

# Recognizing Heat Stress, Acclimatization and First Aid



MINISTRY OF  
MANPOWER

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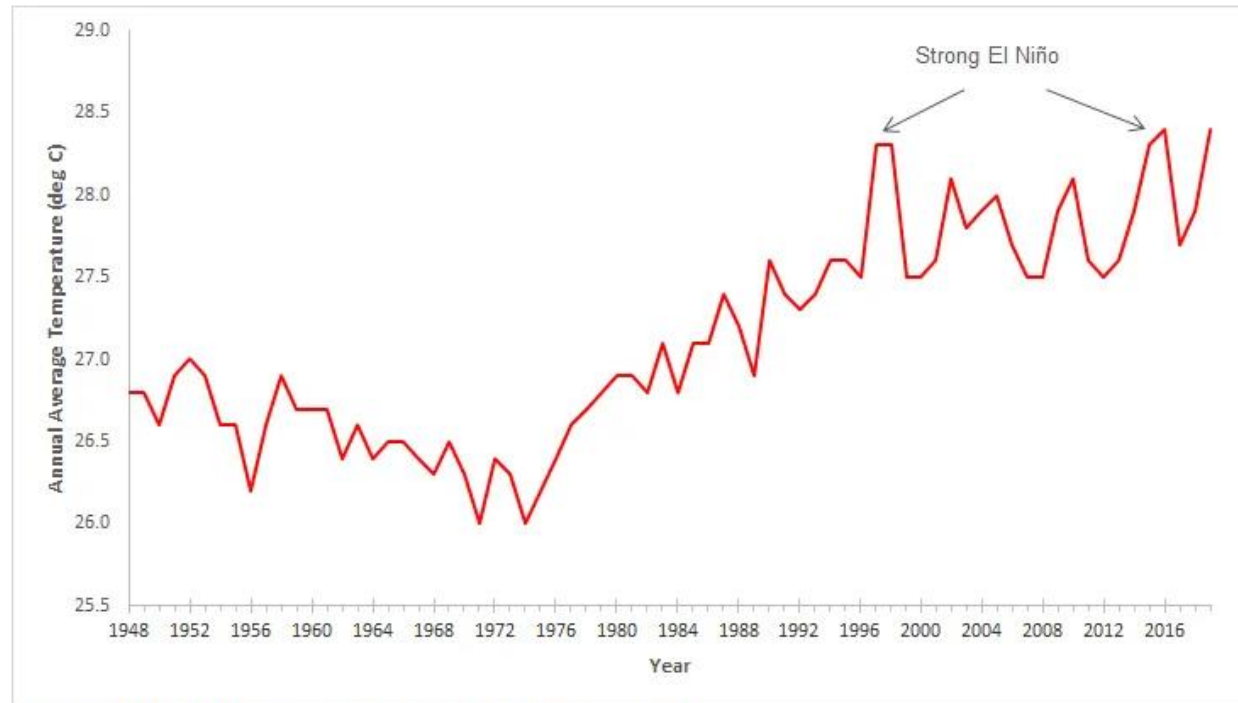
**A Great Workforce A Great Workplace**

