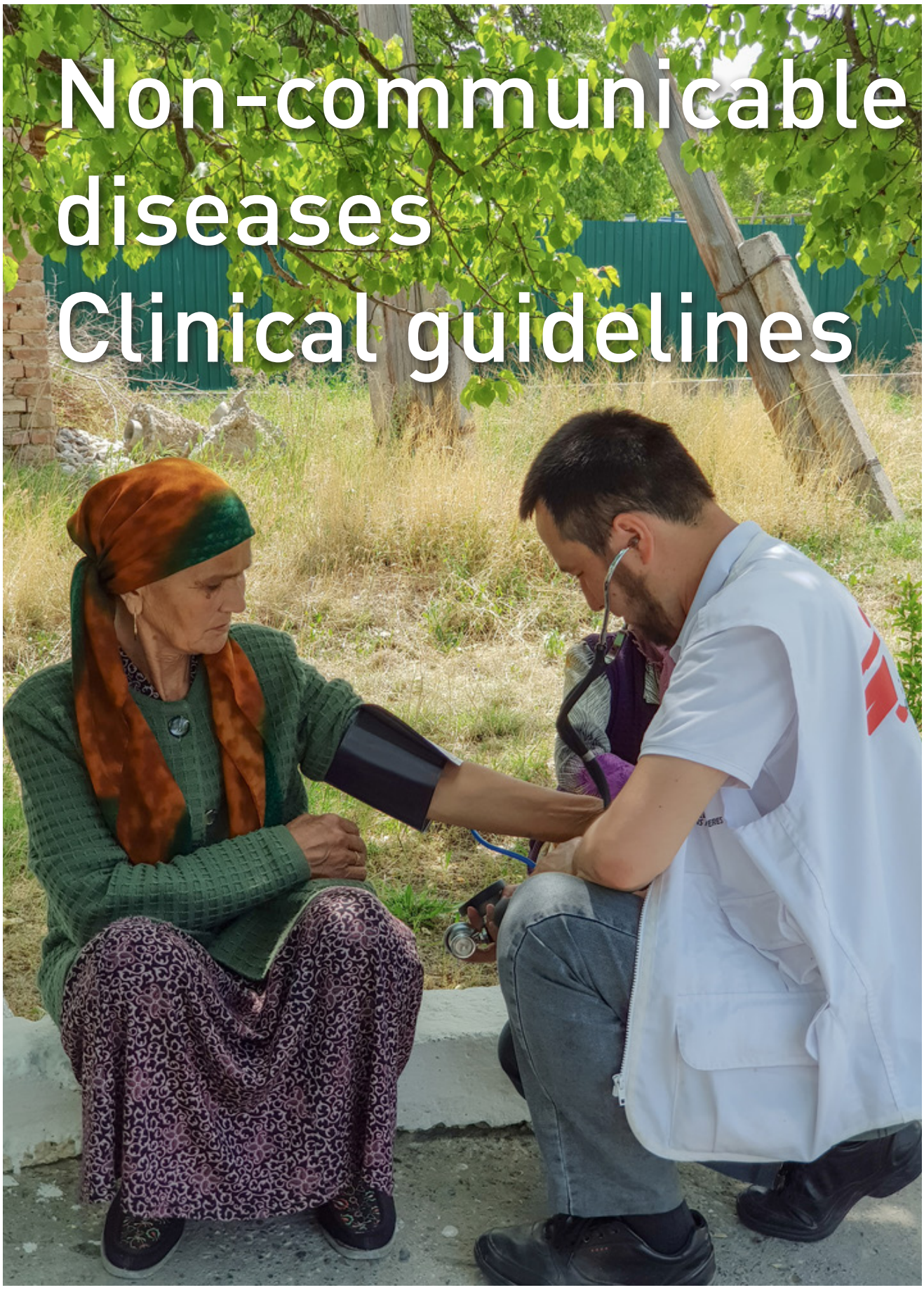
Non-communicable diseases Clinical guidelines



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1st Edition – 2025

MEDECINS SANS FRONTIERES

Non-communicable diseases
Clinical guidelines

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Acknowledgments
This document is a complete revision of the original MSF OCA NCD Guidelines, and a collaboration among MSF Inter-sectional Medical Platforms, Medical Directors and the International Medical Coordinator.

The content was approved by the Medical Directors in June 2024.

Editor and feedback contact
Amulya Reddy (amulya.reddy@london.msf.org)

ABBREVIATIONS AND ACRONYMS

ACE	angiotensin converting enzyme
ACS	acute coronary syndrome
AED	antiepileptic drug
AF	atrial fibrillation
AHF	acute heart failure
APT	antiplatelet therapy
ARB	angiotensin ll receptor blocker
ART	antiretroviral therapy
BiPAP	bilevel positive airway pressure (non-invasive ventilation)
BMI	body mass index
BP	blood pressure
CCB	calcium channel blocker
CKD	chronic kidney disease
COPD	chronic obstructive pulmonary disease
CPAP	continuous positive airways pressure
CT	computerized tomography
CVD	cardiovascular disease
DBP	diastolic blood pressure
DKA	diabetic ketoacidosis
DVT	deep venous thrombosis
ECG	electrocardiagram
EEG	electroencephalogram
EF	ejection fraction
eGFR	estimated glomerular filtration rate
FAST	Face Arm Speech Time test
FEV1	forced expiratory volume in 1 second
FVC	forced vital capacity
GI	gastro-intestinal
HF	heart failure
HIV	human immunodeficiency virus
HOB	head of bed
HR	heart rate
ICH	intra-cerebral haemorrhage
ICS	inhaled corticosteroid
ICU	intensive care unit
IM	intramuscular
INR	international normalised ratio
IS	ischemic stroke
IV	intravenous
LABA	long-acting beta-agonist
LFT	liver function tests
LMIC	low- and middle-income countries
LTRA	leukotriene receptor antagonist
LVEF	left ventricular ejection fraction
MDI	metered dose inhaler
MDR-TB	multidrug-resistant tuberculosis
MI	myocardial infarction
mMRC	modified Medical Research Council
NCD	non-communicable diseases
NG	naso-gastric
NSTEMI	non-ST elevation myocardial infarction
OAC	oral anticoagulation
PO	per os – by mouth
POCUS	point of care ultrasound
PSAP	post stroke aspiration pneumonia
RR	respiratory rate
SABA	short-acting beta-agonist
SAMA	short-acting muscarinic antagonist
SBP	systolic blood pressure
SGLT-2	sodium-glucose cotransporter-2
SOUT	stroke of unknown type
SPC	single pill combinations
SpO_2	blood oxygen saturation by pulse oximetry
STEMI	ST elevation myocardial infarction
SVT	supra-ventricular tachycardia
T3	triiodothyronine
T4	thyroxine
TB	tuberculosis
TE	thromboembolism
TIA	transient ischaemic attack
TSH	thyroid stimulating hormone

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Part 1.
Chronic care

1. INTRODUCTION

© MSF/Oliver Barth I MSF wards in the District Hospital of Magaria, Niger

1.1 Non-communicable diseases and humanitarian settings

Non-communicable diseases (NCD) have entered humanitarian settings for the long term as protracted crises in low- and middle-income countries (LMIC) have become the norm.

Global successes in some areas of public health and economic development have led to increased longevity and NCD risk, in part due to unhealthy lifestyle influences. NCD prevalence has increased, with progressive severity and disability regardless of income level, and with additional negative effects on concurrent infections such as HIV, tuberculosis, and some neglected tropical diseases.[1] The growing NCD burden is increasing poverty-associated inequity across countries.[2]

About 74% of total deaths worldwide are NCD-related; 77% of these occur in LMIC. 80% of NCD deaths are premature (occurring before age 70 years); 86% of premature deaths occur in LMIC.[3]

1.2 Definition of scope

MSF uses the term non-communicable diseases for prevalent conditions among people presenting for care:

- asthma and chronic obstructive pulmonary disease
- diabetes
- hypertension and cardiovascular diseases
- epilepsy
- hypo- and hyperthyroidism
- chronic kidney disease.

Other conditions (e.g. sickle cell disease, thalassaemia, some cancers) are addressed with programme-specific protocols, which are beyond the scope of this guideline.

1.3 Using MSF NCD guidelines

This document focuses on chronic clinical care, primarily for adults. It links to MSF Emergency and Critical Care, Paediatric Care, Non-communicable Diseases in Pregnancy, Mental Health, Manual of Nursing Care Procedures, Nutrition, and Tuberculosis guidance for specific needs.

It is intended for use in electronic format given the links to other specialist documents. Annexes contain materials with additional details and summaries to facilitate printing as needed (e.g. protocol summaries in Annex 1). The chapters are structured to introduce the condition and discuss the clinical approach, patient assessment and management, including self-management.

Advanced disease and/or complications may require local, telemedicine or headquarters specialist support. Clinical care is to be delivered with the person-centred approach described in the MSF Chronic Care programmatic guidelines. This approach entails team-based care and to facilitate service delivery, this document is written for all staff of different cadres who will engage in NCD care.

1.4 Person-centred care

For long-term NCD management, person-centred care that promotes shared decision making and self-management can lead to higher retention, better medical outcomes, and improved quality of life.[4]

People presenting for NCD care must be supported and empowered in self-management of their conditions over time. Non-pharmacologic interventions and enabling teaching points are emphasized in each chapter. A general summary is in Annex 2 and education materials are linked.

2. ASTHMA

© Mariana Abdalla/MSF I Caring for isolated communities in Portel, Brazil

Asthma is a chronic inflammatory disorder of the airways, characterised by reversible airflow constriction triggered by allergic or irritant stimuli.

Life-threatening exacerbations (acute worsening of symptoms) can occur, requiring emergency treatment to prevent death.

Risk factors include family history, environmental exposure to air pollution (outdoor and indoor) and occupational exposure to chemicals or dust.

Asthma affects an estimated 262 million people worldwide. It is the most common chronic disease among children.[5]

2.1 Approach

The diagnosis is clinical.

Asthma should be considered in a patient with episodic and recurrent

- dry cough
- difficulty breathing or shortness of breath and wheeze
- chest tightness.

Symptoms can vary in frequency and severity.

They typically

- occur several times a day or week
- worsen in the night (often disturbing sleep) and morning, then improve later in the day.

Symptoms may be linked to the risk factors above, and/or triggered by

- exercise (exercise-induced asthma)
- exposure to allergens or irritants (e.g. cold air, perfumes, animal dander, dust)
- viral infections
- certain drugs (e.g. aspirin, non-steroidal anti-inflammatory drugs (NSAIDs), beta blockers).

Recurrent attacks of breathlessness and wheezing frequently cause daytime fatigue, reduced activity levels and days missed in school or work.

Asthma diagnosis is difficult in children < 5 years, in part since wheezing can occur with viral infections – see Paediatric Care.

2.2 Patient assessment

2.2.1 Patients with exacerbation

For patients with symptoms or signs of exacerbation

- assess severity using Figure 2.1 (see Paediatric Care for children < 5 years)
- follow emergency protocol.

FIGURE 2.1. ASTHMA SEVERITY ASSESSMENT

SYMPTOMS	MILD	MODERATE	SEVERE OR LIFE-THREATENING
Shortness of breath	While walking	At rest Infant: difficulty feeding	At rest Infant: unable to feed
SpO_2	> 94%	90 to 94%	< 90%
Talking or crying	Sentences Long strong cry	Short sentences Shortened cry	Words Weak cry Unable to speak/cry
Wheeze	Mild, at end of expiration	Loud, throughout expiration	Loud, throughout inspiration and expiration, or absent (silent chest)
Respiratory rate	Child: mild increase Adult: normal	Child: moderate increase Adult: < 30/minute	Child: severe increase Adult: ⩾ 30/minute

Heart rate	Child: normal range for age Adult: normal	Child: mild to moderate tachycardia for age Adult: < 120/minute	Child: tachycardia (or bradycardia) for age Adult: ⩾ 120/minute or bradycardia
Mental state	Normal	Normal	Agitated, drowsy or confused
Accessory muscle use	None	Mild to moderate	Moderate to maximal (or exhaustion)
Other			Cyanosis Hypotension

SpO_2, blood oxygen saturation by pulse oximetry

2.2.2 Patients without exacerbation

For patients without severe symptoms or signs

- take a complete history, including exacerbations/hospitalizations
- check vital signs (respiratory rate (RR), oxygen saturation with pulse oximeter (SpO_2), heart rate (HR)
- perform lung auscultation, listening for
  - expiratory wheeze throughout the chest when symptomatic
  - normal air flow when asymptomatic
- assess severity – the frequency of symptoms and how they affect daily activities – to decide which treatment step is needed
- assess psychological impact (screen for depression) and family support.

2.2.3 Investigations

If available, spirometry or peak expiratory flow measurement (Annex 3) can be helpful:

- In people > 5 years of age, asthma is confirmed on spirometry if forced expiratory volume in 1 second (FEV1) improves ⩾ 200 ml from baseline in response to a bronchodilator or a corticosteroid trial.[6]
- Peak expiratory flow rate increase of ⩾ 60 l/minute with a bronchodilator or corticosteroid trial supports an asthma diagnosis.[7]

2.2.4 Differential diagnoses

Main differential diagnoses include

- in children – bronchiolitis, bacterial tracheitis (inspiratory stridor > expiratory wheeze), foreign body aspiration (often focal wheezing), cardiac disease, congestive heart failure, pulmonary oedema, tuberculosis (TB)

- in adults – TB, chronic obstructive pulmonary disease (COPD), lung cancer, bronchiectasis, pulmonary embolism, heart failure, pulmonary fibrosis, gastro-oesophageal reflux.

Asthma and COPD symptoms are similar and can overlap. Figure 2.2 can help with the differential diagnosis.

FIGURE 2.2. COMPARISON OF ASTHMA AND COPD CHARACTERISTICS

CHARACTERISTICS	ASTHMA	COPD
Age at onset	Often during childhood Can be newly diagnosed in adults	Usually > 40 years
Cough	Intermittent	Chronic
Sputum production	If ongoing respiratory infection	Chronic
Symptom pattern	Intermittent	Persistent and progressively worsening
	Variable from day to day	
	Worse at night and early morning	
Personal/family history	Asthma, allergy, atopy	Smoking history or other long-term smoke exposure (indoor pollution, cooking, second hand)
NCD comorbidities	Not often present	Often present

Findings that favour an asthma diagnosis include

- personal history of atopy (eczema, allergic rhinitis or conjunctivitis) and/or a family history of atopy or asthma (but their absence does not exclude asthma)
- in adults, peak expiratory flow rate improvement ⩾ 60 ml/minute from pre- to post-bronchodilator.
- no evidence of other conditions (e.g. pneumonia, TB) on chest x-ray.

If the diagnosis is in doubt, a corticosteroid trial (Annex 3) can be used. Response supports asthma while the probability of asthma is lower if the person does not respond to it.

2.3 Management

The treatment goals are to control asthma and maintain quality of life by

- reducing symptoms and need for short-acting "reliever" medications
- maintaining lung function and activity levels
- reducing risk of exacerbation, emergency care and hospitalization.

Management of asthma involves lifestyle modification and inhaled corticosteroid (ICS)-based pharmacological therapy tailored to the severity of the condition.

Treatment of the following conditions may improve asthma control: allergic rhinitis and sinusitis, gastro-oesophageal reflux, and mental health conditions (e.g. depression).

In pregnant people, asthma control is essential to ensure adequate oxygen to the foetus (see NCD in Pregnancy).

2.3.1 Therapeutic patient education for self-management

Essential information

- Explain what asthma is (education materials).
- Explain that the disease can be lifelong; medications and follow up may be needed long term.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
  - Explain "reliever" – a drug that provides immediate relief of acute symptoms; often a blue inhaler (salbutamol).
  - Explain "controller" – a drug that does not provide fast relief but with regular use, prevents acute symptoms from occurring; often a brown inhaler (beclometasone) and/or formoterol/salmeterol (Table 2.5 below).
  - Emphasize the importance of continuing "controller" medication even when symptoms improve, are mild or infrequent.
- Check the patient's understanding of why, when, and how the medications are taken.
- Check inhaler technique (Annex 4; from Manual of Nursing Care Procedures).
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise reducing exposure to indoor air pollution, if possible (e.g. ventilation, cooking outdoors, using alternatives to bio-mass fuels, using fuel-efficient stoves).
- Advise smoking cessation, if appropriate.
- Encourage exercise on a regular basis (Annex 2). The risk of exercise-induced asthma should not limit the patient's participation in sport.

Self-management teaching points

- Ensure the patient can recognise signs requiring emergency care or medical review.
  - Signs requiring emergency care (see Table 1.1)
    - faster breathing, increased breathlessness, chest tightness and/or wheeze
    - difficulty talking or walking
    - bluish or grey colour of the lips and/or nailbeds.
  - Signs requiring medical review
    - increasing use of reliever due to feeling of worsening breathlessness, including at night and before exercise
    - cough.
- Review the asthma action plan with pharmacological self-management (Annex 5).
- Advise influenza and/or pneumococcal vaccination(s), if available and appropriate.

2.3.2 Pharmacological treatment

Chronic asthma requires the stepwise treatment approach shown in Figures 2.3 to 2.6.[8]

- For people > 12 years, combination treatment with low-dose inhaled corticosteroid (ICS) + long-acting beta agonist (LABA) gives better results than medium-dose ICS alone.
  - Budesonide can be substituted for beclometasone (Annex 1).
- If combination inhalers are not available, Figure 2.4 shows the alternate option with ICS use each time a short-acting beta-agonist (SABA) is taken.

Asthma treatment is based on use of inhaled drugs, with a spacer to improve drug delivery to the lungs and reduce the risk of local adverse effects of corticosteroids. Inhalers, including corticosteroids, are safe in pregnancy.

- Start treatment at the step most appropriate to the person's condition
- Maintain control by stepping up or down as needed.
- Provide a spacer device for use with all metered dose inhalers (Annex 4).
- For children < 5 years of age, use Step 1 in Figure 2.3.
  - If no improvement with Step 1, seek paediatric or specialist care – the diagnosis of asthma cannot be made reliably in this age group.

FIGURE 2.3. STEPWISE MANAGEMENT OF CHRONIC ASTHMA IN CHILDREN 5 TO 12 YEARS

ASTHMA TREATMENT			
CHILD 5 TO 12 YEARS			
STEP 1	**STEP 2**	**STEP 3**	**STEP 4**
Symptoms < 2 times/month	Symptoms > 2 times/month but not daily	Symptoms most days; or waking up with asthma once a week or more	Symptoms persist on Step 3 treatment
As needed SABA	Low-dose ICS daily	Low-dose ICS + LABA daily	Medium-dose ICS + LABA daily
		or	or
		Medium-dose ICS daily	Leukotriene receptor antagonist (LTRA)
	Reliever: as needed SABA		

FIGURE 2.4. ASTHMA MEDICATION DOSING FOR CHILDREN 5 TO 12 YEARS

CHILD 5 TO 12 YEARS			
ICS	beclometasone MDI, 50 or 100 µg per inhalation	low dose	50 to 100 µg twice daily
		medium dose	100 to 200 µg twice daily
SABA	salbutamol MDI, 100 µg per inhalation		200 µg as needed
LABA	salmeterol MDI, 25 µg per inhalation		50 µg twice daily
LTRA	montelukast	5 years	4 mg once daily
		6 to 12 years	5 mg once daily

FIGURE 2.5. STEPWISE MANAGEMENT OF CHRONIC ASTHMA IN CHILDREN > 12 YEARS AND ADULTS

ASTHMA TREATMENT					
ADULT & ADOLESCENT > 12 YEARS					
	STEP 1	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**
	Symptoms < 2 times/month	Symptoms > 2 times/month but not daily	Symptoms most days; or waking up with asthma once a week or more	Symptoms persist on Step 3 treatment	Symptoms persist on Step 4 treatment
First choice	Low-dose ICS-formoterol combination as needed		Low-dose ICS-formoterol	Medium-dose ICS-formoterol	Seek specialist advice
			Reliever: as needed low-dose ICS-formoterol		
If ICS-formoterol combination not available	Low-dose ICS each time SABA is taken	Low-dose ICS daily	Low-dose ICS + LABA	Medium or high-dose ICS + LABA	Seek specialist advice
			or	or	
			Medium-dose ICS	High-dose ICS	
	Reliever: as needed SABA				

FIGURE 2.6. ASTHMA MEDICATION DOSING FOR CHILDREN > 12 YEARS AND ADULTS

ASTHMA MEDICATIONS			
ADULT & ADOLESCENT >12 YEARS			
ICS-formoterol	beclometasone - formoterol MDI, 100 µg - 6 µg per inhalation	as needed	100 µg - 6 µg
	maximum 8 inhalations/day (controller + reliever)	low dose	100 µg - 6 µg once or twice daily
		medium dose	200 µg - 12 µg twice daily
ICS	beclometasone MDI, 50 or 100 µg per inhalation	each time SABA is taken	100 µg
		low dose	100 to 250 µg twice daily
		medium dose	250 to 500 µg twice daily
		high dose	> 500 µg twice daily
SABA	salbutamol MDI, 100 µg per inhalation		200 µg as needed
LABA	formoterol MDI, 12 µg per inhalation		12 µg twice daily

- Check adherence and inhaler technique before stepping treatment up. Incorrect inhaler technique is the most common reason for failure to achieve good control.

- Step treatment up every 2 to 6 weeks if there are
  - persistent symptoms (e.g. persistent cough)
  - signs of poor control:
    - using short-acting bronchodilator > 3 times/week
    - waking at night with symptoms > 1 time once a week
    - using inhaler before exercise routinely (exercise-induced bronchoconstriction)
    - requiring emergency care every year or more often.

- If the patient is unwell or breathless, treat as an exacerbation; do not use only step-up treatment.

- Step treatment down if asthma is controlled for 3 months and the patient answers 'No' to all questions in the follow up assessment (2.4.2).
  - Inhaled corticosteroid can be reduced by 25% to 50% of the total daily dose at each visit until the lowest dose that maintains asthma control is reached.

2.4 Follow up

2.4.1 Frequency of visits

- Review 2 weeks after any change in medications.
- Review every 6 months when stable.
- Reevaluate treatment if the patient has required emergency/hospital care.

2.4.2 Follow-up visit procedures

- Check history, exam, and peak flow, if available
- Assess asthma control by asking
  1. Have you had asthma symptoms during the day (cough, wheeze, chest tightness, or breathlessness)?
  2. During the night?
  3. Has your asthma interfered with your activities (e.g. work/school) or sleep?

  An answer of "No" to all 3 questions means the asthma is controlled and the same medications can be continued.

- Adjust medications and schedule 2-week follow up if "Yes" to any of the 3 questions
- Review
  - adherence and inhaler technique
  - adverse effects
  - exercise, weight and in children, growth
  - smoking status and advise stopping if current smoker
  - exposure to indoor air pollution and advise on reducing if possible.
- Address patient concerns, anxiety/depression if present.

2.5 Indications for specialist referral

- Seek local or telemedicine specialist support for the following:
  - diagnostic uncertainty
  - children under 5 years uncontrolled at Step 1 in Figure 2.3.
  - children 5 to 12 years uncontrolled at Step 4 in Figure 2.3.
  - children > 12 years and adults uncontrolled at Step 4 or 5 in Figure 2.5.
  - frequent exacerbations requiring hospitalization.

2.6 Special considerations

2.6.1 People living with HIV

In patients taking ritonavir boost regimens and corticosteroids (inhaled and oral), there is a risk of Cushing syndrome. Beclometasone has the most favourable profile among the inhaled corticosteroids.

2.6.2 People with tuberculosis

The risk of TB is increased in asthma patients on long-term corticosteroid therapy.[9]

In high TB prevalence settings, test for TB before starting corticosteroids. Limit use of corticosteroids to patients who gain clear benefit and use lowest effective doses.

The MSF guideline Tuberculosis has more information.

2.7 Chronic asthma medication summary

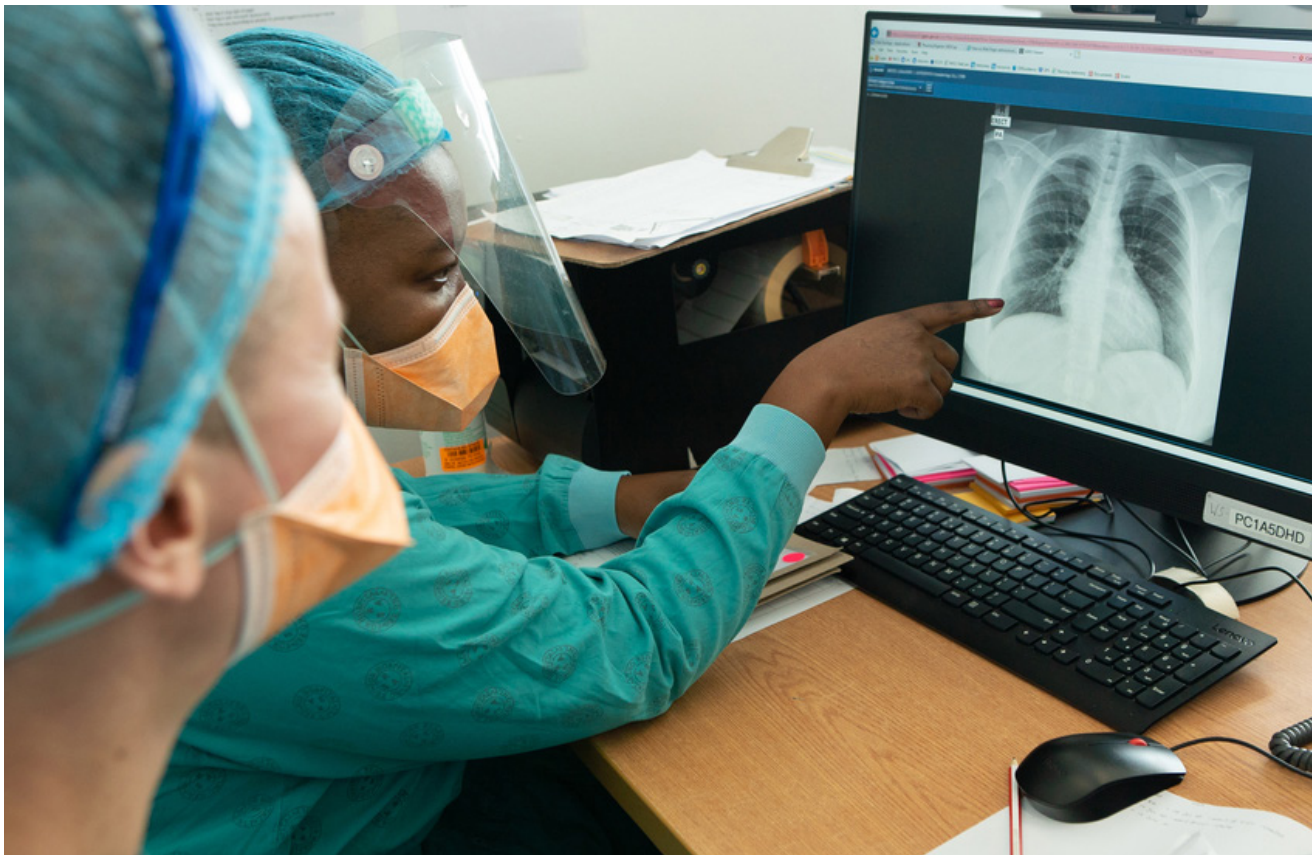
Medications used in treatment steps above are in Figure 2.7.

Protocol summaries are in Annex 1.

FIGURE 2.7. CHRONIC ASTHMA MEDICATION SUMMARY

DRUG CLASS	DRUG	COMMENTS
Inhaled corticosteroid (ICS)	**beclometasone**[10]	Controller medication: steroid is the main treatment for asthma
		Onset of action: initial effect requires several days; does not provide immediate relief but must be used regularly with a spacer for asthma control
		Common adverse effects: throat irritation, oropharyngeal candidiasis - spacer use reduces the risk
Short-acting beta-2-adrenoceptor agonist (SABA)	**salbutamol**[11]	Reliever medication: bronchodilator
		Onset of action: within minutes; duration of action: ± 4 hours
		Common adverse effects: headache, tremor, tachycardia
Long-acting beta-2-adrenoceptor agonist (LABA)	**formoterol**[12]	Controller medication: bronchodilator with longer duration of action than SABA
		Low dose can be used in combination with ICS as needed for people ⩾ 12 y (Figure 1.4)
		Common adverse effects: same as salbutamol
Long-acting beta-2-adrenoceptor agonist (LABA)	**salmeterol**[13]	Controller medication: bronchodilator with longer duration of action than SABA
		Do not use more than 2 times daily (never 'as needed')
		Must be used with ICS
		Common adverse effects: same as salbutamol
Leukotriene receptor antagonist	**montelukast**[14]	Controller medication
		Avoid in pregnant and breastfeeding women (limited data)
		Common adverse effects: headache, gastrointestinal disturbances, skin reactions, increased risk of upper respiratory tract infections

3. CHRONIC OBSTRUCTIVE PULMONARY DISEASE



© Rowan Pybus (@Makhulu_)/MSF I X-ray in Khayelitsha Field Hospital , South Africa

Chronic obstructive pulmonary disease (COPD) is characterised by progressive airflow limitation that is not fully reversible.

Exacerbations can occur, requiring emergency treatment.

Cigarette smoking is the most significant risk factor for COPD. Other risk factors include second-hand smoke inhalation, smoking marijuana, exposure to high levels of indoor air pollution from burning biomass fuel for cooking in poorly ventilated housing, and occupational exposure to dusts, chemicals, and fumes.

COPD caused 3.23 million deaths in 2019. It is the third leading cause of death worldwide.[15]

3.1 Approach

The diagnosis is clinical. Symptomatic patients > 40 years of age with the risk factors above should be evaluated.

Presence of two or more of the following is suggestive of COPD:

- dyspnoea (breathlessness), particularly with exercise and/or wheeze
- chronic cough (usually the initial symptom)
- chronic sputum production
- repeated respiratory tract infections requiring treatment (≥ 3 in the last 2 years).

COPD exacerbations are characterised by increased dyspnoea and sputum production, often with purulence (change in colour due to pus). They can be triggered by acute viral or bacterial respiratory infections, exposure to environmental pollutants or gastro-oesophageal reflux.

People with COPD may tolerate lower blood oxygen levels (SpO_2 88-92%) when stable.

3.2 Patient assessment

3.2.1 Patients with exacerbation

For patients with the following signs of exacerbation, treat using emergency protocol:

- respiratory distress (use of accessory muscles, cyanosis)
- abnormal vital signs (HR > 100/minute, RR > 20/min, SpO_2 < 92%).

3.2.2 Patients without exacerbation

For patients without severe signs or symptoms

- take a complete history, including exacerbations/hospitalizations
- check vital signs (HR, RR, SpO_2)
  - SpO_2 88-92% is acceptable if no signs of exacerbation
- perform lung auscultation; signs of COPD include
  - decreased breath sounds
  - prolonged expiratory phase
  - wheezing.
- Assess severity and how symptoms affect day-to-day activities using the dyspnoea scale in Figure 3.1.
- Assess psychological impact (screen for depression) and family support.

FIGURE 3.1. MODIFIED MEDICAL RESEARCH COUNCIL (MMRC) DYSPNOEA ASSESSMENT SCALE[16]

SYMPTOM SEVERITY	SCORE
Dyspnoea only with heavy exercise	0
Dyspnoea when hurrying or walking up a slight incline	1
Walks slower than people of the same age because of dyspnoea or has to stop for breath when walking at their normal speed	2
Stops for breath after walking 91 metres (100 yards) or after a few minutes	3
Too dyspnoeic to leave house or breathless when dressing	4

Note: walking should be assessed on level ground, if possible

3.2.3 Investigations

If available, spirometry and chest x-ray can be helpful:

- COPD is confirmed on spirometry if FEV1/FVC is < 0.7 after a dose of short-acting bronchodilator (to minimise variability).
- Chest x-ray may show
  - hyperinflation (enlarged airspaces, flattened diaphragms), bullae
  - complications such as pneumonia or pneumothorax (air between the lung and chest wall, collapsed lung).

3.2.4 Differential diagnoses

Main differential diagnoses include tuberculosis, asthma (Table 2.2), congestive heart failure, bronchiectasis, pulmonary fibrosis.

3.3 Management

The treatment goals are to

- relieve symptoms
- improve quality of life
- reduce risk of exacerbations and disease progression.

3.3.1 Therapeutic patient education for self-management

Essential information

- Explain what COPD is (education materials).
- Explain that the disease is lifelong; medications and follow up will be needed long-term.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Encourage patients to ask questions and express any concerns and preferences.

Medications

- Explain medications prescribed: how and when to take them; common adverse effects; and the importance of adherence.
- Check the patient's understanding of why, when and how the medications are taken.
- Check inhaler technique (Annex 4).

Non-pharmacologic interventions

- Advise smoking cessation if appropriate. It is the most important measure to stop progression of disease.
- Advise reducing exposure to indoor air pollution, if possible (e.g. improve ventilation, cook outdoors, use alternatives to bio-mass fuels, use fuel-efficient stoves).
- Encourage physical activity such as walking: start slowly and gradually increase to a goal of 20 to 40 minutes 4 times per week (feeling breathless is not harmful).
- Give diet advice for overweight/obese patients.

Self-management teaching points

- Ensure the patient can recognise an exacerbation, i.e. two or more of the following:
  - worsening breathlessness
  - increased sputum production
  - discoloured (purulent or bloody) sputum.
- Advise what action to take if an exacerbation starts, and check understanding:
  - rest
  - adequate fluid intake and nutrition (frequent small meals)
  - increase inhaled salbutamol or ipratropium to maximum dose,
  - seek medical attention if symptoms persist.
- Advise influenza and pneumococcal vaccination, if available.

3.3.2 Pharmacological treatment

A stepwise approach shown in Figures 3.2 and 3.3 is used.

- Start at the step that corresponds to the person's condition based on the mMRC scale.
- Step treatment up as needed based on clinical evaluation and response.
- Provide a spacer device for use with MDI (Annex 4).

Due to the progressive nature of COPD, stepping down medications is uncommon unless adverse effects occur.

