

The Republic of the Union of Myanmar
Ministry of Health



Standard Operating Procedure
for Heat Related Disorders (Version 3.1)

Date : 4th April 2024

Place : Nay Pyi Taw

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1. Heat-Related Illness

It is a continuum of illness relating to the body's inability to cope with heat.

Spectrum of Heat-related Illness

Mild illness	Moderate illness	Severe illness
<ul style="list-style-type: none">• Heat syncope• Heat edema• Heat cramps• Heat rash	<ul style="list-style-type: none">• Heat exhaustion	<ul style="list-style-type: none">• Heat stroke

1.1 Mild illness

Heat syncope

Brief loss of consciousness due to vasodilation and pooling of blood in the limbs as a result of physiological compensation to heat exposure

Heat edema

Swelling of the limbs caused by peripheral vasodilation and interstitial pooling resulting from physiological compensation in response to heat exposure

Heat cramps

Painful muscle spasms in the abdomen, arms, or legs during or after activity in the heat, which often occur when excessive amounts of salt are lost during sweating from physical exertion

Heat rash

An inflammatory disorder of the epidermis that results from blockage of sweat glands; may be followed by superimposed bacterial soft-tissue infection.

1.2. Moderate illness

Heat exhaustion

Profound fatigue, weakness, nausea, headache, or dizziness (or a combination of these symptoms) resulting from a decrease in body water content or blood volume due to water or salt

depletion from heat exposure; mild elevation (<40°C or 104°F) in body temperature may be present, but no altered mental status.

Two types of heat exhaustion	
<i>Predominant salt depletion</i>	<i>Predominant water depletion</i>
<ul style="list-style-type: none"> • Present insidiously over days • Cramps, nausea, weakness • Postural dizziness, malaise 	<ul style="list-style-type: none"> • Present more acutely • Headache, nausea and • CNS symptoms: confusion, delirium, incoordination

1.3 Severe illness

Heat stroke

A multisystem, life-threatening illness characterized by elevation of
the core body temperature (to > 40°C or 104°F) or
oral temperature (to > 39.4°C or 103°F) or
axillary temperature (to > 39.2°C or 102.5°F)

AND

CNS dysfunction

(confusion, delirium, aggression, seizure, altered consciousness or coma)

Heat stroke can occur as

- Classic or non-exertional heat stroke
- Exertional heat stroke

Table 1. Features of classic and Exertional heatstroke

Heat stroke	Classical or Non-exertional	Exertional
Environmental temperature	Prolonged exposure in hot environment	Acute onset in hot environment
Physical exertion	No exertion	Extreme exertion
Common		
Hyperthermia	≥ 40°C or 104°F	≥ 40°C or 104°F
CNS alteration	Delirium, convulsion	Delirium, convulsion
Hypotension	20–30%	Unknown
Distinctive		
Age	Elderly	Young
Skin	Hot, dry	Hot, profuse sweating
Rhabdomyolysis	Mild/moderate	Severe
Renal failure	Uncommon	Common
Lactic acidosis	Mild/moderate	Severe
Glycaemia	Hyperglycemia	Hypoglycemia
Disseminated intravascular coagulation	Mild/Moderate	Severe

2. STANDARD OPERATING PROCEDURE

2.1. Purpose

To enable the medical officers to effectively manage patient with heat related illness

2.2. Scope

This SOP applies to all medical officers.

2.3. Responsibility

All medical officers

2.4. Procedures

2.4.1. SOP for patient with heat syncope

- Remove patient from heat
- treat with rest in supine position
- passive cooling
- oral or intravenous rehydration
- Avoid unnecessary exertion until acclimatization
- Prolonged recovery or a medical history or physical examination arousing concern for a cardiac cause if the patient has cardiac risk factors should prompt further evaluation

2.4.2. SOP for patient with heat oedema

- Remove patient from heat and elevate the legs
- Diuretic agents are not indicated
- Adequate rest
- Fluid intake

2.4.3. SOP for patient with heat cramps

- Remove patient from heat
- Admission to hospital is rarely indicated
- treat with rest in a cool place
- Stretch muscles and massage gently
- oral rehydration salts (in mild attack)
- fluid replacement as needed (IV normal saline 300-500 ml in severe attack)
- Seek medical attention if heat cramps are sustained for more than one hour

2.4.4. SOP for patient with heat rash

- Remove patient's clothing
- treat with evaporative cooling
- glucocorticoid and antibacterial creams as needed
- avoid topical emollients
- monitor for cellulitis
- Advise patients to avoid hot environments and to wear loose clothing

