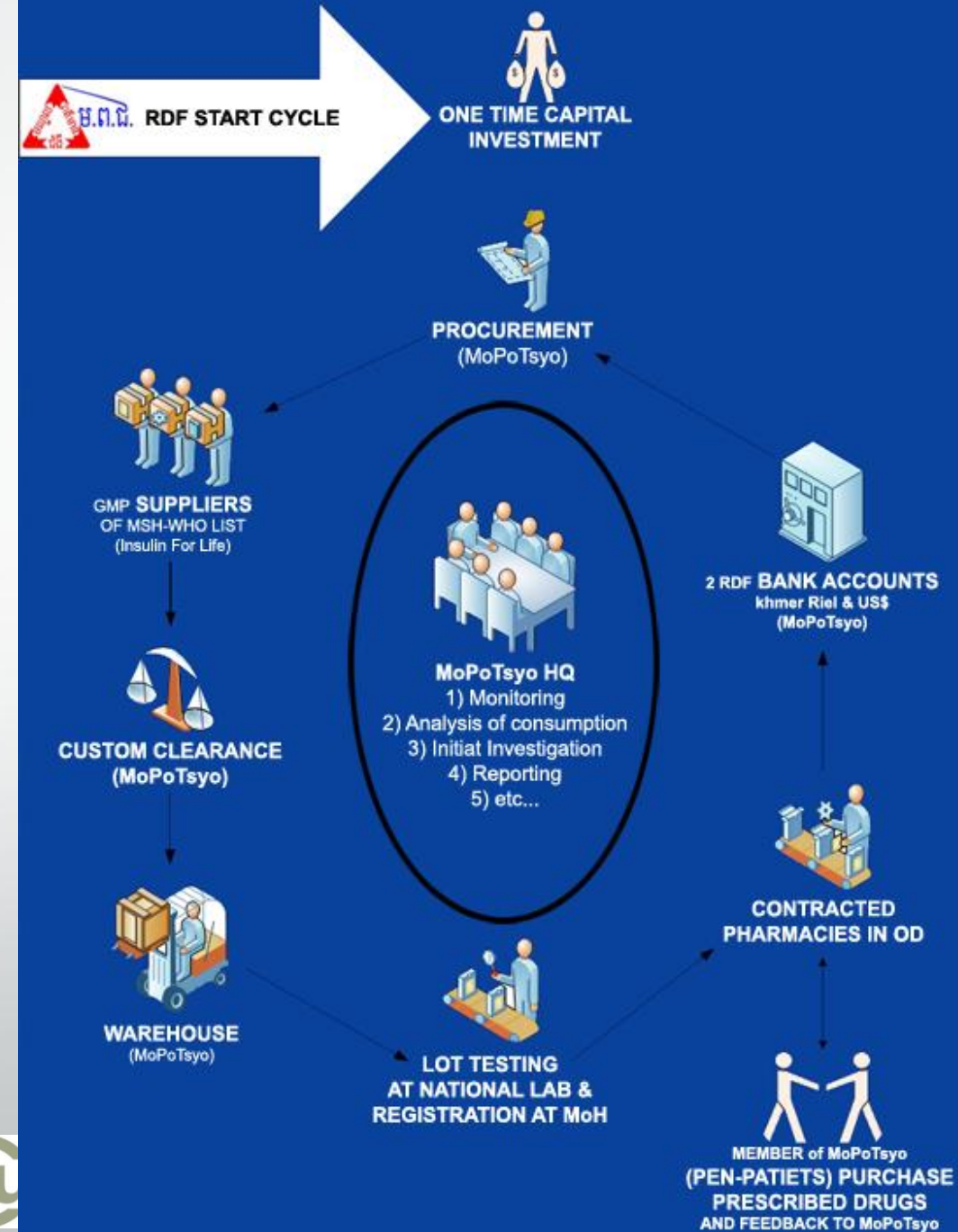


**Belgium**  
partner in development

# Drug shortage solutions: Revolving Drug Fund



**Jaramogi Oginga Odinga**  
University of Science and Technology



# Step 3. Organising care



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

## Change the way we view NCDs





# NCD care

- long-term care
- proactive, patient centered
- community based
- sustainable.



# Step 4. Change management



**Jaramogi Oginga Odinga**  
University of Science and Technology



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partner in development

# **Session 3:**

## **Organising NCD Services in a PHC**



**Jaramogi Oginga Odinga**  
University of Science and Technology



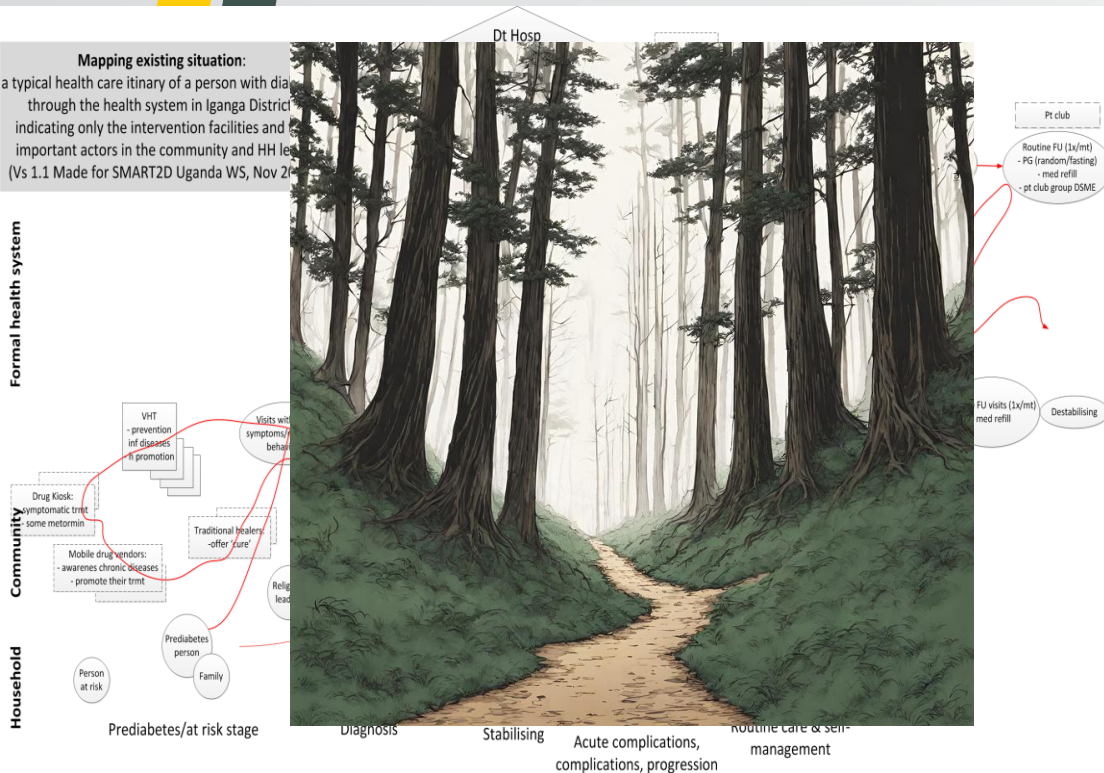
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partner in development

# Questions

- How to start: pool of patients (newly diagnosed)
- Screening points and community awareness point
- Triage
- Continuous mentorship, on the spot
- Planned patient pathway



# Patient pathway



**Jaramogi Oginga Odinga**  
University of Science and Technology



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partner in development

# Organizing NCD services in your facility

## Organization of health services includes:

1. Planning of health service delivery
2. Estimation of resources required, establishing a good referral system
3. Good reporting and recording system
4. Supportive supervision especially in the initial stages of implementation
5. Integrating NCDs into other programs: These include:

NCDs can be integrated with other clinic schedules

Utilize the existing resource, infrastructure and manpower

Clinic timings should suit NCD patients who are usually working and may not be available in the morning hours.



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development



# Change management

- Prepare a phased implementation plan
- Start with what is easiest and most feasible :
  - eg Organising your health centre
  - train your other colleagues in CVD risk assessment.
  - Start a patient recording system with unique numbers



**Jaramogi Oginga Odinga**  
University of Science and Technology



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partner in development

# **Session 4:**

## **Develop Service Delivery Model (SDM) -**

### **Group Work**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Learning Outcome Session 4

- By the end of the session, the participants will be able to develop and use service delivery model in their respective health facilities to improve treatment outcomes and strengthen service delivery in the primary.
- Develop clear and specific strategies in regard to patient flow, resource utilization and the management of follow-up.