FIGURE 3.2. STEPWISE MANAGEMENT OF COPD (ADAPTED FROM GOLD)[17]

STEP 1	STEP 2	STEP 3	STEP 4
DYSPNOEA SCORE 0-1	DYSPNOEA SCORE 2	DYSPNOEA SCORE 3	DYSPNOEA SCORE 4
SABA as needed Reassess after 1 month If not improved, change to SAMA as needed	LABA twice daily and SABA or SAMA as needed	ICS and LABA twice daily (maintenance) and SABA or SAMA as needed ICS increases risk of pneumonia; discontinue if no improvement	For acute symptom relief, see Step 1 For maintenance treatment, seek specialist advice locally, if available, or on telemedicine If available, long-term oxygen therapy, pulmonary rehabilitation (physiotherapy), evaluation for non-invasive ventilation
Move to next step if no improvement			

FIGURE 3.3. COPD MEDICATIONS

COPD MEDICATIONS		
SABA	salbutamol MDI, 100 µg per inhalation	200 µg up to 4 times daily
SAMA	ipratropium MDI, 20 µg per inhalation	40 µg 3 to 4 times daily
LABA	formoterol MDI, 12 µg per inhalation	12 µg twice daily
	salmeterol MDI, 25 µg per inhalation	50 µg twice daily
ICS	beclometasone MDI, 50 or 100 µg per inhalation	200 µg twice daily

- Seek specialist advice if the person has had ⩾ 2 exacerbations or ⩾ 1 hospitalisation for COPD and a dyspnoea score ⩾ 2
  - combined inhaled corticosteroid and long-acting beta-agonist treatment (ICS + formoterol as described in Asthma)[18] may benefit.
- For all with COPD, advise influenza vaccination if available.
- For people with COPD and age > 65 years or comorbid heart or lung disease (at any age), advise pneumococcal vaccination if available.

3.4 Follow up

3.4.1 Frequency of visits

- Review one month after any change in medications or outpatient management of exacerbation.
- Review every 6 months when stable.
- Reevaluate treatment if the patient has required emergency/hospital care.

3.4.2 Follow-up visit procedures

- Check history and exam (and spirometry, if available), noting any exacerbations and/or time off work since last assessment.
- Review
  - adherence and inhaler technique
  - adverse effects
  - exercise, weight
  - smoking status and advise stopping if appropriate
  - exposure to indoor air pollution and advise on reducing if appropriate.
- Adjust medication if needed.
- Address patient concerns, anxiety/depression if present.

3.5 Indications for specialist referral

- Seek local or telemedicine specialist support for the following:
  - diagnostic uncertainty (e.g. patient < 40 years, no risk factors)
  - suspicion of lung cancer, i.e. after ruling out TB – haemoptysis (expectoration of blood or blood-stained sputum), chest pain, weight loss
  - patient requiring Step 4 treatment and/or pulmonary rehabilitation.

3.6 Special considerations

3.6.1 People living with HIV

See 2.6.1. People living with HIV.

3.6.2 People with tuberculosis

Patients with COPD are at higher risk of developing active TB and having poor treatment response. TB has a destructive effect on the lung. It is a contributing factor towards the development of COPD.

- In settings with moderate to high TB prevalence, test anyone with a cough > 2 weeks for TB.
- Have a high index of suspicion for COPD in patients with previous TB or active TB.
- If infection is suspected with COPD exacerbation, do not use fluoroquinolones; use alternate antimicrobials.
  - Fluoroquinolones are essential drugs for drug-resistant TB treatment.
- For patients on rifampicin, double the dose of inhaled (or oral) corticosteroid.
  - Rifampicin reduces the bioavailability of corticosteroids.
- Refer to MSF Tuberculosis guidance for details.

3.7 COPD medication summary

Medications used in treatment steps above are in Figure 3.4.

Protocol summaries are in Annex 1.

FIGURE 3.4. COPD MEDICATION SUMMARY

DRUG CLASS	DRUG	COMMENTS
Short-acting beta-2-adrenoceptor agonist (SABA)	**salbutamol**[19]	Onset of action: within minutes; duration of action: ± 4 hours
		Common adverse effects: headache, tremor, tachycardia
Short-acting muscarinic antagonist (SAMA)	**ipratropium**[20]	Onset of action: 30-60 minutes; duration of action: 3-6 hours
		Common adverse effects: arrhythmias, constipation, cough, dizziness, headache, nausea
Long-acting beta-2-adrenoceptor agonist (LABA)	**formoterol**[21]	Used twice daily, with SABA or SAMA as needed in Step 2; ICS added in Step 3
	salmeterol[22]	Common adverse effects: headache, tremor, tachycardia
Inhaled corticosteroid (ICS)	**beclometasone**[23]	Increases risk of pneumonia; discontinue if no improvement
		Onset of action: initial effect requires several days
		Common adverse effects: throat irritation, oropharyngeal candidiasis - spacer use reduces the risk

4. DIABETES

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Diabetes is characterized by hyperglycaemia (elevated blood glucose level), caused by a lack or impaired use of endogenous insulin (within the body).

Diabetes increases cardiovascular risk and causes damage to small blood vessels of the kidneys, eyes, and nerves and large vessels of the heart, brain, and limbs. Blindness, kidney failure, heart attacks, stroke, and limb amputation are common complications.

The term diabetes refers to several disorders classified as shown in Table 4.1. Risk factors differ among the types.

Diabetes affects 537 million people globally. Its burden is increasing, with the greatest rises by 2045 expected in Africa and the Middle East.[24]

4.1 Approach

Diabetes is classified by features that affect its clinical presentation and required treatment (Figure 4.1):

- Type 1 diabetes (T1D) has a peak incidence in children but is increasingly recognized in adults.[25,26] It presents as sudden severe hyperglycaemia, diabetic ketoacidosis (DKA), and death unless treated with insulin.
- Type 2 diabetes (T2D) can be silent for years and diagnosed when complications occur. Hyperglycaemic symptoms can occur but DKA is rare.
- T1D and T2D can occur in both children and adults.
- Adult-onset T1D should be considered in people not responding to oral treatment, with age < 35 years, BMI < 25 kg/m2, unintentional weight loss, and/or personal or family history of autoimmune disease.[27]
- Gestational diabetes is diagnosed in the second or third trimester of pregnancy in non-diabetic women. Women diagnosed with diabetes in the first trimester usually have pre-existing T1D or T2D. Details are in NCD in Pregnancy.
- Diabetes can occur with medications (e.g. corticosteroids, HIV treatment) and pancreatitis.
- Other types are beyond the scope of these guidelines.[28]
- Pre-diabetes criteria are in Annex 6; T2D risk can be reduced with lifestyle interventions.

FIGURE 4.1. SELECTED DIABETES CLASSIFICATION

	DESCRIPTION	ONSET	BMI (KG/M2)	INSULIN REQUIREMENT	ESTIMATED GLOBAL BURDEN
Type 1	Insulin deficiency due to autoimmune destruction of pancreatic (ß) cells	Childhood or adolescence	< 25, often < 18	At diagnosis	
Adult-onset type 1	Immune-mediated, can be slowly evolving; often with greater β-cell function Includes latent autoimmune diabetes in adults (LADA)	Age < 35 years	< 25	Not always at diagnosis but later evolves	
Type 2	Relative insulin deficiency with ß-cell dysfunction and insulin resistance	Adulthood	> 25	None or years after diagnosis	90% of diabetes cases
Gestational	Hyperglycaemia diagnosed after pregnancy 1st trimester	2nd or 3rd pregnancy trimester		May be needed	

4.2 Patient assessment

Related to the type of diabetes, people may present with or without symptoms and signs as shown in Figure 4.2.

FIGURE 4.2. DIABETES PRESENTATIONS

	MORE COMMON WITH	FEATURES
Acute hyperglycaemia	T1D	Neurologic - lethargy, decreased consciousness, coma Ketoacidosis- rapid or sighing respiration, sweet-smelling breath, abdominal pain, vomiting Infection - urinary tract infection, candidiasis, cellulitis, septicaemia, shock
Classic hyperglycaemia		Polyuria (frequent urination), polydipsia (excessive thirst), weight loss, nocturia (nighttime urination)
Asymptomatic	T2D	Associated risk factors - age; physical inactivity; overweight/obesity; hypertension, cardiovascular disease; first degree relative with diabetes; history of gestational diabetes and/or macrosomic baby (> 4.5 kg at delivery); South Asian, Afro-Caribbean, or Hispanic ethnicity Chronic complications due to undiagnosed disease - see Table 4.11

4.2.1 People with signs of emergency

- If diabetic ketoacidosis or severe hyperglycaemia (Figure 4.2) is suspected or found on testing, follow emergency protocol.

4.2.2 People without signs of emergency

- Complete history and physical exam; refer to Figure 4.2.
  - Asymptomatic people with any risk factors or signs of chronic complications should be prioritized for testing.

- Confirm the diagnosis of diabetes using tests in Figure 4.3:
  - If symptomatic, only one test is required.
  - If asymptomatic, two tests on different days, preferably ⩾ 2 weeks apart, are required.

FIGURE 4.3. DIABETES DIAGNOSTIC CRITERIA[29]

TEST	DIABETES DIAGNOSTIC CRITERIA	COMMENTS
Fasting glucose	⩾ 126 mg/dl (7 mmol/l)	Test after 8 hours fasting (only water intake) Most accurate test
Random glucose	⩾ 200 mg/dl (11.1 mmol/l)	Least accurate test
Glycosylated haemoglobin (HbA1c)	6.5% (⩾ 48 mmol/mol)	Reflects glucose over the past 2-3 months Not used for screening in children/young people, pregnancy, acutely ill patients, suspected type 1 diabetes, haemolytic anaemia, haemoglobinopathy, iron deficiency anaemia, HIV, pancreatic damage, or renal failure
Oral glucose tolerance test	⩾ 200 mg/dl (11.1 mmol/l)	Blood glucose checked 2 hours after a 75 g glucose load (Annex 7) Gold standard for diagnosis of gestational diabetes

- Complete first visit assessment for comorbidities, complications and/or secondary prevention needs (see Figure 4.11):
  - review smoking history
  - calculate BMI
  - check blood pressure
  - check creatinine and calculate estimated glomerular filtration rate (eGFR; see CKD)
  - check urine dipstick albumin
  - check visual acuity (Annex 8)
  - complete diabetic foot exam (Annex 9).

4.3 Management

For all people with diabetes, the goal is to control blood glucose to manage cardiovascular risk and limit symptoms and complications, including weight gain and hypoglycaemia that can occur with pharmacological treatment.
Prevention and management of complications is outlined in Table 4.11.

4.3.1 Therapeutic patient education for self-management

Essential information

- Explain what diabetes is and potential chronic complications if not controlled (education materials and diabetes toolkit).
- Explain that it is lifelong; medications and follow up, including diet control and blood sugar monitoring, are needed long term.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.

- If on insulin, explain the information in Annex 10, including glucose self-monitoring and fingerstick glucose testing method.
- Check the patient's understanding of why, when, and how the medications are taken.
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise on diet, noting its essential role in diabetes control; use Nutrition guidance, and Annex 10 if on insulin.
- If BMI is > 25 kg/m2, suggest the goal of losing 5 to 10% body weight.
- Advise reduction of alcohol consumption, if applicable.
- Advise smoking cessation, if applicable.
- Encourage physical activity such as walking; exercise 2.5 hours per week, with activity that causes a light sweat.

Self-management teaching points

- Ensure the patient can recognise symptoms and signs requiring emergency care or medical review:
  - hypoglycaemia, which can occur due to treatment (not due to diabetes) –
    - blood sugar < 75 mg/dl (4 mmol/l)
    - weakness, dizziness, shaking, palpitations, sweating, anxiety, hunger, nausea
    - poor concentration, headache, confusion, lethargy, blurry vision, difficulty speaking, impaired consciousness, seizures, coma
- Ensure understanding of immediate action if hypoglycaemia symptoms occur: carry a sugary snack or drink at all times, and take it if symptoms occur; candies, dates, fruit juice or regular soda (120 ml/4 oz).
- Ensure the patient can recognize hyperglycaemia symptoms and signs – see Figure 4.2.
- If self-monitoring glucose, review high and low reading thresholds and actions to take – see Annex 10
- If the person plans fasting periods (for religious or other reasons), review Annex 11.

4.3.2 Pharmacological treatment

This section focuses on T1D and T2D glucose control. Medications for comorbidities and complications are in Figure 4.12.

Adjustments for planned fasting periods are in Annex 11.

Treatment targets in Figure 4.4 are for blood glucose and 4.5 for HbA1c.

- Glucose self-monitoring is required for people on insulin; laboratory glucose testing can also be done.
- HbA1c is used for all patients; it is the only test required for people with T2D on oral medications (see Figure 4.12).

FIGURE 4.4. INSULIN TREATMENT TARGETS

	BLOOD GLUCOSE TARGET
Pre-meal	**75-130 mg/dl (4-7 mmol/l)**
2 hours post-meal	< 180 mg/dl (10 mmol/l)

FIGURE 4.5. DIABETES TREATMENT – HBA1C TARGETS

PATIENT GROUP	HBA1C TARGET	EQUIVALENT 24-HOUR AVERAGE BLOOD GLUCOSE
Children (< 18 years)	7% (53 mmol/mol)	150 mg/dl (8.3 mmol/l)
Pregnant women		
Adults age < 65 years; with longer life expectancy, lower risk of hypoglycaemia		
Adults age ⩾ 65 years or people with significant comorbidity - cardiac and/or vascular disease, cognitive impairment, limited life expectancy, end-stage illness Anyone with hypoglycaemia and/or fall risk	8% (64 mmol/mol)	180 mg/dl (10 mmol/l)

Type 1 diabetes insulin treatment

Type 1 diabetes requires insulin treatment (Figure 4.6). In childhood onset, insulin requirements may be low after initial presentation and stabilization, but they usually increase after a few months. Adult-onset T1D insulin requirements are also expected to change over time.

A basal-bolus regimen is first choice. It uses a longer-acting insulin, such as neutral protamine Hagedorn (NPH) or glargine for basal doses, with short- or rapid-acting insulin for bolus doses.

A fixed combination (biphasic) regimen is second choice for T1D since it does not achieve control like a basal-bolus regimen.

FIGURE 4.6. TYPE 1 DIABETES INSULIN TREATMENT

T1D INSULIN TREATMENT		
Basal-bolus NPH regimen	**Adjust to target - see Tables 4.6** Ask the patient to record 3 pre-meal and 1 pre-bed blood glucose each day Intermittent testing (2 weeks at a time) can be used if supplies are limited Decrease testing frequency once stable	**If not controlled, seek specialist advice**
Calculate 0.5 units/kg/day		
Give 1/2 the total daily dose as NPH, split into morning and evening doses		
Give 1/2 the total daily dose as short or rapid-acting insulin, split into doses prior to each meal		
OR		
Basal-bolus glargine regimen		
Calculate 0.5 units/kg/day		
Give 1/2 the total daily dose as glargine once daily		
Give 1/2 the total daily dose as short or rapid-acting insulin, split into doses prior to each meal		
OR		
Fixed combination (biphasic)		
Calculate 0.5 units/kg/day		
Give 2/3 the total daily dose 30 minutes before the morning meal		
Give 1/3 the total daily dose 30 minutes before the evening meal		

FIGURE 4.7. INSULIN ADJUSTMENTS

ABNORMAL GLUCOSE READING		ACTION	
		TWICE DAILY NPH OR BIPHASIC	DAILY GLARGINE OR NPH
Fasting/pre-breakfast		Adjust evening basal dose	Adjust daily basal dose
Pre-lunch, pre-dinner and/or pre-bed		Adjust morning basal dose	n/a
Fasting/pre-breakfast hyperglycaemia continuing, possibly due to rebound after overnight hypoglycaemia		Confirm by checking 2 AM blood glucose for several nights Give a snack at bedtime to reduce overnight hypoglycaemia	
Pre-meal glucose			
Low	< 75 mg/dl (< 4 mmol/l)	Treat for hypoglycaemia Seek cause (review Annex 10) If no identified cause, reduce total insulin dose by 4 units; review in 1 week	
Target	**75-130 mg/dl (4-7 mmol/l)**	Continue current dose Review hypoglycaemia symptoms/signs	
High	131-199 mg/dl (8.4-11 mmol/l)	Review diet and adherence If stays in this range with good diet and adherence on next follow up, increase total dose by 1-2 units; review after 1 week	
	200-499 mg/dl (11.1-27.2 mmol/l)	Check for ketones and ask about symptoms of hyperglycaemia If either is present, follow emergency protocol If neither, increase total dose by 3-4 units; review after 1 week	
	> 500 mg/dl (27.8 mmol/l)	Follow emergency protocol	
Bolus dose adjustments			
Frequent hypoglycaemia		See Annex 10 Seek cause If no identified cause, reduce insulin dose prior to episode by 10-15%	
Hyperglycaemia symptoms after meals		Check post-meal fingerstick glucose 2 hours after eating If ⩾ 180 mg/dl (10 mmol/l), suggest exercising; review after 1 week If no improvement, increase pre-meal insulin dose by 10-15%	

T1D basal-bolus regimen

- Calculate the total amount of insulin required per day using 0.5 units/kg /day.
  - Adjust the calculation if needed: during puberty, adolescents are likely to require 1.5 – 2 units/kg/day; the dose will likely decrease in adulthood.
- Give ½ the total daily dose as NPH split into morning and evening doses, or as glargine once daily.
- Give ½ the total daily dose as short- or rapid-acting insulin, split into doses prior to each meal.
- Ask the patient to record 3 pre-meal and 1 pre-bed blood glucose daily and/or note any hypo-/hyperglycaemia symptoms.
- If all blood glucose readings are not at target, check adherence, injection technique and/or reasons for abnormal insulin absorption (Annex 10).
  - Insulin absorption increases with exercise; decreases with lipodystrophy (changes in fat under the skin).
- If adherent, adjust the NPH or glargine using Figure 4.7.
- If pre-breakfast hyperglycaemia repeatedly occurs, check for overnight hypoglycaemia with 2 AM blood glucose.
- Change only one insulin dose at a time.
- Review weekly until stable.

T1D fixed combination (biphasic) regimen with NPH/regular insulin 70/30

- Calculate the total amount of insulin required per day using 0.5 units/kg /day.
  - Adjust the calculation if needed: during puberty, adolescents are likely to require 1.5 – 2 units/kg/day; the dose will likely decrease in adulthood.
- Give 2/3 the total daily dose 30 minutes before the morning meal.
- Give 1/3 the total daily dose 30 minutes before the evening meal.
- Emphasize that the patient must eat 30 minutes after the dose to avoid hypoglycaemia.
- Advise 3 meals at regular times with mid-morning and pre-bed snacks if the person's circumstances permit.
- Ask the patient to record 3 pre-meal and 1 pre-bed blood glucose daily and/or note any hypo-/hyperglycaemia symptoms.
- As needed, adjust one insulin dose at a time using Figure 4.7:
  - If pre-breakfast blood glucose readings are abnormal, adjust the evening biphasic insulin dose.
  - If pre-lunch, pre-dinner, or pre-bedtime readings are abnormal, adjust the morning dose.
- Review weekly until stable.

Type 2 diabetes treatment

T2D treatment is monitored with HbA1c; targets are in Table 4.5. Strict control is needed in younger people, but a higher target is acceptable in older people and anyone with significant comorbidity.

Stepwise treatment is used for T2D starting with non-pharmacologic interventions and adding oral medications, then insulin if needed to control blood glucose.

- Use fasting glucose or HbA1c to determine the starting step in Figure 4.8.
- Use Figure 4.9 for oral medication dosing.

FIGURE 4.8. STEPWISE TYPE 2 DIABETES TREATMENT

T2D TREATMENT STEPS				
	STEP 1	STEP 2	STEP 3	STEP 4
Fasting glucose	126-150 mg/dl (7-8.3 mmol/l)	> 150 mg/dl (8.3 mmol/l)	> 300 mg/dl (16.7 mmo/l)	
HbA1c			> 10% (86 mmol/mol)	
	Lifestyle changes If not improved in 3-6 months, go to Step 2	**Add metformin** continue lifestyle changes	**Add gliclazide*** continue metformin continue lifestyle changes	**Add insulin** stop gliclazide^ continue metformin continue lifestyle changes

*If gliclazide is not available, use glibenclamide

^Stop glibenclamide if using

FIGURE 4.9. TYPE 2 DIABETES ORAL MEDICATION DOSING

DRUG	DOSE
Metformin	Week 1: 500 mg once daily in the morning with breakfast Week 2: 500 mg 2 times daily, morning and evening with meals If needed and well tolerated, increase by 500 mg/week; usual dose 1 to 2 g daily Maximum 2 g daily
Gliclazide	Weeks 1 and 2: 40 mg once daily with the morning meal If fasting glucose not at target, weeks 3 and 4: 80 mg once daily with the morning meal Increase by 40 mg every 2 weeks until fasting blood glucose reaches target, up to 160 mg once daily with the morning meal If fasting blood glucose not at target after 8 weeks, continue to increase by 40 mg every 2 weeks; divide the total dose into twice daily up to a maximum of 320 mg (total) per day
If gliclazide is not available	
Glibenclamide	Week 1: 2.5 mg once daily in the morning Week 2: 5 mg once daily in the morning Increase by 2.5 mg weekly if needed to reach blood glucose target Usual dose: 5 mg 2 times daily Maximum 15 mg daily

If target blood glucose is not achieved with maximum tolerated doses of oral medications, insulin is the next step to be taken after patient counselling and shared decision making (Annex 10).

Figure 4.10 shows insulin regimens with basal doses of NPH or glargine, and if needed, additional pre-meal bolus doses.

FIGURE 4.10. TYPE 2 DIABETES INSULIN TREATMENT WITH NPH OR GLARGINE

T2D INSULIN TREATMENT STEPS			
Stop gliclazide Continue metformin Continue lifestyle changes			
Add NPH once daily	**If evening pre-meal glucose stays high, change NPH to twice daily**	**Adjust to target - see Tables 4.6 and 4.7**	**If not controlled, pre-meal bolus doses may be needed**
Start 0.2 units/kg/day; if needed, increase up to 0.5 units/kg/day	Divide total insulin dose to 2/3 in AM and 1/3 in PM (about 12 hours later)	Ask the patient to record 3 pre-meal and 1 pre-bed blood glucose each day	
OR			
Add glargine once daily Start 0.2 units/kg/day; if needed, increase up to 0.5 units/kg/day		Intermittent testing (2 weeks at a time) can be used if supplies are limited Decrease testing frequency once stable	Seek specialist advice

NPH regimens

Once-daily NPH

- Continue the maximum tolerated metformin dose.
- Stop gliclazide (or glibenclamide).
- Start NPH injection at bedtime – dose 0.2 units/kg/day.
- Ask the patient to record 3 pre-meal and 1 pre-bed blood sugars daily.
- If the blood sugars are not at target, check adherence and/or any reasons for abnormal insulin absorption (Annex 10).
- If adherent, adjust the NPH dose up to a maximum of 0.5 units/kg/day.
- Review weekly after dose changes.

If the patient's pre-dinner glucose stays high, a morning NPH dose needs to be added.

Twice-daily NPH

- Continue metformin and discontinue gliclazide if not already done.
- Convert the total daily NPH dose to 2/3 in the morning and 1/3 in the evening, about 12 hours apart (for example, total 30 units converts to 20 units in the morning and 10 in the evening).
- Ask the patient to record 3 pre-meal and 1 pre-bed blood sugars daily.
- If the blood sugars are not at target, check adherence and/or any reasons for abnormal insulin absorption (Annex 10).
- If adherent, adjust one NPH dose at a time using Figure 4.7:
  - If the pre-breakfast blood glucose reading is abnormal, adjust the evening NPH dose.
  - If the pre-lunch, pre-dinner, or pre-bedtime readings are abnormal, adjust the morning NPH dose.
- Review weekly after dose changes.

Glargine regimen

If available, glargine is a longer-acting insulin that can be used once daily.

Once-daily glargine

- Continue metformin and discontinue gliclazide.
- Start glargine 0.2 units/kg/day once daily in the morning or evening.
- Ask the patient to record blood sugars daily – 3 pre-meal and 1 pre-bed.
- If the blood sugars are not at target, check adherence and/or any reasons for abnormal insulin absorption (Annex 10).
- If adherent, adjust as needed up to 0.5 units/kg/day.
- Review weekly after dose changes.

Bolus dose addition

If target HbA1c is not achieved with twice daily NPH or daily glargine basal doses despite good counselling, adherence, and dose adjustment, rapid- or short-acting insulin pre-meal bolus doses can be added.

- Evaluate for bolus dose insulin if
  - basal dose > 0.5 units/kg
  - high pre-bed to pre-breakfast glucose difference ((pre-bed) – (pre-breakfast) = ⩾ 50 mg/dl (2.8 mmol/l))
  - recurrent hypoglycaemia (aware or unaware).

- Start 1 dose of rapid- or short-acting insulin with the largest meal (e.g. midday/lunch):
  - initiation – 4 units/day or 10% basal insulin dose
  - titration – increase dose by 1 - 2 units or 10 - 15% twice weekly to achieve target fingerstick blood glucose.

- If needed, add bolus dose insulin with the next largest meal until all meals are covered (full basal-bolus regimen).

4.4 Follow up

4.4.1 Frequency of visits

Diabetes requires regular monitoring of glucose control, comorbidities, and complications.

- Schedule follow up visits as indicated in Figure 4.11.

For people with T2D stable on oral treatment and being monitored with HbA1c:

- schedule follow up visits when an HbA1c is due (every 3-6 months, up to every 12 months) since their treatment can only be changed when HbA1c is checked
- assess for any symptoms/signs of hypo- or hyperglycaemia to determine clinical need for earlier follow-up.

FIGURE 4.11. DIABETES FOLLOW UP – FREQUENCY

DIABETES FOLLOW UP VISITS	
Emergency referral	If ketotic or blood glucose > 200 mg/dl (27 mmol/l) and symptomatic
1 to 2 weeks	Adapted to a person's needs if insulin adjusted (by telephone or in person)
3 to 6 monthly	If fasting blood glucose < 200 mg/dl (11.1 mmol/l) or HbA1c < 8.0% (64 mmol/mol)
Annual review	For diabetic complications screening

4.4.2 Follow up procedures

Review blood glucose control:

- For T1D and T2D on insulin, use fingerstick glucose monitoring to check if the person is in target range (Figure 4.4); follow HbA1c (Figure 4.5).
- For T2D on oral medications only, use Figure 4.5 HbA1c targets.
- Do not check routine fingerstick glucose during clinic visits.
- Complete other procedures listed in Figure 4.12.

FIGURE 4.12. DIABETES FOLLOW UP – PROCEDURES

FOLLOW UP	COMMENTS AND PROCEDURES	FIRST VISIT AND ANNUAL REVIEW	3 OR 6 MONTH VISIT
Blood glucose self-monitoring review	For T1D or T2D on insulin treatment If insulin being adjusted, 1-week follow up needed by telephone or clinic visit If self-monitoring not available, check fasting glucose (establish clinic SoP)	y	y
HbA1c	Minimum interval between HbA1c tests is 3 months For T2D on oral medications only, HbA1c is the test needed for glucose control treatment decisions	y	y
History and lifestyle	Review: blood glucose monitoring; medication adherence; any episodes of hypo-/hyperglycaemia; foot care; weight, diet, exercise; smoking, alcohol, and substance use; if on insulin, injection sites; if relevant, pubertal stage	y	y
	Calculate BMI	y	
Blood pressure	Check BP; target < 130/80 mmHg If BP above target, treat with ACE inhibitor or ARB first line (see hypertension protocol)	y	y
Lipids	Cholesterol-lowering treatment with atorvastatin 40 mg daily Cholesterol testing not required For secondary prevention at any age if known CVD: microvascular - retinopathy, nephropathy, neuropathy macrovascular - heart attack, angina, peripheral arterial disease, stroke, transient ischaemic attack For primary prevention age > 40 years and no known CVD	y	
CVD secondary prevention	Aspirin 75 mg daily if macrovascular CVD Not for primary prevention	y	
Nephropathy	Check kidney function - serum creatinine, eGFR calculation and urine dipstick (for albuminuria) If rising creatinine or albuminuria on repeat visits, start ACE inhibitor or ARB (see hypertension and CKD protocols)	y	
Retinopathy	Ask about night vision, any impairment; check eyes, look for cataract Check visual acuity (Annex 8)	y	
Diabetic foot	Check feet using diabetic foot screening guide (Annex 9)	y	as needed
Autonomic neuropathy	Review possible symptoms/signs: bloating; nausea; vomiting after meals; nighttime diarrhoea; erectile dysfunction; lack of hypoglycaemia awareness Manage by improving blood glucose control - review lifestyle and medications	y	

4.5 Special considerations

4.5.1 People living with HIV

With HIV infection, chronic inflammation and antiretroviral treatment (ART) increases the risk of developing diabetes. HIV-mediated disease may aggravate complications of diabetes: HIV-related cardiovascular disease and cardiomyopathy, nephropathy, neuropathy, CMV retinopathy, increased insulin resistance, and increased infection risk due to immunosuppression.

With ART, protease inhibitors increase insulin resistance and reduce insulin secretion and should be avoided if possible.

- Screen people living with HIV annually for diabetes.
- If diabetes is diagnosed, treat using Figure 4.1 with potential medication adjustments:
  - metformin dose with dolutegravir coadministration
  - gliclazide (or glibenclamide) dose with protease inhibitors.

- For cholesterol-lowering, if the person is taking a protease inhibitor, start atorvastatin 10 mg and increase to 20 mg (see secondary prevention).

4.5.2 Diabetes and tuberculosis

Diabetes increases risk of developing active TB. It is associated with increased symptoms and positive smear rates if glycaemic control is poor. Diabetes-related comorbidities negatively influence TB treatment outcomes. Good glycaemic control reduces impact of diabetes on TB.

Hyperglycaemia with ongoing TB may be transient and require repeated glucose testing.
In settings with high diabetes prevalence (e.g. Middle East):

- Screen newly diagnosed TB patients aged > 18 years for diabetes using HbA1c; if HbA1c is not available, use fasting glucose.
  - Do 2 tests for diagnosis if the patient has no diabetes symptoms.
  - If initial screening is negative, repeat 1 month after initiating TB treatment.

- For any diabetes patient who presents ⩾ 2 weeks cough, night sweats, and/or weight loss, screen for TB using local protocols.

TB drugs may exacerbate diabetes complications or interact with medications used to treat diabetes:

- Patients with any degree of diabetic nephropathy are at much greater risk of TB drug toxicity:
  - For people taking both diabetes and TB drugs, check renal function every 3 months or after any dose changes.

- Ethambutol is associated with retinopathy and isoniazid with neuropathy, which may be prevented with pyridoxine.

- Rifampicin may reduce effectiveness of enalapril, losartan, sulphonylureas and statins.

- Linezolid and bedaquiline are potentially hepatotoxic, increasing risk of lactic acidosis for people on metformin, particularly if also on a statin:
  - Check liver function tests (LFT) every 3 months and if increasing, stop statin and reduce metformin dose by 50%.
  - Recheck at 3 months and stop metformin if required.

4.6 Diabetes medication summary

Medications used in treatment steps above are in Figures 4.13 and 4.14.

Insulins

Regular and NPH are human insulins (Figure 4.13, Annex 12) are more often used in MSF programmes. Newer analogue insulins (genetically modified to change onset and duration of action) are listed in Annex 12 since they are in use in some settings.

FIGURE 4.13. HUMAN AND ANALOGUE INSULIN SUMMARY[30]

HUMAN INSULINS		ONSET OF ACTION	PEAK ACTION	DURATION OF ACTION	COMMENTS
Short acting	Regular	30 minutes	2-4 hours	up to 8 hours	Administer 20-30 minutes before meals
Intermediate acting	NPH	1-2 hours	4-12 hours	14-18 hours	
Biphasic	70/30 - 70% NPH, 30% regular 50/50 - 50% NPH, 50% regular	30-60 minutes	see Figure 4.3	10-16 hours	Timed with meals; hypoglycaemia can occur with incorrect timing
ANALOGUE INSULINS					
Rapid acting	aspart lispro glulisine	15-30 minutes	1.5-3 hours	3-7 hours	Can be used in acute hyperglycaemia treatment
Long acting	glargine	3-6 hours	12 hours	24 hours	
Biphasic	protamine/lispro (50/50 or 75/25) protamine/aspart (70/30)	Faster onset than human insulin	see Figure 4.4	10-16 hours	Can be administered immediately before meals
All insulins					
Caution	• Insulin requirements may be decreased with hepatic and renal impairment • Renal impairment may reduce compensatory response to hypoglycaemia • Insulin requirements may be increased by infection, stress, accidental or surgical trauma and during puberty; increase monitoring if occurring				
Hypoglycaemic effect	increased by	beta blockers, alcohol; possibly ACE inhibitors, anabolic steroids, testosterone			
	decreased by	corticosteroids, loop diuretics (furosemide), thiazide diuretics, oestrogens, progesterones			
Pregnancy and breastfeeding	• Insulin requirements may alter; doses should be frequently monitored • In the first trimester, insulin requirements decrease by 10 to 20%. • After week 16, insulin resistance can occur, requiring dose increases • See NCD in Pregnancy				
Adverse effects	Transient oedema, bruising; lipodystrophy at injection site; hypoglycaemia with overdose				

Type 2 diabetes medications

In addition to the medications in Figure 4.2, newer classes that are not yet available in MSF are listed in Annex 12 since patients who are using them may present.

FIGURE 4.14. TYPE 2 DIABETES MEDICATION SUMMARY

T2D STANDARD MEDICATIONS		
DRUG CLASS	**DRUG**	**COMMENTS**
Biguanide	**metformin[31] po** 500 mg tablets	Reduces cardiovascular complications Contraindication: acute metabolic acidosis (lactic and/or DKA) Caution: B12 deficiency; people on TB treatment with bedaquiline, linezolid; eGFR < 30 ml/min/1.73 m2 in elderly; use of contrast media or anaesthetics - stop before procedure, restart after when oral intake restarts Common adverse effects: abdominal pain; diarrhoea; nausea; vomiting
Sulphonylurea	**gliclazide[32] po** 40 mg tablets	Contraindication: ketoacidosis Caution: can encourage weight gain; G6PD deficiency Common adverse effects: abdominal pain; diarrhoea; hypoglycaemia; nausea
	glibenclamide[33] po 5 mg tablets	Second choice; only if gliclazide not available Can cause prolonged hypoglycaemia

5. HYPERTENSION

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Hypertension, or persistently high blood pressure (BP), is a treatable cause of cardiovascular disease and premature death.

Essential hypertension accounts for 90% of cases. There is no identifiable secondary cause, although risk factors are known and common to other metabolic diseases (see 5.1).

Secondary hypertension accounts for 10% of cases. Main causes include renal disease, adrenal gland tumours, some medications, drug use (e.g. cocaine, amphetamines) and alcoholism.

Most people with hypertension have no symptoms. But if left untreated, they usually develop cardiovascular and renal complications as BP increases progressively.

An estimated 1.3 billion adults worldwide are living with hypertension.[34] Only 21% of them have it controlled with effective treatment.[35]

5.1 Approach

Hypertension is diagnosed based on systolic or diastolic blood pressure thresholds and confirmed in relation to the person's comorbidities as shown in Figure 5.1.