2.4.5. SOP for patient with heat exhaustion

- Remove patient from heat
- Monitor mental status
- Move the patient to a cool, shaded room or air-conditioned place.
- Lay the patient down and raise his or her legs and hips to increase venous return.
- Apply cold wet sheet or spray cold water and use fan if available.
- Start oral hydration. If nausea prevents oral intake of fluids, consider intravenous hydration.
- Youth may just require aggressive oral rehydration with oral rehydration salt and may require 4-6 liters over 6-8 hours; up to 5 liters positive fluid balance may be required in first 24 hours.
- Elderly will require more cautious fluid replacement.
- Intravenous therapy should be guided by clinical state and Urea & Electrolytes. Caution should be taken if decreased or increased Sodium. Normal saline 1 liter over 30 minutes followed by another over an hour, then alternative bottles of 5 % Dextrose water and normal saline 2 hourly. If core body temperature is above 39°C (102.2°F) or impaired mental status or sustained hypotension occurs, treat as heatstroke and transfer the patient to hospital.
- Recovery is usually rapid (12-24 hours)
- Delayed response to treatment warrants further evaluation

2.4.6. Criteria for admission

- Patients meeting the diagnosis criteria for heat stroke as above definition
- Patients with core body temperature > **38°C (100.4°F)** with **ONE** of the followings
 - A. **High risks**
 - ✓ elderly
 - ✓ babies and young children
 - ✓ chronic alcoholics
 - ✓ people with a long-term health condition, such as diabetes, heart or lung condition or mental disorders
 - ✓ people who are already ill and dehydrated (AGE) or diuretics
 - ✓ people who are taking anticholinergics, tranquilizers, diuretics
 - ✓ people with diseases which increased heat production e.g., hyperthyroidism or on cocaine, amphetamine
 - ✓ people doing strenuous exercise for long periods, such as military soldiers, athletes, hikers and manual workers
 - B. **Features of heat exhaustion** (muscle cramps, pale, moist skin, nausea, vomiting, diarrhea, headache, fatigue, weakness, anxiety, and faint feeling)

2.4.7. SOP for patient with heat stroke

A. For EMO at Emergency department

1. Stabilize the patient

1.1. Airway and breathing

- Start key observations to exclude critically ill and if any one noted, contact on-call physician
- stabilize airway and breathing
- give Oxygen, do ECG, IV access

1.2. Circulation

- Stabilize the patient first (reassure and look for vitals /key observations) while doing the booking and insert IV cannula
- Give IV fluid with cool normal saline or normal saline if necessary and ORS (3 sachets WHO new formula with 3 L of water or 2 sachets WHO old formula with 3 L of water) adlib

2. Rapid cooling measures

Rapid cooling should be initiated *as soon as possible and within 30 minutes* of presentation as follows:

- Remove unnecessary clothing
 - Do sponging with ice water or cold water
 - Place ice-pack at neck, armpits and groin or wrap the patient with wet and cool blanket/towel/clothes and fanned vigorously
 - Monitor vital signs (temperature, HR, RR, BP, SpO₂) and mental status continually
 - Cease rapid cooling when rectal temperature reaches approximately 102.2°F (39°C) or patient feel shivering
 - **Avoid paracetamol, aspirin and other antipyretics**
3. Collect blood samples for FBC, ESR, CRP, U&E, Cr, LFT with enzymes, RBS, DIC screening, Blood C&S, Blood for MP, (ABG, Ca, PO₄, CK, LDH if possible), urine RE, ECG, CXR (PA) and CT (Head) if needed
 4. Give broad spectrum antibiotics (IV Ceftriaxone 1 G 12 Hrly)
 5. Admit the patient to medical ward

B. For Medical Officer in medical ward

1. Stabilize the patient

1.1 Airway

- look for evidence of airway obstruction such as,

If patient is conscious;

- respiratory distress as shown by dyspnea, tachypnoea, ability to speak only in short sentences or single words, agitation and sweating
- inspiratory stridor
- suprasternal retraction
- abnormal voice; coughing/choking

If airway obstruction is present in conscious patient,

- a) Sit the patient up
- b) Give high -flow oxygen
- c) Call for urgent help from an anesthetist and ENT surgeon

If patient is unconscious;

- respiratory arrest
- inspiratory stridor
- gurgling; grunting/ snoring

If airway obstruction is present in unconscious patient,

- a) Head tilt and chin lift (Place one hand on the patient's forehead and gently tilt it back; using the fingers of the other hand, gently lift the chin)
- b) Remove dentures (if loose) and aspirate the pharynx, larynx and trachea with a suction catheter
- c) Call for urgent help from an anesthetist
- d) Ventilate the patient using a bag-mask device with 100% oxygen