**Jaramogi Oginga Odinga**  
University of Science and Technology



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partner in development

# Objectives for health facilities

Develop **service delivery model** for NCD (diabetes/cardiovascular disease) in your health facility

- Develop *clear and specific* strategies for
  - A. patient flow: screening, diagnosis, management
  - B. utilization of staff, equipment, drugs, ..... (peer patients, etc)
  - C. Data, monitoring and follow-up.



# Discussion points A) patient flow

A. Think of current & potential patient flow pathway in your health centre

- Screening
- Diagnosis
- Management.
- Referral/collaboration with higher level



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University of Science and Technology



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partner in development

# Discussion points

## B) utilization of staff, equipment etc

- How is availability and functionality of equipment
- How is availability of drugs? What options are possible?
- How many health care workers can be involved? What is the capacity
- Which other people can be involved? Role patients?



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University of Science and Technology



**Belgium**  
partner in development



# Discussion points

## C) Data, monitoring and follow-up.

### A. How do you collect data

- For individual patients: where are patient records kept?
- For the facility: register?

### B. How will you follow up and improve?

- Quality of care
- Capacity of health workers: supervision and coaching



# Way forward:

## Components for a Service Delivery Model

Make a plan/document that will work for your facility:

level

### **Project management**

- Assess who can do what (depend on PHC Facility team based care)
- Develop an NCD team, involve the district county team (administrative orders)
- Make a change management plan

### **Part B) Planning of resources**

- Staff
- Equipment
- Guidelines & tools
- Drugs
- Other people

### **Part A) Patient flow for your facility: WHO-WHEN-HOW-WHERE**

- Screening
- Diagnosis
- Management.
- Referral/collaboration with higher

### **Part C/ Monitoring & follow up**

- Recording and reporting
- Quality monitoring and supervision



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University of Science and Technology



**Belgium**  
partner in development

# Example of PHC SDM for NCD Management

- NCD management has to be integrated within the existing system
- Most health systems follow this pattern
- Reorientation and re-assigning roles and responsibilities of staff will be needed to provide NCD services in a comprehensive manner



**THANK  
YOU**

# Capita selection

Risk prediction chart  
Physical Activity



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University of Science and Technology



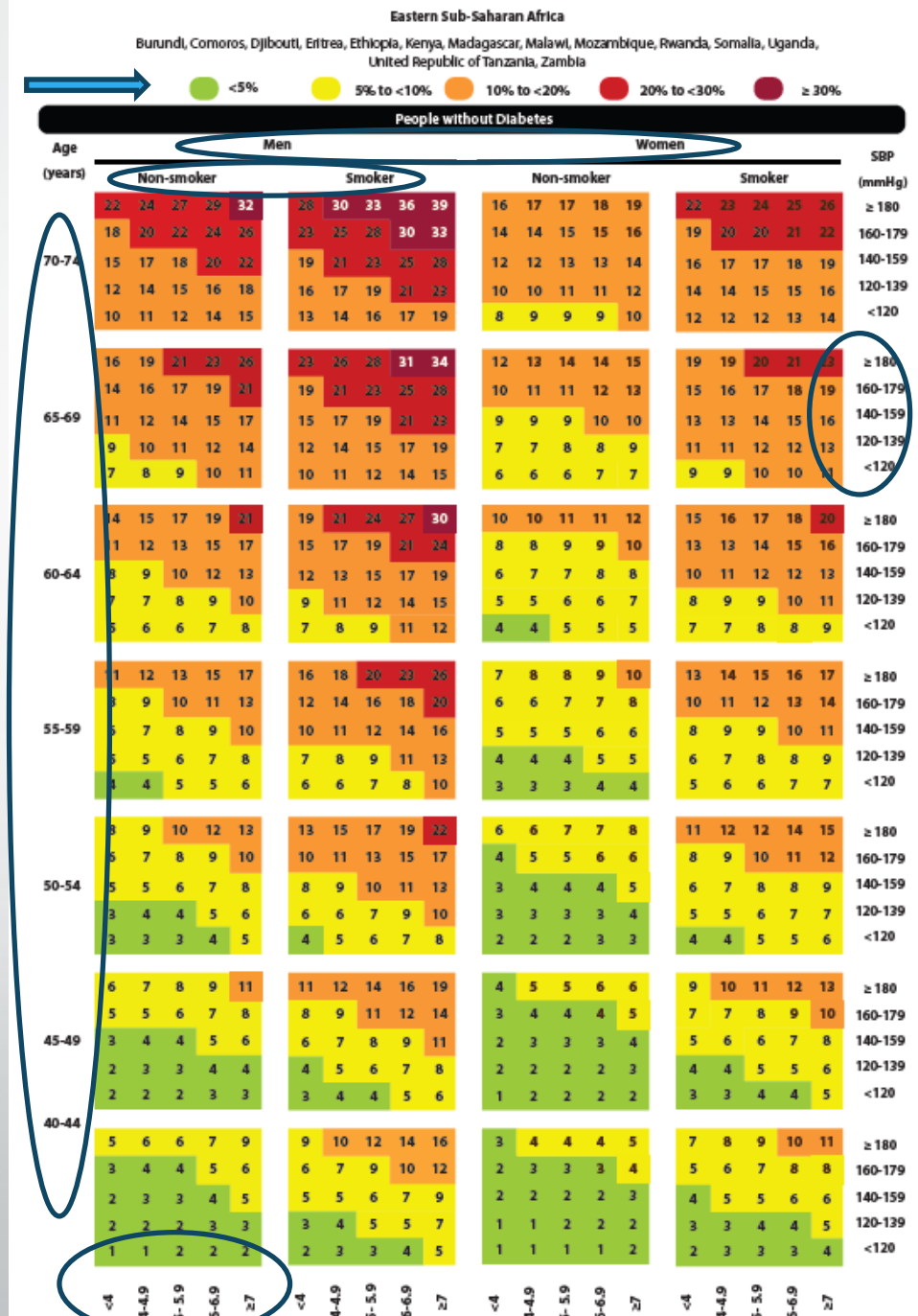
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# Risk prediction chart



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University of Science and Technology

## WHO Cardiovascular Disease Risk Laboratory-based Charts



# Physical activity

- 30 mins per day, dynamic exercise on most days
- Effects of exercise are additive  
=> Incorporate exercise into daily activities
- Join a group – family, workmates, etc to improve motivation
- Create exercise friendly work and living environments



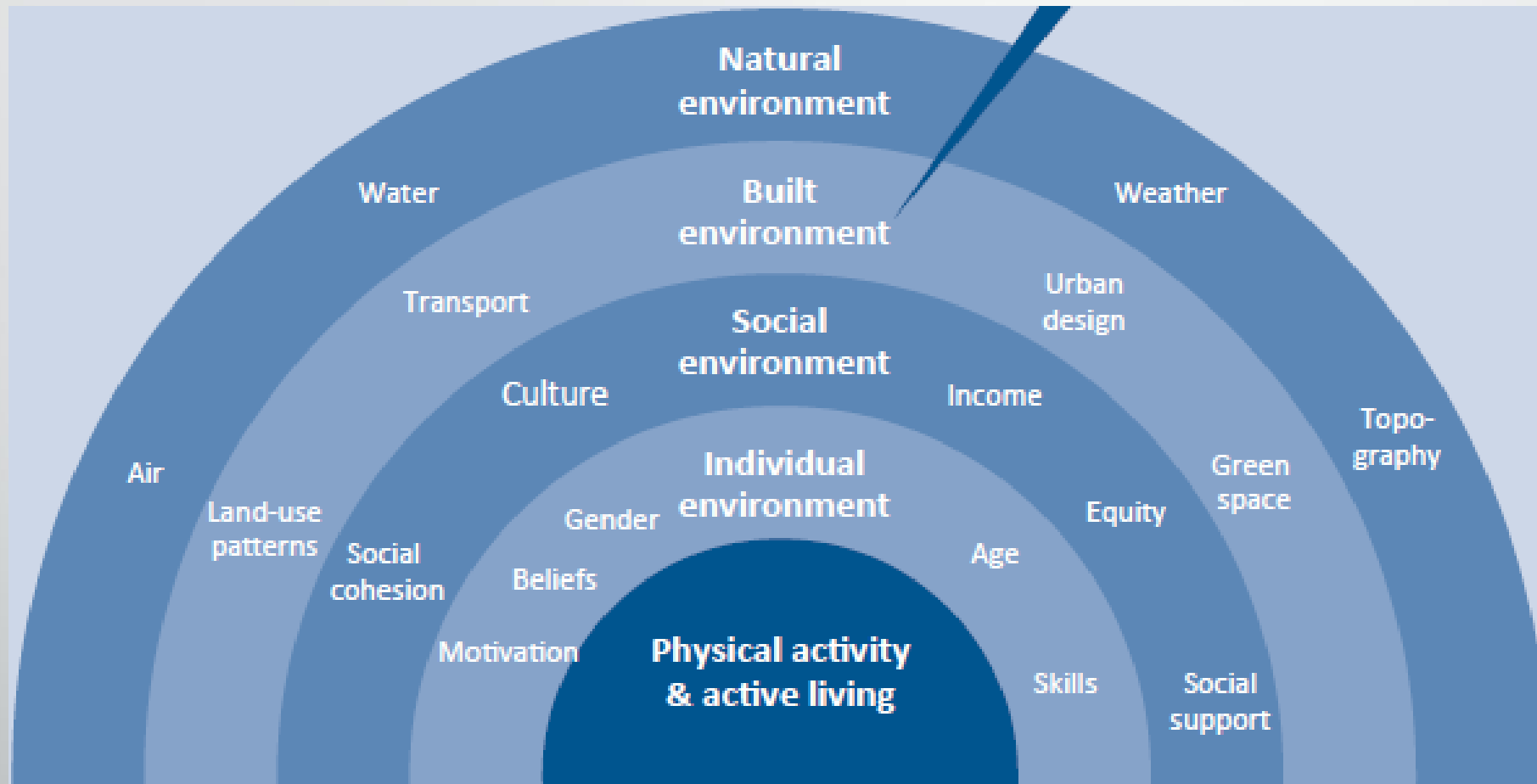
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# Multi-level determinants of physical activity