FIGURE 5.1. HYPERTENSION DIAGNOSTIC CRITERIA

COMORBIDITIES OR CVD RISK	BP	CONFIRMATION
None	SBP ⩾ 140 or DBP ≥ 90	BP measured on 2 different days within 4 weeks and high on both days
None	SBP ≥ 160 or DBP ≥ 100	Same day assessment and treatment if high on repeat readings
CVD Diabetes Chronic kidney disease High calculated CVD risk*	SBP ⩾ 130	Same day assessment and treatment if high on repeat readings

*done using WHO charts - see 7.2.4.

BP, blood pressure; CVD, cardiovascular disease; DBP, diastolic blood pressure; SBP, systolic blood pressure

Symptoms and signs are rare and may be due to complications and/or hypertensive emergency – see 5.2.1.

Strong essential hypertension risk factors include[36]

- age > 60 years
- family history
- diabetes
- obesity
- physical inactivity
- moderate/high alcohol intake (for men, > 2 drinks/day; for women, > 1 drink/day).

5.2 Patient assessment

- Measure blood pressure:
  - Use an automated electronic device. If not available, a sphygmomanometer and stethoscope are acceptable (see Manual of Nursing Care Procedures for technique).
  - Make sure the patient is seated and relaxed for approximately 15 minutes before measuring.
  - Put the cuff on the bare arm.
  - Use the correct size cuff to get an accurate reading (overweight/obese people require a large size cuff).
  - Take at least 2 readings 1–2 minutes apart and use the average of these measurements. If the first reading is SBP ⩾ 130 mmHg and/or ⩾ 80 mmHg, repeat after at least two minutes. Calculate the average of the last 2 readings.

- Refer to Table 5.1:
  - confirm hypertension within 4 weeks for a person with no comorbidities and BP 140-160/90-100.
  - begin immediate treatment for anyone with SBP ⩾ 160 or DBP ⩾ 100 or people with comorbidities/high CVD risk and SBP ⩾ 130 or DBP ⩾ 100.

5.2.1 People with signs of hypertensive emergency

- Evaluate a patient presenting with BP ⩾ 180/110 for the following and if any are present, follow emergency protocol:
  - signs of stroke – use the Face Arm Speech Time test (FAST)
  - new-onset confusion, headache (encephalopathy)
  - if fundoscopy is possible, swelling of the optic disk (papilloedema; due to raised intracranial pressure) and/or retinal haemorrhage
  - chest pain (due to acute coronary syndrome)
  - dyspnoea (due to heart failure or pulmonary oedema).

- If BP ⩾ 180/110 without signs of hypertensive emergency, treat as urgency.

5.2.2 People without signs of hypertensive emergency

- Complete history:
  - Review past medical and family history of cardiovascular disease and diabetes.
  - Assess for other cardiovascular disease risk factors - ask about smoking, alcohol intake, diet, and physical activity.

- Complete physical exam:
  - Check heart rate and body mass index (BMI).
  - Perform heart and lung auscultation. It may be normal, or murmurs, crackles or other signs of heart failure may be present.

5.2.3 Investigations

The following can be done if feasible and do not delay treatment initiation:

- diabetes screening if status not known
- renal function assessment – serum creatinine, eGFR (see CKD) and proteinuria by urine dipstick
- ECG if irregular heart rhythm is heard on auscultation
- in patients < 40 years, evaluation for secondary causes of hypertension.

5.2.4 Cardiovascular disease risk calculation

For people with SBP 130-139 and no known comorbidities, WHO CVD risk charts can be used to determine if they are high risk and should begin treatment (Table 5.1).

5.3 Management

Long-term hypertension treatment reduces risk of cardiac, renal and vascular complications and mortality.

Figure 5.2 shows treatment goals.

FIGURE 5.2. HYPERTENSION TREATMENT GOALS

COMORBIDITIES OR CVD RISK	TREATMENT INITIATION	TREATMENT GOAL
None	SBP ⩾ 140 or DBP ⩾ 90	BP < 140/90
CVD Diabetes Chronic kidney disease High calculated CVD risk*	SBP ⩾ 130	SBP < 130
*calculated using WHO charts - see 7.2.4.		

5.3.1 Therapeutic patient education for self-management

Essential information

- Explain what hypertension is (education materials).
- Explain the progressive nature of hypertension, with potentially increasing need for medication.
- Explain the importance of attending follow-up visits intended to
  - assess status and adjust medications if needed
  - receive medication refills on time.
- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
- Check the patient's understanding of why, when, and how the medications are taken.
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise reduction of alcohol consumption if applicable.
- Advise smoking cessation if applicable.
- Advise salt intake less than 5 g (one teaspoon) per day as salt is a major cause of hypertension.
- Advise low-fat, low-sugar diet (use Nutrition guidance).
- If BMI is > 25 kg/m2, suggest the goal of losing 5 to 10% body weight.
- Encourage physical activity such as walking; exercise 2.5 hours per week, with activity that causes a light sweat.

Self-management teaching points

- Ensure the patient can recognise signs requiring immediate medical attention: new-onset severe headache, visual changes, chest pain, difficulty breathing, speech difficulty, weakness in limbs.

5.3.2 Pharmacological treatment

First line drug classes are angiotensin converting enzyme inhibitors (ACE inhibitor) or angiotensin ll receptor blockers (ARB), dihydropyridine calcium channel blockers (CCB), and thiazides. Additional classes include potassium-sparing diuretics and beta blockers.

Most people require 2 or more drugs from different classes to control their hypertension.

Single pill combinations (SPC) can be used to reduce pill burden, potential adverse effects and titration steps while achieving better BP control. Telmisartan 40 mg + amlodipine 5 mg is the first choice.[37] Other SPC can be used based on national protocols and availability.

If a SPC is not available, individual drugs can be used simultaneously – e.g. an ACE inhibitor or ARB can be started with a CCB.

ACE inhibitor and ARB cannot be used in combination with each other.

- Treat using the steps in Figure 5.3, with telmisartan + amlodipine (SPC or individual tablets).
- If telmisartan is not available, adapt the protocol – an alternate ARB (losartan) or an ACE inhibitor (enalapril) can be used in combination with amlodipine (see 5.5 and Annex 1).
- For people who are or may become pregnant, see NCD in Pregnancy.

FIGURE 5.3. FIRST CHOICE COMBINATION TREATMENT FOR ALL HYPERTENSION PATIENTS EXCEPT PEOPLE WHO ARE OR MAY BECOME PREGNANT

TREATMENT STEPS: TELMISARTAN 40 MG + AMLODIPINE 5 MG		
1	Start telmisartan 40 mg + amlodipine 5 mg daily	
	↓	
	Recheck after 4 weeks. If not at goal:	
2	Increase to telmisartan 80 mg + amlodipine 10 mg daily	
	↓	
	Recheck after 4 weeks. If not at goal:	At any step: if BP at goal, follow up in 3 to 6 months
3	Continue telmisartan 80 mg + amlodipine 10 mg Add hydrochlorothiazide 25 mg daily	
	↓	
	Recheck after 4 weeks. If not at goal:	
4	Continue telmisartan 80 mg + amlodipine 10 mg Increase to hydrochlorothiazide 50 mg daily	
	↓	
	Recheck after 4 weeks. If not at goal:	
5	Seek specialist advice	

5.3.3 Additional CVD risk management and secondary prevention

A cholesterol-lowering medication (statin) is recommended for people at high-risk for cardiovascular complications due to one or more of the following (Table 5.3):

- known cardiovascular disease (history of myocardial infarction (heart attack), stroke, etc.)
- diabetes and age > 40 years
- chronic kidney disease at high risk for progression to renal failure (if categorization is possible, 3bA2 and higher).

- Add atorvastatin po 40 mg once daily (lifelong treatment; for anyone not on protease inhibitors).
  - Start people taking protease inhibitors on atorvastatin 10 mg once daily and increase to 20 mg once daily if tolerated.
  - Cholesterol testing is not required to start or continue this dosing.

An antiplatelet medication should be given to patients with known cardiovascular disease.

- Add aspirin po 75 mg once daily (lifelong treatment).
- If aspirin is contraindicated, add clopidogrel 75 mg once daily.

An ACE inhibitor or ARB and a beta-blocker are indicated post-myocardial infarction.

- If the person's treatment does not yet include an ACE inhibitor or ARB, add enalapril or telmisartan (Figure 5.4).
- Add bisoprolol for at least 12 months and continue lifelong if the person has reduced left ventricular ejection fraction (see Heart failure and Figure 5.4).

FIGURE 5.4. HYPERTENSION AND CVD RISK MANAGEMENT

COMORBIDITIES OR CVD RISK	TREATMENT INITIATION	TREATMENT GOAL	ATORVASTATIN 40 MG DAILY	SECONDARY PREVENTION
None	SBP ≥ 140 or DBP ≥ 90	BP < 140/90		
CVD	SBP ≥ 130	SBP < 130	Age > 40 y	Aspirin 75 mg daily Post-MI: ACE inhibitor/ARB + beta blocker
Diabetes Chronic kidney disease High calculated CVD risk*				
*calculated using WHO charts - see 7.2.4.				

5.4 Follow up

5.4.1 Frequency of visits

- Review 4 to 6 weeks after treatment initiation and any change in medication (it may take up to 6 weeks for maximal antihypertensive effect).
- Review every 6 to 12 months when BP controlled.

5.4.2 Follow-up visit procedures

- Check history and exam:
  - BP and heart rate
  - heart and lung auscultation.
- Review
  - adherence
  - adverse effects
  - diet, physical activity, weight management
  - smoking status, alcohol consumption and advise reduction, if appropriate.
- Adjust medication if needed.
- Address patient concerns, anxiety/depression if present.

5.5 Hypertension and secondary prevention medication summary

Medications used in treatment steps above are in Figure 5.5.

Protocol summaries are in Annex 1.

FIGURE 5.5. HYPERTENSION AND SECONDARY PREVENTION MEDICATION SUMMARY

DRUG CLASS	DRUG AND DOSAGE	COMMENTS
ACE inhibitor	**enalapril**[38] po	Contraindicated in pregnancy, aortic and renal artery stenosis
	Start 5 mg once daily; increase every 4-6 weeks if needed to achieve target BP - to 10 mg, then 20 mg, then to maximum 40 mg daily	Do not use in women who may become pregnant
		Do not use simultaneously with ARB
	In elderly patients, patients taking a diuretic or patients with renal impairment, start 2.5 mg once daily then adapt dose according to renal function	Common adverse effects: angioedema (swelling under the skin); cough; diarrhoea; dizziness; electrolyte imbalance; renal impairment
Angiotensin II receptor blocker	**telmisartan**[39] po	Caution with history of angioedema, renal artery stenosis
	Start 40 mg once daily; increase after 4-6 weeks if needed, to 80 mg once daily	Do not use in women who are or may become pregnant
		Do not use simultaneously with ACEi
		Common adverse effects: abdominal pain; cough; dizziness; hyperkalaemia; renal impairment
Calcium channel blocker	**amlodipine**[40] po	Common adverse effects: constipation; dyspepsia; oedema
	Start 5 mg once daily; increase after 4-6 weeks if needed to maximum 10 mg once daily	
	In elderly patients or patients with hepatic impairment, start with 2.5 mg once daily then increase by 2.5 mg every 4-6 weeks if needed	

DRUG CLASS	DRUG AND DOSAGE	COMMENTS
Thiazide	**hydrochlorothiazide**[41] po	Do not use in pregnancy
	Start 25 mg once daily in the morning; increase after 4-6 weeks if needed to 50 mg once daily	Common adverse effects: constipation; diarrhoea; hyperglycaemia; hyperuricaemia (gout); skin reactions
Potassium-sparing diuretic	**spironolactone**[42] po	Contraindicated in hyperkalaemia, Addison's disease
(aldosterone antagonist)	For resistant hypertension, 25 mg once daily	Adverse effects (frequency unknown): acute kidney injury; agranulocytosis; confusion; hyperkalaemia; skin reactions
	For heart failure, 25 mg daily, then increase if needed to 50 mg once daily	
Beta blocker	**bisoprolol**[43] po	Contraindicated in asthma, 2nd and 3rd degree atrioventricular block, uncontrolled heart failure
	Start 5 to 10 mg once daily, preferably in the morning (max. 20 mg daily)	Common adverse effects: bradycardia; confusion; depression; diarrhoea; dizziness
	In patients with renal or hepatic impairment or heart failure, start 2.5 mg once daily and increase if needed for clinical response up to maximum 10 mg daily	
Cholesterol-lowering	**atorvastatin**[44] po	Cholesterol testing not required with fixed 40 mg dose
(statin)	40 mg once daily	Caution if risk factors for muscle toxicity, including myopathy or rhabdomyolysis
	If simultaneous protease inhibitor use, start 10 mg and increase to 20 mg if tolerated	Common adverse effects: arthralgia, constipation, diarrhoea, headache, muscle complaints
Antiplatelet	**aspirin**[45] po	Contraindicated with peptic ulceration, bleeding disorders, children < 16 years
	75 mg once daily	Common adverse effects: dyspepsia, haemorrhage
	clopidogrel[46] po	Contraindicated with active bleeding
	75 mg once daily	Discontinue 7 days before elective surgery if antiplatelet effect not desired
	(stroke prevention dose)	Common adverse effects: diarrhoea, gastrointestinal discomfort, haemorrhage, skin reactions

6. ISCHAEMIC HEART DISEASE

© Mohammed Sanabani/MSF I NCDs account for 78% of all death in Jordan

Ischaemic heart disease occurs with atherosclerosis (lipid plaques) of the coronary arteries, which reduces oxygenated blood flow to the heart muscle.

Complications include myocardial infarction, ischaemic cardiomyopathy, and sudden cardiac death.

Common risk factors are

- diabetes
- hyperlipidaemia
- hypertension
- male sex
- obesity
- behavioural (lifestyle) – unhealthy diet, physical inactivity, tobacco use and harmful alcohol use.[47]

Cardiovascular diseases, which include ischaemic heart disease and its complications, are the leading cause of death globally, taking almost 18 million lives each year.[48]

6.1 Approach

Angina is characteristic, typically with chest pain, pressure or squeezing provoked by exercise or stress. Pain may radiate to the jaw, back or left arm. It may be associated with breathlessness, nausea, sweating, and palpitations. It resolves with rest.

Women, elderly people, and people with diabetes may complain of indigestion-like symptoms (atypical angina).[49]

Unstable angina occurs at rest or with minimal exertion. It may be prolonged (> 20 minutes) or show a pattern of increasingly frequent episodes.[50]

6.2 Patient assessment

6.2.1 People with unstable angina

- Follow emergency protocol
  - If available, perform an initial ECG to evaluate for acute coronary syndrome (myocardial infarction); if not, refer to hospital.

6.2.2 People with stable angina

- Take a complete history, including personal and family CVD and diabetes
- Assess risk factors – ask about smoking, alcohol intake, diet and physical activity
- Check vital signs and BMI
- Complete a physical exam
  - heart and lung auscultation may be normal, or murmurs, crackles/signs of heart failure may be present.

6.2.3 Investigations

If available, the following can be helpful:

- ECG, to check for signs of coronary ischaemia (SOP: Performing an ECG)
- haemoglobin, for anaemia
- blood glucose, for diabetes
- serum creatinine, for renal function
- if clinical suspicion of thyroid disorders, thyroid stimulation hormone (TSH), thyroxine (T4; to rule out thyrotoxicosis)
- chest x-ray if pulmonary oedema or if in high TB prevalence setting
- exercise ECG, to identify coronary ischaemia.

6.3 Management

The treatment goals are to control angina and prevent complications.

6.3.1 Therapeutic patient education for self-management

Essential information

- Explain what angina is (education materials).
- Explain its progressive nature, with potentially increasing need for medication.
- Explain the importance of attending follow-up visits intended to
  - assess status and adjust medications if needed
  - receive medication refills on time.
- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
- Check the patient's understanding of why, when, and how the medications are taken.
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise reduction of alcohol consumption if applicable.
- Advise smoking cessation if applicable.
- Advise salt intake less than 5 g (one teaspoon) per day as salt is a major cause of hypertension.
- Advise low-fat, low-sugar diet (use Nutrition guidance).
- If BMI is > 25 kg/m2, suggest the goal of losing 5 to 10% of body weight.
- Encourage physical activity such as walking; exercise 2.5 hours per week, with activity that causes a light sweat.

Self-management teaching points

- Ensure the person can recognise signs requiring immediate medical attention: chest pain, difficulty breathing, sweating, lack of relief with current medications.

6.3.2 Pharmacological treatment

- Follow the steps in Figure 6.1 until controlled using the medications in Figure 6.2.
- Review secondary prevention needs – see 5.3.3.

FIGURE 6.1. STEPWISE MANAGEMENT OF ANGINA

ANGINA < 1X/WEEK	ANGINA > 1X/WEEK	ONGOING ANGINA	ONGOING ANGINA	
	Continue short-acting nitrate	Continue short-acting nitrate and beta blocker	Continue short-acting nitrate, beta blocker and long-acting nitrate	Seek specialist advice if symptoms not controlled with nitrates, beta blocker, and calcium channel blocker
Start short-acting nitrate	**Add beta blocker**	**Add long-acting nitrate**	**Add non-rate limiting calcium channel blocker**	

FIGURE 6.2. ANGINA MEDICATIONS SUMMARY

DRUG CLASS	DRUG AND DOSAGE	COMMENTS
Short-acting nitrate	**glyceryl trinitrate**[51] sublingual 0.5 mg as needed for pain	Duration of action: 20 to 30 minutes Common adverse effects: arrhythmias; asthenia (weakness); cerebral ischaemia; dizziness; drowsiness; flushing; headache; nausea; vomiting
Beta blocker	**bisoprolol** po Start 2.5mg daily; increase to 10mg as tolerated	See Figure 5.5
Long-acting nitrate	**isosorbide dinitrate**[52] po Start 5 mg three times daily; increase to 40 mg three times daily as tolerated	Duration of action: up to 12 hours Adverse effects same as glyceryl trinitrate (above)
Non rate-limiting calcium channel blocker	**amlodipine** po 10 mg daily	See Figure 5.5

6.4 Follow up

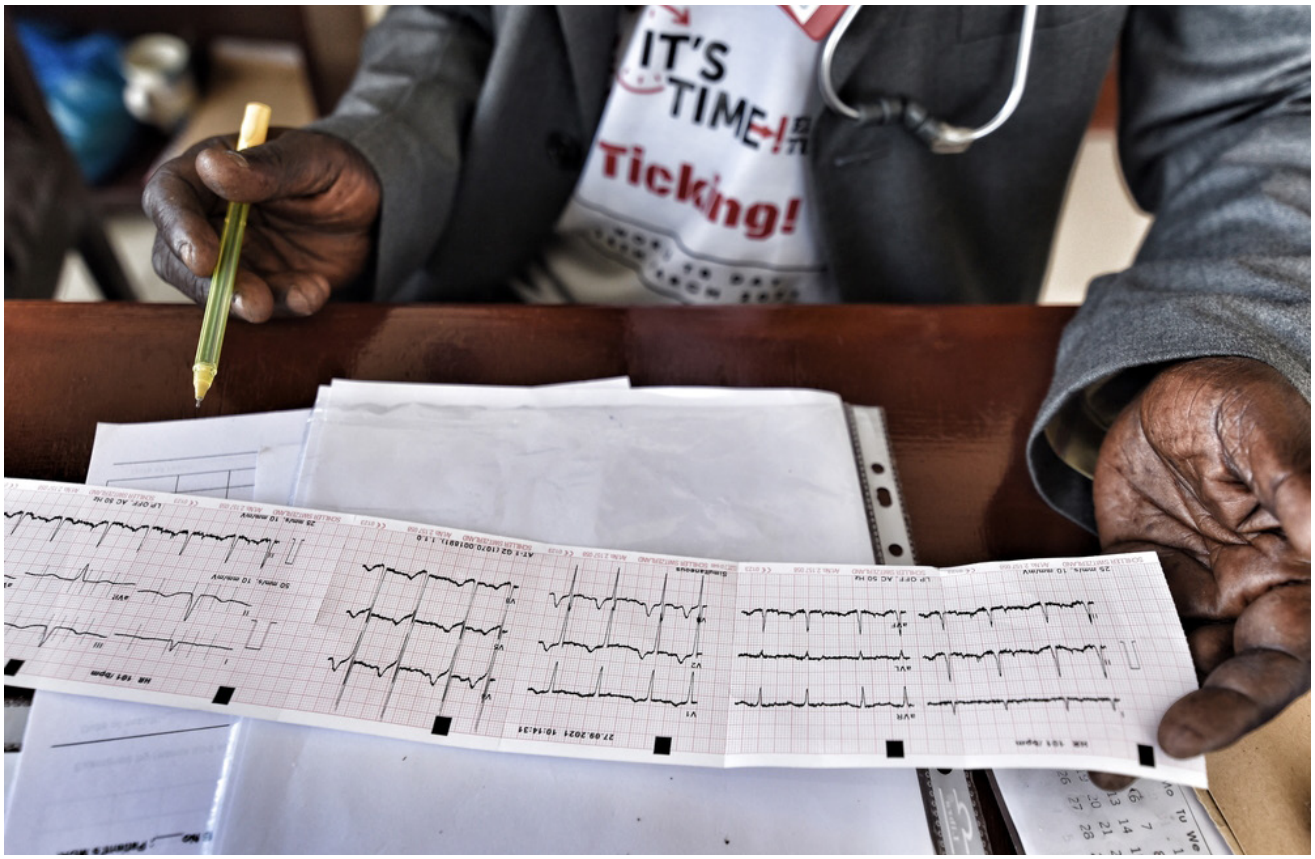
6.4.1 Frequency of visits

- Review 4 weeks after treatment initiation and any change in medication.
- Review every 6 to 12 months when stable.

6.4.2 Follow-up visit procedures

- Check history and exam:
  - BP and heart rate
  - heart and lung auscultation.
- Review
  - adherence
  - adverse effects
  - diet, physical activity, weight management
  - smoking status, alcohol consumption and advise reduction, if appropriate.
- Adjust medication if needed.
- Address patient concerns, anxiety/depression if present.

7. CHRONIC ATRIAL FIBRILLATION



© Mohammed Sanabani/MSF I Clinical Health Officer reading an electrocardiogram in MSF supported Makeni government hospital, Sierra Leone

Atrial fibrillation is the most common sustained cardiac arrhythmia.
If left untreated, atrial fibrillation is a significant risk factor for stroke and other complications.

Risk factors for atrial fibrillation (AF) include[53]

- cardiovascular problems – hypertension; coronary artery disease; heart failure; rheumatic valvular disease; presence of other atrial arrhythmias
- advancing age
- diabetes
- excess alcohol intake
- smoking
- thyroid disease
- excessive caffeine intake.

Its prevalence increases with age; men are more commonly affected than women.

7.1 Approach

Atrial fibrillation may cause no symptoms; the diagnosis may be made by an irregular pulse on physical exam. Palpitations, breathlessness, chest pain, dizziness and stroke symptoms can occur when heart rate reaches 120 beats per minute or higher.

Atrial fibrillation can cause heart failure symptoms due to heart muscle dysfunction with the rapid heart rate (tachycardia-induced cardiomyopathy).[54]

7.2 Patient assessment

7.2.1 People with acute signs

- For anyone with acute symptoms and signs, follow emergency protocol.

7.2.2 People without acute signs

- If no emergency signs are present, check vital signs for
  - tachypnoea (RR > 20/minute)
  - tachycardia (HR > 120/minute)
  - hyper- or hypotension.

- Perform auscultation for
  - irregularly irregular heart rhythm
  - heart murmurs
  - crackles and/or wheeze in the lungs.

7.2.3 Investigations

If available, the following can be helpful:

- thyroid function (thyroid stimulating hormone (TSH))
- creatinine
- electrocardiogram (ECG) – irregularly irregular QRS complexes with absent p waves confirm diagnosis (SOP: Performing an ECG)
- echocardiogram to evaluate for valvular disease, cardiomyopathy.

7.2.4 Differential diagnosis

The main differential diagnosis is ventricular tachycardia, which may cause similar symptoms but usually has a heart rate near 140 beats per minute and a regular rhythm.

7.3 Management

The treatment goals are to prevent complications, particularly stroke, and relieve symptoms respectively with

- anticoagulation
- heart rate control.

7.3.1 Therapeutic patient education for self-management

Essential information

- Explain what atrial fibrillation is (education materials).
- Explain the importance of attending follow-up visits intended to
  - assess status and adjust medications if needed
  - receive medication refills on time.
- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
- Check the patient's understanding of why, when, and how the medications are taken.
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise reduction of alcohol consumption if applicable.
- Advise smoking cessation if applicable.
- Encourage physical activity such as walking 2.5 hours/week; adjust to the person's ability.

Self-management teaching points

- Ensure the patient can recognise signs requiring immediate medical attention: chest pain, difficulty breathing, sweating, lack of relief with current medications.

7.3.2 Pharmacological treatment

Determine eligibility for anticoagulation based on stroke risk and bleeding risk with the following steps:

1. Calculate stroke risk using the CHA2DS2 – VASc score[55] (Figure 7.1).
   - If the CHA2DS2 - VASc score is ⩾ 2, the patient has high risk of stroke and can benefit from anticoagulation therapy.
   - If it is < 2, anticoagulation is not indicated, but rate control may be (see below).

FIGURE 7.1. CHA2DS2-VASC SCORE CALCULATOR FOR STROKE RISK IN A PATIENT WITH ATRIAL FIBRILLATION

FEATURE	SCORE
Congestive heart failure	1
Hypertension	1
Age > 75 years	2
Age between 65 and 74 years	1
Stroke/transient ischaemic attack (TIA)/thromboembolism (TE)	2
Vascular disease (previous myocardial infarction, peripheral arterial disease or aortic plaque)	1
Diabetes mellitus	1
Female	1

2. If the CHA2DS2 - VASc score is ⩾ 2, calculate bleeding risk using the HAS-BLED score (Figure 7.2).
   - If the HAS-BLED score is ⩽ 2, the patient is eligible for anticoagulation.
   - If the HAS-BLED score is ⩾ 3, the patient would be at significant risk of bleeding with anticoagulation therapy and it should not be given.

FIGURE 7.2 HAS-BLED SCORE CALCULATOR FOR BLEEDING RISK IN A PATIENT WITH ATRIAL FIBRILLATION

FEATURE	SCORE IF PRESENT
Hypertension (systolic ⩾ 160mmHg)	1
Abnormal renal function	1
Abnormal liver function	1
Age ⩾ 65 years	1
Stroke in past	1
Bleeding	1
Labile international normalised ratio (INR) results	1
Taking other drugs	1
Alcohol intake at same time	1

3 If the CHA2DS2-VASc score is ⩾ 2 and the HAS-BLED score is ⩽ 2, seek specialist advice for anticoagulation with warfarin or a direct oral anticoagulant.

- Prescribe a beta blocker for rate control – use bisoprolol as shown in Figure 6.2.
  - The treatment target is pulse < 100/minute.

- For patients with severe asthma or with symptoms/signs of acute heart failure who cannot tolerate beta blockers, seek specialist advice.

7.4 Follow up

7.4.1 Frequency of visits

- Review two weeks after any change in medications.
- Review every 3 to 6 months when stable.
- Reevaluate treatment if the patient has required emergency/hospital care.

7.4.2 Follow-up visit procedures

- Check history, exam, any follow up investigations (e.g. INR (international normalized ratio) if on warfarin)
- Adjust medications if needed
- Review
  - adherence
  - adverse effects
  - exercise and weight
  - smoking status and advise stopping if applicable.
- Address patient concerns, anxiety/depression if present.

8. HEART FAILURE

© Anthony Jean/SOS MEDITERRANEE I MSF logisticians move AEDs to the medical clinic, Marseille, Mediterranean Sea

Heart failure occurs when heart ventricle muscle loses normal ability to pump blood to the body. Heart muscle dysfunction can occur during the systolic, diastolic or both phases of the cardiac cycle.

Complications result from decreased blood supply to the brain, kidneys, and other organs. Progressive loss of heart function leads to acute exacerbations with pulmonary oedema that requires emergency treatment.

Common causes or risk factors for heart failure are listed in Table 8.1 in relation to heart failure classification, which then guides management.

An estimated 64.3 million people worldwide are living with heart failure.[56] Prevalence is increasing due to ageing populations and to rising obesity and its related diseases among younger people. Prevalence of heart failure with preserved ejection fraction (see below) is now greater than that of reduced ejection fraction.[34,57]

8.1 Approach

Clinical diagnosis should distinguish between acute and chronic heart failure.

Patients with acute heart failure can exhibit

- severe dyspnoea (breathlessness) and/or orthopnoea (breathlessness when lying flat)
- pink frothy sputum
- hypotension and weak pulse
- peripheral cyanosis with cold extremities.

With chronic heart failure, symptoms and signs include

- dyspnoea, usually with progression from occurring with activity to occurring at rest as heart failure worsens over time
- persistent coughing or wheezing
- oedema and weight increase due to fluid retention
- tachycardia
- fatigue.

Heart failure classification has been developed where echocardiography is available to measure left ventricular ejection fraction (LVEF; blood flow out with each heart contraction). Figure 8.1 shows risk factors that may help guide the approach in the absence of echocardiography.

FIGURE 8.1. HEART FAILURE CLASSIFICATION AND RISK FACTORS

HEART FAILURE WITH	LVEF	RISK FACTORS	RISK FACTORS COMMON TO BOTH
preserved EF	⩾ 50%	female sex, age > 70 years, chronic kidney disease	hypertension, diabetes, older age, obesity, atrial fibrillation, coronary artery disease
mildly reduced EF	41% to 49%	MI, male sex, valvular heart disease, anaemia, cocaine abuse, family history, thyroid disorders, Chagas disease	
reduced EF	< 40%		

EF, ejection fraction; LVEF, left ventricular ejection fraction; MI, myocardial infarction

8.2 Patient assessment

8.2.1 Acute heart failure

- If signs of acute heart failure are present, follow emergency protocol.

8.2.2 Chronic heart failure

- If no emergency signs are present, look for
  - tachypnoea (RR > 20/minute)
  - tachycardia (HR > 120/minute)
  - weight increase
  - hypotension
  - raised jugular venous pressure
  - ascites
  - oedema of the lower limbs.

- Perform auscultation for
  - gallop rhythm
  - cardiac murmurs
  - crackles and/or wheeze in the lungs.

8.2.3 Investigations

If available, the following are useful:

- electrocardiogram (ECG) – to look for signs of left ventricular hypertrophy, ischaemic heart disease, or other abnormalities (SOP: Performing an ECG)
- echocardiogram – the diagnostic gold standard for ventricular ejection fraction measurement and heart failure classification.

8.3 Management

Treatment goals are to reduce symptoms, disease progression and complications.

8.3.1 Therapeutic patient education for self-management

Essential information

- Explain what heart failure is (education materials).
- Explain the progressive nature of heart failure, with increasing need for medication.
- Explain the importance of attending follow-up visits to
  - assess status and adjust medications if needed
  - receive medication refills on time.
- Encourage patients to ask questions and express any concerns and preferences.

Medications

- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
- Check the patient's understanding of why, when, and how the medications are taken.

Non-pharmacologic interventions

- Advise smoking cessation, if applicable.
- Advise *reduction of alcohol consumption*, if applicable.
- Advise salt intake limited to < 5 g (one teaspoon) per day, as salt can cause worsening of symptoms.
- Advise low-fat, low-sugar diet (use Nutrition guidance).
- If BMI is > 25 kg/m^2, suggest the goal of losing 5 to 10% of body weight.
- Advise high-potassium food intake (e.g. bananas), especially for patients on loop diuretics.
- Encourage physical activity such as walking 2.5 hours/week; adjust to the patient's ability.

Self-management teaching points

- Ensure the patient knows when to seek medical attention for acute changes: increasing breathlessness, inability to lie flat, leg/body swelling.

8.3.2 Pharmacological treatment

- Optimize treatment for comorbid non-communicable and infectious diseases.
- If heart failure with preserved ejection fraction is diagnosed or suspected, use Figure 8.2 to prescribe a loop diuretic as needed to relieve signs of congestion.
- If heart failure with reduced ejection fraction is diagnosed or suspected, use Figure 8.2 to prescribe
  - an ACE inhibitor or angiotensin ll receptor blocker at the maximum tolerated dose
  - a beta-blocker at the maximum tolerated dose
  - a potassium-sparing diuretic
  - a loop diuretic as needed.

A SGLT-2 inhibitor (a newer diabetes drug class (Annex 12) is indicated for heart failure with reduced left ventricular ejection fraction regardless of diabetes status.[58, 59]

- Seek referral options if a person already prescribed a SGLT-2 inhibitor presents for care, as these medications are not yet available in MSF.

FIGURE 8.2. HEART FAILURE MEDICATION SUMMARY

DRUG CLASS	DRUG AND DOSAGE	COMMENTS
ACE inhibitor	**enalapril** po 5 mg once daily; increase gradually every 1 to 2 weeks, if tolerated, up to 10 to 20 mg once daily (maximum 40 mg daily) In elderly patients, patients taking a diuretic or patients with renal impairment: start with 2.5 mg once daily then adapt dose according to renal function	See Figure 5.5
Angiotensin II receptor blocker	**telmisartan** po 40mg daily; increase monthly, if tolerated, to 80 mg daily maximum	See Figure 5.5
Beta blocker	**bisoprolol** po 5 to 10 mg once daily, preferably in the morning (maximum 20 mg daily) In patients with renal or hepatic impairment or heart failure: start with 2.5 mg once daily then increase, if necessary, according to clinical response (max. 10 mg daily)	See Figure 5.5
Potassium-sparing diuretic	**spironolactone** po 25 mg daily; increase to 50 mg once daily if needed	See Figure 5.5
Loop diuretic	**furosemide**[60] po 40 mg daily; increase if needed to achieve response with adequate urine output	If possible, monitor potassium and renal function Contraindications: anuria; cirrhosis with coma; drug-induced renal failure; severe hypokalaemia or hyponatraemia Common adverse effects: dizziness; electrolyte imbalance; fatigue; headache; metabolic alkalosis; muscle spasms; nausea

8.4 Follow up

8.4.1 Frequency of visits

- Review two weeks after any change in medications.
- When stable, review every 3 months if on long-term diuretic; every 6 months if not.
- Reevaluate treatment if the patient has required emergency/hospital care.

8.4.2 Follow-up visit procedures

- Check history, exam
- If on long-term diuretic, check renal function
- Adjust medications if needed
- Review
  - adherence
  - adverse effects
  - exercise, weight
  - smoking status and advise stopping if appropriate
- Address patient concerns, anxiety/depression if present.