1.2. Breathing

a) Respiratory rate

Note respiratory rate for one full minute whether < 8 or >30/ minute

- Give oxygen (initially 60-100%) and check arterial oxygen saturation
- Increase inspired oxygen concentration if needed to achieve arterial oxygen saturation 90% (88 – 92 % in acute exacerbation of COPD)
- Maintain patent airway (Head tilt/ chin lift, jaw thrust, remove foreign bodies in mouth by finger sweep and use wide bore rigid suction and oropharyngeal airway)
- If feasible, sit the patient up to improve diaphragmatic descent and increase tidal volume
- Clear secretions: encourage cough, physiotherapy, aspiration

b) Arterial oxygen saturation

- Assess O₂ saturation by pulse oximetry
- If SpO₂ < 90% and/or there are other features of critical illness, initially give 60-80% of oxygen

1.3. Circulation

- Stabilize the patient first (reassure and look for vitals /key observations) while doing the booking and insert IV cannula

- Give I.V fluid with cool normal saline or normal saline if necessary and ORS (3 sachets WHO new formula with 3 L of water or 2 sachets WHO old formula with 3 L of water) adlibs

2. Rapid cooling measures (up to core body temperature of 102.2°F (39°C) or patient feel shivering within one hour)

Rapid cooling should be initiated *as soon as possible and within 30 minutes* of presentation as follows:

- Remove unnecessary clothing
- Do sponging with ice water or cold water
- Place ice-pack at neck, armpits and groin or wrap the patient with wet and cool blanket/towel/clothes and fanned vigorously
- Patient should be treated in designated air-conditioned room
- Monitor vital signs (rectal temperature, HR, RR, BP, SpO₂) and mental status continually
- Cease rapid cooling when rectal temperature reaches approximately 102.2°F (39°C) or patient feel shivering
- **Avoid paracetamol, aspirin and other antipyretics**
- Continue I.V fluid with cool normal saline or normal saline up to 3 L in 24 hours (500 ml in 1 hr, 500 ml in next 2 hrs and 500 ml in next 3 hrs = 1.5 L in first 6 hrs followed by another 1.5 L in following 18 hrs)
- Administration of intravenous fluids for circulatory support differ among patient populations and depend on the presence of hypovolemia, preexisting medical conditions, and preexisting cardiovascular disease. For those patients, aggressive fluid resuscitation generally is not recommended because it may lead to pulmonary edema.

3. Monitoring vital signs

3.1. Heart rate

If heart rate is < 40 or > 130/minutes,

- do ECG and inform on-call physician immediately

3.2. Blood pressure

If patient is in shock,

- Look for features of blood and fluid loss
- Do ECG to exclude arrhythmia and myocardial infarction
- Give fluid challenge and inotropic support

3.3. Perfusion

Note signs of reduced organ perfusion such as cool/ mottled skin with capillary refill time > 2 seconds, agitation/ reduced conscious level; oliguria (urine output < 30 ml/h)

3.4. Temperature

It is recommended that cooling measures be stopped once a temperature of < 102.2°F (39°C) is achieved in order to reduce the risk of iatrogenic hypothermia

3.5. Blood glucose

Monitor blood glucose to avoid hyper- or hypoglycemia

4. Monitor and treat the complications

4.1. *Hypotension*: Vigorous hydration with normal saline or Ringer lactate

4.2. *Convulsions*: Diazepam 5 to 10 mg IV (slowly)

4.3. *Acidosis*: Use bicarbonate judiciously (only in severe acidosis)

4.4. *ARDS*: should be treated aggressively, with early mechanical ventilation and positive end-expiratory pressure (PEEP).

4.5. *Rhabdomyolysis*: infusion of large amounts of intravenous fluids (fluid requirements may be as high as 10 L), alkalinization of the urine, and infusion of mannitol may be needed.

4.6. *AKI*: treated with intravenous fluids, diuretics, and correction of associated acid-base and electrolyte abnormalities.

4.7. *Hepatic failure*: Infusion of dextrose solutions to correct hypoglycemia, early recognition and treatment of DIC, with replacement of clotting factors, fresh frozen plasma, platelets, and blood

5. Look for causes of secondary heat stroke and co-morbidities

The other diagnoses should be considered in a patient presenting with hyperthermia

- Other hyperthermic syndromes -Malignant hyperthermia, Neuroleptic malignant syndrome
- Drug-induced hyperthermia
- Infections - Especially meningitis, encephalitis, and sepsis
- Endocrinopathies - Thyroid storm and pheochromocytoma
- CNS lesions - Hypothalamic bleeding, acute hydrocephalus

6. Consider IV hydrocortisone if BP is still reduced after 24 hrs of corrective treatment with normal saline and oral fluid

7. Referral to ICU (if ICU facility is available)

- Respiratory failure: requiring mechanical ventilation
- Refractory shock
- Glasgow Coma Scale ≤ 8
- Severe infections
- Multi organ failure
- Cardiac arrest

8. Criteria for discharge

Temperature is normal for more than 48 hours and clinically stable and no complication

2.5. Records

SOP is available on EMO's desk, Emergency OPD, consultants table, ward doctors' desk, medical superintendent's office and divisional director's office.

