

Human Resources

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

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South Yorkshire
Fire & Rescue
WORKING FOR A SAFER
SOUTH YORKSHIRE

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

INTRODUCTION

1. South Yorkshire Fire and Rescue (SYFR) are committed to ensuring the health safety and welfare of all employees; including providing guidance on how to recognise, avoid and treat heat induced illness.
2. Working in high temperatures may not only cause heat illness, but can also result in symptoms such as loss of concentration, which can result in mistakes in safe operational procedures that can lead to accidents.
3. Fire fighters are susceptible to heat induced illness as they are often called upon to work in hot and humid conditions. A rising core temperature is a main factor in limiting fire fighter performance.
4. Compartment fire fighting training involves Breathing Apparatus Instructors (BAI's) been exposed to high temperatures on a regular basis and as such they should in addition to the statutory three yearly medical undergo more frequent health screening.
5. As a member of the Dignity at Work Partnership¹, SYFR is committed to promoting a positive working environment where the dignity and respect, to which all employees are entitled, is not undermined. No employee should be treated less favourably on the grounds of race, gender or gender reassignment, disability, sexual orientation, religion or spiritual belief, colour, nationality, national or ethnic origin, marital/parental status, family ties, trade union or political belief, hours worked, or any other reason either directly or indirectly.
6. This policy applies to all operational firefighters; including BAI's and should be read and used in conjunction with the associated documents listed below:
 - Fire Service Manual Volume 4 – Guidance and Compliance Framework for Compartment Fire Behaviour Training
 - Fire and Rescue Service Circular 69/2008, Building Disaster Assessment Group – Research Findings
 - Occupational Health Advice Leaflet – The Heat is On, How to Recognise and Avoid Heat Illness
 - Substance Misuse Policy

RELEVANT LEGISLATION

7. The effects of heat illness must not be taken lightly, and steps must be taken to minimise the impact of the work environment and to promote safe working practices within it. Both the Organisation and the individual have responsibilities and a duty of care under:

¹ The Dignity at Work Partnership is a partnership between the Government, Unite (the UK's largest union) and major public and private organisations. For further information on the Partnership, see www.dignityatwork.org

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

- The Health and Safety at Work etc Act 1974
- The Management of Health and Safety at Work Regulations 1999
- The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995
- The Workplace (Health, Safety and Welfare) Regulations 1992

CORE BODY TEMPERATURE

8. Core body temperature is an individual's internal body temperature, normally 36.5° to 37° C, if core body temperature exceeds 40° C, heat stroke can occur. This is a life threatening disorder requiring immediate medical attention.
9. Duration and intensity of work undertaken, Personal Protective Equipment (PPE) and Respiratory Protective Equipment (RPE), and ambient environment can all affect the rate of rise of core body temperature for example:
 - Fire ground support – provision of water supplies over long and difficult terrain
 - Dealing with extensive grassland fires
 - Strenuous work in Gas Tight Suits (GTS)
 - Undertaking urban search and rescue in full fire fighting PPE

BREATHING APPARATUS DURATION

10. Research and trials have demonstrated that the air supply from Standard Duration Breathing Apparatus (SDBA), limited the duration of heat exposure, often before a physiological limitation was reached (core temperature exceeding 40°).
11. The use of Extended Duration Breathing Apparatus (EDBA) may be essential for certain tasks, research has shown that individuals wearing EDBA may reach physiological limits while they have adequate air supply remaining in the breathing apparatus.
12. Additional measures to monitor safe deployment of personnel should be considered other than telemetry in instances where EDBA is in use, including consideration of the physiological burden of the activity.

SIGNS AND SYMPTOMS OF HEAT ILLNESS

13. The initial symptoms of heat illness are:

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

- Loss of interest in the task
- Difficulty in remaining alert
- The desire to seek more comfortable surroundings
- Irritability
- The initial symptoms can progress to a loss of co-ordination and dexterity, presenting significant safety implications.

14. Heat rash

Also known as prickly heat, heat rash is caused by unrelieved periods of constant perspiration, producing inflammation and blockage of the sweat ducts. Heat rash can cause secondary problems with infections of the skin.

First Aid:

- Treat localised symptoms, antihistamines may be required

15. Heat Syncope (Fainting)

Heat syncope occurs when blood pools in the lower parts of the body causing a temporary reduction in blood supply to the brain resulting in a short term loss of consciousness.