9. STROKE AND TRANSIENT ISCHAEMIC ATTACK

© Paul Odongo/MSF I Inpatient department of MSF's hospital in Lankien, in Jonglei State, South Sudan

A stroke is a sudden-onset focal neurological deficit due to brain ischaemia or haemorrhage.

An episode of focal neurological symptoms that resolves is called a transient ischaemic attack (TIA). Stroke risk is increased after TIA.

Hypertension is associated with haemorrhage. [61,62]

Complications occur due to neurological disability, including swallowing difficulties, aspiration pneumonia, deep venous thrombosis, pressure sores, contractures, and depression.[63]

Main risk factors are

- age ⩾ 55 years
- personal or family history of stroke or TIA
- hypertension
- hyperlipidaemia
- smoking
- diabetes
- atrial fibrillation
- comorbid cardiovascular disease
- sickle cell disease.

Stroke is the second leading cause of death worldwide.[64] Incidence is highest in Africa.[39,65]

9.1 Approach

Stroke is characterised by new-onset focal neurological symptoms and signs,[66] such as

- unilateral (one-sided) weakness/paralysis or sensory loss (often involving the face)
- speech abnormalities
- unilateral vision loss/disturbances
- gait or unilateral coordination abnormalities
- vertigo.

TIA is diagnosed if focal neurological symptoms and signs resolve completely.

9.2 Patient assessment

9.2.1 Urgent clinical signs

Stroke is an emergency.

- Follow emergency protocol if stroke is suspected.
  - Check the Face, Arms, Speech test (FAST), which is positive for stroke if any of the following are present:
    - face weakness – ask the person to smile and check for asymmetry (droop on one side)
    - arm (or leg) weakness – ask the person to raise their arms and check if one drifts downward
    - speech abnormality – ask the person to speak a sentence and check if words are slurred
    - time – emergency care should be sought immediately.

9.2.2 Investigations

If available, the following can be helpful:

- non-contrast CT of the head to differentiate between ischaemic and haemorrhagic stroke
- blood glucose
- creatinine, electrolytes, cardiac enzymes
- ECG to evaluate for atrial fibrillation, other arrhythmias, cardiac ischaemia.

9.3 Management

Stroke requires emergency protocol management. The goal is to preserve brain function.

The TIA treatment goal is to prevent stroke.

9.3.1 Therapeutic patient and family education after stabilization

Essential information

- Explain what stroke/TIA is (education materials).
- Explain the importance of attending follow-up visits to
  - assess status and adjust medications if needed
  - receive medication refills on time.
- Encourage patients to ask questions and express any concerns and preferences.

Medications

- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
- Check the patient's understanding of why, when, and how the medications are taken.

Non-pharmacologic interventions

- Advise smoking cessation, if applicable.
- Advise *reduction of alcohol consumption*, if applicable.
- Encourage physiotherapy and physical activity such as walking 2.5 hours/week; adjust to the patient's ability

Self-management teaching points

- Ensure the patient and family know when to seek medical attention: signs of stroke (FAST), complications such as swallowing difficulties.

9.3.2 Pharmacologic treatment after stabilization

- When stable, ensure CVD secondary prevention measures:
  - aspirin 75 mg daily; If aspirin is contraindicated, clopidogrel 75 mg once daily
  - atorvastatin 40 mg daily.
- If atrial fibrillation is present, evaluate for treatment as shown in 7.3.1.
- Optimize diabetes, hypertension, and other comorbidity treatment as relevant.

9.4 Follow up

9.4.1 Frequency of visits

- Review 1 month after any change in medications.
- Review every 3 to 6 months when stable.
- Reevaluate treatment if the patient has required emergency/hospital care.

9.4.2 Follow-up visit procedures

After stroke, long-term management may require physiotherapy, occupational therapy and psychosocial support in addition to medications.

For routine follow-up

- check history, exam, any follow up investigations
- adjust medications if needed
- review
  - adherence
  - adverse effects
  - exercise and weight
  - smoking status and advise stopping if applicable
- address patient concerns, anxiety/depression if present.

10. EPILEPSY

© Carielle Doe | Psychosocial worker at patient's home as part of his treatment in the joint MSF - Ministry of Health epilepsy program, Monrovia, Liberia

Epilepsy is characterised by chronic recurrent seizures.

A seizure is an event. Most seizures are not due to epilepsy but are provoked (triggered) by acute conditions such as infections (severe malaria, meningitis), metabolic disorders (hypoglycaemia, hyponatraemia), head trauma, alcohol withdrawal, stroke, and eclampsia.

Epilepsy is defined by recurrent seizures that are unprovoked (not triggered by an acute condition). Epileptic seizures can occur repeatedly due to genetic or structural changes in the brain, including injury (perinatal, accidental), chronic infection (HIV, neurocysticercosis) and tumours, but up to 60% of patients have epilepsy of unknown cause.

Approximately 50 million people are living with epilepsy worldwide. Their overall risk of premature death is 3 times higher than the general population.[67]

People with epilepsy often face stigma and discrimination, with significant psychosocial consequences.

10.1 Approach

Diagnosis of epilepsy is clinical and requires careful evaluation to determine

- if events are seizures
- and if seizures, whether they are unprovoked and recurrent.

Epilepsy should be considered in a patient with 2 or more unprovoked seizures occurring more than 24 hours apart.[68]

Seizures are categorized by their origin in the brain (onset). The person's awareness and the presence and type of muscle movement (motor activity) can help identify the onset (Figure 10.1).[69]

FIGURE 10.1 SEIZURE CHARACTERISTICS

ONSET	AWARENESS	MOTOR ACTIVITY	
Generalized throughout the brain	Impaired	Tonic-clonic	jerking movements of all limbs
		Tonic	sudden muscle stiffening
		Clonic	rhythmic jerking movements of arms, neck and face
		Myoclonic	brief jerks in some muscles
		Atonic	loss of muscle tone
		Absence	no motor activity with brief impaired awareness
Focal localized to part of the brain	Normal or impaired	Specific motor activity in some muscles	tonic, clonic, myoclonic or atonic
		No motor activity	sensory, emotional, behavioural changes
		Continues to bilateral tonic-clonic	

Continuous seizure activity, or status epilepticus, is defined as a seizure lasting more than 5 minutes or repeated seizures occurring with no recovery. It is a medical emergency associated with high mortality.

10.2 Patient assessment

10.2.1 Status epilepticus

For patients with continuous seizure activity, follow emergency protocol.

10.2.2 Seizure evaluation

For patients reporting seizures with or without a known diagnosis of epilepsy

- take a detailed history from the patient and a witness (Figure 10.2)
- ask witnesses for any available photos or videos
- review seizure triggers, which can include
  - medication interruptions
  - alcohol or illicit drug use
  - excess caffeine use
  - sleep deprivation
  - flashing lights
  - stress
  - hypoglycaemia
  - menstrual cycle or other hormonal changes in women
- review post-ictal status - confusion, altered speech, incontinence, vomiting, headache and/or drowsiness after the seizure.

FIGURE 10.2. SEIZURE EVALUATION

	ASK THE PATIENT AND/OR THE WITNESS
Description of event	What time did it happen?
	What were you doing before it started?
	Were there any warning symptoms?
	Was there any loss of awareness, tongue biting, incontinence?
	How long did it last?
Post-ictal phase	What happened afterwards?
History	Any prior events?
	Any triggers?
	Any medications used? (including opioids, amphetamines)
	Any alcohol or illicit drug use?
	Any head trauma or neurological problems? (including stroke)
	Any family history?

For a patient presenting after a first seizure

- check vital signs and weight
- perform heart auscultation
- complete neurological examination, including fundi to look for signs of raised intracranial pressure
- assess mental state
- in children, complete a developmental examination (see Paediatric Care).

10.2.3 Investigations

After a first seizure, the following can be helpful if available:

- blood glucose
- serum sodium
- pregnancy test in women of childbearing potential
- in adults, ECG to evaluate for cardiac origin
- if an intracranial cause is suspected and imaging is available, magnetic resonance (MRI) or computerised tomography (CT)
- if cerebral infection is suspected, lumbar puncture may be indicated.

Electroencephalogram (EEG) is not routinely recommended since a normal result does not rule out epilepsy. EEG can help classify the seizure type if the diagnosis is in doubt.

10.2.4 Differential diagnoses

Events that may present like epileptic seizures include

- syncope (including arrhythmias)
- transient ischaemic attacks
- stroke
- sleep disorders
- drop attacks
- migraines
- functional seizures, or neurological symptom disorders with or without associated adverse life events and/or psychological comorbidities (anxiety, panic, and depression, which affect > 50% of these patients).[70]

10.3 Management

The goal of epilepsy treatment is to minimise seizure occurrence and maintain quality of life.

10.3.1 Therapeutic patient education for self-management

Essential information

- Explain what epilepsy is (education materials) and how to recognize a seizure.
- Explain that the disease can be lifelong; medications and follow up may be needed long-term.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Explain medications prescribed: how and when to take them; common adverse effects; the importance of adherence.
- Check the patient's understanding of why, when, and how the medications are taken.
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise reduction of alcohol or drug consumption, if relevant.
- Advise avoiding other triggers.
- Advise avoiding high-risk situations: cycling on busy roads, working at heights, being near open fires/flames, swimming alone, taking baths (shower is safer), standing too close to pavement/platform edges, operating dangerous machinery, working alone, driving.
- Teach family and friends first aid for convulsive seizures:
  - Protect the person from injury (remove harmful objects from nearby), cushion their head, place in the recovery position once the seizure has finished, and stay with the person until complete recovery.
  - Do not restrain the person or put anything in the person's mouth, or move them unless they are in danger, or give them anything to eat or drink until complete recovery.
- Offer psychosocial support if stigma and/or discrimination are noted.

Self-management teaching points

- Provide a seizure diary and ask the patient to write down the date, time, and possible trigger of each seizure they have in order to learn about and avoid potential triggers.
- Ensure they understand when to seek medical attention, e.g. if their seizures become more frequent.

10.3.2 Pharmacological treatment

- Start monotherapy after a second seizure using an antiepileptic drug (AED) from Figure 10.3; use dosage in Figure 10.4.
- If seizures continue despite an optimal monotherapy dose, consider changing to another drug.
- If the AED needs to be changed, introduce the new AED at its starting dose and slowly increase to its mid-range, then start to slowly decrease the dose of the first AED.
- If monotherapy fails, consider combination therapy.
- If the patient is seizure-free for 2 years, consider stopping the AED slowly (over 3 months) with close supervision. If seizures recur, ask the patient to resume the AED at the last dose taken and seek medical attention.

FIGURE 10.3. ANTIEPILEPTIC DRUG CHOICE BY SEIZURE ONSET

ONSET	AWARENESS	MOTOR ACTIVITY	DRUG CHOICE
Generalized	Impaired	Any of the following: Tonic-clonic Tonic Clonic Myoclonic Atonic	First line: **levetiracetam** or **sodium valproate** Alternates for all except myoclonic: carbamazepine, phenobarbital, or phenytoin
		No motor activity: Absence	**levetiracetam** or **sodium valproate** Do not use carbamazepine or phenytoin
Focal	Normal or impaired	Specific motor activity in some muscles No motor activity (sensory/ behavioural changes only) Continues to bilateral tonic-clonic	First line: **levetiracetam** or **carbamazepine** Second: sodium valproate Third: phenobarbital or phenytoin

FIGURE 10.4. ANTIEPILEPTIC DRUG DOSAGE

DRUG	DOSAGE
sodium valproate 200 or 500 mg tablet 200 mg/5 ml oral solution	**Child < 20 kg**: 10 mg/kg 2 times daily **Child > 20 kg**: start 200 mg twice daily; increase dose gradually as needed; usual dose10 to 15 mg/kg 2 times daily **Adult**: start 600 mg/day in 2 divided doses; increase by 200 mg every 3 days; usual dose 1 to 2 g/day in 2 divided doses (20 to 30 mg/kg/day)
levetiracetam 250, 500 or 1000 mg tablet	**GENERALIZED ONSET** **Child**: start 10-20 mg/kg/day (maximum: 1000mg/day); increase in steps of 10mg/kg/day every 2 weeks up to recommended maintenance dose 30-60mg/kg/day (maximum: 3000mg/day) **Adult**: start 500 mg every 12 hours; increase every 2 weeks by 500 mg/dose up to recommended dose of 1.5 g every 12 hours **FOCAL ONSET** **Child > 16 years and adult**: initially 250 mg once daily; increase after 2 weeks to 250 mg twice daily; then increase according to response in steps of 250 mg twice daily every 2 weeks; maximum dose 1.5 g twice daily
carbamazepine 200 mg tablet	**Child:** start 5 mg/kg once daily or in 2 divided doses, increase every 2 weeks up to 10 to 20 mg/kg/day in 2 to 4 divided doses **Adult**: start 100 to 200 mg once daily or in 2 divided doses, then increase by 100 to 200 mg increments every 2 weeks up to 800 to 1200 mg/day in 2 to 4 divided doses
phenobarbital 50 or 60 mg tablet	**Child 1 month to 11 years**: start with 2 to 3 mg/kg once daily at bedtime or 1 to 1.5 mg/kg twice daily for 2 weeks; increase the daily dose by increments of 1 to 2 mg/kg every week, up to 2 to 6 mg/kg once daily if necessary **Child ≥ 12 y and adult**: start with 1 mg/kg (max. 60 mg) once daily at bedtime for 2 weeks; increase the daily dose by increments of 15 to 30 mg every week, up to 3 mg/kg once daily if needed (max. 180 mg daily)
phenytoin 100 mg tablet	**Child 1 month to 11 years**: start with 1.5 to 2.5 mg/kg twice daily; increase the daily dose by increments of 5 mg/kg every 3 to 4 weeks, up to 2.5 to 5 mg/kg twice daily if necessary (max. 7.5 mg/kg twice daily or 300 mg daily) **Child ≥ 12 y**: start with 75 to 150 mg twice daily; increase the daily dose by increments of 25 mg every 3 to 4 weeks, up to 150 to 200 mg twice daily if necessary (max. 300 mg twice daily) **Adult**: start with 150 to 300 mg once daily or 75 to 150 mg twice daily; increase the daily dose by increments of 50 mg every 3 to 4 weeks, up to 200 to 400 mg once daily or 100 to 250 mg twice daily if necessary (max. 400 mg once daily or 300 mg twice daily)

10.4 Follow up

10.4.1 Frequency of visits

- Review 1 month after any change in medications.
- Review every 6 months when stable.
- Reevaluate treatment if the patient has required emergency/hospital care.

10.4.2 Follow-up visit procedures

Epilepsy is often associated with stigma and discrimination. People with epilepsy may need specific psychosocial support in addition to medication.

- Check seizure frequency (review seizure diary if available), time off work or school since last assessment.
- Check any adverse effects.
- Review adherence.
- Adjust medications if needed.
- Check growth in children.
- Address patient concerns, anxiety/depression if present and offer psychosocial support as appropriate.

10.5 Special considerations

10.5.1 People living with HIV or TB

Patients on ART or TB treatment should be treated with levetiracetam since it has the fewest interactions. If levetiracetam is not available, sodium valproate is the best option.

Rifampin can reduce carbamazepine blood levels. Carbamazepine dose adjustment may be needed.

10.5.2 People who are or may become pregnant

Levetiracetam is the drug of choice. Carbamazepine is an alternative.

Sodium valproate should not be used since the risk of foetal malformations is higher than with other AEDs. Training is available on Tembo.

Folic acid (5 mg daily) should be given to anyone on AEDs who could become pregnant and to pregnant people during the first trimester to reduce the risk of congenital malformations.

Effective contraception is recommended for anyone with epilepsy who could become pregnant. The MSF Contraceptive Toolkit has specific recommendations given drug-drug interactions.

- Advise people planning a pregnancy to inform their clinician to review treatment.
  - Treatment should be optimized before contraception is stopped.
- See NCD in Pregnancy for details.

10.5.3 Breastfeeding

Breastfeeding is safe with carbamazepine, phenytoin, and sodium valproate since they are not secreted significantly in breast milk.

Phenobarbital may cause drowsiness and apathy in the neonate. Close monitoring is needed.
Although levetiracetam is secreted into breast milk, neonatal concentrations are low. Breastfeeding is probably acceptable in full-term neonates, with close monitoring.

- See NCD in Pregnancy for details.

10.5.4 Menopause

AED dose adjustment may be needed, as the frequency of seizures may change (increase or decrease).
The risk of osteoporosis is increased with carbamazepine, valproic acid phenytoin and phenobarbital.
Calcium and vitamin D supplementation may be of benefit.

10.6 Antiepileptic drug summary

Medications used above are in Table 10.5.

Protocol summaries are in Annex 1.

FIGURE 10.5. ANTIEPILEPTIC DRUG SUMMARY

SEIZURE ONSET	DRUG	COMMENTS
Generalized	**sodium valproate**[71]	Do not use for women of childbearing potential unless long-term contraception is in use and informed consent is obtained Common adverse effects: abdominal pain; behaviour abnormal; confusion; diarrhoea; drowsiness; hypersensitivity; menstrual irregularities; seizures
Generalized or focal	**levetiracetam**[72]	First choice for women who may become pregnant Third generation, broad spectrum AED Common adverse effects: anxiety; behaviour abnormal; cough; depression; diarrhoea; dizziness; drowsiness; increased risk of infection; insomnia; nausea; skin reactions; vomiting
Focal	**carbamazepine**[73]	Do not use for generalized-onset, non-motor absence seizures Common adverse effects: dizziness; drowsiness; gastrointestinal discomfort; skin reactions; visual disturbances
Generalized or focal	**phenobarbital**[74]	Third line choice Adverse effects (frequency unknown): agranulocytosis (low white blood cell count); behaviour abnormal; confusion; drowsiness; hypersensitivity reactions; respiratory depression
Generalized except absence or focal	**phenytoin**[75]	Do not use for generalized-onset, non-motor absence seizures Third line choice Adverse effects (frequency unknown): agranulocytosis (low white blood cell count); confusion; constipation; dizziness; drowsiness; skin reactions

11. HYPOTHYROIDISM

© Karin Ekholm/MSF I MSF mobile clinic in the Kherson region, Ukraine

Hypothyroidism occurs with underproduction of the thyroid gland hormones thyroxine (T4) and triiodothyronine (T3). This results in chronic under-stimulation of other organs.

If left untreated, complications include cardiovascular disease and multi-organ failure.

Hypothyroidism due to iodine deficiency remains common globally (see MSF Clinical guidelines). Other causes include autoimmune disease[76], medications (e.g. amiodarone, lithium, stavudine, some TB drugs), pituitary disease and surgical removal or irradiation of the thyroid gland.[77]

Prevalence is higher in women than men and increases with age.[78]

11.1 Approach

Clinical features are nonspecific and may be confused with other conditions, especially in the elderly. Thyroid hormone testing is needed for confirmation (Figures 11.1 and 11.2).

Common symptoms are fatigue, depression, menstrual irregularity, constipation, and weight gain.
Signs include dry skin, eyelid oedema, bradycardia, hypertension, delayed tendon reflexes, and in prolonged disease, myxoedema facies (facial puffiness).

Goitre is uncommon but is more likely with iodine deficiency and Hashimoto thyroiditis

People with symptoms/signs and any of the following should be prioritized for thyroid hormone testing:

- elderly, pregnant, or postpartum women
- history of or first-degree relative with autoimmune disorders (including type 1 diabetes)
- first-degree relative with hypothyroidism
- history of thyroid surgery or head and neck irradiation.

Subclinical hypothyroidism, diagnosed as shown in Figure 11.2, is common but usually asymptomatic.

FIGURE 11.1. THYROID HORMONE NORMAL RANGES

THYROID HORMONE	USUAL NORMAL RANGE
TSH	0.4-4.5 mU/l
Free T4	0.8-1.8 ng/dl

Note: normal range may vary by laboratory

FIGURE 11.2. HYPOTHYROIDISM DIAGNOSTIC CRITERIA

SYMPTOMS	TSH	FREE T4	DIAGNOSIS
Present or not	⩾ 10 mU/l	Low or normal	Hypothyroidism
None	⩾ 4.5 and < 10 mU/l	Normal	Subclinical hypothyroidism
Present or not < 4.5 mU/l	< 4.5 mU/l	Low	Secondary hypothyroidism due to pituitary disease

11.2 Patient assessment

- Complete history and physical exam, evaluating for the symptoms and signs above.
- Confirm the diagnosis by blood tests, comparing with ranges in Table 11.1 and 11.2:
  - Check thyroid stimulating hormone (TSH).
  - If the TSH is > 4.5 mU/litre, repeat TSH and add free thyroxine (free T4).

11.3 Management

The treatment goal is normalization of TSH, to reduce symptoms and prevent complications.

11.3.1 Therapeutic patient education for self-management

- Explain what hypothyroidism is (education materials).
- Explain that the disease and treatment are lifelong.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Explain the medication prescribed: how and when to take it; the importance of adherence.
- Check the patient's understanding of why, when, and how the medication is taken.
- Encourage patients to ask questions and express any concerns and preferences.

11.3.2 Pharmacological treatment

- Treat using Figures 11.3 and 11.4.

FIGURE 11.3. HYPOTHYROIDISM MANAGEMENT

SYMPTOMS	TSH	FREE T4	MANAGEMENT
Present or not	≥ 10 mU/l	Low or normal	levothyroxine
None	≥ 4.5 and < 10 mU/l	Normal	Subclinical hypothyroidism
			For people who are or plan to become pregnant, begin levothyroxine
			For others, check TSH in 3 months
			If repeat TSH is
			< 10 mU/l, test TSH yearly
			≥ 10 mU/l, begin levothyroxine
Present or not	< 4.5 mU/l	Low	Seek referral for secondary hypothyroidism, if available

FIGURE 11.4. LEVOTHYROXINE[79] TREATMENT

	LEVOTHYROXINE			
	INITIAL DOSE	DOSE ADJUSTMENT	TSH TARGET	COMMENTS
Adults < 60 years	Start 75 to 100 mcg once daily	Adjust in 25 mcg increments every 6 weeks to keep TSH in target range	0.4-4.5 mU/l	Usual maintenance dose is 100 to 200 mcg daily
Adults ⩾ 60 years and/or with CVD	Start 25 mcg once daily			Usual maintenance dose is 100 to 125 mcg daily Dose reduction may be needed with advancing age
Pregnant women with hypothyroidism	Increase usual dose by 25-30% (see SRH)		0.4-2.5 mU/l	Baby at risk for neonatal hypothyroidism; evaluate and if present, treat

FIGURE 11.5. HYPOTHYROIDISM MEDICATION SUMMARY

DRUG CLASS	DRUG	COMMENTS
Thyroid hormone replacement	**levothyroxine** po 25 and 100 mcg tablets	Best taken same time each day, in AM (on empty stomach) 30 minutes before food or caffeinated beverages People taking carbamazepine, phenobarbital, and/or phenytoin may need higher doses of levothyroxine

11.4 Follow up

11.4.1 Frequency of visits

- Schedule TSH check 6 weeks after initiation and any dose change.
- Once stable with TSH in target range, check TSH yearly.
- For pregnant women, check TSH every 4 to 6 weeks (NCD in Pregnancy).

11.4.2 Follow-up visit procedures

- Check symptoms, adherence.
- Adjust medication if needed.
- Address patient concerns, anxiety/depression if present.
- If no clinical improvement, evaluation of underlying causes may be needed.

11.5 Special considerations

11.5.1 People living with HIV

Ritonavir can reduce levothyroxine blood levels.

- Monitor TSH one month after initiation and cessation of ritonavir-containing ART.
- Adjust the levothyroxine dose if needed to keep TSH in the target range.

11.5.2 People with TB

There is a risk of drug-induced hypothyroidism with multidrug-resistant tuberculosis (MDR-TB) regimens containing ethionamide, prothionamide or para-aminosalicylic acid.

- Monitor TSH in people on MDR-TB treatment using MSF Tuberculosis guidance.

12. HYPERTHYROIDISM

© IFaiz Abubakr I IFadasi Camp, Wad Madani - Al Jazirah state, Sudan

Hyperthyroidism occurs with overproduction of the thyroid gland hormones thyroxine (T4) and triiodothyronine (T3). This results in chronic overstimulation of other organs.

If left untreated, hyperthyroidism can lead to cardiac arrhythmias, heart failure, and/or thyrotoxic crisis, a rare but life-threatening complication.

Toxic multinodular goitre is the most common cause in areas of iodine deficiency. Autoimmune Grave's disease is more common where iodine deficiency is not prevalent.[80] Other causes are pituitary disease, postnatal thyroiditis, and drugs (e.g. amiodarone, lithium).[81]

Toxic multinodular goitre and Grave's disease prevalence is higher in women than men and increases with age.[82]

12.1 Approach

Common features include heat intolerance, hyperphagia (excessive eating), depression, warm moist skin, lid lag, irregular pulse, tachycardia, tremor, and weight loss.[83] Orbitopathy (upper eyelid retraction, eyes bulging forward) occurs with Grave's disease.

Goitre with irregular texture may be present, but its absence does not exclude hyperthyroidism.
Older people may have apathetic hyperthyroidism, showing only weight loss.

Thyrotoxic crisis usually features

- fever > 38.5 °C and frequently hyperpyrexia (> 41°C), profuse sweating
- tachycardia, hypertension
- gastrointestinal disturbances (vomiting, diarrhoea, jaundice, and abdominal pain)
- neurological symptoms (anxiety, seizures, coma).

12.2 Patient assessment

12.2.1 Patients with thyrotoxicosis

- If symptoms/signs of thyrotoxic crisis are present, follow emergency protocol.

12.2.2 Patients without urgent symptoms/signs

- Complete history and physical exam, evaluating for the features noted above.
- Confirm the diagnosis by blood tests:
  - Check thyroid stimulating hormone (TSH).
  - If the TSH is < 0.4 mU/litre, repeat TSH and add free thyroxine (free T4).
  - Refer to Figure 12.1 for diagnostic criteria (normal ranges in Figure 11.1)

FIGURE 12.1. HYPERTHYROIDISM DIAGNOSTIC CRITERIA

TSH	FREE T4	DIAGNOSIS
> 0.4 mU/l	< 1.8 ng/dl	Excludes hyperthyroidism
< 0.4 mU/l	> 1.8 ng/dl	Confirms hyperthyroidism

12.3 Management

The treatment goal is to normalize free T4, control symptoms and prevent complications.

12.3.1 Therapeutic patient education for self-management

- Explain what hyperthyroidism is (education materials).
- Explain that treatment is usually 18 months, and it can recur after.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Explain the medication prescribed: how and when to take it; the importance of adherence.
- Check the patient's understanding of why, when, and how the medication is taken.
- Encourage patients to ask questions and express any concerns and preferences.

12.3.2 Pharmacological treatment

- Treat confirmed hyperthyroidism in adults except pregnant or lactating women with carbimazole as shown in Figure 12.2.
  - TSH can remain low for several weeks after the person is euthyroid (T4 normalizes); in some cases, it may remain low briefly as hypothyroidism develops.
- For pregnant or lactating women, see NCD in Pregnancy.
- If needed
  - to control acute symptoms of tachycardia or tremor, a beta-blocker can be used until carbimazole takes effect
  - for eye dryness, 0.9% saline drops can be used.

FIGURE 12.2. CARBIMAZOLE[84] TREATMENT

	CARBIMAZOLE DOSE AND MONITORING	TSH TARGET	COMMENTS
Adults except pregnant or lactating women	Weeks 1 to 4: 20 mg once daily	> 0.4 mU/l	Symptoms may take up to 2 weeks to resolve after normalization of thyroid tests Symptoms and T4 usually normalize within 4 to 8 weeks; TSH can remain low for several weeks after T4 normalizes Usual treatment time: 12 to 18 months
	Recheck TSH and T4 after 4 weeks; if not at target, increase dose weeks 5 to 8: 40 mg daily		
	Recheck TSH and T4 every 4 weeks until TSH at target		
	When TSH at target, reduce dose gradually to lowest that controls symptoms: usually 5 to 15 mg daily		
	Once stable, check TSH every 3 months		

FIGURE 12.3. HYPERTHYROIDISM MEDICATION SUMMARY

DRUG CLASS	DRUG	COMMENTS
Antithyroid	**carbimazole** po 20 mg tablets	Do not use during pregnancy first trimester Avoid with severe hepatic impairment Contraindication: severe blood disorders Adverse effects (frequency unknown): agranulocytosis; angioedema; gastrointestinal disorder; headache; pancreatitis A white blood cell count should be performed if there is any clinical evidence of infection; carbimazole should be stopped immediately if there is clinical or laboratory evidence of neutropenia

12.4 Follow up

12.4.1 Frequency of visits

- Schedule TSH check 4 weeks after initiation and any dose change.
- Once stable with TSH in target range on 2 measurements 4 weeks apart, check TSH every 3 months until treatment complete (usually 12 to 18 months).

12.4.2 Follow-up visit procedures

- Check symptoms, adherence.
- Adjust medication if needed.
- Address patient concerns, anxiety/depression if present.
- If no clinical improvement, evaluation of underlying causes may be needed.

13. CHRONIC KIDNEY DISEASE

© MSF I Kidney screening, Guatemala

Chronic kidney disease (CKD) is common among NCD patients but often unrecognized until late stages.

Diabetes and hypertension are the most common causes among adults. Polycystic kidney disease, obstructive uropathy (e.g. due to renal stones), various nephritic and nephrotic syndromes are less frequent causes.

Climate change is affecting vulnerable people, with heat stress likely causing epidemics: Mesoamerican and Sri Lankan nephropathy are two examples.[85]

CKD is a risk factor for cardiovascular disease, independent of other factors such as hypertension.

Global prevalence is increasing given aging populations with increasing diabetes, hypertension, and other comorbidities.

13.1 Approach

People with CKD are often asymptomatic. Figure 13.1 shows some suggestive features.

FIGURE 13.1. SELECTED CKD FEATURES

FEATURE	COMMENTS
Risk factors	diabetes, hypertension, age > 50 y, childhood kidney disease, family history, smoking, obesity, male sex, long-term analgesic use
Oedema	periorbital and peripheral; exacerbated by hypoalbuminaemia; glomerular disease with nephrotic syndrome caused by e.g. diabetes, minimal change nephropathy in children
Nausea without vomiting Pruritis	possibly due to urea accumulation
Flank pain	renal stone - obstructive uropathy
Haematuria	glomerular disease with nephritic syndrome caused e.g. by infection (group A beta-haemolytic streptococci, hepatitis B and C, HIV), non-steroidal anti-inflammatory drugs

Diagnosis requires blood and urine testing on ≥ 2 occasions to confirm persistent abnormalities for > 3 months.

Diagnosis and classification (Figure 13.2 below) are based on

- estimated glomerular filtration rate (eGFR), calculated using serum creatinine, which remains normal until 80% of renal function has been lost
- albuminuria, measured with a spot urine sample or dipstick.

13.2 Patient assessment

Assessment will be limited by diagnostic capacity, but high risk and/or symptomatic people can be prioritized.

- Screen patients with diabetes and/or hypertension annually:
  - check serum creatinine and urine dipstick.

- Calculate eGFR using an electronic calculator, preferably CKD-EPI.
  - If CKD-EPI is not available, use Cockroft-Gault calculation for creatinine clearance:
    - Creatinine clearance = {[(140–age) x weight)/(72xserum creatinine)} x 0.85 if female

- If eGFR is abnormal, recheck after 3 months to confirm CKD:
  - age
  - serum creatinine and eGFR calculation
  - urine dipstick.

- Categorize CKD by eGFR and albuminuria using Figure 13.2 to estimate risk of progression and adverse outcomes:
  - no CKD – green
  - moderately increased risk – yellow
  - high risk – orange
  - very high risk – red.

FIGURE 13.2. CKD CATEGORIZATION[86]

Prognosis of CKD by GFR and albuminuria category

Prognosis of CKD by GFR and Albuminuria Categories: KDIGO 2012				Persistent albuminuria categories Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				<30 mg/g <3 mg/mmol	30-300 mg/g 3-30 mg/mmol	>300 mg/g >30 mg/mmol
GFR categories (ml/min/ 1.73 m²) Description and range	G1	Normal or high	≥90			
	G2	Mildly decreased	60-89			
	G3a	Mildly to moderately decreased	45-59			
	G3b	Moderately to severely decreased	30-44			
	G4	Severely decreased	15-29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red, very high risk.

- Check haemoglobin.
- Obtain an ultrasound of the kidneys, ureters and bladder if
  - clinical suspicion of urinary tract obstruction (such as pain consistent with obstruction, polyuria, palpable bladder)
  - haematuria
  - eGFR < 30 ml/min/1.73 m^2
  - albuminuria > 300 mg/g (if measured)
  - accelerated deterioration of renal function (sustained fall in eGFR of 25% or by 15 ml/min/1.73 m^2 annually)
  - patient with repeated symptoms of pyelonephritis
  - palpable enlarged kidneys.

13.3 Management

The treatment goal is to slow CKD progression and prevent need for renal replacement therapy (dialysis), which is often not available.

13.3.1 Therapeutic patient education for self-management

Essential information

- Explain what CKD is (education materials).
- Explain that it is progressive and will require regular monitoring.
- Explain the importance controlling comorbidities such as diabetes if present.
- Explain the importance of attending follow-up visits to
  - assess status and adjust treatment if needed
  - receive medication refills on time.
- Encourage patients to ask questions and express any concerns and preferences.

Non-pharmacologic interventions

- Advise smoking cessation, if applicable.
- Advise reduction of alcohol or drug consumption, if applicable.
- Advise low-sodium, low-fat diet.

Self-management teaching points

- Ensure understanding of CKD as an independent risk factor for cardiovascular disease.

13.3.2 Pharmacological treatment

- If eGFR is 30-90 and/or albuminuria is 30-300 (yellow to red/moderate to very high risk), adjust medications:
  - Optimize blood pressure with an ACE inhibitor or angiotensin ll receptor blocker.
  - Optimize diabetes control.
  - Optimize lipid control; begin atorvastatin 40 mg daily if not already prescribed.
  - Advise paracetamol if needed for analgesia; avoid non-steroidal anti-inflammatory drugs.
- If eGFR ⩽ 30, discontinue metformin if prescribed.
- If eGFR ⩽ 30 or albuminuria > 300, seek local or telemedicine specialist advice for additional adjustments.
- If anaemic, seek specialist advice on iron supplementation, as ferrous sulfate is usually available.[87]

13.4 Follow up

- Ensure monitoring by CKD classification as follows:
  - no CKD (green) – usual review
  - moderately-increased risk (yellow) – repeat creatinine and albuminuria once a year
  - high risk (orange) – repeat creatinine, albuminuria and potassium every 6 months; and haemoglobin once a year
  - very high-risk (red) – repeat creatinine, albuminuria and potassium every 3 months; and haemoglobin every 6 months.