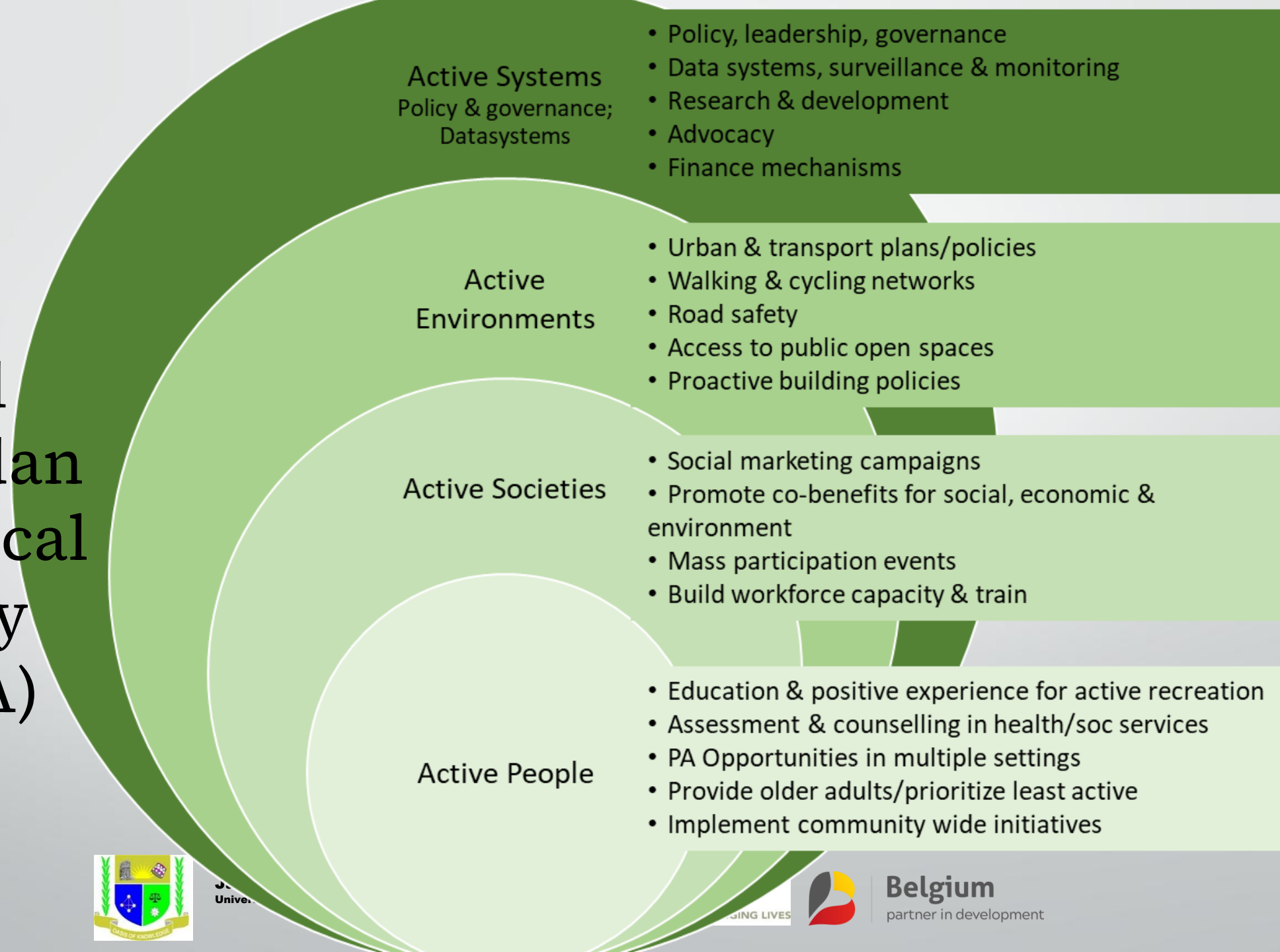


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University of Science and Technology



**Belgium**  
partner in development

# WHO Global Action Plan for Physical Activity (GAPPA)



Jyväskylä  
Univer.

MAKING LIVES



**Belgium**

partner in development

# Physical activity as an example how WHO PEN aligns to our context

- Thirty(30) mins, dynamic exercise on most days of the week for at least 3 months (to achieve physical fitness), then maintain
- Effects of exercise are additive
- Exercise and weight reduction prevents diabetes
- Join a group – family, workmates, etc to improve motivation
- Create exercise friendly work and living environments
- Incorporate exercise into daily activities

For detailed information, [refer to WHO Guidance on physical activity](#)



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University of Science and Technology



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# Use the environment



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development





# Tailor approaches



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University of Science and Technology



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partner in development

# DAY 3



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University of Science and Technology



**Belgium**  
partner in development



# **Session 5:**

# **Patient Counselling and Care**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Key messages for this session

- Counselling provides support to patients to enable behavioural changes.
- All interactions with patients should be utilised as opportunities for **counselling in self-care**.
- Discussion points - Counseling on self care should be **integrated with routine services**.
- All healthcare workers involved in **NCD care should be trained in counseling**.



# Counselling self-care and care in the community

## Counselling

- Counselling can be described as professional guidance and support to help a person to solve a problem.
- Counselling for healthy lifestyles involves guiding and supporting patients toward making changes in certain behaviours to reduce the risk of NCDs.
- Primary health care workers play an important role in helping patients to change their unhealthy behaviours and maintain healthy behaviours.



# Counselling self-care and care in the community (Continue)



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# Counselling self-care and care in the community (**Continue**)

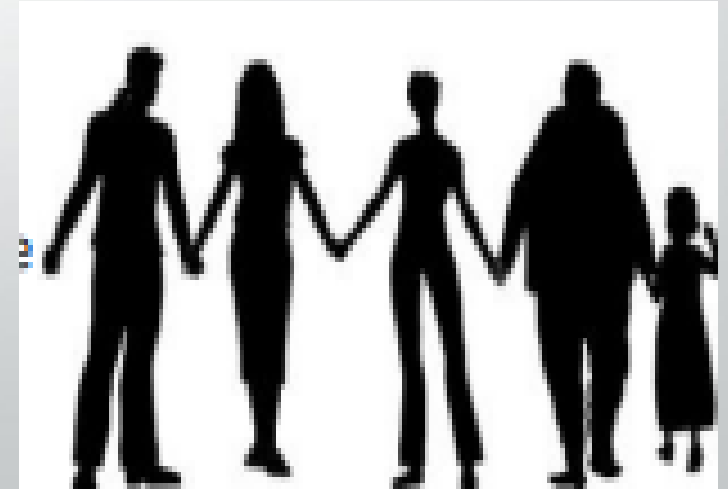
## Guidance on counselling activities

- Understanding behaviour change is important for primary health care providers as they usually provide the first point of contact for patients accessing the health system.
- It is therefore necessary for the primary health care worker to assess and understand the different stages of readiness of the patient to make the required change in behaviour **using 5As brief interventions.**
- Short interactions of **between three and 20 minutes, called brief interventions**, aim to identify a real or potential problem, provide information about it and motivate and assist the patient to do something about it.