First Aid:

- Rest the casualty in a head down position, preferably in a cool shaded environment.

16. Heat Exhaustion

Heat exhaustion results from the failure of the blood flow to adequately remove heat. A decrease in blood volume may result from dehydration caused by an inadequate intake of fluids.

It can also be as a result of an excessively fast heartbeat, triggered by environmental heat stress and work rate. The time interval between contractions of the heart muscles may be insufficient to maintain an adequate supply to the heart and, as a consequence, the rate of blood flow will drop. Core body temperature may also rise to above 39°C.

The symptoms of heat exhaustion can include:

- Tiredness, thirstiness, dizziness
- Numbness or tingling in fingers and toes
- Breathlessness, palpitations, low blood pressure
- Blurred vision, headache, nausea and fainting

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

- Clammy skin that may be either pale or flushed

First Aid:

- Remove the casualty to a cool shaded environment
- Sit or lie the casualty down with their legs elevated
- Remove excessive clothing
- Give plenty of water, in sips
- Cool skin with tepid water or by fanning
- In severe cases attendance at hospital for a medical examination may be necessary

17. Heat Stroke

This is the most serious of all heat-related illnesses and may occur when the body core temperature exceeds 41°C; the involuntary nervous system including thermal regulation is affected. Irreversible injury to the liver, kidneys and the brain can occur, and there is a risk of cardiac or respiratory arrest. Heat stroke must be treated as a medical emergency.

Some symptoms of heat stroke are similar to those of less serious heat illnesses, such as headaches, dizziness, nausea, fatigue, thirst, breathlessness and palpitations. However, the onset of the illness can be sudden and dramatic.

Additional symptoms of heat stroke can include:

- Cessation of perspiration, the skin remains hot but is dry and may adopt a blotchy and red colouration. The lips may take on a bluish tinge
- Disorientation, which may become severe, including dilated pupils, a glassy stare and irrational aggressive behaviour
- Shivering and other uncontrolled muscular contractions
- Loss of consciousness and convulsions

First Aid:

- Urgent medical treatment is required, in the meantime treat as for heat exhaustion and be prepared to commence cardiopulmonary resuscitation if necessary

REDUCING THE RISK OF HEAT ILLNESS

18. Individuals can help minimise the effects of heat by presenting themselves for duty in a good condition. This includes:

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

- Maintaining a healthy diet and optimum weight
 - Ensuring a good quality rest period prior to commencing tour of duty
 - Eating prior to the commencement of each shift, this aids hydration. Bread, beans, bananas, yoghurts, oats, cereal bars and fruitcake are all recommended. Ensuring that alcohol intake is within national recommended guidelines. 21 units per week for a male, 14 units per week for a female, and avoid drinking alcohol 8 - 12 hours before the start of a shift
 - Avoid taking excessive caffeine before the start of a shift ie coffee, tea and cola
 - Increase fluid intake prior to the start of a shift by drinking non-caffeine based drinking water, milk and squash to ensure proper hydration. Research has shown that milk is the most effective at replacing fluid and salt > 8% CARBOHYDRATE DRINKS
 - Informing the Occupational Health Nurse Advisor (OHNA) if there is any change in your medical circumstance, or a change in prescribed medication
19. Some medical conditions and prescribed medication can have side effects relevant to heat (**see table 1**). If there is any change of medical circumstance and prescribed or over the counter medication is taken, the Confidential Medication Advice Form (**appendix 1**) should be completed and returned to Occupational Health. Following screening of the form an appointment may be arranged to see the OHNA or the Medical Officer (MO).

MEDICATION	EFFECT
Antihistamine (hay fever tablets)	Inhibits perspiration
Beta blockers (some blood pressure tablets or heart medicine)	May inhibit exercise tolerance
Diuretics (water tablets)	May cause dehydration
Angina treatments (GTN spray, tablets, patches)	May cause a drop in blood pressure
Tranquillisers, sedatives (anti-depressants or sleeping tablets) or muscle relaxants	Implicated in lowered heat tolerance, and may cause a drop in blood pressure
Anti-inflammatories and anal gesics (Ibuprofen, voltarol, paracetamol)	May interfere with body temperature regulation