Part 2. Emergency protocols

This section contains emergency protocols for quick reference, some with links to detailed Emergency and Critical Care guidance.

ASTHMA EXACERBATION

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN CHILDREN <16 YEARS)		
Refer to MSF Pediatric Guidelines 2024 (page 167)		
ASSESS SEVERITY OF EXACERBATION		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
- Can walk and speak whole sentences in one breath - SpO_2 in air > 94% - Respiratory rate mild increase - Heart rate normal for age - Accessory muscle use none - Wheezes mild, at end of expiration - Peak Expiratory Flow Rate (PEFR) > 75% predicted	Any of: - unable to speak in full sentences - SpO_2: 90 – 94 % in air - Respiratory rate moderate increase - Heart rate: mild to moderate tachycardia for age - Accessory muscle use moderate - Wheezes loud, throughout exhalation - PEFR 50-75 % predicted	Any of: - cannot talk or cry - SpO_2 < 90 % in air - Respiratory rate severely increased - Heart rate severe tachycardia (or bradycardia) for age - Accessory muscle use: moderate to maximal (or exhaustion) - Wheezes loud, throughout inspiration and expiration, or absent (silent chest) - PEFR < 50% predicted - Mental status: agitated, drowsy, confused, coma, - any cyanosis

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN CHILDREN <16 YEARS)		
TREATMENT OF EXACERBATION IN ER		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
1. OXYGEN VIA NASAL CANULA OR NON-REBREATHE MASK		
NO need	target SpO_2 between 94 -98%	target SpO_2 between 94-98 %
2. SALBUTAMOL AND IPRATROPIUM BROMIDE		
ONLY Salbutamol By inhaler (MDI) + spacer: **4-6 puffs** over 10 minutes. Shake inhaler before each puff. Reassess: if child remains symptomatic repeat same dose of salbutamol inhaler every 20 minutes up to 3 doses. Reassess: - no improvement and/or child requires O_2, then treat as moderate - improvement: aim to administer salbutamol inhaler every 4 hours and observe for any symptoms between treatments. When child has remained stable with minimal or no wheezes 4 hours after the last inhaler, review for discharge home (below)	**Salbutamol:** - inhaler (MDI) + spacer ⩽ 10 kg: 4 to 8 puffs > 10 kg: 10 puffs - nebulizer (5 mg = 2.5 mL) ⩽ 5 years: 2.5 mg (1.25 mL) > 5 years: 5 mg (2.5 mL) **+** **Ipratropium** - inhaler + spacer 4 puffs - nebulizer (0.25 mg/mL = 1 vial) ⩽ 5 years: 0.25 mg (1 mL) > 5 years: 0.5 mg (2 mL) Repeat the combined administration **every 20 min** (or sooner if needed) for one hour (**total 3 times**). Reassess clinical condition and severity after each combined administration. CAUTION: If inhaler delivery technique is in doubt, nebulizers should be administered. Assess response within the first hour: a. if marked improvement - stop bronchodilator treatment, reassess after 1 hour: If sustained improvement continues, reassess hourly. If child has sustained improvement without need for bronchodilators for up to 4 hours after initial treatment, discharge home (see below) b. if good improvement but with persisting symptoms - wean down salbutamol while reassessing hourly: 4-6 puffs (MDI + spacer) every 2 hours for a total of 2 times. Reassess: if child remains stable, continue the same every 3 hours, for a total of 2 times. If child remains stable, continue the same every 4 hours [= goal frequency] for a total of 2 times. If child has no improvement or worsens, keep the same space between doses (if child is on 2-hourly salbutamol, continue the same until there is improvement, then wean to 3-hourly) When child has remained stable with minimal or no wheezes on 4-hourly salbutamol, review for discharge home (below) c. slight improvement, symptoms still moderate - salbutamol (alone) as per doses above every 30 to 60 min, reassess after each treatment. If good improvement, then start weaning salbutamol following above management. If no improvement or deteriorating despite salbutamol every 30-60 min for 3 hours, then treat as Severe	**Salbutamol nebulizer** (5 mg = 2.5 mL) ⩽ 5 years: 2.5 mg (1.25 mL) > 5 years: 5 mg (2.5 mL) **+** **Ipratropium nebulizer** (0.25 mg/mL = 1 vial) ⩽ 5 years: 0.25 mg (1 mL) > 5 years: 0.5 mg (2 mL) Administer each treatment over 20 min and repeat to a total of 3 doses (start a new dose after every 20 min) = continuous nebulization: refers to delivering one nebulizer treatment immediately after the other without pause between treatments for 3 times After 3 combined nebulizers, continue with nebulised salbutamol alone every 20 min (i.e. continuously) assessing for improvement between each dose. NOTICE: if nebulizer not available, administer via a spacer every 10 to 20 min for a total of 3 times, and after continue only salbutamol: Salbutamol ⩽ 10 kg: 4 to 8 puffs > 10 kg: 10 puffs + ipratropium 4 puffs. When child starts to improve, stop continuous nebulizer and start weaning down the salbutamol (follow weaning step as per Moderate attack). If the child deteriorates again within 1 hour of stopping continuous salbutamol restart continuous salbutamol every 20 min for another hour and then reassess.

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN CHILDREN <16 YEARS)		
TREATMENT OF EXACERBATION IN ER		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
3. SYSTEMIC STEROIDS		
ORAL **Prednisolone:** 1 to 2 mg/Kg (max 40 mg) to complete 3 days **Dexamethasone**: 0.3 to 0.6 mg/Kg (max 16 mg) to complete 2 days	**ORAL:** **Prednisolone:** 1 to 2 mg/Kg (max 40 mg) to complete 5 days **Dexamethasone**: 0.3 to 0.6 mg/Kg (max 16 mg) to complete 2 days	**ORAL:** **Prednisolone:** 2 mg/Kg (max 60 mg) OD Dexamethasone: 0.6 mg/Kg OD (max 16 mg) **If unable to take PO** **Dexamethasone IV/IM**: 0.6 mg/Kg OD (max 16 mg) **Hydrocortisone IV** 4 mg/Kg every 6 hours.
4. MAGNESIUM SULPHATE IV		
NO	**NO**	ONLY if no improvement or deterioration despite nebulizer and corticosteroids: 40 mg/Kg (max 2 g/dose) diluted in NaCl 0.9% over 15 min using an infusion or syringe pump
5. EPINEPHRINE IM		
NO	**NO**	ONLY if no response to Magnesium after the first 5 min of infusion: 0.01 mg/Kg IM/SC (= 0.01 mL/Kg of 1:1000 concentration) repeat after 5-15 min if needed (refer to Vasopressor Therapy). *Persisting Severe or Life-threatening signs: Transfer to ICU/ High dependency unit if available. Consider non-invasive ventilation or intubation/ventilation if expertise/equipment available (see specific protocols)
6. ANTIBIOTICS: ONLY WHEN THERE IS CLEAR EVIDENCE OF INFECTION (FEVER, PRODUCTIVE PURULENT COUGH)		
7. IV FLUIDS		
NO	**NO**	Start maintenance fluid (see Paediatric Care)

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN CHILDREN <16 YEARS)		
DISCHARGE/ADMISSION		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
Discharge criteria: stable in room air and minimal respiratory distress on 4-hourly salbutamol **I. salbutamol** 4-6 puffs every 4 hours with spacer for 48-72 hours, wean down as tolerated aiming to stop between day 5 and day 7 after discharge **II. PO corticosteroids** to complete 3 days if prednisolone (1 to 2 mg/kg max 40 mg) or 2 days if dexamethasone (0.3 to 0.6 mg/kg (max 16mg) **III. assess need** for controller medication and provide as needed **IV. arrange follow up** (5 to 7 days) and advise patient if needing more than 4 hourly they will need to return to clinic for assessment *If no discharge criteria matched, then admit to hospital*	*Discharge criteria: stable in room air and minimal respiratory distress on 4-hourly salbutamol* **I. salbutamol** 4-6 puffs every 4 hours with spacer for 48-72 hours, wean down as tolerated aiming to stop between day 5 and day 7 after discharge **II. PO corticosteroids** to complete 5 days if prednisolone (1 to 2 mg/kg max 40 mg) or 2 days if dexamethasone (0.3 to 0.6 mg/kg (max 16mg) **III. assess need** for controller medication and provide as needed **IV. arrange follow up** (5 to 7 days) and advise patient if needing more than 4 hourly they will need to return to clinic for assessment *If no discharge criteria matched, then admit to hospital*	**Admit** (to ICU if possible): continue treatment as per above with: - salbutamol and ipratropium - steroids - fluids When the child starts to improve, stop continuous nebulizer and start weaning down the salbutamol (follow weaning steps described in management of moderate exacerbation) and oxygen while monitoring SpO_2. *Discharge criteria: stable in room air and minimal respiratory distress on 4-hourly salbutamol* same as per Moderate BUT arrange follow up in 2-3 days

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN ADULTS (≥ 16 YEARS)		
ASSESS SEVERITY OF EXACERBATION		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
- Can walk and speak whole sentences in one breath - SpO_2 in air > 95% - Respiratory rate mild increase - Heart rate < 100 beats/min - Accessory muscle use none - Wheezes mild, at end of expiration - Peak Expiratory Flow Rate (PEFR) > 75% predicted	Any of: - unable to speak in full sentences (only phrases) - SpO_2: 90 – 95 % in air - Respiratory rate moderate increase - Heart rate: 100-120 beats/min - Accessory muscle use moderate - Wheezes loud, throughout exhalation - PEFR 50-75 % predicted	Any of: - speaks in single words - SpO_2 < 90 % in air - Respiratory rate >30 breaths/min - Heart rate > 120 beats/min - Accessory muscle use: moderate to maximal (or exhaustion) - PEFR ⩽ 50% predicted - Mental status: agitated, drowsy, confused, coma, - any cyanosis

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN ADULTS (≥ 16 YEARS)		
TREATMENT OF EXACERBATION		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
1. OXYGEN VIA NASAL CANULA OR NON-REBREATHE MASK		
NO need	titrate O_2 to SpO_2 93 to 95% * aim for SpO_2 > 95% in pregnant women * aim for 88-92% if asthma-COPD overlap	titrate O_2 to SpO_2 93 to 95% * aim for SpO_2 > 95% in pregnant women * aim for 88-92% if asthma-COPD overlap
2. SALBUTAMOL AND IPRATROPIUM BROMIDE		
ONLY Salbutamol By inhaler (MDI) + spacer: 6-12 puffs over 10 minutes. Shake inhaler before each puff. Reassess: if person remains symptomatic repeat same dose of salbutamol inhaler every 20 minutes up to 3 doses. Reassess after the first hour: - no improvement and/or person requires O_2, then treat as moderate - improvement: aim to administer salbutamol inhaler every 4 hours and observe for any symptoms between treatments. When person has remained stable with minimal or no wheezes 4 hours after the last inhaler, review for discharge home (below)	**Salbutamol:** by inhaler (MDI) + spacer **6-12 puffs** over 10 min. Shake inhaler before each puff. **+** **Ipratropium** - Inhaler + spacer **4-8 puffs** Repeat the combined administration **every 20 min** for one hour or sooner if needed **(total 3 times)**. Reassess clinical condition and severity after each combined administration. CAUTION: If inhaler delivery technique is in doubt or the person is too in distress, nebulizer should be administered: salbutamol 5 mg (2.5 mL) + ipratropium 0.5 mg (2 mL) . Assess response within the first hour: a. if marked improvement - stop bronchodilator treatment, reassess after 1 hour: If sustained improvement continues, reassess hourly. If person has sustained improvement without need for bronchodilators for up to 4 hours after initial treatment, discharge home (see below) b. if good improvement but with persisting symptoms - wean down salbutamol while reassessing hourly: 6-12 puffs (pMDI + spacer) every 2 hours for a total of 2 times. Reassess: if person remains stable, continue the same every 3 hours, for a total of 2 times. If person remains stable, continue the same every 4 hours [= goal frequency] for a total of 2 times. If person has no improvement or worsens, keep the same space between doses (if person is on 2-hourly salbutamol, continue the same until there is improvement, then wean to 3-hourly) When child has remained stable with minimal or no wheezes on 4-hourly salbutamol, review for discharge home (below) c. slight improvement, symptoms still moderate - salbutamol (alone) as per doses above every 30 to 60 min, reassess after each treatment. If good improvement, then start weaning salbutamol following above management. If no improvement or deteriorating despite salbutamol every 30-60 min for 3 hours, then treat as Severe	**Salbutamol nebulizer** **5 mg (= 2.5 mL)** **+** **Ipratropium nebulizer** **0.5 mg (2 mL)** Administer each treatment over 20 min and repeat to a total of 3 doses (start a new dose after every 20 min) = continuous nebulization: refers to delivering one nebulizer treatment immediately after the other without pause between treatments for 3 times After 3 combined nebulizers, continue with nebulized salbutamol alone every 20 min (i.e. continuously) assessing for improvement between each dose. NOTICE: if nebulizer not available, administer via a spacer every 10 to 20 min for a total of 3 times, and after continue only salbutamol: Salbutamol 6-12 puffs + ipratropium 4-8 puffs. When the person starts to improve, stop continuous nebulizer and start weaning down the salbutamol (follow weaning step as per Moderate attack). If the person deteriorates again within 1 hour of stopping continuous salbutamol restart continuous salbutamol every 20 min for another hour and then reassess.

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN ADULTS (≥ 16 YEARS)		
TREATMENT OF EXACERBATION		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
3. SYSTEMIC STEROIDS		
ORAL **Prednisolone:** 40 mg	**ORAL:** **Prednisolone:** 40 mg	**ORAL:** **Prednisolone:** 40 to 60 mg **If unable to take PO** **Hydrocortisone IV** 100 mg every 6 hours.
4. MAGNESIUM SULPHATE IV		
NO	**NO**	ONLY if no improvement or deterioration despite nebulizer and corticosteroids: **2 g** diluted in NaCl 0.9% over 15 min
5. EPINEPHRINE IM/SC		
NO	**NO**	ONLY if no response to Magnesium after the first 5 min of infusion: 0.5 mL of 1:1000 concentration repeat after 5-15 min if needed (refer to Vasopressor Therapy). *Persisting Severe or Life-threatening signs: Transfer to ICU/ High dependency unit if available. Consider non-invasive ventilation or intubation/ventilation if expertise/equipment available (see specific protocols)
6. ANTIBIOTICS: ONLY WHEN THERE IS CLEAR EVIDENCE OF INFECTION (FEVER, PRODUCTIVE PURULENT COUGH)		

MANAGEMENT OF ACUTE EXACERBATION OF ASTHMA IN ADULTS (≥ 16 YEARS)		
DISCHARGE/ADMISSION		
MILD	**MODERATE**	**SEVERE OR LIFE THREATENING**
Discharge criteria: stable in room air and minimal respiratory distress on 4-hourly salbutamol **I. salbutamol** 4-6 puffs every 4 hours with spacer for 48-72 hours, then aiming to BD **II.** resume or introduce controller medication **(beclometasone** via spacer: 400 mcg daily (or increase baseline dose if already regularly taking) - overlap with oral steroids **III. PO corticosteroids t**o complete 5 days (if prednisolone: 40 to 60 mg/day) **IV. arrange follow up** (5 to 7 days) and advise patient if needing more than 4 hourly they will need to return to clinic for assessment *If no discharge criteria matched, then admit to hospital*	*Discharge criteria: stable in room air and minimal respiratory distress on 4-hourly salbutamol* **Follow recommendations as per Mild** *If no discharge criteria matched, then admit to hospital and continue as per recommendations here above on weaning bronchodilators and on other treatment*	**Persisting Severe or Life-threatening signs:** Transfer to ICU/ High dependency unit if available. Consider non-invasive ventilation or intubation/ventilation if expertise/equipment available (see specific protocols). **- salbutamol 10 mg + Ipratropium 0.5 mg via nebulizer 2-4 hourly or more often,** for 24 hours then review (and in case of improvement, follow weaning as per Moderate) . - consider repeat the dose of IM Epinephrine. - rest of the treatment as per the component above mentioned (steroids). - Vital signs every 1 hour and alert doctor if deteriorating. *Discharge criteria: stable in room air and minimal respiratory distress on 4-hourly salbutamol* Follow recommendations as per Mild and Moderate, BUT arrange follow up in 2-3 days

COPD EXACERBATION

Management of Acute Exacerbation of COPD

Exacerbations are characterised by acute worsening of COPD symptoms

- Shortness of breath
- Increased quantity of phlegm and change in colour

Normally triggered by infections (viral or bacterial) or environmental pollutants

CAUTION: Asthma and COPD can be difficult to differentiate as symptoms are similar and can overlap (refer to COPD chapter)
➔ In case of no response to COPD management algorithm below, consider reverting to acute asthma management protocol

Assess Severity of exacerbation ➔ USE ABCDE approach

Vital signs: pulse, BP, respiratory rate, oxygen saturations, temperature	→	Pulse > 100 bpm and/or Respiratory rate > 20 bpm and/or	
Respiratory Distress? Use of accessory muscles Colour (cyanosis most worrying) Able to talk? Level of consciousness **Peripheral oedema**? (heart failure)	→	SpO_2 < 92% and/or Use of accessory muscles and/or Inability to complete sentences and/or Cyanosis and/or Decreased level of consciousness	→ Move immediately to treatment room and doctor to treat immediately

INITIAL TREATMENT OF EXACERBATION OF COPD

OXYGEN	BRONCHODILATORS	ORAL STEROIDS	ANTIBIOTICS
If SpO_2 < 92% give 28% oxygen (2 L with nasal cannula is sufficient) to maintain SpO_2 88 – 92%. Higher oxygen concentrations can reduce respiratory drive	Salbutamol + Ipratropium bromide via spacer (start with 10 puffs of salbutamol & 10 puffs of ipratropium q20min x 3, and then 4 to 6 puffs of each one every 4 hours). If very unwell, use nebulized salbutamol 2.5 mg + ipratropium 0.5 mg, air driven and repeat 3 times over the first hour.	Prednisolone 40 mg PO OD for a total of 5 days. No need to taper the dose down.	Give only if increased sputum purulence AND either increased sputum volume or increased dyspnoea: Amoxicillin 500 mg TDS for 7 days. If penicillin allergic, Doxycycline 100 mg BD.

IF PATIENT NOT IMPROVED AFTER ONE NEBULISED SALBUTAMOL, SEVERE UNDERLYING COPD, RESPIRATORY DISTRESS, IMPAIRED LEVEL OF CONSCIOUSNESS, OLD AGE OR INSUFFICIENT HOME SUPPORT - **ADMIT TO HOSPITAL** FOR SEVERE CASES, IF RESOURCES ARE AVAILABLE, ADMIT TO ICU FOR NON-INVASIVE VENTILATION (1).

OXYGEN	BRONCHODILATORS	STEROIDS	ANTIBIOTICS
Sit upright and continue Oxygen as directed above	Nebulized Salbutamol 5mg + Ipratropium 0.5 mg, continuous x 3, driven by air (not oxygen). Repeat every 1-4 hours	Prednisolone 40 mg PO OD for a total of 5 days. Hydrocortisone 200 mg IV ONLY if the patient is unable to take PO, then convert to oral prednisolone to complete 7 days	If sputum purulence is increased, co-amoxiclav 625mg TDS PO for 7 days. IV antibiotics are not necessary unless severe pneumonia clinically or on chest X-ray + Chest physio if available

Discharge home when wheeze has resolved, normal respiratory rate and can mobilise around ward.
Follow up in 1 to 4 weeks time

(1) Bilevel Noninvasive ventilation (BiPAP): whenever possible as the majority of patients with severe exacerbations will benefit (unless immediate intubation is indicated or non-invasive ventilation is contraindicated)

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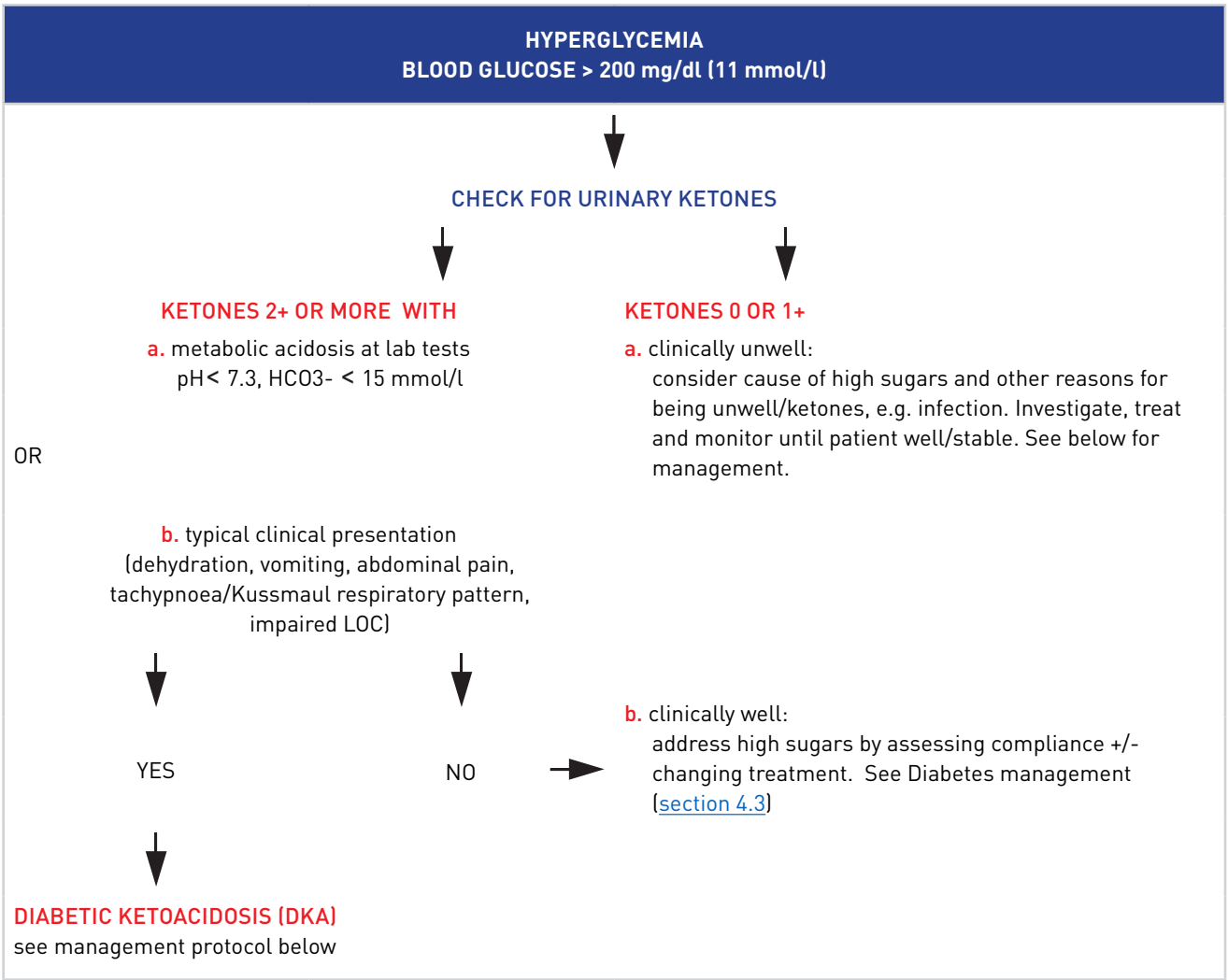
DIABETIC EMERGENCIES

DIABETIC EMERGENCIES

- **Any diabetic patient with acute condition, symptoms (medical/surgical), or trauma should have their blood glucose checked.**
- Patients with signs or symptoms of hyperglycaemia (fasting or random glucose > 200mg/dl or 11mmol/l) or hypoglycaemia (glucose <75mg/dl or 4mmol/l should be moved to a treatment room to be assessed.



Management of Diabetic Ketoacidosis (DKA) in Adults and Children

For children, see Paediatric Care.
For adults, see MSF NCD Guidelines v. 5.2.
Emergency and Paediatric Working Group protocol will be available mid-2025 - contact NCD Advisor for the version pending final approval.
20220712_ Diabetic Ketoacidosis in Adults and Children_ final.docx

MANAGEMENT OF PATIENTS WITH HYPERGLYCAEMIA – WITHOUT DKA	
Assessment	As per flow chart above; • Patient is **unwell** but **does not** have severe symptoms • Ketones 0 or 1+ (< 2+) • OR Ketones 2+ but **NO severe symptoms**
Management	• Encourage patient to drink 500ml non-sugary drink (10ml/kg in children <15yrs) over 1 hour then re-check glucose • Look for infection and treat as appropriate • If glucose still >200mg/dl (11mmol/l) consider additional oral/IV fluids to restore adequate fluid and hydration status, especially if patient is not known diabetic. Concurrent aetiologic investigations and treatment. Re-check glucose in 1 hour. Re-check urinary ketones. Rule-out DKA. • If glucose still >200mg/dl (11mmol/l) AND unwell give 2 units of short acting insulin (Actrapid) subcutaneously (0.05units/kg in children <15). Continue oral/IV fluids and re-check glucose in 1 hour. Re-check urinary ketones • If patient is now well or stabilised: o If patient was on insulin prior to this episode, increase baseline total insulin dose by: * 2 units (0.05units/kg in children <15) if previous total dose was <20units / day * 4 units (0.05units/kg in children <15) if previous total dose was >20units / day o if patient was not on insulin, consider increasing dose of oral hypoglycaemic drugs • If glucose persistently >200mg/dl (11mmol/l) and patient remains unwell/severe symptoms – consider treating as DKA as above

MANAGEMENT OF HYPOGLYCAEMIA BLOOD GLUCOSE <75mg/dl (4mmol/l) WITH OR WITHOUT SYMPTOMS	
Conscious Patient **Able to drink safely**	**Unconscious Patient** **Unable to drink safely**
• Give 15g of simple sugar = 200mls of fruit juice (non-diet) cola or fizzy sweet drink OR 25ml of 50% dextrose by mouth (0.2 g/kg for infants) • Re-check glucose in 15 mins o IF still <75mg/dl (4mmol/l) then repeat above and re-check in 15 mins o IF >75mg/dl (4mmol/l) give the next meal or snack that is due or a source of slow-release carbohydrate (2 biscuits, bread or fruit). Re-check in 1 hour • Look for a cause – e.g. too much insulin (incorrect dose or type, or recent weight loss, missed or delayed meal, alcohol, extra or unplanned exercise, other medications)	• IV access and give 50ml of 50% Dextrose (children <15yrs give 2ml/kg of 10% Dextrose IV/IO) followed by a flush of NaCl • Recheck in 15 mins • IF still <75mg/dl (4mmol/l) and unconscious or unable to drink, repeat as above • IF still <75mg/dl (4mmol/l) but lucid and able to drink, give 200ml of sugary drink or 25ml of 50% dextrose by mouth. Recheck in 15 mins • IF >75mg/dl (4mmol/l) give the next meal or snack that is due or a source of slow-release carbohydrate (see opposite) • IF >75mg/dl (4mmol/l) and consciousness is still impaired, start an IV infusion of 10% Dextrose 1L over 2 hours o children <15yrs: * 4-9kg: 6ml/kg/hr * 10-19kg: 5ml/kg/hr * 20-39kg: 4ml/kg/hr * 40-59kg: 3.5ml/kg/hr * 60-80kg: 3ml/kg/hr o Recheck in 1 hour and stop when conscious and able to drink safely

HYPERTENSIVE EMERGENCY AND URGENCY

BLOOD PRESSURE (BP) ≥180/110 MMHG
HYPERTENSIVE EMERGENCIES AND HYPERTENSIVE URGENCIES

- **For patients with blood pressure ≥180/110 mmHg, a hypertensive emergency must be ruled in or out.**
- Hypertensive **EMERGENCY** = presence of any sign/symptom of stroke or other end organ damage.
  - Note that true hypertensive emergencies are rare.
- Hypertensive **URGENCY** = absence of signs/symptoms of hypertensive emergency

HYPERTENSION ALGORITHM

BP ≥ 180/100

↓

Stroke Signs/symptoms (FAST) ? ------

Facial drooping - ask patient to smile

Arm (or leg) weakness - ask patient to raise both arms and then both legs

Speech difficulty - ask patient to repeat a sentence

If at least one NEW sign of stroke (above) is present:

Time: treat immediately

↓

NO signs/symptoms of stroke

↓

End-organ damage? ------

- Hypertensive encephalopathy:
  - severe headache
  - altered mental status
- Pappilloedema or retinal haemorrhages (if fundoscopy available)
- Acute Coronary Syndrome - see algorithm (page 108)
- Pulmonary oedema
- Acute Kidney Failure: check BUN, serum creatinine

↓

YES → **HYPERTENSIVE EMERGENCY**

1. Lower MAP by 25% within 1 hour
2. Then target 160/100 within 2-6 hours
3. Admit

MAP=DBP=(SBP-DBP)/3)
MAP : Mean Arterial Pressure
SBP : Systolic BP
DBP : Diastolic BP

NO → **STAGE 3 HYPERTENSION**

Treat hypertension (see 5.3.2)

PARENTERAL DRUGS FOR HYPERTENSIVE EMERGENCIES IN MSF			
DRUG	**MAIN INDICATIONS**	**ADVERSE EFFECTS AND CONTRA-INDICATIONS**	**DOSE**
IV Labetalol Refer to MSF Essential obstetrics and newborn care 4.5 Hypertensive disorders in pregnancy | MSF Medical Guidelines	Hypertensive emergencies including ACS, hypertensive encephalopathy, pregnancy-induced, post-operative hypertension	Nausea/vomiting, paresthesias (eg, scalp tingling), dizziness; Avoid in: asthma/COPD, heart block, bradycardia and heart failure	Initial IV bolus 20 mg over 1-2 min, followed by 0.5 to 2 mg/minute as IV infusion or Initial bolus of 20 mg IV followed by 20 IV slow bolus every 10 minutes do not exceed a total dose of 300 mg
IV Hydralazine Refer to MSF Essential obstetrics and newborn care 4.5 Hypertensive disorders in pregnancy | MSF Medical Guidelines	Pregnancy-related hypertension (although prolonged and unpredictable effect)	Sudden precipitous drop in BP, tachycardia, flushing, headache, vomiting, aggravation of angina Avoid: acute heart failure, ACS	5-10 mg over 2-5 min; may be repeated in 20-30 min or IV infusion with initial dose 200 to 300 mcg/min and maintenance 50 to 150 mcg/min do not exceed total dose of 20 mg
IV Glyceryl Trinitrate (Nitroglycerin)	Hypertensive emergencies with acute cardiac failure (acute coronary syndrome or pulmonary oedema)	Tachycardia (reflex sympathetic activation), headache, vomiting, flushing, tolerance with prolonged use (24-48 hours) Avoid: recent use of phosphodiesterase-type 5 inhibitors (e.g. sildenafil)	5 to 100 mcg/minute as IV infusion

HYPERTENSIVE URGENCIES = ABSENCE OF SIGNS/SYMPTOMS OF HYPERTENSIVE EMERGENCY

In this case:

- BP should be reduced over a period of hours to days
  (slower reduction may be needed in older adult patients at high risk for cerebral or myocardial ischemia resulting from excessively rapid reduction of BP)

- the shorter-term goal of management is to reduce the blood pressure to ⩽160/⩽100 mmHg.
  However, the mean arterial pressure should not be lowered by more than 25 to 30% over the first several hours:

  - confirm BP measures at least 3 times over 30 minutes while the patient rests (preferably in a sitting position in a quiet room); ask the patient about their pain level or other stressors which may affect BP.

  - If BP persists ⩾180/110 after repeat readings and rest, outpatient hypertensive management should be undertaken with oral medications (see 5.3.2 for hypertension treatment).

To notice: start treatment and observe response for few hours in patients judged to be at high risk for imminent CV events due to severe hypertension, including those with known aortic or intracranial aneurysms. Use either short-acting agents as oral captopril (if the patient is not volume overloaded) or longer-acting agents (as per the chapter on Hypertension).

ACUTE CORONARY SYNDROME

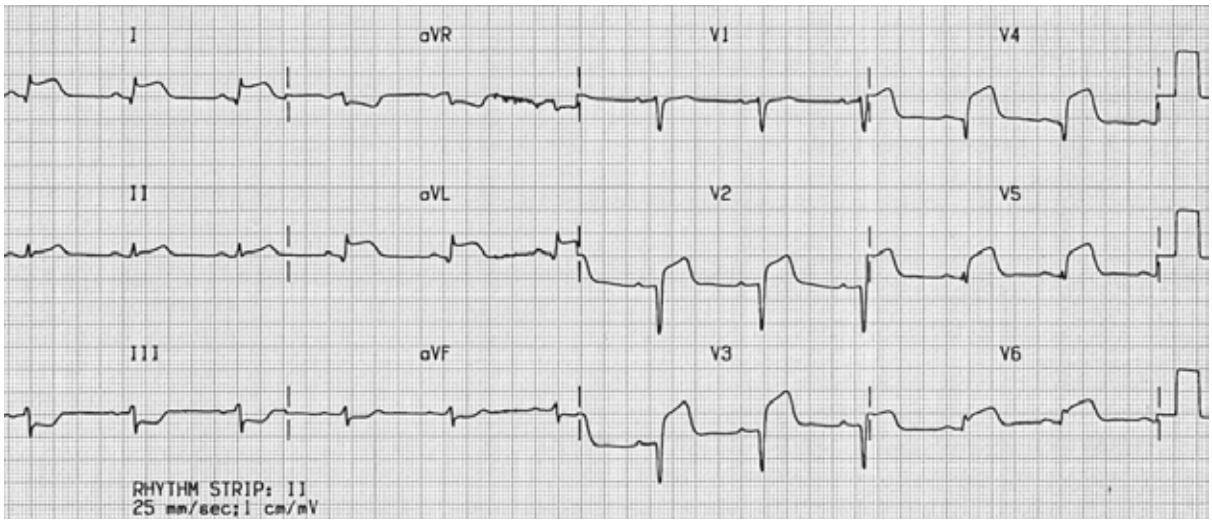
MANAGEMENT OF ACUTE CORONARY SYNDROMES (ACS)
ACS is a spectrum comprising ST elevation Myocardial Infarction (STEMI), non-ST elevation MI (NSTEMI) or unstable angina. There is either infarction or ischaemia in ACS. They are treated the same way. There are numerous causes for chest pain, so a good history and exam needs to be done to help confirm the diagnosis and prioritize the life-threatening ones.