# Outline

1. Recognizing Heat Stress Early– What, Why, How
2. Acclimatization – What, Why, How
3. First Aid for Heat Disorders



# Background



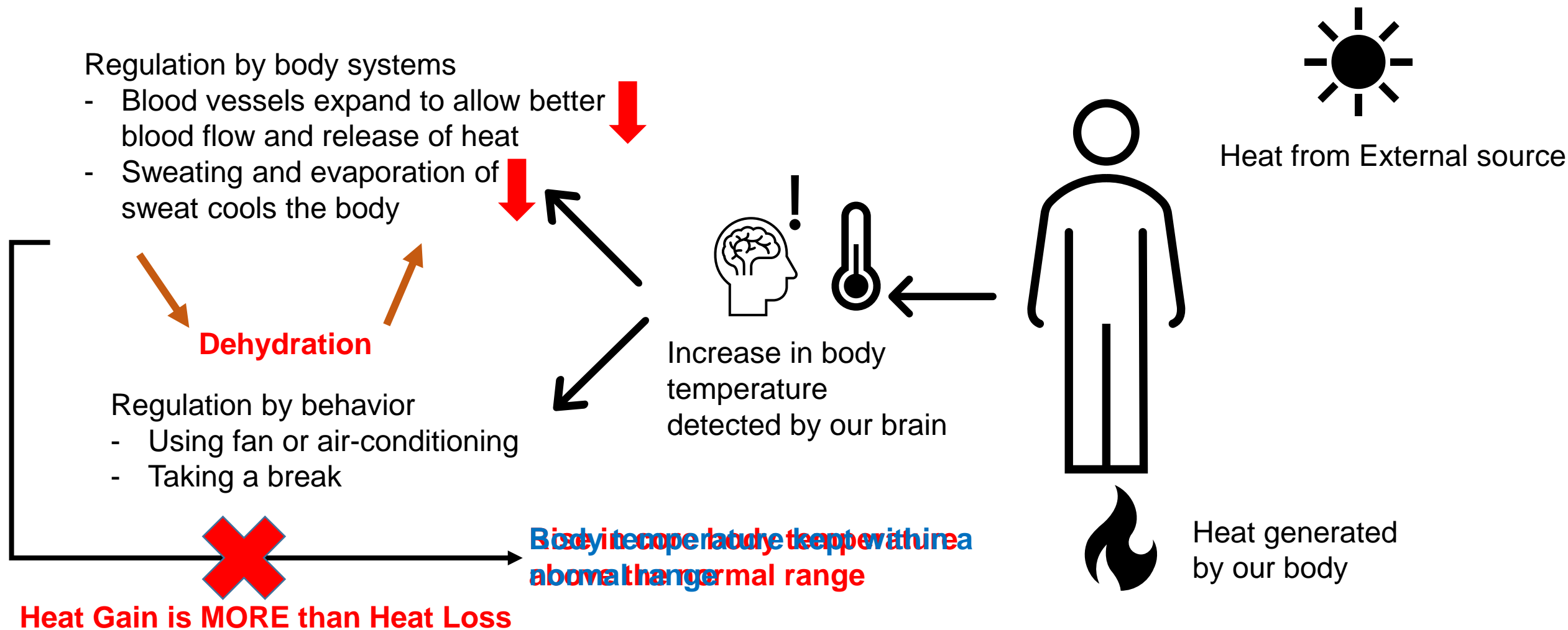
Local Temperatures have risen by 1.8 degrees

Fig 1 – Annual mean temperature in Singapore from 1948 to 2019  
(Data based on climate station)

<http://www.weather.gov.sg/climate-past-climate-trends/>



# How do we develop heat disorders?



# Recognizing Heat Stress - What

## Risk factors



### Job Risk factors

- Workload severity and duration
- Worker clothing



### Environmental Risk factors

- Direct Heat Source
- Ambient Temperature
- Ambient Humidity
- Air movement



### Personal Risk factors

- Heat Acclimatization
- Medical conditions
  - Recent illness
  - Pre-existing medical conditions
  - Chronic medications
  - History of heat injury
  - Obesity
- Other factors
  - Fitness levels
  - Sleep deprivation
  - Alcohol consumption



# Recognizing Heat Stress – Why

Mild

Heat Cramps

Heat Exhaustion

Heat Stroke

Severe

- Muscle cramps and spasms
- Light-Headed, Headache, Fainting
- Breathlessness and Fast Heart Rate
- Abdominal cramps, Nausea, Vomiting, Diarrhea
- Muscle Cramps and weakness
- **Confusion, Disorientation, Seizures and Coma**
- Light-Headed, Headache, Fainting
- Breathlessness and Fast Heart Rate
- Abdominal cramps, Nausea, Vomiting, Diarrhea
- Muscle Cramps and weakness



