What is ‘cold’?

Cold is experienced when the body is in circumstances that deplete the body’s heat and potentially reduce its core temperature to unsafe levels.

A reduction in the body’s temperature results in a range of protective responses from the body including shivering, vasoconstriction and at times peripheral vasodilation. These protective mechanisms have limited benefit and can become overwhelmed.

Outcomes of exposure to cold

Even where the harm is not directly caused by cold, the effects of exposure can increase the risk of other types of injury or exacerbate existing health conditions. The range of potential adverse workplace health and safety outcomes includes:

- Discomfort from cold stiff hands and feet, runny nose and shivering.
- Reduced manual skills, dexterity, coordination and accuracy with impact on productivity and patient safety (from procedural accidents).
- Increased risk of musculoskeletal injuries from stiffness of muscles and joints and reduced peripheral circulation.
- Increased risk of accidents from reduced alertness, manual dexterity and coordination, e.g. increased risk of needlestick injuries.
- Aggravation of medical conditions such as asthma and arthritis.
- Difficulty maintaining the core body temperature and comfort of patients and employees, especially where patients have medical conditions affecting circulation.
- Potential impact on patient mobility and pain levels.
- Chilblains – red, swollen, tender, itchy patches.
- Trenchfoot – a serious condition resulting from exposure to cold and wet. Symptoms include swelling, numbness, pain, discolouration and blisters.
- Frostbite – results when tissue freezes and is damaged. There is a loss of sensation and a risk of infection and gangrene.
- Core temperature and hypothermia. Hypothermia is potentially fatal and results from a reduction in the body’s core temperature. Symptoms become evident as the body’s temperature drops below 36°C (rectal) or 35.5°C (oral). Severe hypothermia is defined as a core temperature of less than 33°C. Symptoms include shivering, pain in extremities, numbness, loss of fine motor coordination, clumsiness, reduced alertness, very cold extremities, and, as the core temperature continues to fall, weakness, confusion, slurred speech, drowsiness, reduced pulse and respiration, shivering stops, dilated pupils, and unconsciousness.
Responsibilities

Employers are required by the Occupational Health and Safety Act 2000 to ensure the health and safety of employees and other persons in the workplace. This includes all places where employees work including hospitals, clinics, residences, and service vehicles.

The Occupational Health and Safety Regulation 2001 requires the identification, assessment and control of all risks including cold [clause 9(2)(i)(vi)] in consultation with employees.

Clause 48 of the Occupational Health and Safety Regulation 2001 requires employers to:

- Provide access to heated or sheltered areas and warm clothing or other personal protective equipment.
- Implement appropriate work-rest regimes taking into consideration the physical fitness, general health, medication taken and body weight of each employee.

Employers must also:

- inform and train employees and managers to recognise and act on symptoms.
- monitor environmental conditions.
- take action (including stopping work if necessary) if there is a risk to employees.

Managers must act to control risks that have been identified or reported by employees or others.

Employees are responsible for reporting potential risks arising from cold working conditions and for reporting any symptoms in themselves, other employees or patients.

Identification and assessment of risk

Hazard identification and risk assessment need to be carried out in consultation with employees, including the employees at risk of exposure to cold.

All risk factors and foreseeable risks need to be taken into account when determining risk and control strategies. This includes events that may occur only infrequently or rarely, e.g. vehicle breakdown or facility air conditioning/heating breakdown.

Risk factors include:

- Air temperature. Air temperatures below 16\(^\circ\) Celsius are a significant risk, and serious harm can occur at temperatures below 10\(^\circ\) Celsius.
- Air velocity. The higher the air velocity the greater the chill factor resulting in a lower effective temperature.
- Humidity and wetness. High humidity and wetness from sweat or other sources increase heat loss from the body.
- Fatigue.
- Physical activity level. The lower the activity level the less heat is generated by the body. People with low activity levels are therefore most affected by cold.
- Clothing. Multiple layers of clothing are best. Dehydration and inadequate food intake reduce the body’s ability to maintain body temperature. If wetness is an additional factor, the outer layer of clothing must be waterproof.
- Health, fitness, or obesity and some medications. Diseases and medications that affect circulation increase risk of harm from cold. Examples are diabetes, cardiovascular disease, underactive thyroid, Reynaud’s disease, and medications such as tranquillisers and beta-blockers.
- Dehydration and hunger decrease the body’s ability to maintain its core temperature.
- Gender. Women have a lower capacity for generating body heat. They lose heat more slowly from the torso but more quickly from the extremities than men.
- Tobacco, alcohol or caffeine consumption. Alcohol decreases shivering (a heat generating mechanism) and increases heat loss by vasodilation. Caffeine increases urine production and blood circulation and hence increases heat loss. Tobacco decreases blood flow to the extremities making them more vulnerable to cold injury.
- Tolerance. Frequently exposed parts of the body can develop some tolerance.