# Continuing Care in the Community (Continue)

- NGO or Volunteers could be linked to the health system
- Social support to the affected family by way of
- Helping with transport to hospital
- Linking with other support groups
- Helping to get benefits from various sources
- Rehabilitation
- Emotional support
- Basic nursing, Diabetic foot care
- Follow up



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# Continuing Care in the Community (**Continue**)

## **Expert Patient**

- The origin of the idea of the “expert patient” can be traced back to the 1980s in patient living with HIV/AIDS (PLHA)
- The main thinking behind the “expert patient” approach is that the patients with chronic conditions need not to be mere healthcare recipients, but to take greater responsibilities and work with health providers managing their conditions.
- Self-management education complements traditional patient education in supporting patients to build their confidence and self-esteem, and identify and solve problems with the support of professionals.



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partner in development

# Continuing Care in the Community (Continue)

## Peer educators

- Identifies a patient who has certain credibility in the community.
- The patient then establishes an education program on active urine glucose screening by teaching the other patients in his/her own community or village.
- He or she also counsels the other patients on lifestyle changes, asks them to record glucose strip testing, conducts follow-up, and reports back to the center on a regular basis



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# Counselling and care (*Continue*)

## **The 5As is a tool used for brief interventions**

- It summarizes what a health worker can do to help someone who is ready to change.
- This can be integrated into regular visits by health providers of any level, either at community or facility level.
- Risk-factor counselling should be integrated with existing programme delivery at all levels of care.



# The 5As is a tool used for Brief Interventions

<b>Assess</b>	<p>Assess the patient's readiness to start making a change by asking two question :</p> <ol style="list-style-type: none"><li>1. Are you ready to have a diet that includes more healthy options? Be more physically active? Be a non-smoker? Be a low drinker?</li><li>2. Do you think you will be able to make the change?</li></ol> <p><b>Question 1</b>   <b>Yes</b>   <b>Not Sure</b>   <b>No</b></p> <p><b>Question 2</b>   <b>Yes</b>   <b>Not Sure</b>   <b>No</b></p> <p>Any answer in the shaded area indicates that the person is not yet ready to change. In this Case , effort needs to be made to increase motivation for change</p> <p>Answers in the white area suggest that you and the patient can move on the next step</p>
---------------	--



# Counselling and care (*Continue*)

## The 5As-Ask (Alcohol as an example of Risk Factor)

<b>ASK</b>	Do you ever drink alcohol?	Yes
	No	
	If Yes	
	<ul style="list-style-type: none"><li>● How often do you have an alcoholic drink?</li><li>● How many alcoholic drinks do you have on a usual day when you are drinking?</li></ul>	



# Advice

## Advise

- For people drinking fewer than 2 units (According to local drink strengths and commonly available sizes) per day and drinking on 5 or fewer days per week, inform them of the following.
- Use of alcohol can increase the risk of having a heart attack or stroke
- It also increase the risk of getting certain cancers and can cause damage to other parts of the body.
- Overall, the best way to avoid the health risk of alcohol is to abstain.
- If you do drink alcohol, keep in mind that “less is better”
- Avoid having more than two units on any single day and do not drink any alcohol on at least two days per week.
- Do not drink alcohol for health reasons





# Advice (*Continue*)

## Advise

- Do not use alcohol when you are
  - o Driving
  - o Operating machinery
  - o Pregnant or breastfeeding
  - o Taking medication that interact with alcohol
  - o Living with health conditions that are made worse with alcohol
  - o Having difficulties controlling how much you drink



# Assess

## Assess

- For people who drink two or more units per day, who drink on more than five days per week and/or have any indication that alcohol could potentially be a problem, say:
- Your drinking habits could be harmful to your health, may I ask you few more questions to have a better idea of the possible risks?

YES

NO



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Assist and Arrange

## Assist and arrange

If No:

- Give brief advice. End the discussion positively by saying, “This can be a difficult issue to discuss but I am here to help you.”
- Provide health education materials and information about additional resources such as help lines, counseling, support groups.
- If Yes:
- Give brief advice and refer for further counselling and tests (for which further training, tools and resources are required) See AUDIT test (link below)  
The score will determine next step.



# Assist

<b>Assist</b>	<ul style="list-style-type: none"><li>● Help the person to develop a plan that can increase the chance of success</li><li>● Provide practical counselling that focuses on :<ul style="list-style-type: none"><li>● Provision of basic information about the risk factor</li><li>● Identification of situations that could trigger relapse</li><li>● Ways of coping with trigger situations</li></ul></li><li>● Provide social support including:<ul style="list-style-type: none"><li>● Providing Encouragement</li><li>● Communicating interest and concerns</li><li>● Encouraging the person to talk about the change process with family and friends.</li></ul></li><li>● Provide and ensure availability of health education materials and details about additional resources, such as support groups quit line etc.</li></ul>
---------------	--



# Arrange

## Arrange

- Arrange a follow up contact, by phone or in person, Discuss timing of follow-up with patients. At follow up for all patients:
- Identify problems already experienced as well as a new ones that could arise
- Remind them of the additional support that is available
- Schedule next follow-up visit.
- Refer to specialist services if needed and available
- For those who have made the planned changes:
  - Congratulate them on their success
- For those who have challenges:
  - Remind them to view this as a learning experience
  - Review their circumstances and motivate them to re-commit
  - Link to more intensive support, if available



# The 5Rs Counselling Framework

## 5R's

- When encountering patients who are not willing to change their behaviours.
- The 5 R's counselling framework is a strategy that can be used to see if they might change their minds.





# Roadblocks

## Roadblocks

- I am really interested in learning more about whether you have tried to change your consumption of alcohol in the past.
- Was there a time when you were successfully able to cut back on alcohol consumption?
- I recognize that this must be a challenging situation for you but if you are ready, I think we can explore some of the reasons why this may be a difficult change for you.



# Risks

## Risks

- There are several risk factors that can lead to CVD.
- The awareness of the link between lack of physical activity and the higher risk of CVD.
- This information helps in learning.



# Rewards

## Rewards

- Stopping the use of tobacco is the best change for one's health
- It brings a direct benefit of decreasing risk of CVD and other chronic diseases
- It also brings a noticeable large financial difference over the period of a few months and years.



# Relevance

## Relevance

- It is not easy to change behaviour instantly.
- Need to explore some reasons around this.
- The level of physical activity is having any effect on health and well-being.



# Repetition

## Repetition

- Emphasize the productiveness of the visit.
- With the provided information on the risks and benefits of changing a behaviour, is the patient ready to commit to a change?



# SELF CARE AMONG PATIENTS WITH DIABETES & HYPERTENSION DISEASE

- All patients with NCDs perform some level of selfcare.
- Counselling patients on self-care
- All interactions with patients to understand and improve the self-care strategies of patients.

## Recommendation for all patients recommendations

### Adherence

- Strategies to improve adherence
- Promotion of self care

### Education

- Group education rather than individual education if feasible

## Condition specific

### NCDs

- Self measurement of BP if feasible

### Diabetes

- Self monitoring of blood glucose levels
- Self adjustment of doses





# Counselling on treatment adherence

- Teach the patient how to take the medications at home.
- Show the patient the appropriate dose.
- Explain the difference between medicines for long-term control (for example, of blood pressure) and medicines for quick relief (such as for headaches).
- Explain the reason for prescribing the medicine(s).
- Inform patient of the complications of untreated hypertension, including stroke, heart attack, kidney failure.
- Explain the disability and economic and family burden these preventable complications cause.



# Counselling on Treatment Adherence (**Continue**)

Explain how many times a day the patient should take the medication and at what time, and adopt the following simple steps to help them to adhere to the guidelines:

- Check the patient's understanding before the patient leaves the health centre.

**Explain how important it is for the patient to:**

- Keep an adequate supply of medications safely at home.
- Take the medicines regularly as advised, even if there are no symptoms.
- Explain potential adverse effects of the medications and what to do if the patient experiences them.



## **Group Work:**

**Watch a presentation for the experience by  
Ratta HC on establishing an NCD clinic**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Learning Outcome Session 5

- By the end of the session, participants will obtain knowledge and skills of counselling will be able to provide counselling for adherence to medication and behavioral changes to all patients
- Provide and recommend social support as part of treatment adherence among patients with chronic diseases.
- Gain knowledge in good practice in behavior change and self-management counselling for DM and HTN.



# **Session 6:**

# **Monitoring and Evaluation systems**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Monitoring of NCD Management

- What is Monitoring of NCD Management?
- What is key objective?



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development



# Monitoring of NCD Management (Continue)

## Monitoring

- It's the track keeping or collection, management and use of information to assess whether an activity or program is proceeding according to plan and/or achieving defined targets.
- The purpose of a monitoring system is to support continuous service enhancement.
- The monitoring system should assess the performance of the PHC service delivery system.
- This module, therefore, focuses on measuring the performance of the PHC service delivery system.