INITIAL ASSESSMENT AND EMERGENCY CARE	
A - AIRWAY	
B - BREATHING	- check SpO_2 and respiratory rate, give O_2 only if hypoxia
C - CIRCULATION	- BP, pulses, HR, IV access (& draw bloods), heart monitor/ECG

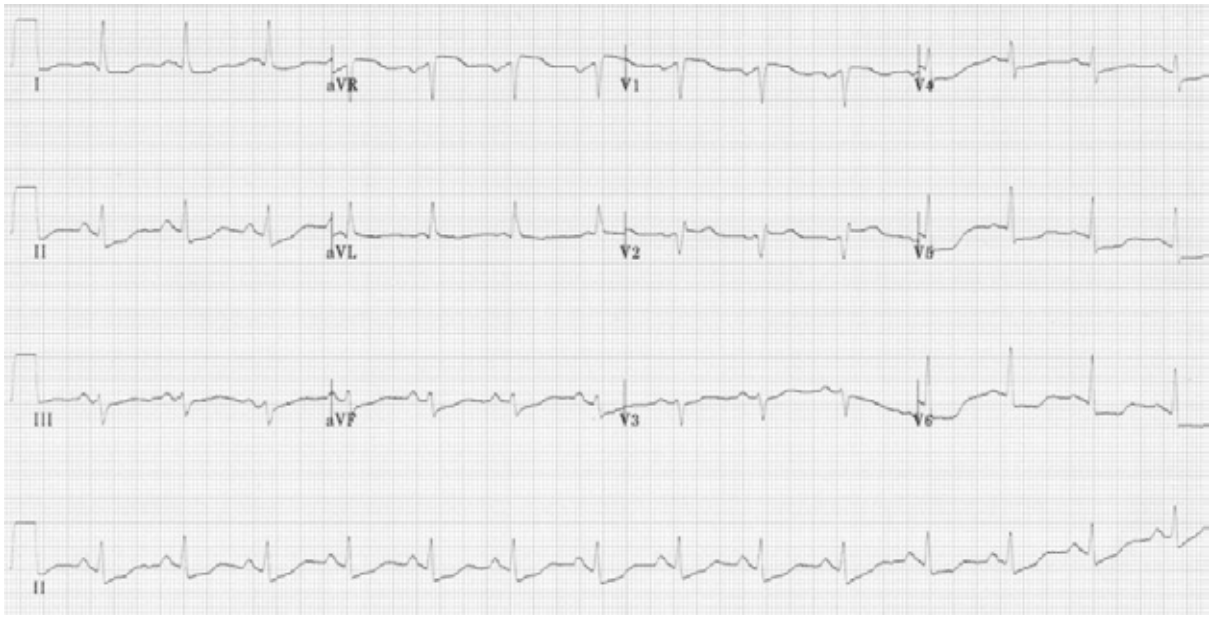
HISTORY OF CHEST PAIN	EXAMINATION OF PATIENT WITH CHEST PAIN
Chest pain description: Classic cardiac pain is diffuse, central, dull ache/squeeze lasting >15 min. Associated with radiation to 1 or 2 arms and the jaw. **Possible associated symptoms**: sweatiness, nausea and vomiting, dizziness. **Presentation may be atypical:** in women, older adults and diabetic patients. **Review of CVD risk factors:** smoking, hypertension, diabetes, prior CVD. **Consider other life threatening non-ischaemic causes of chest pain** e.g. acute aortic dissection, pulmonary embolus, oesophageal rupture.	**Cardiovascular exam** look for haemodynamic compromise and signs of left ventricular failure (pulmonary oedema, cardiogenic shock). **ECG** (if available) and repeat every 15 mins (first ECG often not diagnostic). Document in notes any ischaemic changes. **Imaging** POCUS: if possible, 5-view cardiac exam to evaluate for signs of decreased cardiac functionCXR: if possible, if heart failure suspected.

ECG examples (source: EKG Library • LITFL • ECG Library Basics)

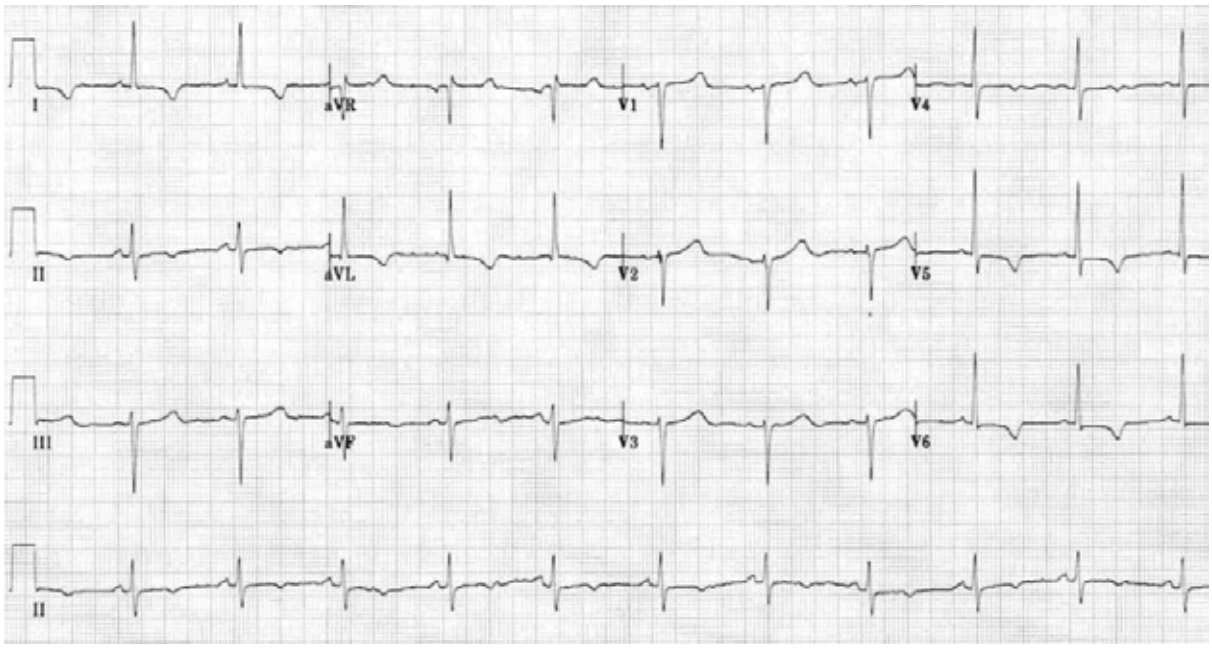
a) Anterolateral STEMI: ST elevation in anterior (V2-4) and lateral leads (I, aVL, V5-V6)



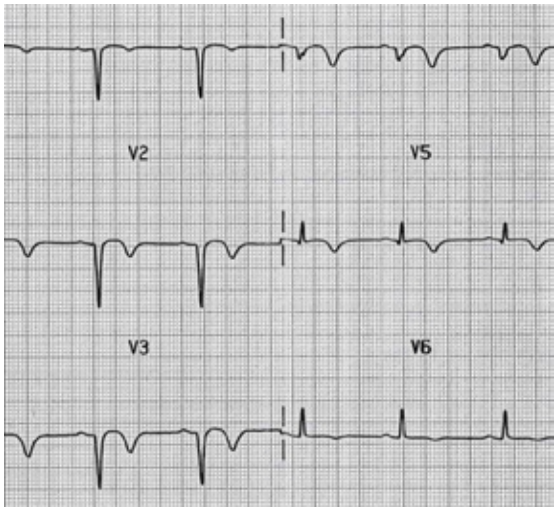
b) NSTEMI: ST depression in leads I, II, V5, V6 (consistent with widespread subendocardial ischemia)



c) NSTEMI: T-wave inversion, widespread, most prominent in lateral leads (I, aVL, V5-V6)



d) Anterior q waves (V1-V4) with T-wave inversion due to recent MI



IMMEDIATE TREATMENT OF SUSPECTED ACS (ONGOING DURING ASSESSMENT ABOVE)

Give Aspirin **300mg oral STAT**
Unless prior anaphylaxis or recently taken by patient during this episode of chest pain

↓

Oxygen **2-5L nasal cannula ONLY in hypoxic patients**

↓

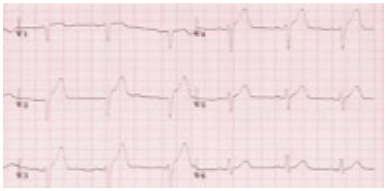
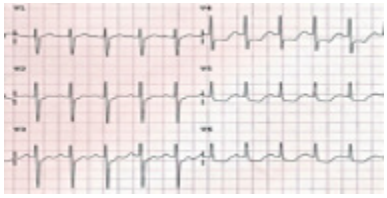
Glyceryl trinitrate **0.5 mg sublingual** if systolic BP >90 mmHg
Give every 5 minutes up to 3-4 doses if required and tolerated
If benefitting from this, **convert to Isosorbide Dinitrate 10-40mg tds**
DO NOT use a response (relief of pain) to make a diagnosis of ACS!

↓

Morphine **2.5 – 5 mg IV** every 5-15 minutes **ONLY IF** needed for pain or anxiety

Diagnosis of ACS confirmed if one or both of

- Chest pain consistent with cardiac event on history and related symptoms suggestive of ischaemia
- ECG changes suggestive of new ischaemia or development of pathological q-wave changes (if ECG not available or normal – still treat as ACS if there is a strong clinical suspicion)

ST ELEVATION MI	NON-ST ELEVATION MI
	
STsegment elevations ≥1 mm (0.1 mV) in 2 anatomically contiguous leads or ≥2 mm (0.2 mV) in leads V2 and V3 or new left bundle branch block (BBB) and presentation consistent with ACS.	ST segment depressions or deep T wave inversions without Q waves or possibly no ECG changes.

If ACS is low probability (i.e. does not meet the diagnostic criteria above) and the patient is stable, admit to hospital if possible, perform ECG twice daily to check for evolving changes, but do not give further treatment. Discharge after 24-48 hours if there are no new ECG changes and the patient remains stable.

ONGOING TREATMENT OF ACS : **ACS CONFIRMED**

Give loading dose 300mg Clopidogrel (75mg if >75yrs)

↓

Angioplasty/Thrombolysis available? ← YES ← Refer to hospital where angioplasty or thrombolysis available within 12 hours of onset of pain

↓

NO

↓

Admit to hospital
Start 12-lead ECG monitoring

↓

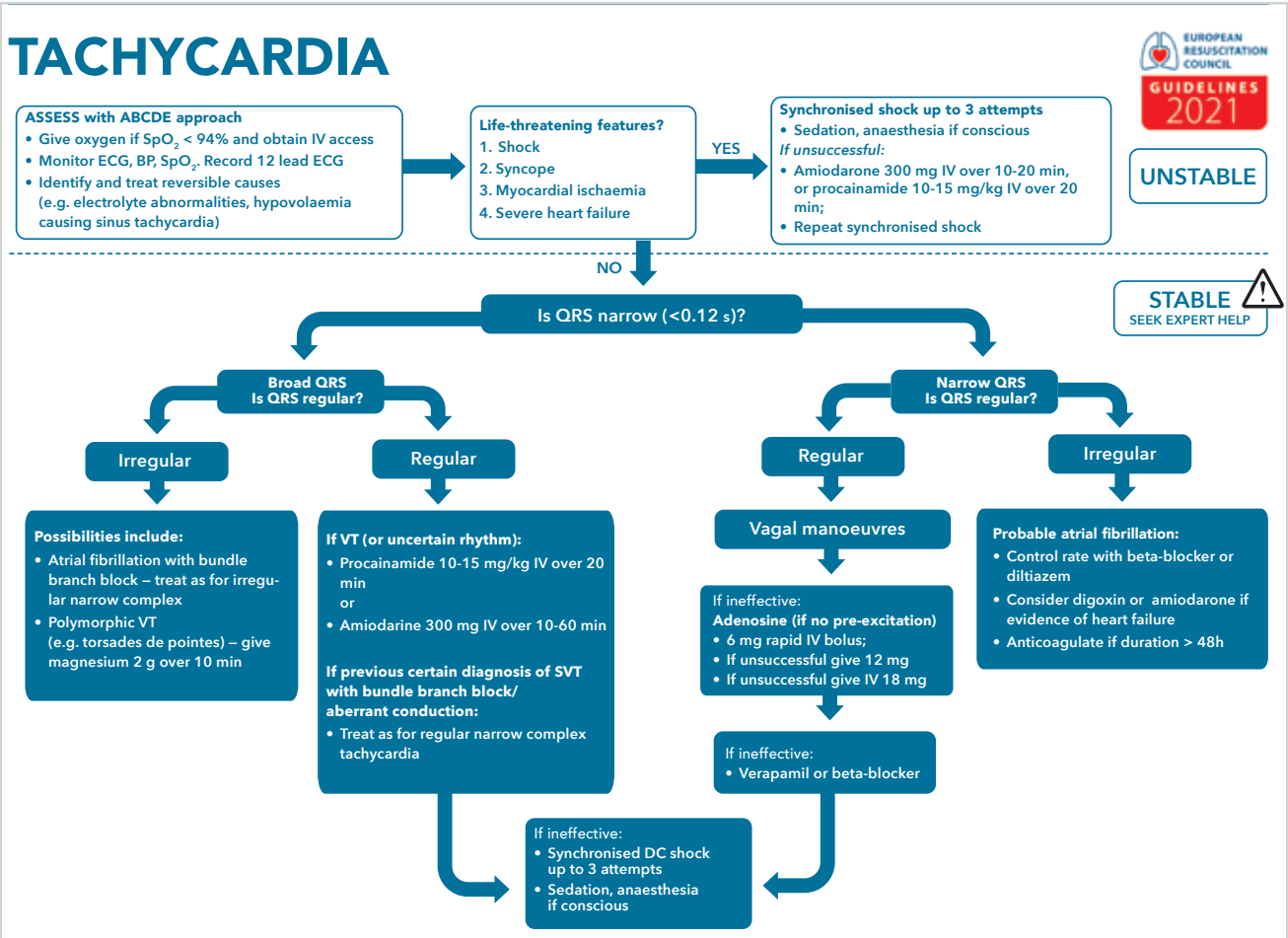
For NSTEMI/Unstable Angina & STEMI where no thrombolysis available:
Enoxaparin 1 mg/kg subcutaneously twice daily for 2 – 5 days.
Review bleeding risk prior to use. Reduce dose in renal impairment.

↓

Bisoprolol 2.5 mg po OD, increase to 10 mg po OD as tolerated.
Do NOT give if low output state, risk of cardiogenic shock,
hypotension, heart block, bradycardia (heart rate < 50) or active severe asthma.
See CVD section for long term management

COMPLICATIONS OF ACS AND THEIR TREATMENTS				
ONGOING OR RECURRENT ISCHAEMIA/ INFARCTION	DYSRHYTHMIAS	CIRCULATORY COMPROMISE	PERICARDITIS	EVOLVING ECG CHANGES
Exclude musculoskeletal pain and pericarditis **Plus** ECG changes: Differentiate new changes from resolving/evolving changes as the heart recovers from the MI ↓ Continue or restart enoxaparin until the patient's clinical condition and ECG changes improve ↓ Increase the dose of Bisoprolol ↓ Add or continue isosorbide dinitrate (or parenteral nitrates if available and upon cardiologist indication)	**Complete heart block** - develops early in the post-MI period - Often transient, resolves spontaneously in 2-3 days - Keep the patient on bed rest - Stop bisoprolol if heart block develops but do not withhold bisoprolol to 'prevent' heart block - atropine only if there is significant bradycardia **VT/VF** is the major cause of sudden death in the post-infarct period - The most vulnerable time is the first 48 hours after onset of symptoms: patients require supervision and should not be left alone for at least 48 hours - bisoprolol (cardioprotective effect) to all patients with acute MI - do NOT give other prophylactic anti-arrhythmic - do NOT attempt to treat ventricular ectopic beats - If VT is diagnosed on ECG - treat according to algorithm 'emergency management of arrhythmias'	**Cardiogenic shock**: this has a very poor prognosis (see page 121) **Pulmonary oedema**: Treat as per heart failure protocol	May be seen in 12-20% of patients after MI - Continue Aspirin but avoid other NSAIDs for 7-10 days after acute MI: give paracetamol	**STEMI:** **Q waves** develop after several hours; ST changes may resolve, or may persist (fixed ST elevation); Persistent ST elevation does NOT always signify an LV aneurysm. **ST depression** is usually transient and should resolve as ischaemia improves. - Persistent anterior ST depression: consider posterior STEMI (dominant R wave in V1) - Persistent lateral ST depression: consider LV strain pattern (tall high voltage QRS complexes) **T wave inversion:** After infarction, T waves often deepen and sharpen. May remain inverted or may return to normal

ARRHYTHMIAS



The treatment of all arrhythmias addresses the condition of the patient (stable versus unstable) and the nature of the arrhythmia.

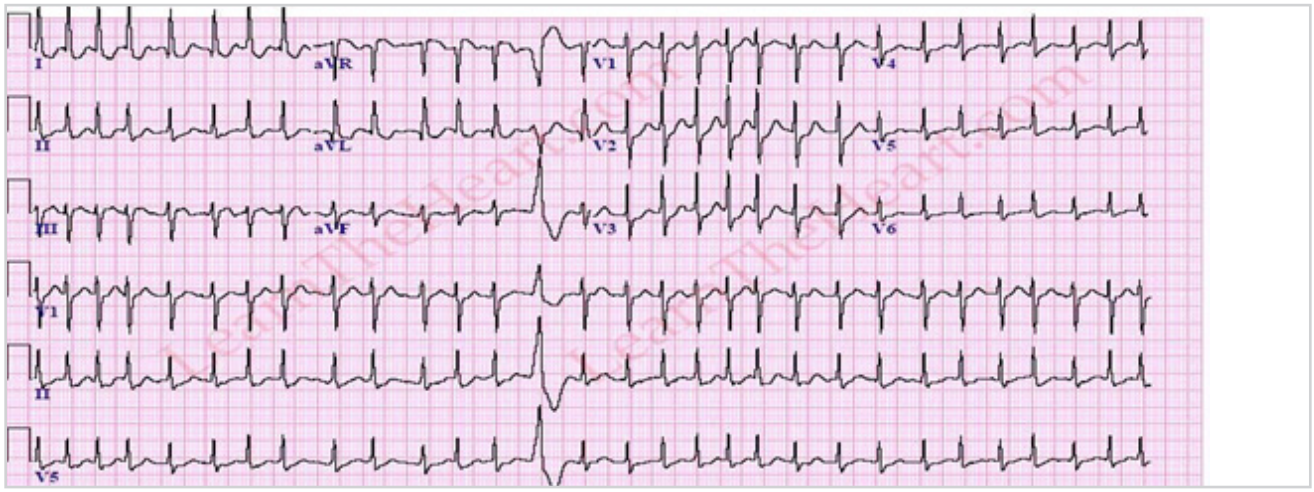
Life-threatening features in an unstable patient include:

- **Shock**: appreciated as hypotension (e.g. SBP < 90 mmHg) and symptoms of increased sympathetic activity and reduced cerebral blood flow
- **Syncope**: as a consequence of reduced cerebral blood flow
- **Heart failure**: manifested by pulmonary oedema (failure of the left ventricle) and/or raised jugular venous pressure (failure of the right ventricle)
- **Myocardial ischaemia**: may present with chest pain (angina) or may occur without pain as an isolated finding on the 12-lead ECG (silent ischaemia)

ONLY when a patient is stable consider the following indications!

Whereas if unstable: synchronized shock (see above ERC poster)

a. Narrow QRS --- IRREGULAR = Atrial fibrillation



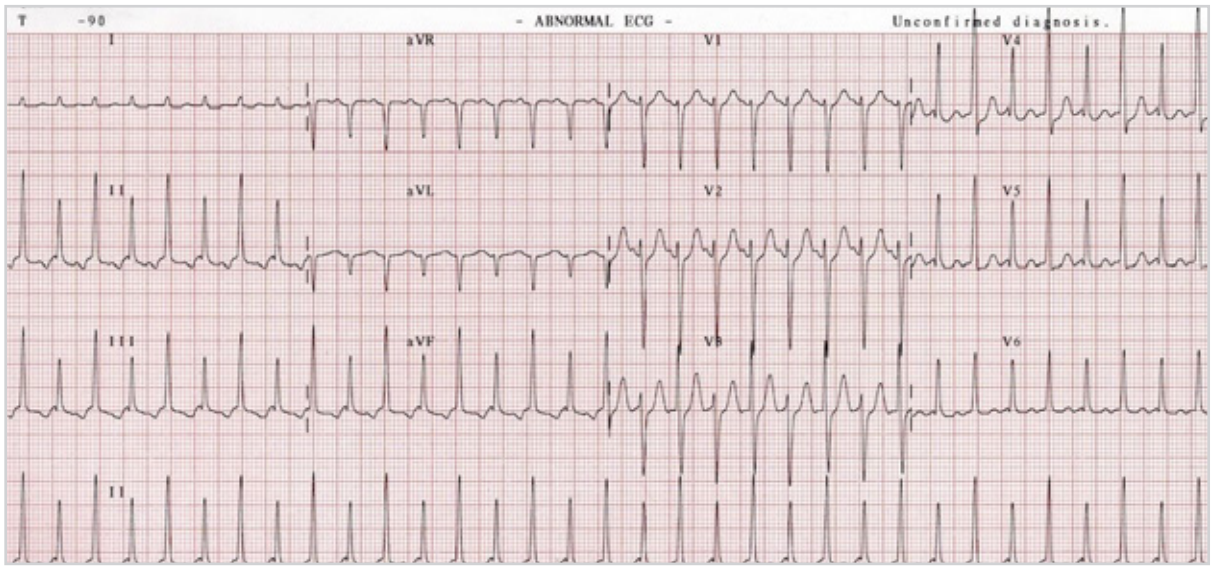
SIGNS/SYMPTOMS OF HEART FAILURE (HF)?	
YES	NO
Control rate (goal HR < 110/min) i. Digoxin iv/PO • PO (0.25 mg tab): initial dose 0.5 mg, then 0.25 mg every 6 hours for a total loading dose of 0.75 to 1.5 mg • IV: initial dose 0.25 to 0.5 mg over 5 min, followed by 0.25 mg every 6 hours for a total loading dose of 0.75 to 1.5 mg **NB**: Intravenous digoxin begins to act in 15-30 min, with a peak effect in 1 to 5 hours. ii. Amiodarone IV 5 mg/kg over 30 min 300 mg (1 to 2 amp in 250 mL of dextrose 5%) followed by 600 mg over 24 hours (add 4 ampules to 500 mL of dextrose 5% and give over 24 hours = 21 mL/hour) **NB**: see Acute Heart Failure	**Control rate (goal HR < 110/min) with:** i. Beta-blocker PO (if no other contra-indications as asthma/COPD, SBP < 90 mmHg) • metoprolol IV: 2.5 - 5 mg bolus; up to 4 doses (then maintenance dose 25 - 100 mg BD) • if no IV available: bisoprolol PO: 1.25 mg to 10 mg OD ii. CCB IV (if no contra-indications as SBP < 90 mmHg) • diltiazem IV: 0.25 mg/kg bolus over 5 min (average of 20 mg), then 5 - 15 mg/h maintenance (1 vial = 25 mg, to dilute in dextrose or NaCl) • verapamil IV: 2.5 - 10 mg bolus over 5 min, repeat with 5 - 10 mg every 15 minutes **Caution** **Do not use CCB and beta-blockers if heart failure; use cautiously if SBP < 100**

References

2020 ESC Guidelines for the diagnosis and management of atrial fibrillation. *Eur Hearth J* (2020) 42, 373 – 498

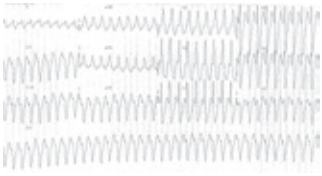
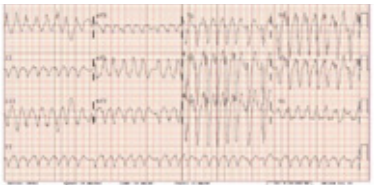
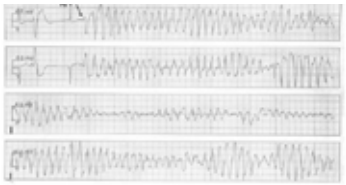
https://www-uptodate-com.bvsp.idm.oclc.org/contents/treatment-with-digoxin-initial-dosing-monitoring-and-dose-modification?search=Treatment%20with%20digoxin:%20Initial%20dosing,%20monitoring&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

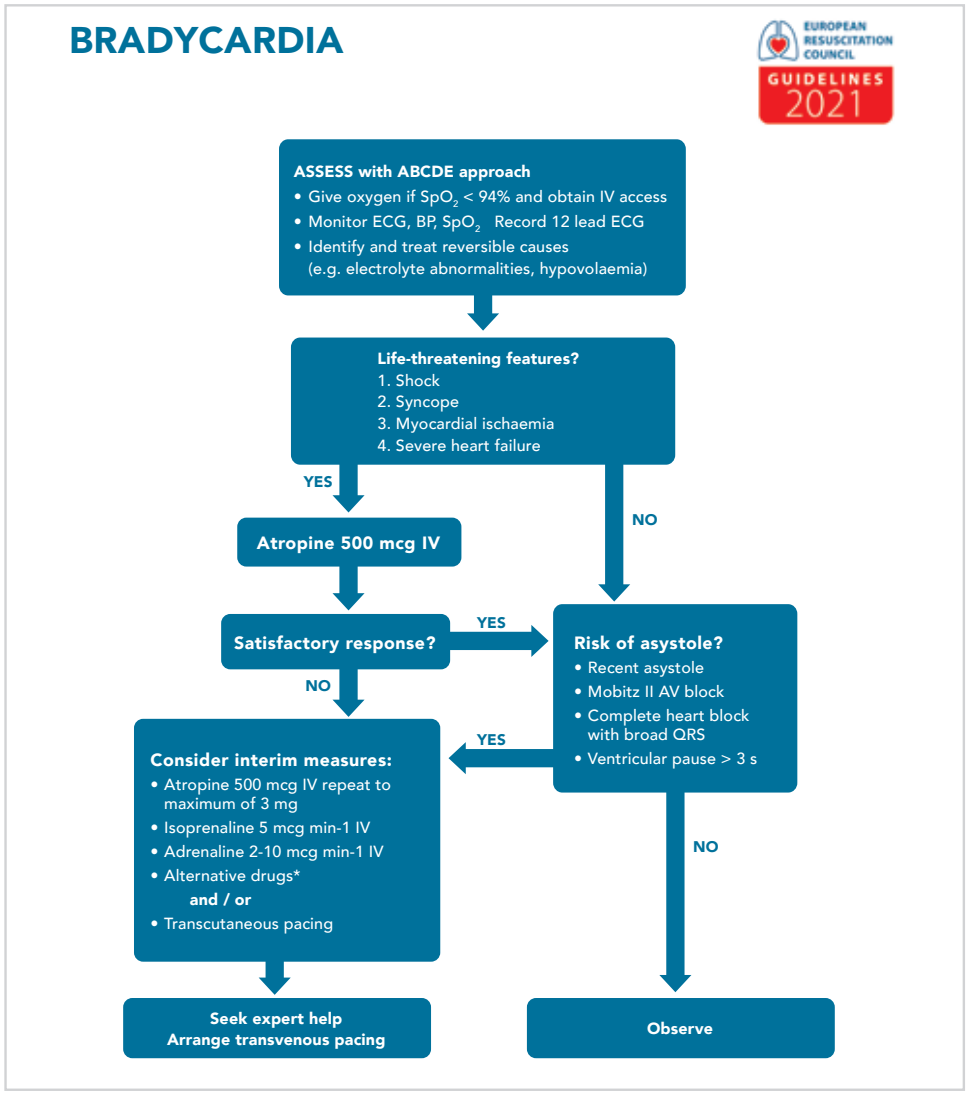
b. Narrow QRS --- REGULAR = Supra-Ventricular Tachycardia (SVT)



STEP 1	VAGAL MANEUVERS		
	Modified Valsalva maneuver		
	The modified Valsalva maneuver is nearly three times more successful at converting SVT compared to the traditional Valsalva maneuver		
	1 Have the patient take a normal breath in, then bear down for 15 seconds	2 Immediately place them supine and passively raise their legs to 45 degrees for 15 seconds	3 Return to semi-Fowler position (seated with head of bed at 30 to 45 degrees) and wait for up to 1 full minute for resolution of SVT
	Carotid Sinus Massage (never in a patient with recent stroke/TIA)		
	The carotid sinus massage is a vagal maneuver that can be performed on a patient who is unable to follow commands		
	1 Ensure there is no carotid bruit with your stethoscope	2 Locate the carotid sinus This is inferior to the angle of the mandible at the level of the thyroid cartilage (near the pulse)	3 Apply firm pressure for 10-15 seconds May repeat on the other side if needed
STEP 2	**ADENOSINE**		
	6 mg IV bolus rapid injection (1 amp): if persistence after 2 min ➔ 12 mg IV bolus if persistence after 2 min ➔ 12 mg IV bolus If no response after 3 bolus ➔ change molecule		

c. Broad QRS arrhythmias

MANAGEMENT OF BROAD QRS (> 0.12MS) TACHYCARDIA		
Regular: **Ventricular tachycardia**	**Irregular: Atrial fibrillation with left bundle branch block**	**Irregular:** **Polymorphic VT**
		
TREATMENT		
Give Amiodarone 300 mg over 20 min and then 900 mg/24 h	Same as AF	Magnesium 2 g in 10 min



* alternative drugs in MSF: currently not alternative available

References

European Resuscitation Council (ERC) Guidelines 2021. resuscitationjournal.com). Resuscitation, 2021; 161: 1-60

ACUTE HEART FAILURE

MANAGEMENT OF ACUTE HEART FAILURE (AHF)	
refer to Paediatric Care for management in children	
1	**Assessment – ABCD:** • Lung auscultation: congestion? to notice: occasionally 'cardiac' wheezes • Poor perfusion: cold extremities, weak pulse, restless/confusion? • Heart auscultation: new murmurs/extra heart sounds? • Neck: jugular vein distension? • ECG: ischemia/arrhythmias (examples in figures below)? • POCUS or/and chest XRay: evaluate for signs of bilateral pulmonary oedema and/or pleural effusions + cardiac exam to evaluate for signs of acute volume overload and/or decreased cardiac function • Blood tests: electrolytes, serum creatinine, complete blood count, and cardiac troponins if available • Always ask about previous history of cardiac diseases or heart failure!
2	**Attach monitor** (BP, HR, SpO_2) + insert IV cannula & monitor urine output (urinary catheter if needed)
3	**Look for possible cause:** • pre-existing heart failure (see dedicated chapter) → look for any precipitating factor (infection, non-adherence with drugs, uncontrolled hypertension, arrhythmias, ischaemia) • ischaemia • arrhythmias • valvular disease (severe aortic or mitral valve stenosis or regurgitation) • cardiomyopathy (hypertrophic, dilated, stress, peri-partum)
4	**Treat** according to different clinical syndromes in the below table
5	**Monitor** the response to treatment: vital signs including urine output

3 MAIN CLINICAL SYNDROMES	
Acute Pulmonary Oedema	**due to:** increased afterload (e.g. high BP) and/or predominant LV dysfunction (acute left sided "backward" failure) ± volume overload **characterized by:** lung congestion + acute respiratory failure (hypoxemia and/or hypercapnia): dyspnea with orthopnea, tachypnoea >25/min, and increased work of breathing, elevated jugular pressure (JVP) **onset:** usually rapid ('flash' pulmonary oedema) **main treatment:** volume overload YES→ diuretics + vasodilators (nitrates) ± CPAP or BiPAP (* refer to specific protocols/Critical Care referents) volume overload NO → vasodilators (nitrates) + CPAP or BiPAP (* refer to specific protocols/Critical Care referents)
Cardiogenic Shock	**due to:** severe cardiac dysfunction (due to different causes) **characterized by:** systemic hypoperfusion (BP <90 mmHg, weak pulse, prolonged capillary refill time, cutaneous pallor, cold extremities, altered consciousness, oligo/anuria) **onset:** possible gradual or rapid **main treatment:** little fluids boluses (e.g. crystalloids 250 ml) + vasopressors and inotropic agents (refer Vasopressor Therapy) *to notice:* when it is associated with overload & pulmonary oedema, the patients may need diuretics once BP normalized
Acute Decompensated CHF	**due to:** worsening of chronic cardiac dysfunction (usually involving LVEF +/- RV dysfunction), with progressive fluid retention **characterized by:** progressive systemic congestion (jugular vein congestion, lower limb oedema, hepatomegaly, ascites, scrotal oedema, anasarca, lungs). Rarely associated with hypoperfusion **onset:** usually gradual (days) **main treatment:** diuretics + correction of the precipitant cause
Caution: The above clinical groups are not mutually exclusive (e.g. a patient with cardiogenic shock may develop pulmonary oedema)	

Acute Pulmonary Oedema

Estimate volume status whenever possible (POCUS) and adapt treatment

ALL PATIENTS: POSTURE AND O_2

- use a non-rebreather mask with high-flow 100% 02
- if possible (and not contra-indicated) use CPAP (Continuous Positive Airways Pressure) or non-invasive positive-pressure-ventilation (BiPAP) (* refer to specific protocols/Critical Care referents)

IF SBP ≥110 MMHG: DIURETICS + VASODILATORS

loop diuretics (furosemide)

PO:IV conversion ratio 2:1

i. diuretics = furosemide 20-40 mg IV

- onset of diuresis occurs within 30 min
- peak diuresis usually at 1-2 hours
- if little or no response ➔ double the dose at 2-hour intervals as needed up to the max doses
- patients treated chronically with diuretics may need a higher dose ➔ the initial daily IV dose should be equal to or greater than (e.g. 2 times) their maintenance total daily oral dose, and then adjusted depending upon response
- patients with renal insufficiency (estimated from serum creatinine) may require higher maximum bolus doses of up to 160 to 200 mg

ii. vasodilators = nitrates

- to decrease systemic vascular resistance and LV afterload (e.g. patients with flash pulmonary oedema due to hypertension, acute aortic or mitral regurgitation)

a. if an electronic pump is available, an IV route is preferred for greater speed, reliability of delivery and ease of titration:

- IV glyceryl trinitrate (also known as nitroglycerin NTG) 5mg/ml, 10ml, vial:
- initial infusion dose of 5 to 10 mcg/min of IV nitroglycerin is recommended with the dose increased in increments of 5 to 10 mcg/min every 3-5 minutes as required and tolerated (dose range 10 to 200 mcg/min) *

or

- IV isosorbide dinitrate (10 ml ampoule, 1 mg/ml): 2 mg (= 2 ml) by slow IV injection (over 2 minutes) then if necessary 2 to 10 mg/hour by continuous infusion**

b. when IV administration not possible:

- isosorbide dinitrate sublingual (5 mg tablet)
  5 mg per dose; if necessary up to 2 doses taken 10 minutes apart

or

- glyceryl trinitrate sublingual (0.5 mg tablet)
  0.5 mg per dose; if necessary up to 3 doses taken 5 minutes apart

* note: potential adverse effects of IV nitrates include hypotension and headache. Nitrate therapy should be avoided or used with caution in settings in which hypotension is likely or could result in serious decompensation such as right ventricular infarction or aortic stenosis. Nitrate administration is contraindicated after use of PDE-5 inhibitors such as sildenafil. Tachyphylaxis develops within 24 to 48 hours of continuous IV nitrates administration. If diuretic therapy is effective during the initial period, the vasodilatory effects of nitroglycerin are commonly no longer required after this period.