The greater the number of risk factors and the more extreme the conditions, the higher the level of risk and the more serious the outcomes. The chart for minimum recommended working temperatures (see below) can be used as an action trigger. Bear in mind that the chart only includes a single risk factor, i.e. temperature, and is intended for indoor work environments. If it is used to assess outdoor environments, or if other risk factors such as wetness or wind are present then adjustments will need to be made.

All environments in which nurses and midwives may find themselves in the course of their work must be considered. For example, community nurses, disaster response personnel and air ambulance nurses may work outdoors in inclement conditions at least part of the time.

Nurses’ and midwives’ activity levels vary across a shift and may also depend on:
- Which shift is being worked (e.g. nights are often less physically active)
- Patient acuity and work area (e.g. acute ward, community work, outpatients clinic, aged care)
- The nature of the nursing or midwifery position (e.g. clinical versus management).

The activity levels of others in the work area also need to be taken into account, i.e. patients. Since patients tend to be physically inactive, NSWNA suggests that
the minimum temperatures for clinical areas should be 20° C as recommended below for ‘light work (mental), sitting’.

Minimum and recommended working temperatures

WorkCover NSW has not issued any recommendations for minimum working temperatures. However, some Canadian state regulations stipulate the following minimum working temperatures for indoor environments and these can be used as a guide.

Table 1: Minimum working temperatures

<table>
<thead>
<tr>
<th>Activity level</th>
<th>Minimum temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light work (mental), sitting</td>
<td>20</td>
</tr>
<tr>
<td>Light work (work with small tools), sitting</td>
<td>18-19</td>
</tr>
<tr>
<td>Light work, standing</td>
<td>17</td>
</tr>
<tr>
<td>Moderate physical work, standing</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 2 provides New Zealand Department of Labour recommended temperatures for comfort in indoor working environments. Note that the temperature recommendations are made on the basis that seasonal clothing is worn (e.g. warm clothing in winter), there is no source of radiant heat, humidity of 40-70%, and air speeds are in the range of 0.1-0.2 m/s.

Table 2: Recommended working temperatures (°C) for indoor comfort

<table>
<thead>
<tr>
<th></th>
<th>Sedentary</th>
<th>Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer</td>
<td>19-24</td>
<td>16-21</td>
</tr>
<tr>
<td>Winter</td>
<td>18-22</td>
<td>16-19</td>
</tr>
</tbody>
</table>

Options for risk control

Strategies for risk control must be developed in consultation with employees, including the employees who may be exposed to cold in the course of their work.

Control strategies and action plans, including emergency procedures and equipment should be developed for all foreseeable situations including those that may occur infrequently or rarely, e.g. vehicle breakdown, disaster response at site of incident.

Control strategies should be documented and revised periodically or if there is reason to suspect that they may not be adequate.

Training must be provided to managers and employees.

Control options include:
- Adequate heating of indoor environments including vehicles (see tables 1 and 2 above for guidance on minimum and recommended indoor temperatures).
• Routine maintenance of heating equipment and vehicles to prevent breakdown, and arrangements for rapid response by maintenance personnel in the event of breakdown.

• Planning for the possibility of equipment breakdown by development of contingency plans.

• Provision of clothing and equipment that can be used if vehicles breakdown.

• Provision of adequate clothing and personal protective equipment including waterproof clothing as needed. This includes uniform options suited to the range of working environments that employees experience.

• Access to hot drinks.

• Rest breaks to allow employees to warm up and maintain hydration and food intake.

• Administrative measures including rotation of staff and work organisation.

• Employees working in very cold conditions must not work alone.

• Provision of information and training for managers and employees on appropriate clothing, the risks of working in cold, and the signs and symptoms of cold stress/illness.

• Contracting with clients in the community to provide heating during the employee’s visit.

• Procedures for procurement of premises and vehicles should ensure that adequate heating is available and in good working order.

Advice on clothing for cold conditions

• Multiple light, loose-fitting layers are best. The innermost layers must remain dry.

• Hats (beanie styles that cover ears are best) and scarves will significantly reduce heat loss from the head and neck.

• Footwear should not allow feet to get wet. Two layers of socks should be considered for very cold conditions. Footwear should be large enough to comfortably accommodate socks. Compression of socks will reduce the insulation effect.

• Damp or wet clothing (including socks) should be changed as wetness increases heat loss.

• Gloves or mittens to keep hands warm.

• If wet environments may be a factor, then the outermost layer of clothing must be waterproof, e.g. jacket, gloves, hat, boots.

References


2. WorkCover NSW, 2001, Work in Hot or Cold Environments – Code of Practice

3. Canadian Centre for Occupational Health and Safety, OHS Answers, Working in extreme hot or cold temperatures. What are exposure limits for working in the cold?

4. Department of Labour (NZ), Occupational Health and Safety Service, 1997, What you need to know about temperature in places of work, Information Sheet No 3 – What you need to know about thermal comfort
5. Canadian Centre for Occupational Health and Safety, *OHS Answers, Cold Environments – Working in the Cold*

**Notes**
The term ‘patient’ refers to all users of health, residential aged care and community services including residents and clients.