# Monitoring of NCD Management (Continue)

## Types of monitoring

- There are two types NCD management indicators
  1. Individual patient monitoring.
  2. Programme monitoring.
- And the main objective for developing a monitoring system is to optimize on service delivery on the health centre than burdening the system while putting into consideration of it recording keeping and the frequency of reporting.
- Training on recording and reporting of data.



## Part 2: Tools for data collection and reporting

- Treatment card
- Identity card
- NCD register (Excel sheet preferable)
- Monthly Report
- Quarterly report
- Annual report



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Models of record keeping

- Data collection and recording could be Paper- based
- This is based on a system of paper-based individual health records, registers, and data collection forms.
- A data collection model using a longitudinal register (paper based or electronic)
- Electronic ; the electronic system should collect and aggregate the facility data exactly as the paper based system
- The health facility should have a electronic data management system



# Monitoring of NCD Management

## Discussion points

- Why is monitoring important ?
- What would you require to monitor health programs?

## Key messages for this session

1. A good health program should have an inbuilt system of monitoring
2. Monitoring assesses whether program activities are proceeding according to plan.
3. Review of records and personal interaction can be effective ways of monitoring
4. Simple actionable indicators should be calculated in the primary care level

To be done by clinical facility assessment, reviewing of its data and that of its patients, analyzing the reports, cohort monitoring for hypertension and diabetes control.



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Learning Outcome Session 6

- By the end of the session, participants will have knowledge on monitoring and evaluation, measuring the performance of the Primary Health Care service delivery system.
- Understand Monitoring and Evaluation systems utilized to support DM and HTN Management initiatives.
- Understand how to monitor and evaluate Patient Level and Program Level Outcomes.
- Participants will revive a functional monitoring and evaluation system in all Primary Health Care facilities for data collection, entry, and reporting for decision making and programming.



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University of Science and Technology



**Belgium**  
partner in development



# **Session 7: Mentoring, Support Supervision and Team-based care**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Team based care

## Need for Team based care

- Many low-resource settings including Kenya have a shortage of physicians and health workers.
- In order to provide patient centred continuous care more effectively, primary care systems can include team-based care strategies in their clinic workflows and protocols.
- Team-based care uses multidisciplinary teams (which may involve new staff, or the shifting of tasks among existing staff).
- Teams can include patients themselves, primary care physicians, and other allied health professionals, such as nurses, pharmacists, counsellors, social workers, nutritionists, community health promoters, or others.



# Advantages of team based care

- Teams reduce the burden on physicians by utilizing the skills of trained health workers.
- Evidence shows that team-based care is effective in improving hypertension control among patients in a cost-effective way.
- Some amount of task shifting/team-based care is already taking place in many settings;
  - this session provides further guidance on how to maximize this approach for greater impact



# Roles and responsibilities of members of the NCD Chronic Care Team

## Physician

- The physician serves as the team leader
- Receives the referral of NCD cases and manages using the existing protocols.
- Trains other team members in NCD management

## Nurse/Clinical Officer

- The nurse or CO shall be responsible for conducting the risk assessment and screening.

## Community Health Promoter

- Provides health information to the client.
- Disseminates health education messages in the community

## The Nutritionist

- Counsels and monitors the patient's compliance to dietary management.



# Task shifting

- Task shifting is the reassignment of clinical and non - clinical tasks from one level or type of health worker to another so that health services can be provided more efficiently or effectively.
- For example, when medical officers are in short supply, some services can be effectively shifted to equipped and well trained non physicians such as clinical officers and nurses, while maintaining quality.



# Advantages of task shifting

- Expanded access to care (more hours of coverage, shorter wait times)
- Better patient support, Improved patient knowledge
- Improved patient adherence to medications
- Better follow-up
- Improved BP control and other patient outcomes (CVD morbidity and mortality)
- Time saving for patient and health care team
- Cost efficient
- Improved patient and physician satisfaction





# Barriers to Task shifting

- Rapid staff turnover
- Retention of training
- Patient attitudes: perception by patients of being treated by non-physician health workers
- Physician attitude and reactions
- Legislation and policy



# Requirements

- Train health care workers in new skills.
- Enable additional health workers to prescribe medications.
- Clearly define roles and responsibilities for different team members.
- Arrange close supervision, mentoring and support by experienced health centre staff.
- Schedule regular clinical team meetings including CMEs and good communications between staff to discuss patient cases and issues, so that they can work together to solve problems.



# Learning Outcome Session 7

- By the end of the session, participants will have knowledge and understating of mentorship, support supervision and team based care model/ system to motivate staff and enhance quality service delivery.
- Understand the role and advantages of team-know care and management of NCDs (DM & HTN).
- Understand the ways through which information is shared and coordinating activities by different professionals in interdisciplinary groups.



# Session 8: Closing



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Theoretical Framework

- Groups to review current Theory of Change and improve it based on local context



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Service Delivery Model

- Complete all the group tasks including finalization of the SDM



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University of Science and Technology



**Belgium**  
partner in development



## Next steps:

- Post Tests (To be completed before lunch break for availability of results)
- Workshop Evaluation Surveys
- Monthly support visit, quarterly visits, data review meetings
- OJT
- Support supervision checklist



# III. RESOURCES

WHO PEN Guideline-

[http://www.who.int/ncds/management/pen\\_tools/en/](http://www.who.int/ncds/management/pen_tools/en/)

Kenya 2024 DM Guideline

Kenya 2024 HTN Guideline

Kenya KEML Guideline:



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# THANK YOU!



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# **HTN MEDICATION**

## **(Later Re-training Session)**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Pharmacological Management

## Introduction:

- Initiation of BP lowering therapy (pharmacological and non-pharmacological) is decided on two criteria:
  - the level of SBP and DBP, and
  - the level of total CV risk
- Hypertension should be managed together with other comorbidities and CV risk factors.



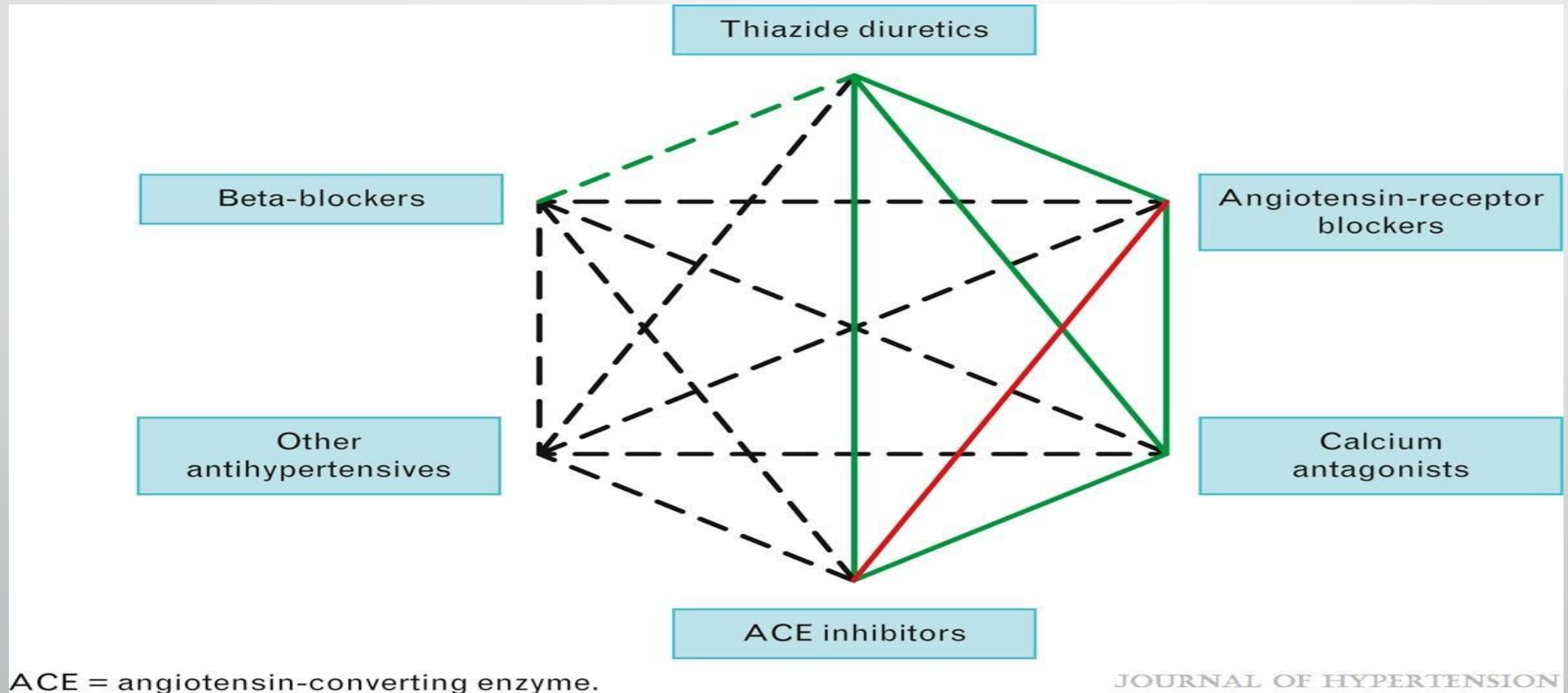
# Antihypertensive Medication - Drugs

- There are five major classes of antihypertensive agents:
  - **A:** Angiotensin Converting Enzyme Inhibitors (ACEIs) and Angiotensin receptor blockers (ARBs);
  - **B:**  $\beta$ -blockers (BBs);
  - **C:** Calcium Channel Blockers (CCBs);
  - **D:** Thiazide or thiazide-like diuretics; and
  - **Z:** others (sympatholytics,  $\alpha$  adrenergic blockers, centrally acting alpha 2-agonists and direct arterial vasodilators
- This last class contains agents that are rarely used, or are obsolete:
  - Sympatholytics and alpha-adrenergic blockers e.g. methyldopa and prazosin
  - Direct arterial vasodilators e.g. hydralazine