** note: Similar benefits have been described with IV isosorbide dinitrate. However, if hypotension occurs, the longer half-life of isosorbide dinitrate compared with nitroglycerin (4 hours versus 3-5 min) is a major disadvantage.

IF SBP <110 MMHG (BUT >90 MMHG): DIURETICS ONLY

Follow above recommendations on furosemide use

Opiates (morphines): routine use is not recommended, although they may be considered in selected patients, particularly in case of severe/intractable pain or anxiety or in the setting of palliation.

Cardiogenic Shock (with or without pulmonary oedema)

Use ECG and POCUS whenever accessible to detect the cause

LOOK FOR THE REASON
• myocardial: acute myocardial infarction, acute heart failure, outflow tract obstruction, myocardial depression in setting of septic shock • valvular: e.g. valvular rupture • electrical: tachyarrhythmias, bradycardia • others: e.g. toxic causes
GIVE LITTLE FLUIDS
• crystalloids 250 ml in bolus over 10 - 20 min • monitor closely (vitals, lungs, liver edge) and reassess • repeat if needed and keep close monitoring
START VASOPRESSORS
• **norepinephrine 1st line** 0.05 - 0.2 mcg/kg/min (refer to protocols Vasopressor_Therapy) • if very hypotensive, epinephrine as alternative • compulsory to adminster by infusion or syringe pump

Acute Decompensated CHF

LOOK FOR THE REASON
• non-adherence to chronic treatment is a very common one • check for associated signs/symptoms: new murmurs, chest pain, palpitations, signs of infection etc.
GIVE DIURETICS
• furosemide 20 - 40 mg IV bolus (see above for PO:IV ratio and for renal function adjustments) • monitor response to diuretics

for AHF in pregnancy: NCD in Pregnancy Guidelines

References

2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. *European Heart Journal (2021)* 42, 3599-3726

www-uptodate-com.bvsp.idm.oclc.org/contents/approach-to-diagnosis-and-evaluation-of-acute-decompensated-heart-failure-in-adults?search=acute%20heart%20failure&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1

STROKE – ACUTE MANAGEMENT

CONFIRM TYPE OF STROKE: ISCHEMIC (IS) VERSUS HAEMORRHAGIC (ICH, INTRA-CEREBRAL HAEMORRHAGE)

i. majority is ischemic, however in sub Saharan Africa up to 25 - 30% may be haemorrhagic (vs 10 % in other settings).
ii. **acute (first 48 hours)** treatment is different among the types, in regards of:
   - thrombolysis / vascular surgery
   - antiplatelet therapy
   - Blood Pressure (BP) management
iii. CT scan is the gold standard and it is required for diagnostic certainty = refer for CT whenever possible!
iv. NO set of clinical signs reliably differentiates among the 2, though certain clinical features may indicate a higher likelihood of ICH: depressed level of consciousness, vomiting, seizure at symptom onset, severe hypertension on presentation, headache

CT SCAN AVAILABLE?

YES	NO
Management of confirmed IS	**Management of Stroke of Unknown Type (SOUT)**
I. Revascularization available?	**I. Thrombolysus or Vascular Surgery**
YES • Thrombolysis: within 3 hours from symptoms onset • Carotid surgery: within few days from symptoms onset **NO**: see following box	NO indication if no diagnostic certainty
II. Antiplatelet Therapy	**II. Antiplatelet Therapy**
• ASA 300 mg loading dose immediately • continue ASA 300 mg OD for 2 weeks from symptom onset **Caution:** Rule out Atrial Fibrillation (AF): check pulse, ECG if available (see 7.2) • Then continue long-term (along with statin): o ASA 75 mg or o Clopidogrel 75 mg OD*	• Delay the ASA 300 mg loading dose: until 25-48 hours after onset of symptoms • Continue ASA 300 mg OD for 2 weeks from symptoms onset **To notice:** Rule out Atrial Fibrillation (AF): check pulse, ECG if available (and see related algorithm in case of AF+) • Then continue long-term (along with statin): o ASA 75 mg or o Clopidogrel 75 mg OD*
III. BP (refer to Management of Hypertensive Emergencies)	**III. BP** (refer to algorithm of Hypertensive Emergencies)
• Prior to thrombolysis: target BP ⩽ 180/105 mmHg • NO thrombolysis: hypotension may be harmful! first 24 hours: allow BP to go as high as 220/120 mmHg without medications (auto-regulation)	• **first 24 hours from symptom onset:** target Systolic Blood Pressure (SBP) = 175 mmHg (this target: in IS avoids the hypotension that is harmful and is unlikely to exacerbate cerebral ischaemia - in ICH does not seem to increase risk of death/severe disability due to hematoma expansion * If symptoms worsen during the BP lowering, then allow the BP to go as high as the body decides to go without medications (auto-regulation)! • **between 24 - 72 hours from symptom onset:** safer to lower BP, usually target BP ⩽ 175/105 mmHg • **beyond 72 hours from symptom onset** (often seen in MSF contexts due to late arrival): safe the medium/long-term BP goals ⩽ 130/80 mmHg

If AF present: assess indication (and bleeding risk) for Oral Anticoagulation (OAC). If OAC not available, APT (Aspirin) is indicated in AF for secondary stroke prevention.

- Patients with Stroke should not routinely be admitted to hospital unless they require a specific treatment that is available or if it is culturally appropriate.

* Clopidogrel: 2nd line in case of contraindications to Aspirin

Volemia: volume status	Hypovolemia could be harmful!	• Always assess volume status (clinical examination, POCUS;) • Use cristalloids for rehydration/ maintenance
Fever	T > 39°C is associated with increased mortality	• Check out for infections (cultures, imaging); • Treat with antipyretics and if indicated with antibiotics
Hyperglycemia	It is associated with worse outcome	• BS monitoring with a goal of 140-180 mg/dl; • Use insulin only in settings equipped for BS monitoring
Deep Venous Thrombosis (DVT)	In SOUT: mandatory to wait 72 hours after symptoms onset + only if patient is stable at neurological examination	Enoxaparin sc every 24 hours according to body weight
Head Of Bed (HOB) position	• decreases the risk of aspiration • lowers ICP	Elevate HOB to ≥30 degree for ALL, unless worsening of symptoms with elevation; Do it using blankets, boxes..
Post Stroke Aspiration Pneumonia PSAP	Check for dysphagia. Refer to Nursing procedure 9.3: Oral feeding and dysphagia V1 2021.pdf	Oral hygiene care (Nursing Care manual 12.4. SOP Mouthcare V1 2022.pdf; 12.4. Mouth Care V1 2021.pdf)) NGT in presence of dysphagia (Nursing Care manual Nursing Care Working Group - 9.2. Gastric Tubes_Insertion SOP V2 2021.pdf - All Documents (sharepoint.com))

References

M.L. Prust, et al. Inpatient Management of Acute Stroke of Unknown Type in Resource-Limited Settings. Stroke, 2022; 53: e108-e117

SEIZURE AND STATUS EPILEPTICUS

ACUTE MANAGEMENT OF PATIENT WITH A SEIZURE

Most seizures are brief and self-limiting and stop within 5-10 mins.

At pre-hospital level

➔ Protect from injury, place the patient in 'recovery position' to maintain the airway. Loosen clothing, remove eye glasses.

If seizure lasts > 5 minutes or repeated (≥ 3 in 1 hour)

➔ transfer to treatment room immediately and get doctor's assessment:

- ABCDE approach + check blood glucose, electrolytes and calcium
- Get history from patient +/or witness
- Look for and if possible treat cause e.g. metabolic/infectious/febrile seizure
- If seizure continues use the following management algorithms:

PEDIATRIC	New Paediatric Emergency Seizure Management Protocol V14_2022.docx
ADULTS (including pregnant women except eclamptic patients)	- Status epilepticus management in adults_final_13092022_EMACC.docx - Algorithm status epilepticus_Adults_final_13102022 (4).pdf

THYROTOXIC CRISIS

SYMPTOMS AND SIGNS OF THYROTOXIC CRISIS

- Fever > 38.5°C and frequently hyperpyrexia (>41°C), profuse sweating
- Tachycardia
- Poor feeding in children and weight loss
- Hypertension – which may lead to congestive heart failure and subsequently cardiac arrhythmias, hypotension and shock
- GI symptoms – vomiting, diarrhoea, jaundice and abdominal pain
- Neurological symptoms - anxiety, altered behaviour, seizures/coma

A specific scale is recommended for the diagnosis of thyroid storm: Burch-Wartofsky Point Scale (BWPS) for Thyrotoxicosis (mdcalc.com)

INVESTIGATIONS

- Diagnosis is normally clinical
- If available, complete blood count, electrolytes, liver function tests, thyroid function tests and ECG for arrthymia may be useful

TREATMENT

Patients will require urgent supportive care as an inpatient, including fluid resuscitation and then careful management of fluid balance and electrolytes

I. Paracetamol 1g PO/NG/IV immediately

II. Steroids – Glucocorticoids reduce the peripheral conversion of T4 to T3 and reduce thyroxine production in patients with Graves's disease. Thyrotoxicosis is associated with adrenal insufficiency states and steroid co-administration helps reduce the risk of exacerbation of adrenal insufficiency:
IV hydrocortisone loading dose of 300 mg then 100 mg every 8 hours (or prednisolone 60-80mg/day PO/NG for adults)

III. Beta blocker –

CAUTION: Beta-blockers need to be given with extreme caution in patients with cardiac failure and/or asthma.
Give bisoprolol PO/NG: starting dose is 1.25 mg/day (up to 10 mg OD titrating according to response)

alternative is metoprolol (starting dose 50 mg/day divided in 2 administrations and up to 100 mg titrating according to response).

Use propranolol PO as first choice if available (60-80 mg every 4 to 6 hours titrating according to HR and BP; IV use must be restricted to setting where hemodynamics can be monitored).

IV. Carbimazole – 15-40mg/day PO; can be given via NG tube if needed. Alternative could be methimazole PO 20 mg every 4 to 6 hours.

V. Potassium iodide (stops release of preformed thyroid hormone) – if available - 5–10 drops (1ml) of Lugol's solution orally every 6–8 hours to be administered

SUBSEQUENT MANAGEMENT

After there is evidence of clinical improvement (defervescence, resolution of central nervous system and cardiovascular manifestations), some medications can be discontinued and others reduced.

- Beta blockers can be withdrawn, but only after thyroid function tests have returned to normal.
- Glucocorticoids are tapered and discontinued. The pace of the glucocorticoid taper depends upon the clinical course of the patient; a slower taper is necessary in patients who had a prolonged intensive care unit (ICU) stay with longer duration of glucocorticoid treatment.
- Carbimazole or methimazole would be continued if needed. It is important to provide patient education about the risk of abruptly discontinuing treatment.

References

Chiha M, Samarasinghe S, Kabaker AS. Thyroid storm: an updated review. J Intensive Care Med 2015; 30:131

Senda A, Endo A, Tachimori H, et al. Early administration of glucocorticoid for thyroid storm: analysis of a national administrative database. Crit Care 2020; 24:470

Annexes

ANNEX 1. CHRONIC CARE PROTOCOL SUMMARIES

ASTHMA PROTOCOL – CHILD 5 TO 12 YEARS

- Assess asthma control by asking
  - Have you had asthma symptoms during the day (cough, wheeze, chest tightness, or breathlessness)?
  - During the night?
  - Has your asthma interfered with your activities (e.g. work/school) or sleep?

  "No" to all 3 questions means the asthma is controlled and the same medications can be continued.

- take a complete history, including exacerbations/hospitalizations
- check vital signs (RR, SpO_2, HR)
- perform lung auscultation
- review differential diagnoses.

- Assess adherence and inhaler technique before changing medications.
- Provide spacer for use with MDIs.
- Use stepwise treatment:

ASTHMA TREATMENT

CHILD 5 TO 12 YEARS

STEP 1	STEP 2	STEP 3	STEP 4
Symptoms < 2 times/month	Symptoms > 2 times/month but not daily	Symptoms most days; or waking up with asthma once a week or more	Symptoms persist on Step 3 treatment
As needed SABA	Low-dose ICS daily	Low-dose ICS + LABA daily	Medium-dose ICS + LABA daily
		or	or
		Medium-dose ICS daily	Leukotriene receptor antagonist (LTRA)
	Reliever: as needed SABA		

ASTHMA MEDICATIONS

CHILD 5 TO 12 YEARS

ICS	beclometasone MDI, 50 or 100 µg per inhalation	low dose	50 to 100 µg twice daily
		medium dose	100 to 200 µg twice daily
SABA	salbutamol MDI, 100 µg per inhalation		200 µg as needed
LABA	salmeterol MDI, 25 µg per inhalation		50 µg twice daily
LTRA	montelukast	5 years	4 mg once daily
		6 to 12 years	5 mg once daily

ASTHMA PROTOCOL – ADULT ICS + SABA

- Assess asthma control by asking
  - Have you had asthma symptoms during the day (cough, wheeze, chest tightness, or breathlessness)?
  - During the night?
  - Has your asthma interfered with your activities (e.g. work/school) or sleep?

  "No" to all 3 questions means the asthma is controlled and the same medications can be continued.

- take a complete history, including exacerbations/hospitalizations
- check vital signs (RR, SpO_2, HR)
- perform lung auscultation
- review differential diagnoses.

- Assess adherence and inhaler technique before changing medications.
- Provide spacer for use with MDIs.
- Use stepwise treatment:

ASTHMA TREATMENT				
ADULT & ADOLESCENT > 12 YEARS				
STEP 1	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**
Symptoms < 2 times/ month	Symptoms > 2 times/ month but not daily	Symptoms most days; or waking up with asthma once a week or more	Symptoms persist on Step 3 treatment	Symptoms persist on Step 4 treatment
Low-dose ICS each time SABA is taken	Low-dose ICS daily	Low-dose ICS + LABA or Medium-dose ICS	Medium or high-dose ICS + LABA or High-dose ICS	Seek specialist advice
Reliever: as needed SABA				

ASTHMA MEDICATIONS			
ADULT & ADOLESCENT >12 YEARS			
ICS	beclometasone MDI, 50 or 100 µg per inhalation	each time SABA is taken	100 µg
		low dose	100 to 250 µg twice daily
		medium dose	250 to 500 µg twice daily
		high dose	> 500 µg twice daily
SABA	salbutamol MDI, 100 µg per inhalation		200 µg as needed
LABA	formoterol MDI, 12 µg per inhalation		12 µg twice daily

ASTHMA PROTOCOL – ADULT BECLOMETASONE + FORMOTEROL

- Assess asthma control by asking
  - Have you had asthma symptoms during the day (cough, wheeze, chest tightness, or breathlessness)?
  - During the night?
  - Has your asthma interfered with your activities (e.g. work/school) or sleep?

  "No" to all 3 questions means the asthma is controlled and the same medications can be continued.

- take a complete history, including exacerbations/hospitalizations
- check vital signs (RR, SpO_2, HR)
- perform lung auscultation
- review differential diagnoses.

- Assess adherence and inhaler technique before changing medications.
- Provide spacer for use with MDIs.
- Use stepwise treatment:

ASTHMA TREATMENT				
ADULT & ADOLESCENT > 12 YEARS				
STEP 1	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**
Symptoms < 2 times/ month	Symptoms > 2 times/ month but not daily	Symptoms most days; or waking up with asthma once a week or more	Symptoms persist on Step 3 treatment	Symptoms persist on Step 4 treatment
Low-dose ICS-formoterol combination as needed		Low-dose ICS-formoterol	Medium-dose ICS-formoterol	Seek specialist advice
		Reliever: as needed low-dose ICS-formoterol		

ASTHMA MEDICATIONS			
ADULT & ADOLESCENT >12 YEARS			
ICS-formoterol	beclometasone - formoterol MDI, 100 µg - 6 µg per inhalation maximum 8 inhalations/day (controller + reliever)	as needed	100 µg - 6 µg
		low dose	100 µg - 6 µg once or twice daily
		medium dose	200 µg - 12 µg twice daily

COPD PROTOCOL

- Treat as emergency if
  - respiratory distress (use of accessory muscles, cyanosis)
  - abnormal vital signs (HR > 100/minute, RR > 20/min, SpO_2 < 92%).

- Assess signs and dyspnoea score:

SYMPTOM SEVERITY	SCORE
Dyspnoea only with heavy exercise.	0
Dyspnoea when hurrying or walking up a slight incline.	1
Walks slower than people of the same age because of dyspnoea or has to stop for breath when walking at their normal speed.	2
Stops for breath after walking 91 metres (100 yards) or after a few minutes.	3
Too dyspnoeic to leave house or breathless when dressing.	4

- Assess adherence and inhaler technique before changing medications.

- Use stepwise treatment:

STEP 1	STEP 2	STEP 3	STEP 4
DYSPNOEA SCORE 0-1	**DYSPNOEA SCORE 2**	**DYSPNOEA SCORE 3**	**DYSPNOEA SCORE 4**
SABA as needed Reassess after 1 month If not improved, change to SAMA as needed	LABA twice daily and SABA or SAMA as needed	ICS and LABA twice daily (maintenance) and SABA or SAMA as needed ICS increases risk of pneumonia; discontinue if no improvement	For acute symptom relief, see Step 1 For maintenance treatment, seek specialist advice locally, if available, or on telemedicine If available, long-term oxygen therapy, pulmonary rehabilitation (physiotherapy), evaluation for non-invasive ventilation
Move to next step if no improvement			

COPD MEDICATIONS		
SABA	salbutamol MDI, 100 µg per inhalation	200 µg up to 4 times daily
SAMA	ipratropium MDI, 20 µg per inhalation	40 µg 3 to 4 times daily
LABA	formoterol MDI, 12 µg per inhalation	12 µg twice daily
	salmeterol MDI, 25 µg per inhalation	50 µg twice daily
ICS	beclometasone MDI, 50 or 100 µg per inhalation	200 µg twice daily

HYPERTENSION PROTOCOL - TELMISARTAN + AMLODIPINE

- Review comorbidities and CVD risk:

COMORBIDITIES OR CVD RISK	TREATMENT INITIATION	TREATMENT GOAL	ATORVASTATIN 40 MG DAILY	SECONDARY PREVENTION
None	SBP ⩾ 140 or DBP ⩾ 90	BP < 140/90		
CVD	SBP ⩾ 130	SBP < 130	Age > 40 y	Aspirin 75 mg daily Post-MI: ACE inhibitor/ARB + beta blocker - bisoprolol
Diabetes Chronic kidney disease High calculated CVD risk				

- Use for all except people who are or may become pregnant:

	TREATMENT STEPS: TELMISARTAN 40 MG + AMLODIPINE 5 MG	
1	Start telmisartan 40 mg + amlodipine 5 mg daily	
	↓	
2	Recheck after 4 weeks. If not at goal: Increase to telmisartan 80 mg + amlodipine 10 mg daily	
	↓	
3	Recheck after 4 weeks. If not at goal: Continue telmisartan 80 mg + amlodipine 10 mg Add hydrochlorothiazide 25 mg daily	At any step: if BP at goal, follow up in 3 to 6 months
	↓	
4	Recheck after 4 weeks. If not at goal: Continue telmisartan 80 mg + amlodipine 10 mg Increase to hydrochlorothiazide 50 mg daily	
	↓	
5	Recheck after 4 weeks. If not at goal: Seek specialist advice	

- See NCD in Pregnancy for people who are or may become pregnant.

HYPERTENSION PROTOCOL - LOSARTAN + AMLODIPINE

- Review comorbidities and CVD risk:

COMORBIDITIES OR CVD RISK	TREATMENT INITIATION	TREATMENT GOAL	ATORVASTATIN 40 MG DAILY	SECONDARY PREVENTION
None	SBP ⩾ 140 or DBP ⩾ 90	BP < 140/90		
CVD	SBP ⩾ 130	SBP < 130	Age > 40 y	Aspirin 75 mg daily Post-MI: ACE inhibitor/ARB + beta blocker
Diabetes Chronic kidney disease High calculated CVD risk				

- Use for all except people who are or may become pregnant:

TREATMENT STEPS: LOSARTAN + AMLODIPINE		
1	Start losartan 50 mg + amlodipine 5 mg daily	At any step: if BP at goal, follow up in 3 to 6 months
	↓	
2	Recheck after 4 weeks. If not at goal: Increase to losartan 100 mg + amlodipine 10 mg daily	
	↓	
3	Recheck after 4 weeks. If not at goal: Continue losartan 100 mg + amlodipine 10 mg Add hydrochlorothiazide 25 mg daily	
	↓	
4	Recheck after 4 weeks. If not at goal: Continue losartan 100 mg + amlodipine 10 mg Increase to hydrochlorothiazide 50 mg daily	
	↓	
5	Recheck after 4 weeks. If not at goal: Seek specialist advice	

- See NCD in Pregnancy for people who are or may become pregnant.

HYPERTENSION PROTOCOL - ENALAPRIL + AMLODIPINE

- Review comorbidities and CVD risk:

COMORBIDITIES OR CVD RISK	TREATMENT INITIATION	TREATMENT GOAL	ATORVASTATIN 40 MG DAILY	SECONDARY PREVENTION
None	SBP ⩾ 140 or DBP ⩾ 90	BP < 140/90		
CVD	SBP ⩾ 130	SBP < 130	Age > 40 y	Aspirin 75 mg daily Post-MI: ACE inhibitor/ARB + beta blocker
Diabetes Chronic kidney disease High calculated CVD risk				

- Use for all except people who are or may become pregnant:

TREATMENT STEPS: ENALAPRIL + AMLODIPINE		
1	Start enalapril 5 mg + amlodipine 5 mg daily	At any step: if BP at goal, follow up in 3 to 6 months
	↓	
	Recheck after 4 weeks. If not at goal:	
2	Increase to enalapril 10 mg + amlodipine 10 mg daily	
	↓	
	Recheck after 4 weeks. If not at goal:	
3	Increase to enalapril 20 mg + continue amlodipine 10 mg	
	↓	
	Recheck after 4 weeks. If not at goal:	
4	Increase to enalapril 20 mg + continue amlodipine 10 mg	
	↓	
	Recheck after 4 weeks. If not at goal:	
5	Increase to enalapril 20 mg + continue amlodipine 10 mg	
	↓	
	Recheck after 4 weeks. If not at goal:	
6	Continue telmisartan 80 mg + amlodipine 10 mg Increase to hydrochlorothiazide 50 mg daily	
	↓	
	Recheck after 4 weeks. If not at goal:	
7	Seek specialist advice	

- See NCD in Pregnancy for people who are or may become pregnant.

EPILEPSY PROTOCOL

SEIZURE EVALUATION

	ASK THE PATIENT AND/OR THE WITNESS
Description of event	What time did it happen?
	What were you doing before it started?
	Were there any warning symptoms?
	Was there any loss of awareness, tongue biting, incontinence?
	How long did it last?
Post-ictal phase	What happened afterwards?
History	Any prior events?
	Any triggers?
	Any medications used? (including opioids, amphetamines)
	Any alcohol or illicit drug use?
	Any head trauma or neurological problems? (including stroke)
	Any family history?

ANTIEPILEPTIC DRUG CHOICE BY SEIZURE ONSET

ONSET	AWARENESS	MOTOR ACTIVITY	DRUG CHOICE
Generalized	Impaired	Any of the following: Tonic-clonic Tonic Clonic Myoclonic Atonic	First line: **levetiracetam** or **sodium valproate** Alternates for all except myoclonic: carbamazepine, phenobarbital, or phenytoin
		No motor activity: Absence	**levetiracetam** or **sodium valproate** Do not use carbamazepine or phenytoin
Focal	Normal or impaired	Specific motor activity in some muscles No motor activity (sensory/ behavioural changes only) Continues to bilateral tonic-clonic	First line: **levetiracetam** or **carbamazepine** Second: sodium valproate Third: phenobarbital or phenytoin

ANTIEPILEPTIC DRUG DOSAGE

DRUG	DOSAGE
sodium valproate 200 or 500 mg tablet 200 mg/5 ml oral solution	**Child < 20 kg**: 10 mg/kg 2 times daily **Child > 20 kg**: start 200 mg twice daily; increase dose gradually as needed; usual dose10 to 15 mg/kg 2 times daily **Adult**: start 600 mg/day in 2 divided doses; increase by 200 mg every 3 days; usual dose 1 to 2 g/day in 2 divided doses (20 to 30 mg/kg/day)
levetiracetam 250, 500 or 1000 mg tablet	**GENERALIZED ONSET** **Child**: start 10-20 mg/kg/day (maximum: 1000mg/day); increase in steps of 10mg/kg/day every 2 weeks up to recommended maintenance dose 30-60mg/kg/day (maximum: 3000mg/day) **Adult**: start 500 mg every 12 hours; increase every 2 weeks by 500 mg/dose up to recommended dose of 1.5 g every 12 hours **FOCAL ONSET** **Child > 16 years and adult**: initially 250 mg once daily; increase after 2 weeks to 250 mg twice daily; then increase according to response in steps of 250 mg twice daily every 2 weeks; maximum dose 1.5 g twice daily
carbamazepine 200 mg tablet	**Child:** start 5 mg/kg once daily or in 2 divided doses, increase every 2 weeks up to 10 to 20 mg/kg/day in 2 to 4 divided doses **Adult**: start 100 to 200 mg once daily or in 2 divided doses, then increase by 100 to 200 mg increments every 2 weeks up to 800 to 1200 mg/day in 2 to 4 divided doses
phenobarbital 50 or 60 mg tablet	**Child 1 month to 11 years**: start with 2 to 3 mg/kg once daily at bedtime or 1 to 1.5 mg/kg twice daily for 2 weeks; increase the daily dose by increments of 1 to 2 mg/kg every week, up to 2 to 6 mg/kg once daily if necessary **Child ≥ 12 y and adult**: start with 1 mg/kg (max. 60 mg) once daily at bedtime for 2 weeks; increase the daily dose by increments of 15 to 30 mg every week, up to 3 mg/kg once daily if needed (max. 180 mg daily)
phenytoin 100 mg tablet	**Child 1 month to 11 years**: start with 1.5 to 2.5 mg/kg twice daily; increase the daily dose by increments of 5 mg/kg every 3 to 4 weeks, up to 2.5 to 5 mg/kg twice daily if necessary (max. 7.5 mg/kg twice daily or 300 mg daily) **Child ≥ 12 y**: start with 75 to 150 mg twice daily; increase the daily dose by increments of 25 mg every 3 to 4 weeks, up to 150 to 200 mg twice daily if necessary (max. 300 mg twice daily) **Adult**: start with 150 to 300 mg once daily or 75 to 150 mg twice daily; increase the daily dose by increments of 50 mg every 3 to 4 weeks, up to 200 to 400 mg once daily or 100 to 250 mg twice daily if necessary (max. 400 mg once daily or 300 mg twice daily)

- Review 1 month after any change in medications.
- Review every 6 months when stable.
- Reevaluate treatment if the patient has required emergency/hospital care.

HYPOTHYROIDISM PROTOCOL

HYPOTHYROIDISM DIAGNOSTIC CRITERIA

SYMPTOMS	TSH	FREE T4	DIAGNOSIS
Present or not	⩾ 10 mU/l	Low or normal	Hypothyroidism
None	⩾ 4.5 and < 10 mU/l	Normal	Subclinical hypothyroidism
Present or not	< 4.5 mU/l	Low	Secondary hypothyroidism due to pituitary disease

HYPOTHYROIDISM MANAGEMENT

SYMPTOMS	TSH	FREE T4	MANAGEMENT
Present or not	⩾ 10 mU/l	Low or normal	levothyroxine
None	⩾ 4.5 and < 10 mU/l	Normal	Subclinical hypothyroidism
			For people who are or plan to become pregnant, begin levothyroxine
			For others, check TSH in 3 months
			If repeat TSH is
			< 10 mU/l, test TSH yearly
			⩾ 10 mU/l, begin levothyroxine
Present or not	< 4.5 mU/l	Low	Seek referral for secondary hypothyroidism, if available

LEVOTHYROXINE[88] TREATMENT

	INITIAL DOSE	DOSE ADJUSTMENT	TSH TARGET	COMMENTS
Adults < 60 years	Start 75 to 100 mcg once daily	Adjust in 25 mcg increments every 6 weeks to keep TSH in target range	0.4-4.5 mU/l	Usual maintenance dose is 100 to 200 mcg daily
Adults ⩾ 60 years and/or with CVD	Start 25 mcg once daily			Usual maintenance dose is 100 to 125 mcg daily Dose reduction may be needed with advancing age
Pregnant women with hypothyroidism	Increase usual dose by 25-30% (see SRH)		0.4-2.5 mU/l	Baby at risk for neonatal hypothyroidism; evaluate and if present, treat

Schedule TSH check 6 weeks after initiation and any dose change.

- Once stable with TSH in target range, check TSH yearly.
- For pregnant women, check TSH every 4 to 6 weeks (NCD in Pregnancy).

HYPERTHYROIDISM PROTOCOL

HYPERTHYROIDISM DIAGNOSTIC CRITERIA

TSH	FREE T4	DIAGNOSIS
> 0.4 mU/l	< 1.8 ng/dl	Excludes hyperthyroidism
< 0.4 mU/l	> 1.8 ng/dl	Confirms hyperthyroidism

CARBIMAZOLE[89] TREATMENT

	CARBIMAZOLE DOSE AND MONITORING	TSH TARGET	COMMENTS
Adults except pregnant or lactating women	Weeks 1 to 4: 20 mg once daily	> 0.4 mU/l	Symptoms may take up to 2 weeks to resolve after normalization of thyroid tests Symptoms and T4 usually normalize within 4 to 8 weeks; TSH can remain low for several weeks after T4 normalizes Usual treatment time: 12 to 18 months
	Recheck TSH and T4 after 4 weeks; if not at target, increase dose weeks 5 to 8: 40 mg daily		
	Recheck TSH and T4 every 4 weeks until TSH at target		
	When TSH at target, reduce dose gradually to lowest that controls symptoms: usually 5 to 15 mg daily		
	Once stable, check TSH every 3 months		

HYPERTHYROIDISM MEDICATION SUMMARY

DRUG CLASS	DRUG	COMMENTS
Antithyroid	**carbimazole** po 20 mg tablets	Do not use during pregnancy first trimester Avoid with severe hepatic impairment Contraindication: severe blood disorders Adverse effects (frequency unknown): agranulocytosis; angiooedema; gastrointestinal disorder; headache; pancreatitis A white blood cell count should be performed if there is any clinical evidence of infection; carbimazole should be stopped immediately if there is clinical or laboratory evidence of neutropenia

- Schedule TSH check 4 weeks after initiation and any dose change.
- Once stable with TSH in target range on 2 measurements 4 weeks apart, check TSH every 3 months until treatment complete (usually 12 to 18 months).

ANNEX 2.
THERAPEUTIC PATIENT EDUCATION WITH A PERSON-CENTRED APPROACH

The objective is to create a patient-caregiver relationship of trust to promote adherence and reach treatment goals.

This requires tailoring teaching to the individual:

- Provide a setting where the person can feel comfortable to ask questions and discuss fears and concerns. This can be done in individual or group sessions.
- Assess literacy and numeracy skills to adapt educational messages.
- Divide the information into manageable packages – people can be easily overwhelmed by new information even in small quantities.
- Reassure the person that it takes time to understand and manage chronic conditions.
- Encourage the person to attend as needed for education and support.
- If appropriate, encourage the person to involve a family member or other person who can support them in learning and managing their health.

General non-pharmacological lifestyle interventions:

- Advise smoking cessation if applicable.
- Advise reduction of alcohol consumption if applicable.
- Advise salt intake less than 5 g (one teaspoon) per day, as salt is a major cause of hypertension.
- Advise low-fat, low-sugar diet (use Nutrition guidance).
- If BMI is > 25 kg/m2, suggest the goal of losing 5 to 10% body weight.
- Encourage physical activity such as walking; exercise 2.5 hours/week, with activity that causes a light sweat.
    - Many people are physically active in their daily routines; the message to exercise should be adjusted.
    - If possible, aerobic activity (e.g. walking, running, cycling) and strength training exercises should be done regularly.

General points for medication adherence:

- Chronic conditions require lifelong medications.
- A daily routine helps to take medications on schedule.
- Many conditions are progressive, requiring higher doses and/or additional medications over time.
- Medications are to be taken regularly for long term control, even if no symptoms are present; they are prescribed to reduce risk of complications.
- If side effects occur, medications may need to be adjusted, changed, or discontinued.

ANNEX 3.
PEAK EXPIRATORY FLOW MEASUREMENT AND CORTICOSTEROID DIAGNOSTIC TRIAL

How to use a peak flow meter to obtain a peak expiratory flow rate measurement
1.2. SOP_Manual Peak Flow_v1.0-2020.pdf

Respiratory Assessment-

Peak Flow reading using a Manual Peak Flow Meter

***SOP** – Please refer to the full procedure for rational and additional information on each step*

Peak expiratory flow can be used to monitor the efficacy of treatment and the progression of lung disease for older paediatric or adult patients e.g. asthma or chronic obstructive pulmonary disease. It is a simple objective procedure used to measure how hard a patient can blow out air from the lungs and should be performed following a medical prescription. A single measurement should not be evaluated in isolation.

