Preventing harmful health effects of heat-waves

ABSTRACT

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Introduction

Recent heat-waves have caused serious health and social problems in the WHO European Region. These effects can be prevented. Prevention demands a proactive, multidisciplinary approach to preparedness, planning and response.

Over the last few years, several countries have developed action plans, including France[1] and Italy.[2] These include the triggering of heat health warnings in case of certain meteorological conditions, activation of social and health care networks, development and distribution of a heat-wave plan, provision of practical advice to the population and collection of real-time health data (for example, on mortality).

The WHO Regional Office for Europe, in collaboration with The European Commission (EC) Directorate-General for Health and Consumer Affairs, has developed expertise through an EC project called EuroHEAT and has established a network to identify effects, risk factors, effective interventions and early-warning systems. Countries are invited to participate.[3]

Health effects

During a heat episode, body heat increases owing to the environment and metabolism. This heat load must be dissipated to maintain a body temperature of 37 °C, a process called thermoregulation. A rise in blood temperature of less than 1 °C activates peripheral and hypothalamic heat receptors that signal the hypothalamic thermoregulatory centre. This centre makes two powerful responses: active sympathetic cutaneous vasodilatation and initiation of sweating. Failure in these body responses may cause a number of health effects, particularly in elderly people and the most vulnerable (see below).

Heat-waves can:

- cause the development of heat stroke, heat exhaustion and heat cramps; severe dehydration; and acute cerebrovascular accidents;
- contribute to thrombogenesis;
- aggravate chronic pulmonary conditions, cardiac conditions, kidney disorders and psychiatric illness; and
- interfere with hypertension treatment.

Who is at risk?

Although any one can suffer from heat-related illness at any time, some people are at greater risk than others.

1. Infants and children up to 4 years of age are sensitive to the effects of high temperatures, and rely on others to regulate their environments and provide adequate liquids.

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[1] Douste-Blazy P, Falco H et al. *Plan canicule*. Paris, Ministère de la Santé et de la protection sociale, 2004 (http://www.sante.gouv.fr/canicule/doc/dossier_presentation.pdf, accessed 21 July 2006).

[2] *Linee guida per preparare piani di sorveglianza e risposta verso gli effetti sulla salute di ondate di calore anomalo* [Guidelines for preparing monitoring and action plans for health effects of anomalous heat-waves]. Rome, Ministry of Health, 2006 (http://www.ministerosalute.it/ccm/documenti/LineeGuidaCaldo_2006.pdf, accessed 21 July 2006).

[3] More information on EuroHEAT is available on request by e-mail (globalchange@ecr.euro.who.int).

2. People aged 65 years or more may not compensate for heat stress efficiently, and are less likely to sense and respond to changes in temperature.
3. People who are overweight may be prone to heat sickness because of their tendency to retain more body heat.
4. People who overexert during work or exercise may become dehydrated and susceptible to heat sickness.
5. Other vulnerable groups include:
    - people confined to bed and unable to care for themselves;
    - people who are physically ill, especially those with endocrine disorders, cardiovascular diseases, neurological diseases and psychological disorders, chronic pulmonary diseases, liver diseases and kidney problems, or high blood pressure; and
    - people who take medications that aggravate dehydration and heat exhaustion, such as diuretics, anti-inflammatory drugs, certain antibiotics (sulfonamides), certain antivirals (such as indinavir), neuroleptics and antidepressants, benzodiazepines, amphetamines, analgesics, beta-blockers, ACE inhibitors and many others.[4]

Important external exposure factors include:

- the timing, duration and intensity of the heat-wave
- homes with characteristics that lead to easy and continuous accumulation of heat (for example, on top floors or with no external shading of windows or cross.ventilation).

Several interventions are considered crucial in reducing mortality and morbidity:

- identifying people with increased risk of dying during heat-waves
- directing protective measures towards them and others
- rapidly intervening when early signals of heat illness are received.

Advice to the public

To protect your health when temperatures are extremely high, remember to keep cool and use common sense. The following tips are important.[5]

Drink plenty of fluids

During hot weather you will need to increase your fluid intake, regardless of your activity level. Don't wait to drink until you are thirsty. During heavy exercise in a hot environment, drink 2–4 glasses of cool fluids per hour.

Warning: If your doctor usually limits the amount of fluid you drink or you take diuretics, ask how much you should drink while the weather is hot.

Don't drink liquids that contain alcohol, caffeine, or large amounts of sugar; they may actually cause your body to lose more fluid. Also avoid very cold drinks, because they can cause stomach cramps.