# Recommendations for combining BP-lowering drugs and availability as Fixed-dose Combinations



# ACEI and ARBs

MOA: Blockers of Renin Angiotensin System (RAS), reduce production of angiotensin II, and reduce sympathetic nervous system activity, resulting in vasodilation

ACE inhibitor	Captopril	25-50 BD or TDS	50mg TDS	<ul style="list-style-type: none"> <li>• Cough (ACEI)</li> <li>• Hypotension</li> <li>• Increased serum creatinine</li> <li>• Angioedema</li> </ul>
	Enalapril	10-20mg daily in 2 divided doses	20mg twice daily	
	Lisinopril	10mg OD	40mg OD	
	Perindopril	5mg OD	10mg OD	
	Ramipril	2.5 mg OD	10mg OD	
ARB	Candesartan	8mg OD	32 mg OD	
	Irbesartan	150mg OD	300mg OD	
	Losartan	50mg OD	100mg OD	
	Telmisartan	40mg OD	80mg OD	
	Valsartan	80mg OD	160mg OD	
	Olmesartan	20mg OD	40mg OD	

# B- Beta Blockers

**MOA:** Blockers of Beta adrenergic receptors, resulting in reduced heart rate and contractility hence reduced cardiac output. Carvedilol and Labetalol also reduce total peripheral resistance

Class	Examples	Usual monotherapy starting dose	Maximum dose	Possible side effects	Compelling indications
Beta blockers	Atenolol Labetolol Propranolol Carvedilol Nebivolol Metoprolol Bisoprolol	25 mg 200 mg 40 mg 6.25 mg 2.5 mg 25 mg 2.5 mg	100 mg 2500 mg 160 mg 25 mg 5 mg 100 mg 10 mg	Bradycardia Dizziness Fatigue Cold extremities May provoke asthmatic attack E.D. Masks hypoglycemia	IHD CCF Aortic dissection Hyperthyroidism

# C. Calcium Channel blockers

**MOA: Block calcium channels hence reduce intracellular calcium as a result cause vasodilatation(reduced peripheral resistance)**

Class	Examples	Usual monotherapy starting dose	Maximum daily dose	Possible side effects
<b>Long-acting CCB</b>	Amlodipine	5mg OD	10mg OD	<ul style="list-style-type: none"><li>• Oedema</li><li>• Fatigue</li><li>• Headache</li><li>• Palpitations</li></ul>
	Felodipine	5mg OD	10mg OD	
	Nifedipine	Retard tabs:20 mg BD LA tabs: 30mg OD	Retard tabs: 20 mg BD LA tabs: 60 mg OD	

# D: Thiazides and thiazide-like diuretics

MOA: Act in the distal convoluted tubule of the kidney by blocking Na/CL pump hence increase sodium excretion and reduce intravascular volume. Long term , may act as vasodilators.

Class	Examples	Usual monotherapy starting dose	Maximum daily dose	Possible side effects
Thiazide diuretic	Chlorthalidone	25mg 0D	50mg 0D	<ul style="list-style-type: none"><li>• Hypokalaemia</li><li>• Hyponatraemia</li><li>• Hyperuricaemia</li><li>• Hypocalciuria</li><li>• Hyperglycaemia</li></ul>
	Hydrochlorothiazide (HCTZ)	12.5mg 0D	25mg 0D	
Thiazide-like diuretic	Indapamide	1.5mg	2.5mg	<ul style="list-style-type: none"><li>• Rash</li><li>• Dyslipidaemia</li><li>• Erectile dysfunction</li></ul>

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# Z-Others

MOA: Centrally acting alpha 2 agonist; direct arterial dilator;  
alpha 1 receptor blocker

Drug	Minimal dose	Maximum dose	Side effects
Methyldopa	250mg	1000mg	Depression, nightmares, anxiety, poor concentration, fatigue, tachycardia.
Hydralazine	25mg	150mg	Severe allergic reactions Tachycardia Depression, Dizziness Fatigue
Prazocin	0.5mg	10mg	Hypotension, diarrhea, Tachycardia





# Hypertensive emergencies (1)

Definition: Large elevations in SBP or DBP ( $>180\text{mmHg}$  or  $>120\text{mmHg}$ , respectively) associated with impending or progressive Organ Dysfunction including:

- Hypertensive encephalopathy
- Hypertensive left ventricular failure
- Hypertension with myocardial infarction
- Hypertension with unstable angina
- Hypertension with dissection of the aorta
- Severe hypertension associated with subarachnoid haemorrhage or cerebrovascular accident



# Hypertensive emergencies (2)

- Other conditions that present as hypertensive emergencies
  - Crisis associated with pheochromocytoma
  - Use of recreational drugs such as amphetamines, LSD, cocaine or ecstasy
  - Hypertension perioperatively
  - Severe preeclampsia or eclampsia
  - Head injury with intracranial bleeds



# Hypertensive Urgencies

- **Hypertensive urgencies:** are isolated large BP elevations without acute organ damage
- This is often associated with treatment discontinuation or reduction as well as anxiety
- It should not be considered an emergency but treated by reinstitution or optimization of drug therapy and treatment of anxiety



# Management of Hypertensive Emergencies

- Other than in pregnancy, if patient is conscious and able to swallow give oral medication and consult with a physician on plan of management
- If patient is unconscious refer immediately to a health centre



# **DM MEDICATION**

## **(Later Re-training Session)**



**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# DM Pharmacological treatment

- Insulin (Type 1 and Type 2 DM)
- Sulfonylurea (Type 2 DM)
- Biguanides (Type 2 DM)
- Meglitinides (Type 2 DM)
- Thiazolidinediones Glitazones (Type 2 DM)
- $\alpha$ -Glucosidase inhibitors (Type 2 DM)
- Incretin mimetic (Type 2 DM)
- DPP4 inhibitors (Type 2 DM)
- Amylin analogs (Type 1 and Type 2 DM)
- SGLT2 Inhibitors (Type 2 DM)





# Drug Therapy: Insulin

## Exogenous insulin:

- Required for all patient with type 1 DM
- Prescribed for the patient with type 2 DM who cannot control blood glucose by other means

## Source of insulin

### Human insulin

- ☐ Most widely used type of insulin
- ☐ Cost-effective & less allergic reaction
- Insulins differ in regard to onset, peak action, and duration
- Different types of insulin may be used for combination therapy



# Drug Therapy: Insulin (**Continue**)

## Types of insulin

- Regular insulins
- Insulin analogs
- Pre-mixed insulin

## Methods of Insulin Administration

- Cannot be taken orally
- Insulin delivery methods
  - ☐ Ordinary SQ injection with syringes
  - ☐ Insulin pen
  - ☐ Insulin pump