# Recognizing Heat Stress – How

## Signs and Symptoms to Recognize

	Common Signs (Visible to colleagues and employer)	Common Symptoms (Experienced by worker)
<b>General</b>	Fainting Spells, Walking unsteadily, <b>Unconscious or Seizures</b>	Feeling faint, Feeling dizzy or weak, Feeling nauseous
<b>Behaviour</b>	<b>Confusion, Disorientation</b>	
<b>Heart and Lungs</b>	Hyperventilating (Rapid shallow breathing)	Breathlessness, Chest Discomfort, Fast Heartbeat
<b>Muscles and Limbs</b>	Muscle Cramps	Muscle Cramps, Tingling sensation
<b>Stomach and Gut</b>	Vomiting	Dry mouth, Vomiting, Abdominal pain



# Recognizing Heat Stress – How

## Practical Implementation

- Raising worker awareness



- Buddy system



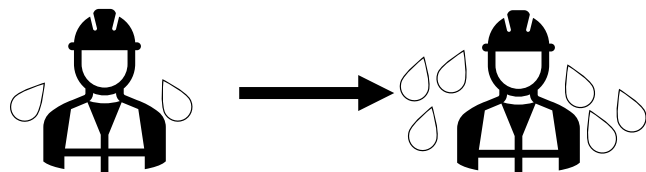
- Familiarity with emergency procedures



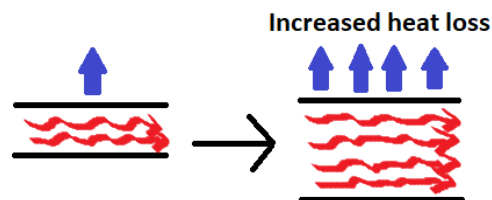


# Acclimatisation – What and Why

- Acclimatisation is a gradual adaptation of the body that improves an individual's ability to tolerate heat stress. This usually takes place over a **7 to 14 day** period.
- Acclimatisation allows workers to



- Increase the efficiency of sweating e.g. sweating earlier, more sweat production, less electrolyte loss



- Increase the blood flow to the skin at a given core body temperature
- Perform work at lower core body temperature and heart rate



# Acclimatization - How

- Newly assigned workers should be acclimatized to hot working conditions.
- Workers returning from vacation or prolonged leave (more than a week) will need to be reacclimatized.
- Workers can be placed on a heat acclimatisation program with gradual increase in exposure to hot working environment for up to 14 days.



Figure 4: Example of heat acclimatisation schedule over two weeks assuming an 8-hour workday.