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[4] A more exhaustive list is available from Agence française de sécurité sanitaire des produits de santé (http://agmed.sante.gouv.fr/htm/10/canicule/canicul1.pdf).

[5] These tips are adapted from *Extreme heat. A prevention guide to promote your personal health and safety*. Atlanta, National Center for Environmental Health, Centers for Disease Control and Prevention, 2004 (http://www.bt.cdc.gov/disasters/extremeheat/pdf/heat_guide.pdf, accessed 21 July 2006).

Replace salt and minerals

Heavy sweating removes salt and minerals from the body. These must be replaced.

If you must exercise, drink 2–4 glasses of cool, non-alcoholic fluids each hour. A sports beverage can replace the salt and minerals lost in sweat. If you are on a low-salt diet, talk with your doctor before drinking a sports beverage or taking salt tablets.

Wear appropriate clothing

Wear as little clothing as possible at home. Choose lightweight, light-coloured, loose-fitting clothing. Sunburn affects the body's ability to cool itself and causes a loss of body fluids. It also causes pain and damages the skin.

If you must go outdoors, protect yourself from the sun by wearing a wide-brimmed hat (which will also keep you cooler), along with sunglasses and protective but light clothing.

Schedule outdoor activities carefully

If you must be outdoors, try to limit your activity to morning and evening hours. Try to rest often in shady areas so that your body's thermostat will have a chance to recover.

Pace yourself

If you are not used to working or exercising in a hot environment, start slowly and gradually increase the pace. Remember to drink before you get thirsty.

If exertion in the heat makes your heart pound and leaves you gasping for breath, stop all activity. Get into a cool area, or at least into the shade, and rest, especially if you become light-headed, confused, weak or faint.

Stay cool indoors

Stay cool indoors, take frequent cool showers or a foot bath, or wet your hands, face and back of neck or use wet blankets. Use your stove and oven less to maintain a cooler temperature in your home. Try to cool the home at night. If necessary, find a cooler place than your home and spend a few hours there.

Adjust to the environment

Be aware that any sudden change in temperature, such as an early summer heat-wave, will be stressful to your body. You will have a greater tolerance for heat if you limit your physical activity until you become accustomed to the heat. If you travel to a hotter climate, allow several days to adapt to local temperatures before attempting any vigorous exercise, and work up to it gradually.

Remember common sense

- Limit sun exposure at mid-day and in places of potential severe exposure such as beaches.
- Never leave infants, children or pets in a parked car.
- Provide plenty of fresh water for pets, and leave water for them in a shady area.

Take care of those at risk

Visit adults at risk at least twice a day and watch them for signs of heat illness. Check on infants and young children much more often.

Advice for care providers[6]

Heat can cause heat stroke and aggravate medical conditions. Heat stress induces thermoregulatory, acute-phase and heat-shock responses. Thermoregulatory failure, exaggeration of the acute-phase response and alteration in expression of heat-shock proteins, individually or collectively, may contribute to the development of heat stroke.

Heat stroke

Heat stroke can cause death or permanent disability if emergency treatment is not provided. The most effective way of reducing the potential of a heat shock development is immediate cooling. Symptoms that may signal the development of heat stroke include: an extremely high body temperature (39.4 ^{o}C orally), red, hot and dry skin (no sweating), rapid, strong pulse, throbbing headache, dizziness, nausea, confusion, unconsciousness. A person showing these signs needs immediate medical assistance.

Heat exhaustion

Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. It is the body's response to an excessive loss of the water and salt contained in sweat. Those most prone to heat exhaustion are people who are elderly, have high blood pressure or work or exercise in a hot environment.

Measures that may reduce heat exhaustion include cool showers, cooling rooms, rest and lightweight clothing.

Further advice

Comprehensive advice is available from the Centers for Disease Control and Prevention, in the United States of America.[7]

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[6] These tips are adapted from *Extreme heat. A prevention guide to promote your personal health and safety*. Atlanta, National Center for Environmental Health, Centers for Disease Control and Prevention, 2004 (http://www.bt.cdc.gov/disasters/extremeheat/pdf/heat_guide.pdf, accessed 21 July 2006).

[7] Extreme heat [web site]. Atlanta, Centers for Disease Control and Prevention, 2006 (http://www.bt.cdc.gov/disasters/extremeheat, accessed 21 July 2006).

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WORLD HEALTH ORGANIZATION
Regional Office for Europe
Scherfigsvej 8, DK-2100 Copenhagen Ø, Denmark
Tel.: +45 39 17 17 17. Fax: +45 39 17 18 18. E-mail: postmaster@euro.who.int
Web site: www.euro.who.int