> ## Impact of Environment on Human Health and Performance

Information Sheet One: Working during extreme heat [ref 1.]

Causes: *This can be the result of extreme outside air temperature due to the weather or heat build-up in a work area due to equipment generating heat, or restricted workspace, or large areas of glass within a building, or air conditioning problems or windows that won't open, or a combination of conditions eg* ==high energy tasks whilst wearing PPE and few rest breaks for fluid intake==

1. How does my body react to heat?

When hot our body increases the blood flow to our skin's surface, and we start to sweat. This results in cooling due to:

a. Sweat evaporating from the body's surface and
b. Increase in blood flow carrying more heat to the surface of the body which is then lost by radiation and convection from the body's surface.

If someone is wearing eg protective clothing, or too much clothing, and performing heavy work or intense mental work in hot and humid conditions then the body starts to react, see Figure 1.1.

2. What do I need to do about Heat Stress?

Over time we adapt to hot conditions by sweating more, and by changing our behaviour to try and cool down, eg removing clothing, taking cool drinks, fanning ourselves, sitting in the shade or a cool area, and/or reducing our work rate.

However, in many work situations such behavioural changes may not be possible, eg working in a contaminated environment, or in the case of health workers whilst treating highly infectious patients.

Therefore, if there is a possibility of heat stress occurring you will need to carry out a risk assessment.

3. What do I need to look at in a risk assessment?

When carrying out a risk assessment, the major factors you need to consider are:

- Who will be working in the area and what will they be doing? Eg Checking the vital signs of a patient will not generate the same work rate as someone

cleaning the area or moving a patient. Work Rate: the harder someone works the greater the amount of body heat generated.

Note: Both mental and emotional stress can also increase core body temperature by increasing their heart rate and sweat rate (fight or flight response)

- Working climate – this includes air temperature, humidity, air movement and effects of working near a heat source

- PPE – what will people actually be wearing to fulfil their role. Specific clothing, masks, visors and respiratory protective equipment – this may impair the efficiency of sweating and other means of temperature regulation of the body

- Employee's age, build and medical factors – these may affect an individual's personal tolerance

Talk to your workforce and their safety representatives and check whether any of them have been suffering early signs of heat stress (see Figure 1.1). If it seems likely that there is a problem, you may need to consult with people who are more experienced assessing the risk from hot environments (PPE creates an individual work environment that combines with the environment the person is working in).

4. How can I reduce the risks?

1) Remove or reduce any extra sources of heat where possible
     - Control the temperature in the area (consider both the needs of the patient and the needs of the carer)
     - Use fans or air conditioning to increase air movement (this helps evaporate sweat and move heat away from the body) particularly important in hot summer weather
     - Lower the humidity by use of dehumidifiers where possible to help sweat to evaporate from any exposed skin
     - Provide mechanical aids where possible to reduce the workload or work rate eg hoists, electric beds to raise/lower patients

2) Regulate the length of exposure to the hot environment with PPE itself classed as a potentially hot environment. Temperatures at 26° or more can affect decision making and our ability to process information.

3) Specify how long someone can work before having a rest break and provide rest facilities away from the work area in a cooler environment

4) Prevent Dehydration (sweating causes the loss of vital fluids in the body and must be replaced) Provide cool water in the workplace and encourage workers to drink it before and after working. It is recognised that if wearing respiratory equipment or masks due to the risk of contamination it is not possible to drink whilst working. Often people will reduce their fluid intake before working due to the risk of needing to use toilet facilities during their work. Team Leaders need to explain the danger of this response behaviour and support their Carers and workers by ensuring they take regular agreed rest breaks and respond positively to requests for a break.

5) If needed provide specialised personal protective equipment. Specialised personal protective clothing is available which incorporates personal cooling systems or breathable fabrics (check if appropriate for the environment your workforce will be working in)

6) Training: Provide training for everyone. Explain the risks of heat stress, what symptoms to look out for, safe working practices eg taking on fluids and having rest breaks more frequently than normal and provide training in emergency procedures. Eg what to do if you or a colleague is experiencing heat exhaustion or heat stroke.

7) Acclimatisation - Allow the work force to acclimatise to their environment and identify which workers are achieving this and are fit to work in the hot conditions with the required level of PPE

8) Identify anyone at extra risk - Identify workers who are more susceptible to heat stress and dehydration either due to a medical condition or medication that may encourage the early onset of heat stress, or a reduced general level of fitness or someone who identifies as pregnant. Place these individuals in a different role

9) Monitor the Health of those working in PPE - As well as implementing as many control measures as practicable you should also monitor the health of those working under these conditions

This document is based on:

Ref 1: HSE (2013) INDG451 Heat Stress in the workplace – a brief guide

Figure 1.1 What happens to us when we experience extreme heat

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┌─────────────────────────────┐
│ Sweat Evaporation is        │
│ restricted (depends on type │
│ of clothing worn + humidity)│
└─────────────────────────────┘
              ↓
┌─────────────────────────────┐
│ Body Heat is produced due   │
│ to the workload +           │
│ insufficient heat loss      │
└─────────────────────────────┘
              ↓
⬡ Core Body Temperature starts ⬡   →   ┌──────────────────────────┐
⬡ to increase                  ⬡       │ Impact:                  │
                                        │  • Inability to Concentrate│
                                        │  • Muscle Cramps         │
                                        └──────────────────────────┘
              ↓
┌─────────────────────────────┐
│ Body Sweats more to cool    │
└─────────────────────────────┘
              ↓
⬡ Dehydration + Heart          ⬡   →   ┌──────────────────────────┐
⬡ Rate Increases               ⬡       │ Impact:                  │
                                        │  • Severe Thirst         │
                                        │  • Fainting              │
                                        │  • Signs of Heat exhaustion =│
                                        │    fatigue & giddiness,  │
                                        │    nausea, headache, moist│
                                        │    skin (any of these signs│
                                        │    may indicate dehydration)│
                                        └──────────────────────────┘
              ↓
┌─────────────────────────────┐
│ Body gains more heat than   │
│ it can get rid of           │
└─────────────────────────────┘
              ↓
⬡ Body Control                 ⬡   →   ┌──────────────────────────┐
⬡ Mechanism Fails              ⬡       │ • Heat Stroke – hot dry skin,│
                                        │   confusion, convulsions &│
                                        │   eventual loss of       │
                                        │   consciousness, death if not│
                                        │   detected quickly       │
                                        └──────────────────────────┘
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