# Acclimatization – How

## Practical Implementation

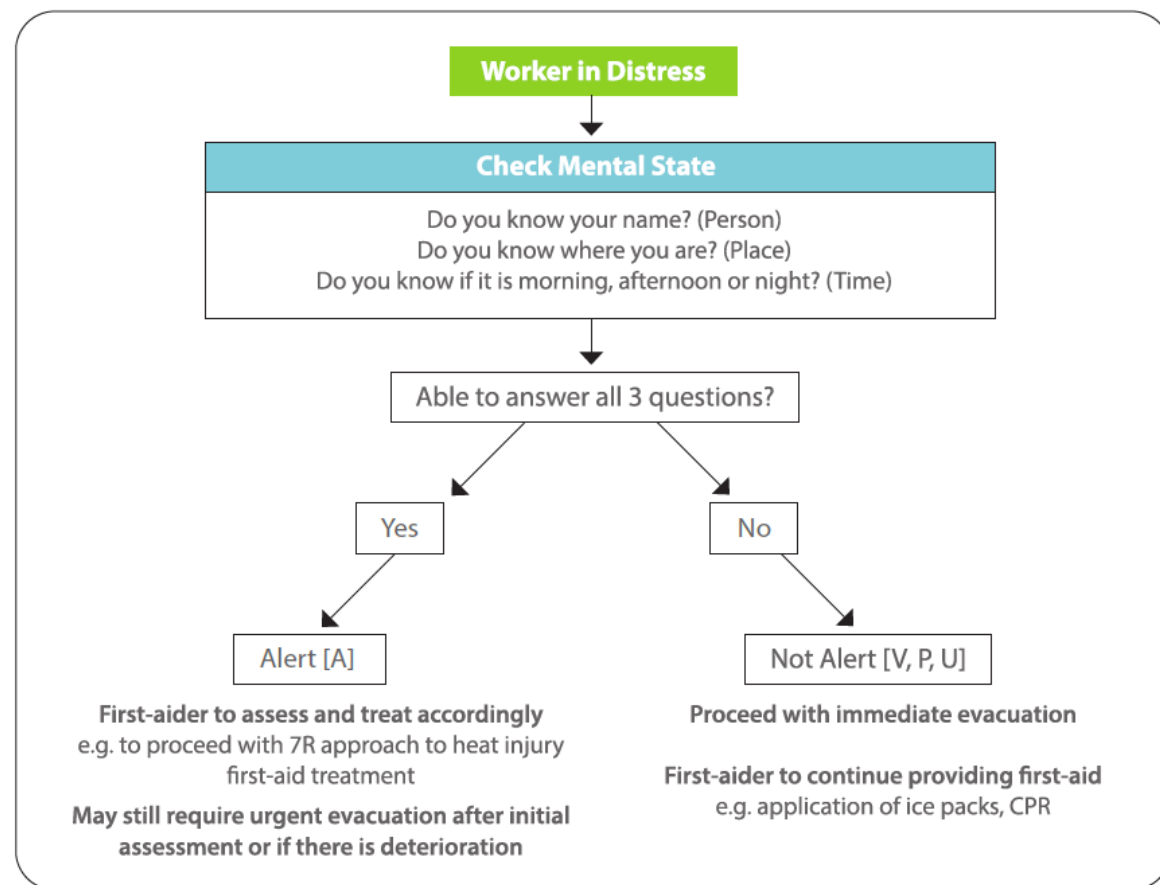
- Closer monitoring for symptoms of heat disorders
- Easy Identification – Arm Bands, Helmet Tags
- Acclimatization period may be extended as necessary



# First Aid for Heat Disorders

## Step 1: Basic Assessment of Mental Status – AVPU Scale

<b>Alert</b>	The worker is fully awake with spontaneous eye opening.
<b>Verbal</b>	Eyes do not open spontaneously but the worker responds appropriately when spoken to.
<b>Pain</b>	The worker does not respond to verbal stimuli but moves or groans in response to painful stimuli e.g. pinching nail bed.
<b>Unresponsive</b>	The worker does not respond to any stimuli.



# First Aid for Heat Disorders

## Step 2: 7R Approach

<b>R</b> ecognise symptoms	Recognise symptoms of heat stress and report early.
<b>R</b> est casualty	Get the worker to sit or lie down in a cool shaded area with good ventilation.
<b>R</b> emove clothing	Loosen or remove excess clothing as appropriate (while preserving the modesty of the worker).
<b>R</b> educe temperature	Reduce body temperature as fast as possible by applying ice packs, wet towels or cool water. Other measures include fanning the casualty (to promote evaporative cooling), the use of cooling blankets and subjecting the worker to cold water immersion.
<b>R</b> ehydrate	Rehydrate by providing fluids. If casualty is unconscious, do not provide fluids by mouth as this may result in choking.
<b>R</b> esuscitate	If the worker becomes unconscious, call for help immediately and resuscitate using principles of cardiopulmonary resuscitation (CPR) if first-aider is trained to do so.
<b>R</b> ush to hospital	Rush worker to the nearest hospital if the worker is not alert.



# Summary

- Heat disorders can be severe and life threatening. Prompt recognition allows for medical treatment at an early stage.
- Acclimatization improves the ability of workers to tolerate heat stress and reduces the risk of heat disorders. It is important and can be achieved with a heat acclimatization program.
- Workers who are not alert and suspected of having heat disorders will require immediate evacuation. Appropriate first aid should be provided using the 7R approach.