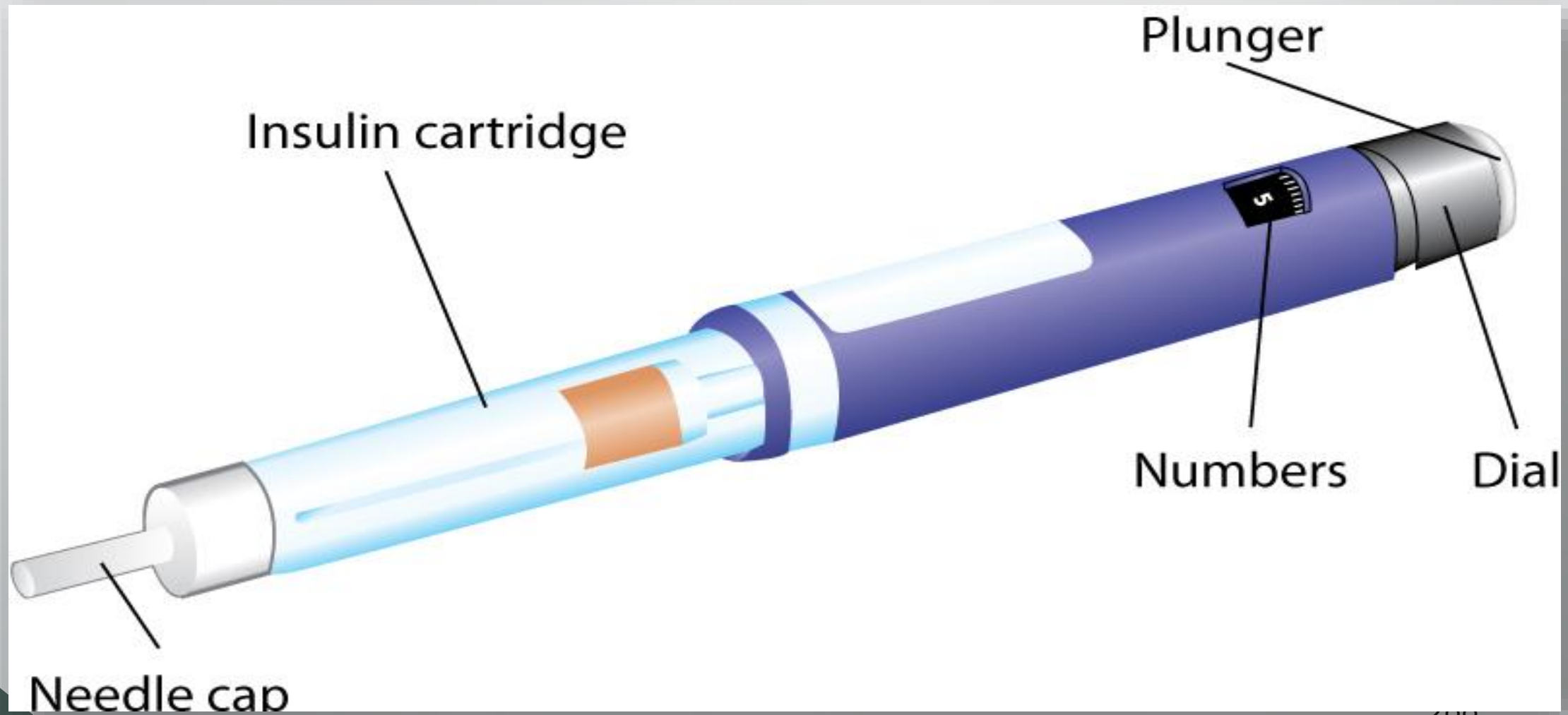
# Drug Therapy: Insulin (**Continue**)

## According to onset:

- Rapid-acting insulin e.g. Insulin lispro and insulin aspart
- Short-acting insulin e.g. Regular insulin
- Intermediate-acting insulin e.g. NPH and Lente insulin
- Long-acting insulin e.g. Insulin Glargine
- Mixture of insulin can provide glycemic control over extended period of time e.g. Humalin 70/30 (NPH + regular).



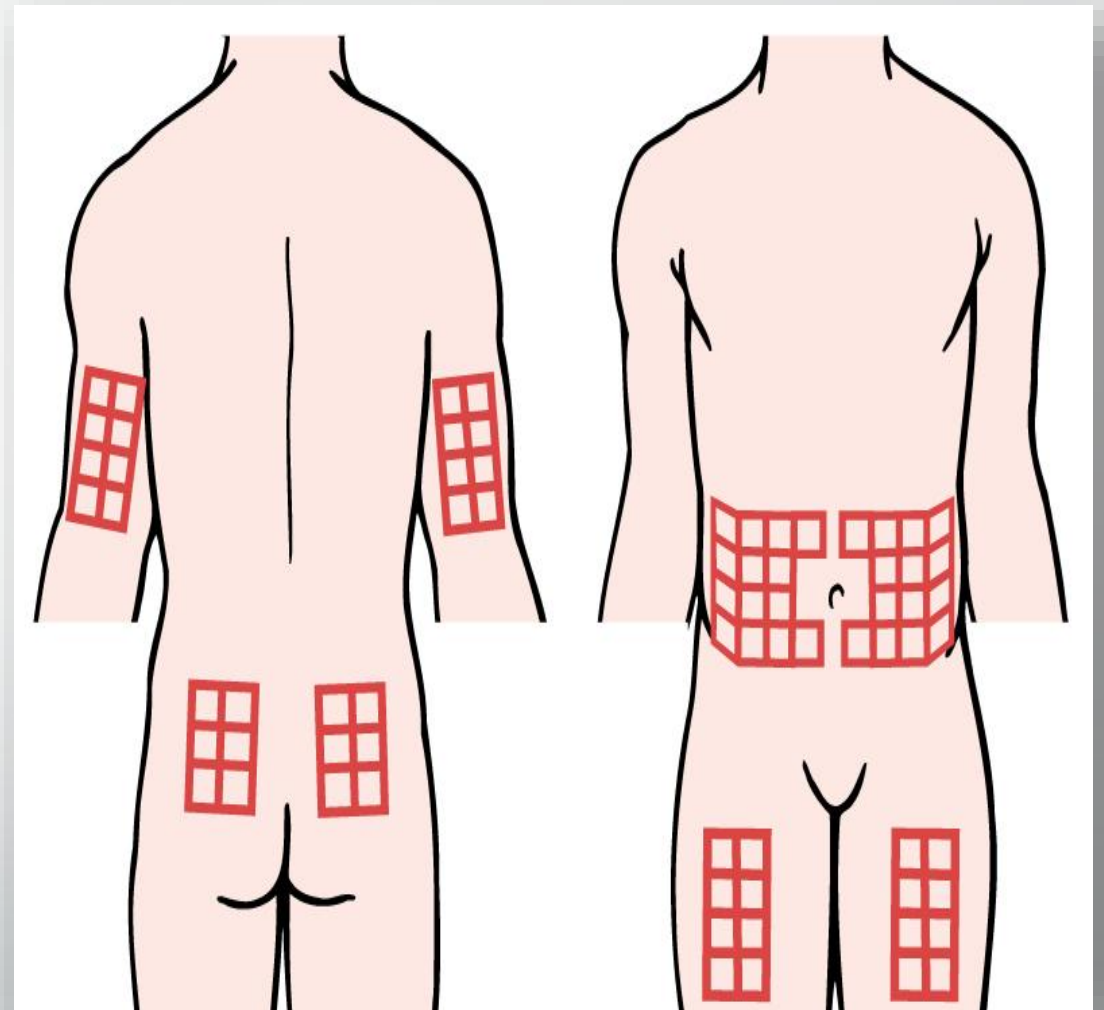
# Drug Therapy: Insulin (**Continue**)



# Drug Therapy: Insulin (**Continue**)

## Administration of insulin

- Fastest absorption from abdomen, followed by arm, thigh, buttock
- Rotate injections within one particular site
- Do not inject in site to be exercised



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**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Drug Therapy: Insulin (**Continue**)

## Problems with insulin therapy

- Hypoglycemia :
  - ❑ Due to too much insulin in relation to glucose availability
- Allergic reactions
- Local inflammatory reaction
- Lipodystrophy
  - ❑ Hypertrophy or atrophy of SQ tissue due to frequent use of same injection site





# Drug Therapy: Insulin (**Continue**)

## Drugs interfering with glucose tolerance

- Diazoxide
- Thiazide diuretics
- Corticosteroids
- Oral contraceptives
- Streptazocine
- Phenytoin

☐ *All these drugs increase the blood glucose concentration.*



# Drug Therapy: Oral Agents

- Increase insulin production by pancreas
- Reduce glucose production by liver
- Enhance insulin sensitivity and glucose transport into cell
- Slow absorption of carbohydrate in intestine



# Sulfonylureas

- Stimulate the pancreatic secretion of insulin

## **Classifications:**

### *First generation*

- e.g. tolbutamide, chlorpropamide, and acetohexamide

### *Second generation*

- e.g. glimepiride, glipizide, and glyburide



# Sulfonylureas (Continue)

## Side effects

- Hypoglycemia
- Hyponatremia (with tolbutamide and chlorpropamide)
- Weight gain



# Meglitinides

- E.g Repaglinide, Nateglinide
- Stimulate the pancreatic secretion of insulin
- Should be given before meal or with the first bite of each meal.
- Should not be taken if meal skipped
- Lower incidence of hypoglycemia (0.3%)



# Biguanides

- E.g Metformin

## **Act by**

- Reduces hepatic glucose production
- Increases peripheral glucose utilization
- Does not promote weight gain

## **Side effects**

- Nausea, vomiting, diarrhea, and anorexia
- lactic acidosis (rare)





# Glitazones (PPAR $\gamma$ - Agonists)

- E.g Rosiglitazone - Pioglitazone
- Act by stimulation of peroxisome proliferator-activated receptor  $\gamma$ 
  - Reduces insulin resistance in the periphery and possibly in the liver
- Most effective in those with insulin resistance
- Edema and weight gain are the most common side effects.