Table 1 Effects of common medication on thermo-regulation

20. The risk can be further minimised by adopting good working practices including:
- Ensuring that leggings and tunic fit correctly, allowing heat to escape, although not too loose to allow ingress of flames
 - Make sure that leggings are held above the foot part of the boot to assist air circulation (there must not be a gap between top of boot and leggings when bending)

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

- Working rig worn beneath the firekit is comfortable and does not restrict ease of movement or circulation. It is recommended that BAI's change the working rig between hot wears
- Work at a sensible pace and make sure that others do not over exert themselves
- Walk whenever possible
- Share heavy workloads and rotate crews regularly
- Monitor colleagues for signs of fatigue or heat illness
- Regular drinking to maintain an adequate hydration level. A potential sweat loss of one litre per hour has to be replaced. It is recommended that regular small drinks are taken rather than fewer large drinks. An intake of 200ml every 20 minutes is recommended throughout the day, when operational this can be achieved by sipping from a water bottle when the BA set is off. Salt should **not** be added to water as this can interfere with the kidneys normal physiological control mechanisms
- Avoid drinks containing caffeine; also energy drinks should be taken in moderation as excessive consumption can lead to an electrolyte, particularly, potassium imbalance. Research has found that milk is the most effective fluid at replacing fluid and salts lost through sweat, keeping the body rehydrated four times longer than water or isotonic drinks
- Monitor hydration levels. This can be accomplished by observing the colour of the urine stream. The darker the colour the less hydrated the individual.

21. When it is safe to do so and in an identified cool down area:

- Remove your helmet
- Open your tunic to encourage cooling
- Remove your flash hood to encourage heat to escape
- Remove gloves
- Cool hands and wrists with cold water

REDUCING THE RISK OF HEAT ILLNESS – BREATHING APPARATUS INSTRUCTORS

22. Due to the regularity and the frequency of hot exposures BAI's are potentially more at risk to the effects of heat illness.
23. An exposure log should be maintained; this should include time and frequency of exposure, and pre and post exposure tympanic temperature (the measurements

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

should be taken from the same ear).

24. Where the pre exposure tympanic temperature is above 37.5°C the instructor should not undertake compartment fire fighter training. Investigation as to the probable cause of the high core temperature should be undertaken; this may be due to viral illness.
25. Where the post exposure tympanic temperature is above 39°C, the individual should not undertake a further fire compartment exposure on that day. Investigation as to the probable cause should be undertaken, including general health and wellbeing, condition of personal protective equipment and the type of undergarments worn.
26. If the log indicates that any BAI repeatedly exceeds a post exposure tympanic temperature of above 39°C a referral should be made to Occupational Health.
27. No more than two hot wears per day should take place. The second or subsequent hot wear should not be attempted without a rest of at least two hours.
28. BAIs who are undertaking the hot wear should not prepare the compartment for the burn nor clean and prepare for subsequent burns.
29. Appropriate PPE should be worn when cleaning out the fire compartment:
 - Respiratory half face mask
 - Visors, safety glasses or goggles
 - Gloves
30. A break from compartment fire training can reduce the ability to cope with heat. After absence from training for sustained periods BAIs should build their exposure back up gradually, a period of heat acclimation could be considered with the use of an acclimatization chamber (sauna).
31. A break from compartment fire training can reduce the ability to cope with heat. After absence from training for sustained periods BAIs should build their exposure back up gradually, limiting hot wears to one per day for the first two weeks of the return. Monitoring of the tympanic temperature will indicate whether this would be required to be extended, or other interventions to be considered.

HEALTH SCREENING/SURVEILLANCE

32. Health screening and surveillance commences at recruitment and continues throughout service through the statutory 3 yearly medical screening and surveillance
33. Any absence as a result of heat illness must always trigger a referral to Occupational Health for medical assessment prior to re-exposure.
34. Additional screening will take place for BAIs, in the form of a six monthly health

RECOGNITION AND AVOIDANCE OF HEAT INDUCED ILLNESS

monitoring record. It is the responsibility of individual B AIs to complete the Confidential Six Monthly Health Monitoring Record (appendix 2) and return it to Occupational Health. Following screening of the record an appointment with the OHNA or MO may be required.

35. Screening appointments will be arranged regardless of information on the monitoring record at annual intervals.

**If you require any further guidance on this document, please contact
Human Resources or Occupational Health Nurse Advisor**