2.6. Prevention of Heat Stroke

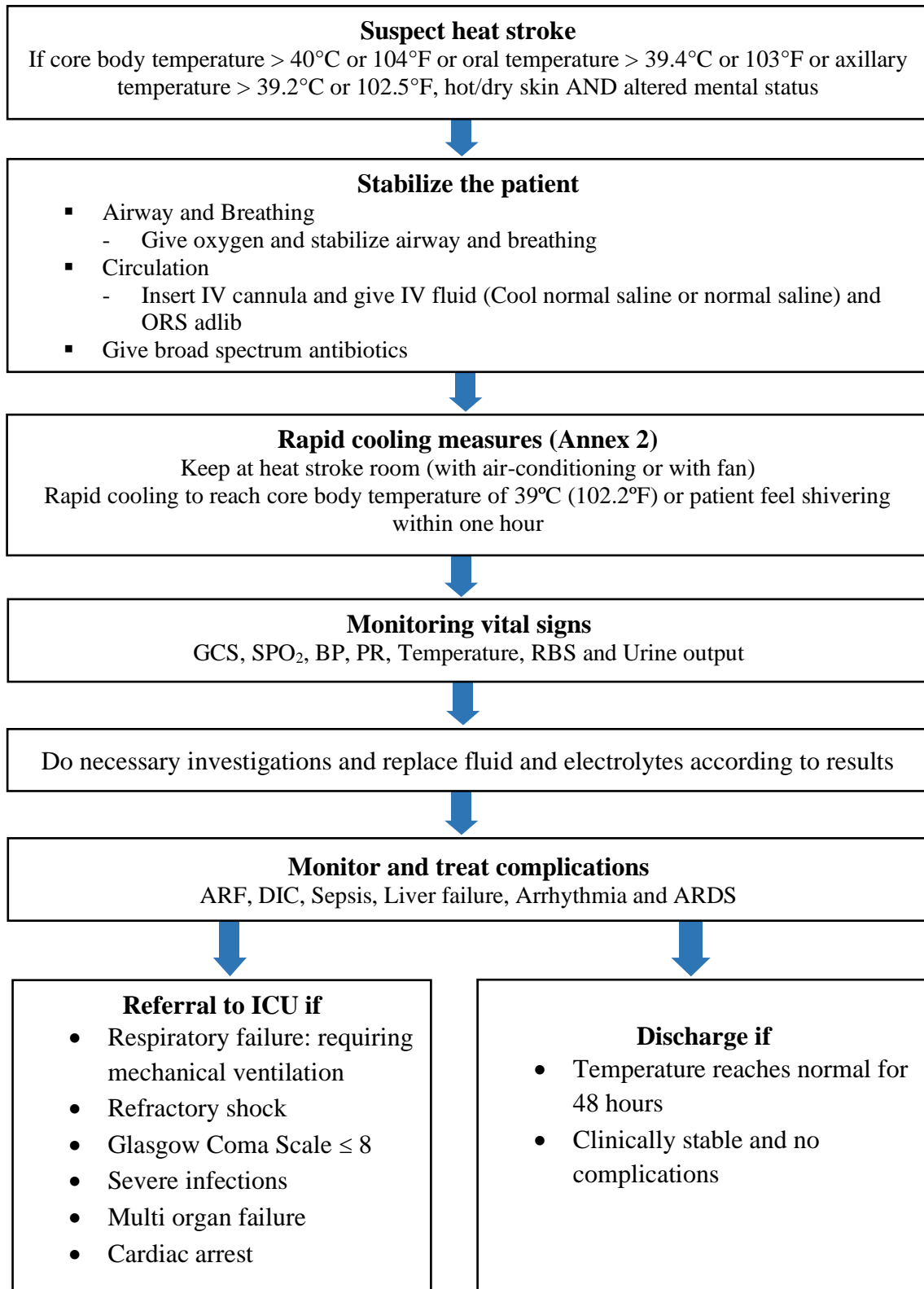
Prevention is key to avoiding heat stroke. The following measures can be taken to prevent heat stroke:

- Stay hydrated by drinking plenty of fluids, especially water
- Wear lightweight, loose-fitting, and light-colored clothing
- Avoid direct sunlight and stay in cool and shaded areas
- Take frequent breaks in a cool place, especially during outdoor activities
- Avoid strenuous activities during the hottest hours of the day

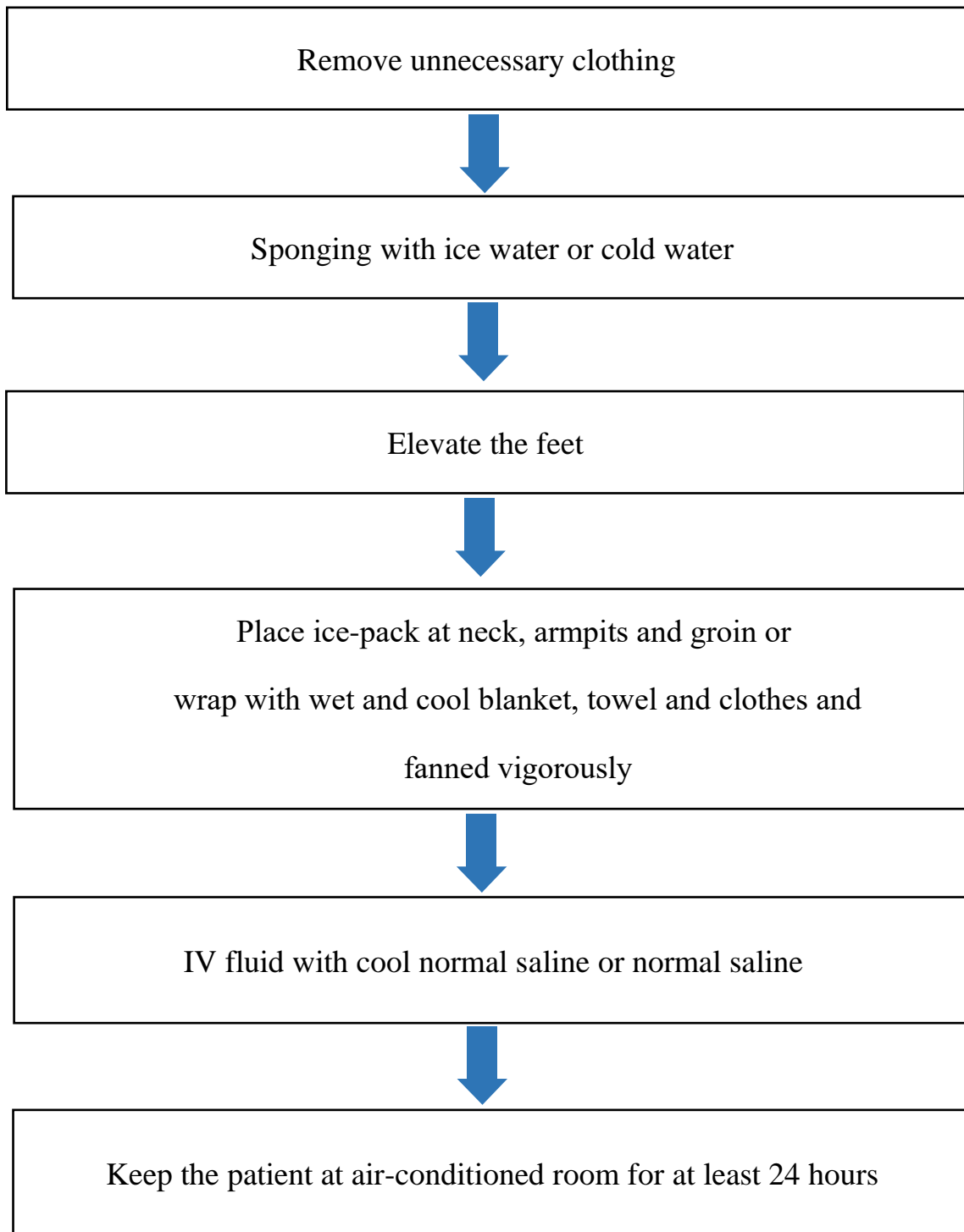
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Annex 1. Algorithm for management of heat stroke



Annex 2. Flow chart for rapid cooling



Update on this version

- Temperature has been updated by adding “Fahrenheit” degree.
- Initial oxygen therapy (%) has been updated as (60 – 80%) if SpO2 is <90%, in management of patient in Medical Ward.

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Department of Medical Services

Contact for any suggestion;

Medical Care Division, Department of Medical Services :
medicalcaredivision@gmail.com