	Pre-procedure
	1. Perform hand hygiene
	2. Confirm the patient's identity
	3. Explain procedure to patient or caregiver in his/her preferred language and why they need the procedure. Explain the risks and benefits of the procedure. Allow the patient/caregiver to ask questions and obtain verbal consent
	4. Ask the patient or caregiver if he/she has undergone peak flow measurements in the past. If yes, what were their previous results?
	5. Perform hand hygiene
	6. Clean/disinfect tray/trolley and peak flow meter and allow to dry
	7. Gather equipment: a. Peak flow meter b. Disposable OR autoclavable mouthpiece c. Peak flow documentation chart d. Measuring tape e. Alcohol-based hand rub
	Procedure
	8. Perform hand hygiene
	9. Measure the patient's height using the measuring tape
	10. Assemble equipment by putting disposable or autoclavable mouthpiece in meter
	11. Ask the patient to either stand or sit while keeping their neck relaxed
	12. Ensure the needle gauge is at zero
	13. Have the patient hold the peak flow horizontally ensuring their fingers are not obstructing the gauge
	14. Ensure the patient has nothing in his/her mouth and ask him/her to breathe in as much as they can through their mouth and hold
	15. Ask the patient to immediately tighten their lips around the mouthpiece
	16. Ask the patient to blow out, using a sharp 'huff', through the meter as hard as they can
	17. Note the initial reading. Allow the patient to rest, return the meter to zero and repeat steps 12-15 two more times, each time allowing the patient to rest and noting the reading
	Post-procedure
	18. If mouthpiece disposable, dispose of according to local procedure. If mouthpiece autoclavable, place to be sterilized
	19. Clean/disinfect flow meter
	20. Perform hand hygiene
	21. Document the highest reading in the patient's file and analyse results

Corticosteroid diagnostic trial
Beclometasone MDI 250 µg twice daily for 6 weeks

ANNEX 4.
INHALER AND SPACER TECHNIQUES

Administration of inhaler medication using a spacer
Manual of Nursing Care Procedures link here

Medication administration by inhalation using a spacer

SOP – Please refer to the full procedure for rational and additional information on each step

	Pre-procedure
	1. Perform hand hygiene
	2. Confirm the patient's identity
	3. Explain procedure to patient or caregiver, ensuring the patient/caregiver understands why he/she is receiving the treatment, the risks and benefits of receiving the medication and what the possible side effects are. Allow patient/caregiver to ask questions and obtain verbal consent
	4. Ensure the patient does not have any known allergies to medications
	5. Perform any necessary assessment before administration of medication
	6. Perform hand hygiene
	7. Clean/disinfect tray/trolley and allow to dry
	8. Verify the prescription and ensure: a. The right patient b. The right medication c. The right dose and dilution d. The right route e. The right date and time f. The prescription is valid (legible and signed) g. The medication has not already been administered h. The medication is appropriate for the patient's condition
	9. Gather equipment on dry tray/trolley: a. Medication to be administered in an inhaler form b. Spacer with face mask OR with mouthpiece c. Alcohol-based hand rub d. Nurses watch or a clock with a second hand e. Waste bin (s)
	Procedure
	10. Perform hand hygiene
	11. Confirm the patient's identity and check that it matches the medical prescription
	12. Position patient upright in a sitting position
	13. If necessary, clear the upper airways by asking the patient to blow his/her nose or clearing the patient's nose
	14. Remove mouthpiece cover from inhaler and shake the inhaler well for 2-5 seconds
	15. Insert the inhaler upright into the spacer
	16. Ask the patient to create a seal with their mouth over the mouthpiece or ensure that the mask covers the nose and mouth and apply gently to the face to create a seal
	17. Ask the patient to slightly tilt their head backwards while inhaling slowly and deeply. Press down on the canister to deliver the medication
	18. If possible, the patient should hold his/her breath for 10 seconds and then breathe out. If this is not possible, follow the next step
	19. If patient unable to hold breath, instruct the patient to breathe normally for 4-6 breaths
	20. If more than one dose/puff is needed, wait 30 seconds while the patient breathes normally, shake the inhaler and repeat steps 16-19

How to make a spacer
15.6. SOP_Annex 1_Make a spacer_Medication inhalation using a spacer_v1.0-2020.pdf

How to make a spacer with a plastic bottle

Annex n 1 – Medication by inhalation using a spacer

If no commercially produced spacer available within the project, a plastic one can be made from a 500ml plastic bottle.

- Cut the bottom of the bottle.
- Wash the bottle in a solution of one drop of dishwashing soap in 1 L of potable water to reduce the electrostatic charge within the plastic spacer. Do NOT rinse and let air dry. Not rinsing improves medication delivery of the spacer.
- Once air dried, tape the end to make the edges smooth before applying to the patient's face.
- Adapt the MDI to the nozzle of the bottle with tape.
- Prior to use, prime the spacer with two puffs of the medication to be delivered.

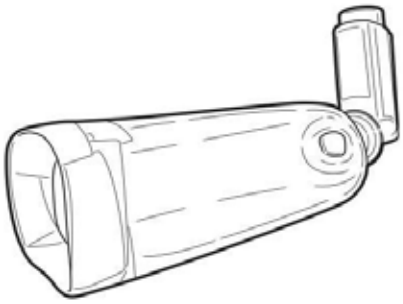


Figure 1: *Homemade spacer from 500ml plastic bottle*

Note that plastic spacers have electrostatic charges within the chamber that attract particles and significantly reduce medication delivery to the lungs.

A very similar process can be followed for producing a plastic spacer with mouthpiece.

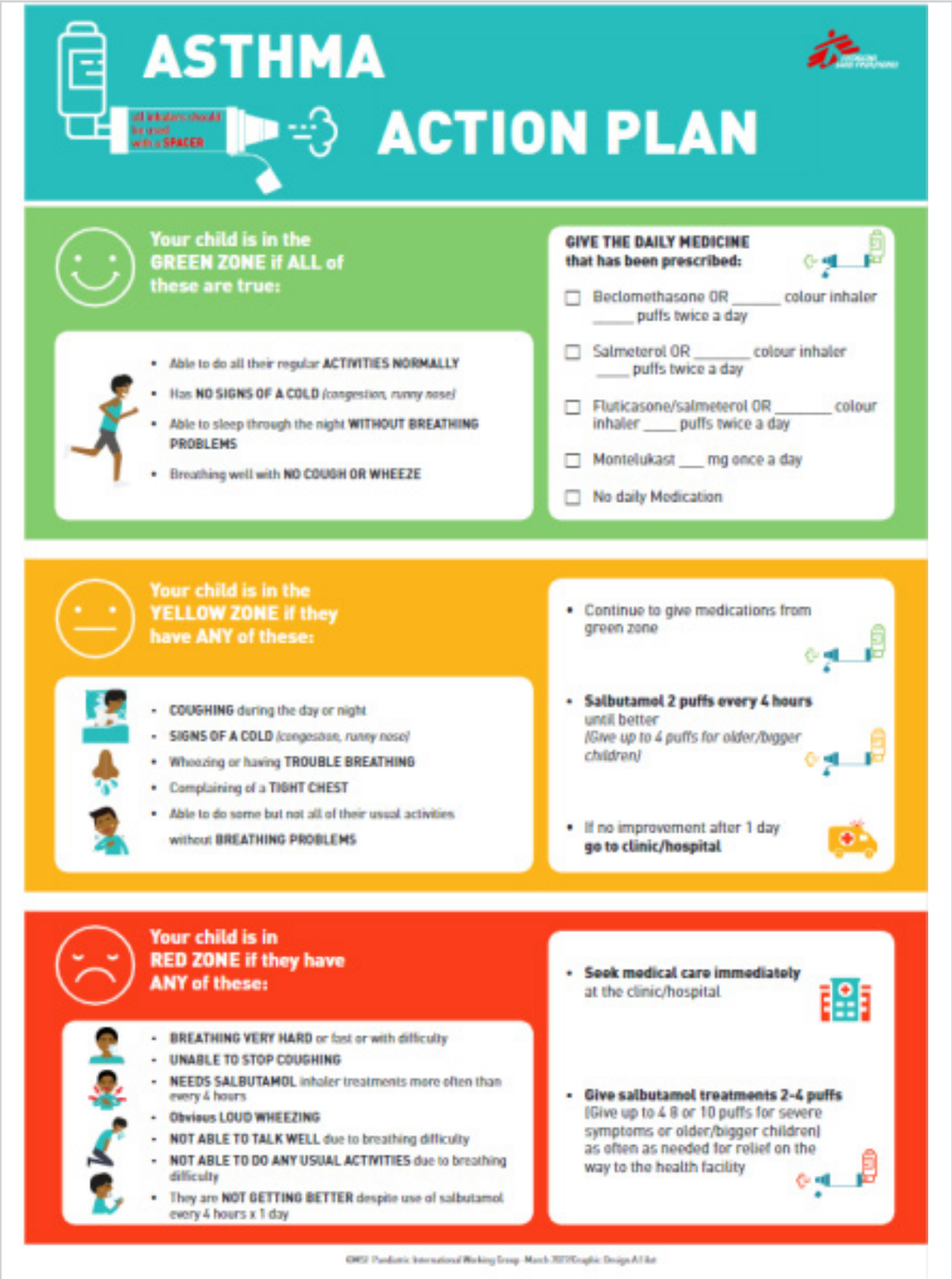
- Wash the bottle in a solution of one drop of dishwashing soap in 1 L of potable water to reduce the electrostatic charge within the plastic spacer. Do NOT rinse and let air dry. Not rinsing improves medication delivery of the spacer.
- Once air dried, prepare an opening with the same shape and size of the MDI connection at the end of the bottle
- Adapt the MDI to the opening with tape.
- Prior to use, prime the spacer with two puffs of the medication to be delivered.

Figure 2: *Homemade spacer from 500ml plastic bottle*

Note that plastic spacers have electrostatic charges within the chamber that attract particles and significantly reduce medication delivery to the lungs

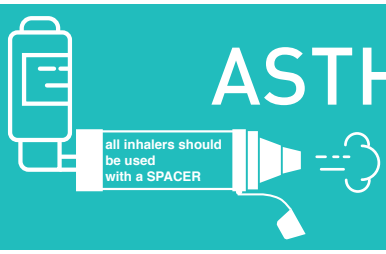
ANNEX 5.
ASTHMA ACTION PLAN

CHILD ASTHMA ACTION PLAN (FROM PAEDIATRIC CARE)



MEDECINS SANS FRONTIERES

ASTHMA ACTION PLAN adult



EVERY DAY ASTHMA CARE

My personal best peak flow is ____

My controller inhaler (insert name/colour) ____

I need to take my controller inhaler every day even when I feel well

I take ____ puff(s) in the morning and ____ puff(s) at night

My reliever inhaler (insert name/colour) ____

I take my reliever inhaler only if I need to.

I take ____ puff(s) of my reliever inhaler if any of these things happen:

- I'm wheezing
- My chest feels tight
- I'm finding it hard to breathe
- I'm coughing

Other medicines I take for my asthma every day:

With this daily routine I should expect/ aim to have no symptoms.

WHEN I FEEL WORSE

- **My symptoms are coming back (wheeze, tightness in my chest, feeling breathless, cough)**
- I am waking up at night
- My symptoms are interfering with my usual day-to-day activities
- I am using my reliever inhaler ____ times a week or more
- My peak flow drops to below ____

THIS IS WHAT I CAN DO STRAIGHT AWAY TO GET ON TOP OF MY ASTHMA

1. If I haven't been using my controller inhaler, start using it regularly again or:

Increase my controller inhaler dose to ____ puffs 2 times a day until my symptoms have gone and my peak flow is back to normal.

Take my reliever inhaler as needed (up to ____ puffs every four hours)

If I do not improve in 48 hours, seek urgent medical care at the clinic or hospital.

2. If I have been given prednisolone tablets (steroid tablets) to keep at home:

Take ____ mg of prednisolone tablets (which is x 5 mg) **immediately** and again every morning for ____ days or until I am fully better.

URGENT! Seek medical attention.

IN AN ASTHMA ATTACK

- My reliever inhaler is not helping or I need it more than every ____ hours
- I find it difficult to walk or talk
- I find it difficult to breathe
- I'm wheezing a lot or I have a very tight chest or
- I'm coughing a lot
- My peak flow is below ____

THIS IS AN EMERGENCY TAKE ACTION NOW

1. **Sit up straight - don't lie down. Try to keep calm**
2. **Take one puff of my reliever inhaler every 30 to 60 seconds up to a maximum of 10 puffs**
3. **Seek medical attention**

ANNEX 6.
PRE-DIABETES DIAGNOSIS AND MANAGEMENT

People with pre-diabetes are at risk for diabetes but can prevent or delay it with non-pharmacologic lifestyle interventions.

DIAGNOSIS

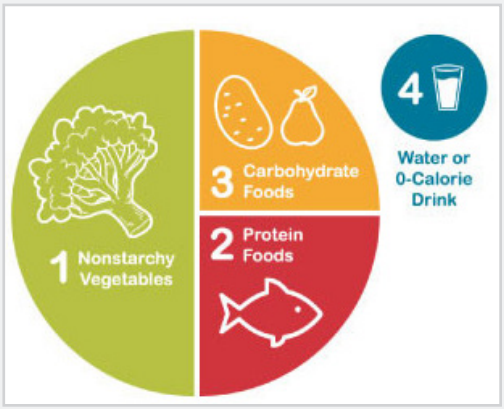
- Use criteria in the table below.

Pre-diabetes diagnostic criteria

TEST	DIABETES DIAGNOSTIC CRITERIA	PRE-DIABETES
Fasting glucose	⩾ 126 mg/dl (7 mmol/l)	**⩾ 110-125 mg/dl (6.1-6.9 mmol/l)**
Random glucose	⩾ 200 mg/dl (11.1 mmol/l)	(not applicable)
Glycosylated haemoglobin (HbA1c)	6.5% (⩾ 48 mmol/mol)	**5.7-6.4% (38 – 47 mmol/mol)**
Oral glucose tolerance test	⩾ 200 mg/dl (11.1 mmol/l)	**⩾ 140-199 mg/dl (7.8-11.0 mmol/l)**

MANAGEMENT

- Advise increased physical activity to 150 minutes/week if they are not already active. Emphasize that exercising 150 minutes/week reduces risk of developing diabetes by 52%.
  - Help the person identify what activity they can feasibly do.
  - Encourage them to increase activity gradually until the target is reached.
- Advise them to eat regular meals following the Diabetes Plate Method[90].



- If BMI > 25 kg/m^2, provide weight loss guidance – see Nutrition.
- Advise an annual fasting glucose test.

ANNEX 7.
ORAL GLUCOSE TOLERANCE TEST

- Instruct patients to
    - maintain normal carbohydrate intake and normal exercise levels for 3 days before the test
    - fast for 8-10 hours before the test, consuming water only.

FOR THE TEST:

- Collect a fasting blood glucose sample
  (using Manual of Nursing Care Procedures SOP: Venipuncture).
- Give the patient a solution of 75 g anhydrous glucose and ask them to drink it within 5 minutes.
- Ask the patient to sit quietly for 2 hours, consuming only plain water and if a smoker, not smoking.
- At 2 hours, collect a second blood glucose sample.

NOTE:

If anhydrous glucose solution is not available, seek specialist advice on using pure glucose.

ANNEX 8.
DIABETIC RETINOPATHY SCREENING

Retinopathy (damage to the retina) is a common microvascular complication of diabetes, and a leading cause of blindness.

- If available, refer patients for annual ophthalmology screening and as needed treatment.
- If ophthalmology referral is not available, check visual acuity:
  - Ask the patient about visual disturbance, night blindness, and examine for cataract.
  - Use a 3-metre small Snellen Chart or a Tumbling E chart (for patients who cannot read).
  - If the patient wears glasses or contacts for distant vision, keep them on.
  - Place the patient 3 metres from the chart.
  - Ask the patient to cover one eye and read the letters out loud to you or indicate which direction each E is pointing, starting with the top (biggest) line.
    - The smallest line successfully read with maximum 2 errors corresponds to the visual acuity for that eye.
    - For example, visual acuity left eye 3/12 = at 3 metres, using the left eye, the patient read the line marked on the chart as 12 with a maximum of two errors[1].
  - Repeat with the opposite eye covered.

- If the patient cannot read any of the lines, test the number of fingers they can see:
  - While you cover one of their eyes, hold up the fingers of your other hand about ½ metre from their face.
  - Ask the patient how many fingers they can see
  - Repeat twice while holding up different numbers of fingers.
  - Repeat for the other eye.

- If unable to count fingers, test light/dark differentiation by shining a light up to the eye with the other eye covered and repeat for the other eye.

1 Visual Acuity is usually expressed as Distance from Chart/ Number of the Smallest Line Read. It is expressed as 6/ number of metres at which you should see this line if you had perfect vision.. Perfect vision is 6/6 in metres (20/20 in feet).

ANNEX 9.
DIABETIC FOOT SCREENING

Neuropathy – nerve damage and loss of function – is a common complication of diabetes. Foot care and clinical screening can prevent wounds, infection, amputations and mortality.

- For daily foot care, ask the patient to follow these instructions:
    - Examine the feet daily looking for redness, irritation, or wounds – use a mirror.
    - Wear well-fitting, closed shoes with socks if possible. (Micro-cellular rubber shoes are best.)
    - Check shoes do not have stones or other objects before putting them on.
    - Protect feet from extreme heat or cold.
    - Do not use hot water bottles or hot water to warm up cold feet.
    - Do not walk in bare feet, even at home.
    - Wash feet and use moisturiser (any oil will work) daily, dry carefully between toes
    - Cut nails regularly (straight across, not arched and not too short).
    - Visit clinic annually for foot examination.
    - Attend to small injuries promptly.
    - Stop smoking.

- For neuropathy screening, evaluate for high-risk diabetic foot:
    - Check
      1. History of ulcer or amputation?
      2. Deformity or absent pedal pulse?
      3. Current wound (active ulcer, in-grown toenail, callus, blister, or fissure)?
      4. Neuropathy (absent sensation at four out of ten sites examined by monofilament on either foot or by the Ipswich Touch Test (below))?
    - If "no" to all questions, review annually.
    - If "yes" to any of the above questions on either foot, advise the patient they are at high-risk for diabetic foot and monitor.

- If wounds are present, follow protocols in the Wound Care protocol

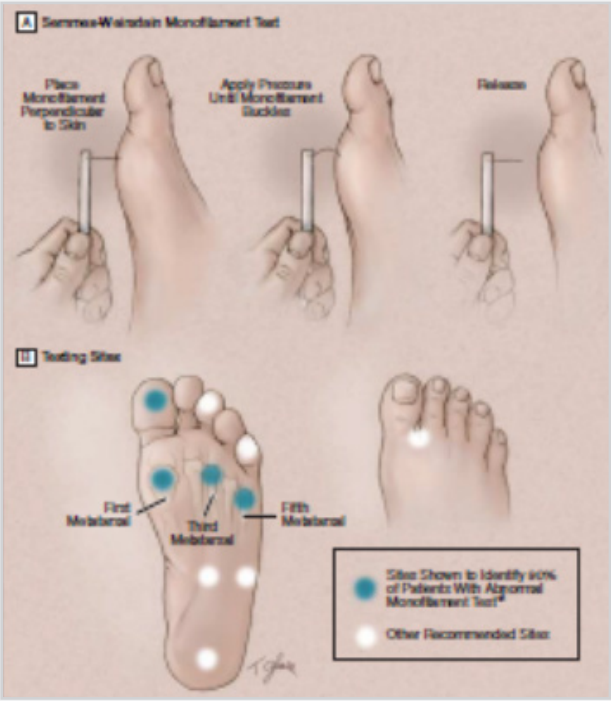
- If neuropathic pain is present, follow pain management protocol.

NEUROPATHY SCREENING METHODS

Monofilament testing

1. Show the monofilament to the patient and demonstrate by touching their arm with it.
2. Ask the patient to close their eyes and say "yes" each time they feel the monofilament touching and to say where they feel it on their foot.
3. Touch the monofilament to the skin of the foot with enough pressure to form a "C" shape (see Figure A).
4. Evaluate 10 sites per foot.
5. Avoid areas with very hard skin where sensation will be reduced.
6. Diagnose neuropathy if there is lack of sensation at 4 out of 10 sites on either foot.

FIGURE A. MONOFILAMENT TESTING



Ipswich Touch Test[91]

The Ipswich Touch Test requires no equipment. It is easily done where a monofilament is not available:

1. Instruct patient to close their eyes and say "yes" whenever the touch on a toe is felt.
2. Lightly touch (rest the tip of your index finger) for 1 to 2 seconds on the tips of the patient's first, third, and fifth toes.
   - Do not push, prod, tap, or poke since this may elicit a sensation other than light touch.

3. Repeat on the other foot.
4. Score 1 point for each touch felt:
   - 6/6 is a good score with normal sensation
   - < 4/6 indicates neuropathy.

Neuropathy can be due to many causes.

- If < 4/6, review HIV, hepatitis B and C, and syphilis history and/or screen if relevant.

ANNEX 10.
INSULIN TREATMENT: THERAPEUTIC PATIENT EDUCATION

For people with diabetes who need insulin, home management with glucose self-monitoring is standard of care. People on rapid-acting or mixed insulin, or with recurrent hypoglycaemia, are given priority.

This starts with counselling to determine if the patient is ready for self-injections and if they understand hypoglycaemia risk and management.

The family/carer should be involved, if possible.

Education materials appropriate to the local setting should be provided.

ESSENTIAL INFORMATION

- Review therapeutic patient education for self-management (4.3).
- Explain insulin treatment requires glucose self-monitoring and injections.

GLUCOSE SELF-MONITORING

- Give them a glucometer, test strips, lancets, a sharps bin, and a glucose record book.
- Show them how to use these (SOP: Capillary blood sampling).
- Ask them to practice in front of you.
- Advise them to use different fingertips each time, avoiding the thumb and index fingers (since they are used more often in daily tasks).
- Explain when they should check blood glucose and how to record it.
- Explain normal, low and high values and corresponding actions to take.

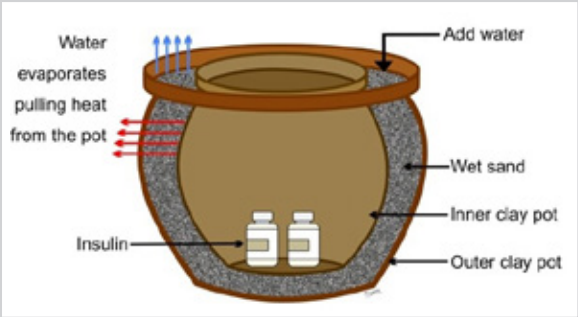
INSULIN

- Explain what insulin is, how it works, and its relationship with food intake.
- Explain the doses of insulin and why they may differ.
- Explain that doses are linked with food intake.
- Review meal timings and give individual guidance.
- Emphasize pre-meal doses based on meal timings.

INSULIN STORAGE

- Explain that open vials can be kept in a fridge or at room temperature until finished; or at room temperature for up to 28 days, and then it must be discarded.
- Explain that insulin should not be frozen.
- If the fridge or electricity supply is not reliable, a locally made container (Figure A) may be better.
- If not refrigerated, insulin should be stored in a cooling container such as a clay pot kept in the coolest part of the house.
- If needed, provide a travel letter to take the insulin home.

FIGURE A. LOCALLY MADE COOLING CONTAINER – CLAY POT IN CLAY POT WITH WET SAND[92]



DRAWING UP INSULIN

Use Manual of Nursing Care procedures.

- Give the patient their insulin pen and needle or insulin vial and insulin syringe.
- Explain how to read the pen device and dosing or how to draw up insulin from a vial, with no air in the syringe.
- Using water for injection, ask them to practice drawing up different doses you give them.

INJECTION TECHNIQUE

If using pens

- For detailed insulin pen instructions, use the Nursing Care SOP - 15.9. SOP_SC Inj - Prefilled Insulin Pen_v1.0-2020.pdf.

If using vials

- Explain to the patient how to administer the insulin:
  - Wash hands.
  - Check the vial has been open less than 28 days.
  - Mix it by rolling the vial between your palms.
  - Remove the cap from the needle and place the needle into the vial.
  - Draw up the appropriate dose and check there is no air in the syringe.
  - Find an appropriate site to inject the insulin (Figure B) and pinch a bit of skin between your thumb and forefinger.
  - Place needle into pinched skin at a 90-degree angle and inject insulin (45-degree angle if very thin).
  - Leave needle in place for 10 seconds before removal.
  - Remove the needle and dispose in the sharps bin.
  - Change injection sites regularly to avoid lipodystrophy and reduced absorption (Figure C).

For additional details on subcutaneous injection technique, refer to Nursing Care SOP: 15.9. SOP_Subcutaneous injection_v1.0-2020.pdf

FIGURE B. INSULIN INJECTION TECHNIQUE

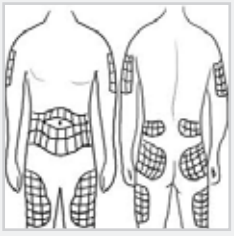


FIGURE C. FACTORS THAT AFFECT INSULIN ABSORPTION

INSULIN ABSORPTION	
increased by	local massage or heat; exercise; intramuscular injection
decreased by	lipodystrophy (increased or decreased subcutaneous fat)

- Advise patients to use a new needle for every injection.
- If patients report reusing needles, understand why and try to provide enough supply.
  - Until adequate supply is available, needles can be reused up to 4-5 times if they are clean and have not touched other surfaces or objects.
  - Needles must be discarded if they have touched something other than the patient's injection site, are blunt, or injection is painful.
- Emphasize that patients should never share needles with other people.

MEAL PLAN

- Provide specific advice based on home/work circumstances (see Nutrition).
- Suggest weight loss if applicable.
- Adapt advice to the reality of the person's resources and food availability.

HYPOGLYCAEMIA

- Explain the symptoms of hypoglycaemia and that action must be taken as a soon as these symptoms are felt using the "15-15 Rule":

  - Check blood sugar and take a sugary drink or snack.
  - The amount of sugar needed is only 15 g:
    - 1 tablespoon (3 teaspoons) of sugar or honey
    - 5 candies
    - 1 Medjool date or 3 small dates
    - 200ml of regular sugary soda or juice.
  - Taking too much sugar can cause hyperglycaemia.
  - After 15 min, check the blood sugar again and assess how they feel.
  - Follow with a normal meal, otherwise hypoglycaemia (hypo) will quickly reoccur.

- When feeling better, suggest they reflect on the episode and why it might have happened.

  - The most common reasons for hypoglycaemia are current infection, late or missed meal, extra or unplanned exercise, too much insulin or tablets, alcohol (especially on an empty stomach), hot weather, and not drinking enough water.

- Advise them to always be prepared for a hypo – keep a sugary snack or drink on hand, especially while driving.

  - They should not drive if blood sugar is below < 90 mg/dl (5 mmol/l).

SICK DAY RULES

- Explain how infections affect diabetes, causing blood sugar to increase even if not eating or vomiting.
- Ask them to follow these instructions:
  - Never stop taking insulin.
  - Check blood sugar levels every 2-3 hours (extra supply of glucose strips needed).
  - Drink 2-3 litres of non-sugary drinks between meals.
  - Try to eat even if they don't feel like it – bread, crackers, plain biscuits, milky drinks.
  - Avoid spicy food.
  - Seek medical help if
    - blood sugar is persistently > 300 mg/dl (16 mmol/l)
    - cannot keep drinking and become thirsty
    - persistent vomiting
    - drowsy
    - breathing is deep and rapid.

EXERCISE

- Advise the patient to eat a snack before exercising to avoid hypoglycaemia.

ALCOHOL

- Discuss with patient if culturally appropriate:
  - Drink minimal amounts of alcohol with food only.
  - Double the pre-bed snack after taking alcohol and eat a larger breakfast.
  - Note that hypoglycaemia may persist for 24 hours.

ANNEX 11.
FASTING PERIOD DIABETES MANAGEMENT

People with diabetes may choose to fast for religious or other reasons and should be provided guidance. More detailed guidance is on the NCD Working Group website.

- Advise people with the following contraindications not to fast:
  - type 1 diabetes
  - poorly controlled diabetes (HbA1c > 8%)
  - kidney, heart and/or infectious diseases
  - pregnancy
  - elderly or those living alone.

- Assess the person planning to fast 1-2 months before their start date:
  - evaluate glucose control
  - assess risks
  - review the self-management teaching points below
  - adjust medications using the table below
  - advise that after the fasting period, the original medication regimen will be resumed.

SELF-MANAGEMENT TEACHING POINTS

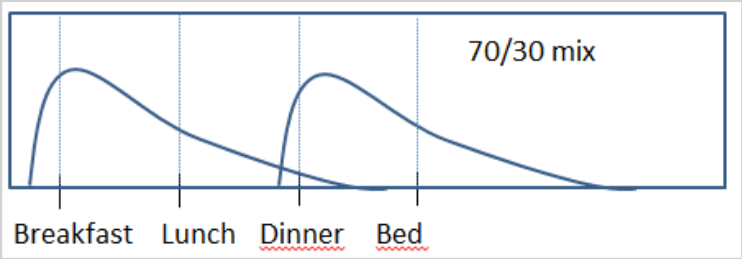
- Avoid eating large meals during the break of fast; have 2 or 3 smaller meals.
- At the break of fast, eat something sugary or with simple carbohydrates (e.g. white bread or rice, baked goods).
- Take adequate fluids during break of fast.
- Just prior to fasting, eat a meal rich in complex carbohydrates (that will be broken down more slowly; e.g. brown rice, beans, peas, lentils, potatoes).
- Continue medications as advised in the pre-fast consultation.
- If on insulin, monitor blood sugar regularly, stop the fast if hypoglycaemia occurs and treat it.

DIABETES MEDICATION ADJUSTMENTS DURING FASTING PERIODS

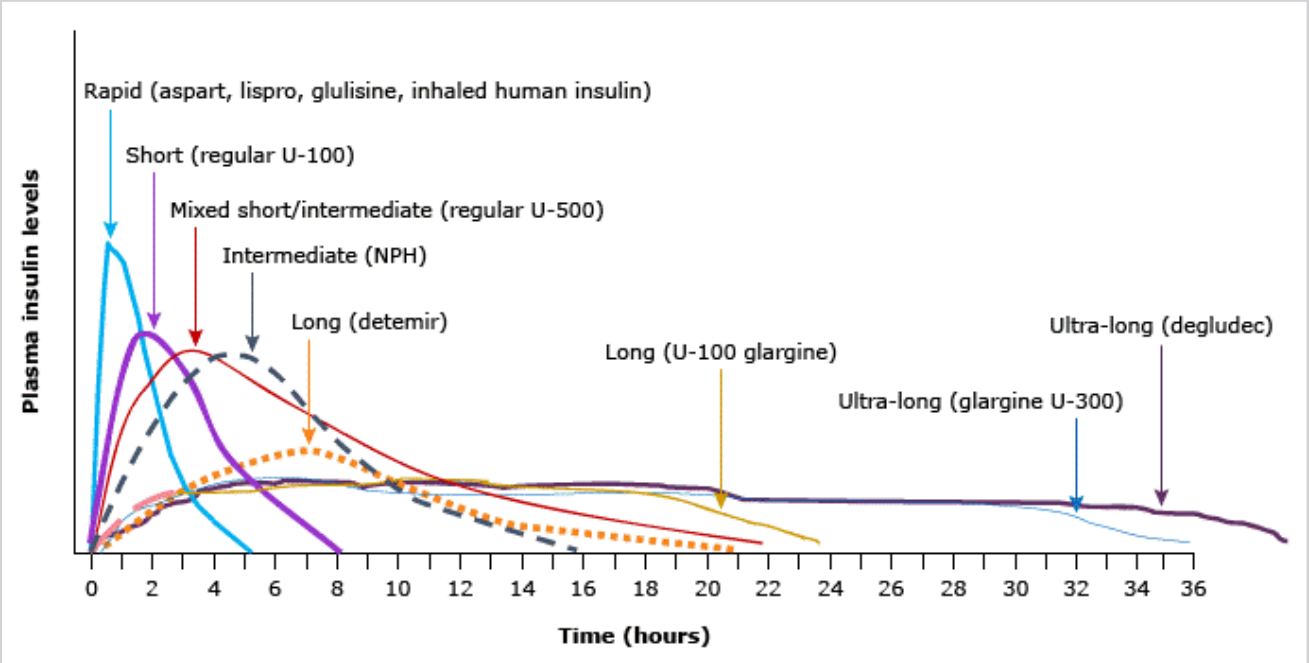
	DOSE CHANGE	COMMENTS
Metformin	**1 or 2 times daily**: No adjustment **3 times daily:** 2/3 dose with Iftar meal (break of fast) and 1/3 with pre-fast Suhoor meal	Low hypoglycaemia risk
Gliclazide (or glibenclamide)	**Once daily:** Usual dose in evening with Iftar meal (break of fast) **Twice daily:** 1/2 of each dose (both doses are reduced by 1/2) If tablets cannot be divided for 1/2 dose twice daily, change to once daily with Iftar meal (break of fast)	Moderate to high hypoglycaemia risk
Insulin	**NPH once daily:** Usual AM dose in evening pre-Iftar (break of fast) NPH or biphasic twice daily: Usual AM dose in evening pre-Iftar (break of fast) 50% usual PM dose in morning pre-Suhoor If on twice daily premixed and if available, change to once daily long-acting (glargine) at Iftar and rapid-acting with meals	Advise not to fast

ANNEX 12.
INSULIN PHARMACOKINETICS AND NEWER ORAL MEDICATIONS

BIPHASIC INSULIN PHARMACOKINETICS (ONSET, PEAK AND DURATION OF ACTION)[93]



HUMAN AND ANALOGUE INSULIN PHARMACOKINETICS[94]



T2D NEWER MEDICATIONS (NOT YET AVAILABLE IN MSF)

DRUG CLASS	DRUG	COMMENTS
Sodium-glucose co-transporter 2 (SGLT2) inhibitor	dapagliflozin, empagliflozin, canagliflozin, bexagliflozin	Mechanism of action: blood glucose reduction by increased urinary glucose excretion; do not usually cause hypoglycaemia
		Improved outcomes in comorbid CVD and CKD
	po	Indicated in heart failure with reduced ejection fraction
		Contraindicated in T1D, DKA, T2D with eGFR < 30 ml/min/1.73 m2
Glucagon-like peptide 1 receptor agonist	semaglutide, liraglutide, dulaglutide, exenatide	Mechanism of action: stimulate insulin release, slow gastric emptying, inhibit post-meal glucagon release, and reduce hunger and food intake; do not usually cause hypoglycaemia
(GLP1 RA)		Recommended in combination with metformin and other medications for atherosclerotic CVD, high HbA1c, obesity
	injectable and po	Contraindicated in pregnancy, history of medullary thyroid cancer, pancreatitis
Dipeptidylpeptidase-4 inhibitor	sitagliptin, linagliptin, saxagliptin, alogliptin	Mechanism similar to GLP1 RA; do not cause hypoglycaemia
(DPP4i)		Add on for modest HbA1c lowering
	po	Can be used in CKD with dose adjustment

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COPD

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12 Formoterol fumarate | Drugs | BNF | NICE

13 Salmeterol | Drugs | BNF | NICE

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20 Ipratropium bromide | Drugs | BNF | NICE

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43 Bisoprolol fumarate | Drugs | BNF | NICE

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