# $\alpha$ -Glucosidase Inhibitors

- E.g Acarbose - Miglitol
- **Act by**
  - ☐ Slow down absorption of carbohydrate in small intestine
  - ☐ Prevent the breakdown of sucrose and complex carbohydrates
  - ☐ The net result reduction of postprandial blood glucose rise



# Amylin analog

- Indicated for type 1 and type 2 diabetics
- Administered subcutaneously (Thigh or abdomen)
- Slows gastric emptying, reduces postprandial glucagon secretion, increases satiety
  - Example : **Pramlintide (Symlin)**



# Incretin mimetic

- Synthetic peptide
- Given by subcutaneous injection
- Activates GLP-1 receptor
- This results in :
  - ☐ Stimulates release of insulin from  $\beta$  cells
  - ☐ Suppresses glucagon secretion
  - ☐ Reduces food intake
  - ☐ Slows gastric emptying
- Not to be used with insulin
- Example : Exenatide - liraglutide



# DPP4-Inhibitors

- Inhibits DPP-4
- This results in increase of GLP-1 action leading to improved pancreatic islet glucose sensing, increase glucose uptake
- Example : Sitagliptin - Linagliptin



# SGLT-2 Inhibitors

- SGLT-2 :Sodium Dependent Glucose Transporters – 2
- Inhibit glucose reabsorption in renal proximal tubule
- Resultant glucosuria leads to a decline in plasma glucose & reversal of glucotoxicity
- This therapy is simple & nonspecific
- Even patients with refractory type 2 diabetes are likely to respond





# Pharmacotherapy :Type 2 DM

## General considerations:

- Consider therapeutic life style changes (TLC) for all patients with Type 2 DM
- Initiation of therapy may depend on the level of HbA1C
  - ☐ HbA1C < 7% may benefit from TLC
  - ☐ HbA1C 8-9% may require one oral agent
  - ☐ HbA1C > 9-10% may require more than one oral agent



# Pharmacotherapy: Type 2 DM (Continue)

## Obese Patients:

- Metformin or glitazone then if inadequate
- Add SU or short-acting insulin secretagogue then if inadequate
- Add Insulin or glitazone



# Pharmacotherapy: Type 2 DM (Continue)

## Non-Obese Patients :

- Add SU or short-acting insulin secretagogue then if inadequate
- Add Metformin or glitazone then if inadequate
- Add Insulin



# Pharmacotherapy: Type 2 DM (Continue)

## Early insulin resistance :

- Metformin or glitazone then if inadequate
- Add glitazone or metformin then if inadequate
- Add SU or short-acting insulin secretagogue or insulin



# Pharmacotherapy :Type 1 DM

- The choice of therapy is simple
  - ❑ All patients need Insulin
- The goal is:
  - ❑ To balance the caloric intake with the glucose lowering processes (insulin and exercise), and allowing the patient to live as normal a life as possible



# Pharmacotherapy: Type 1 DM (Continue)

- The insulin regimen has to mimic the physiological secretion of insulin
- With the availability of the SMBG and HbA1C tests adequacy of the insulin regimen can be assessed
- More intense insulin regimen require more intense monitoring

## Example:

1) Morning dose (before breakfast):

Regular + NPH or Lente

2) Before evening meal:

Regular + NPH or Lente

- Require strict adherence to the timing of meal and injections





# Pharmacotherapy: Type 1 DM (Continue)

## Modification

- NPH evening dose can be moved to bedtime
- Three injections of regular or rapid acting insulin before each meal + long acting insulin at bedtime (4 injections)
- The choice of the regimen will depend on the patient

## How much insulin ?

- A good starting dose is 0.6 U/kg/day
- The total dose should be divided to:
  - ☐ 45% for basal insulin
  - ☐ 55% for prandial insulin



# Pharmacotherapy: Type 1 DM (Continue)

## Self-monitoring of blood glucose(SMBG)

- Extremely useful for outpatient monitoring specially for patients who need tight control for their glycemic state.
- A portable battery operated device that measures the color intensity produced from adding a drop of blood to a glucose oxidase paper strip.
- e.g. One Touch, Accu-Chek, DEX, Prestige and Precision.

## Insulin Pump Therapy

- This involves continuous SC administration of short-acting insulin using a small pump
- The pump can be programmed to deliver basal insulin and spikes of insulin at the time of the meals
- Requires intense SMBG
- Requires highly motivated patients because failure to deliver insulin will have serious consequences



# Self Monitoring Test

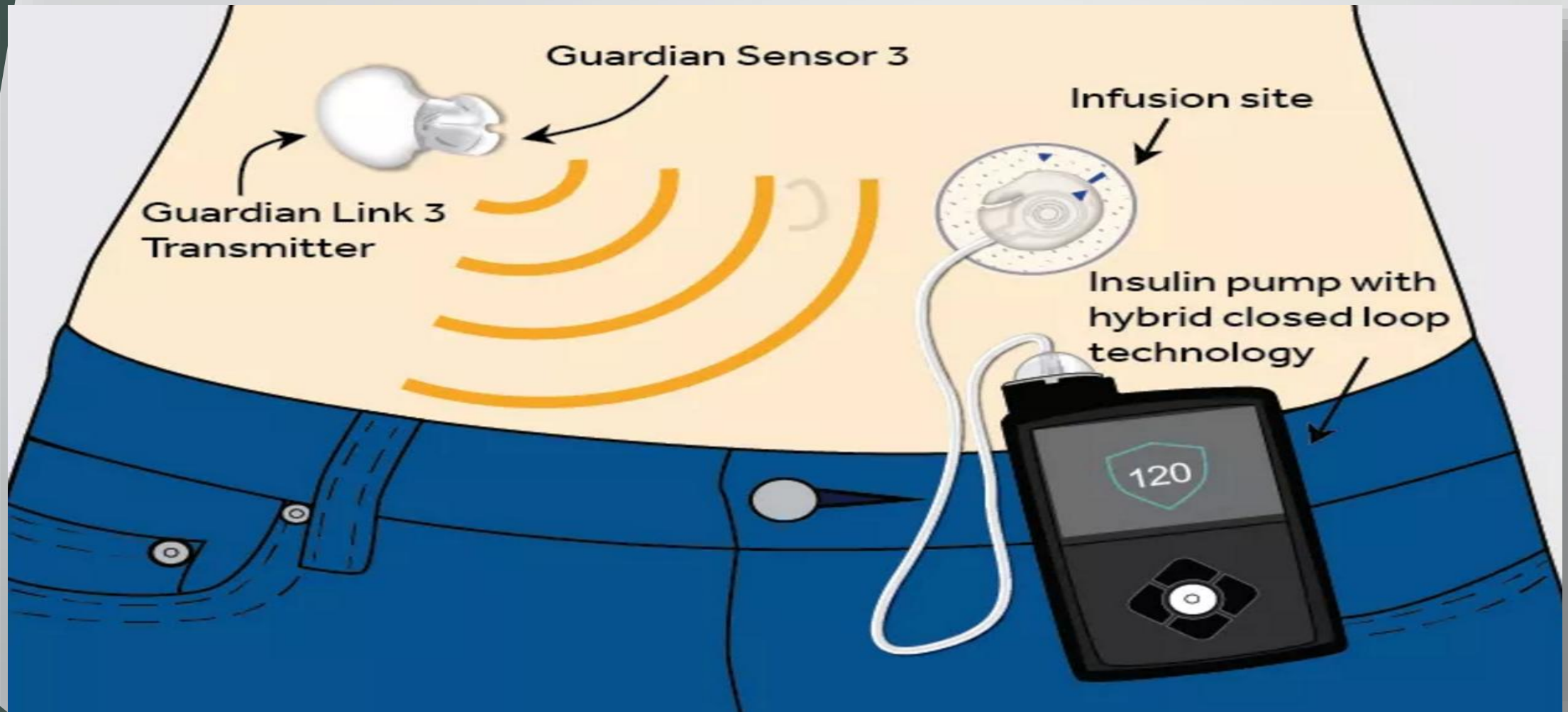


**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development

# Pharmacotherapy :Type 1 DM



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**Jaramogi Oginga Odinga**  
University of Science and Technology



**Belgium**  
partner in development