

Excessive Heat at Work: How to Prevent Indoor Heat Illness

Participant Handouts

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¹ California Division of Occupational Safety and Health (DOSH), also known as Cal/OSHA

² Commission on Health and Safety and Workers' Compensation

Indoor Heat Illness in the Workplace

Many people think that excessive heat only causes discomfort. However, heat illnesses are a serious health problem. If precautions are not taken in time, heat illnesses can greatly affect one's health and even cause death. Workers and employers should know the symptoms of heat illnesses to take action right away and prevent death or adverse health effects.

Under California law, the workplace should NOT be a source of injury or illness or threaten the lives of those who work there. In California, employers are required to establish, implement and maintain effective programs to prevent injury and illness as mandated by the *Cal/OSHA Injury and Illness Prevention Standard (Title 8 CCR Section 3203)*.

Employers must provide a hazard-free workplace, not only because it is their legal responsibility, but also because a safe and healthy workplace is a more productive workplace. A workplace with an effective safety plan conveys to workers that they are valued and promotes a positive attitude. The safety plan ensures that all workers can go home safe and sound at the end of the day. Safe and healthy workplaces mean that businesses grow in a responsible manner and that workers and employers benefit from such growth.

In summary, both workers and supervisors have good reasons to be invested in keeping safe and healthy working conditions. Therefore, they should be well informed about job hazards, develop the necessary skills to control them, and take measures to maintain a safe and healthy workplace for all.

When it comes to heat hazards, workers should know: What conditions contribute to the risk of a heat illness; what are the signs and symptoms of heat illnesses; what steps can be taken to avoid heat illnesses, and what to do in case of an emergency. These topics will be covered in this training.

How does the body cool down when it is too hot?

First, to prevent heat illnesses, it is necessary to understand how the human body cools off when it is overheated.

The human body tries to maintain an internal temperature of 98.6 °F. When we get hotter than this “normal” temperature, our body reacts automatically to cool down and remove the excess heat. Our body does this primarily in two ways:

- ✓ **Increased blood circulation:** When we are overheated, our heart beats faster and pumps more blood. There is an increase in the amount of blood that circulates closer to the skin. As the warm blood gets closer to the surface of our skin, some of the excess heat is released into the environment.
- ✓ **Increased sweating:** At the same time as increased blood circulation, we sweat more. As the sweat evaporates, excess heat from our body is released.

If the body cannot reduce its temperature through increased blood circulation and sweating if:

- The air temperature is too high.
- There is too much humidity in the air.
- The person is dehydrated.
- We are doing strenuous work.
-

All of these will make the body begin to store heat!

In summary, to help our bodies cool down, we need to drink water, slow down any physical activity and take breaks in cool areas.

Heat-Related Illnesses

Heat Illness	Description	Treatment
Heat Rash	Areas of the skin itch intensely and often feel prickly and swollen due to overheating. Sweat glands get plugged due to too much heat, humidity, and sweat.	<ul style="list-style-type: none"> • Keep skin clean and dry. • Rest in a cool area. • Drink water. • Change clothes frequently to stay dry.
Heat Cramps	Painful muscle cramps, usually in the legs or near the stomach (abdomen), are caused by losing too much salt through sweating. This is a warning that more serious heat illness can develop.	<ul style="list-style-type: none"> • Take rest breaks in a cooler environment. • Drink water. • Remove any PPE and loosen tight-fitting clothing. • If possible, have the worker lie down.
Heat Exhaustion	When fluids are not replaced, excessive loss of water and salt occurs through sweating. The person may become tired, weak and dizzy and have damp or clammy skin. This is a serious condition.	<ul style="list-style-type: none"> • Have the worker rest in a cool area and drink water if he or she is not nauseous. • If possible, have worker lie down with knees raised. • Loosen the worker's clothing. • Seek medical aid. • Notify your supervisor.
Heat Stroke	This is a life-threatening condition in which the body's core temperature rises above 105°F (41°C) and vital functions begin to break down, including the worker's mental functions. Without immediate medical help, heat stroke may result in permanent brain damage or death.	<ul style="list-style-type: none"> • <i>MEDICAL EMERGENCY:</i> Seek immediate medical help!!! • Remove the worker to a cool area. • Loosen clothing; put a cool, wet cloth under the person's armpits and on the groin; and use a fan to create air movement. • Avoid extreme cold because the body can go into shock. • Do NOT take the person to the hospital in a hot car! Call an ambulance!

It is important to recognize the symptoms of heat illness during its early stages to avoid more serious illnesses. **Please be aware that not all of these signs and symptoms may be present or occur in any particular order, and that individual workers may react differently to excessive heat!**

Be Aware	Caution Tell your supervisor	Danger! Call 911
<ul style="list-style-type: none"> • Sweating profusely • Tiredness • Skin rashes • Feeling thirsty 	<ul style="list-style-type: none"> • Nausea • Dizziness • Headache • Irritability 	<ul style="list-style-type: none"> • Confusion • Convulsions • Vomiting • Loss of coordination • Fainting • Pale, clammy skin or • Dry, red, hot skin

Emergency medical response (911) should be contacted if:

- An employee is showing symptoms of possible heat illness and no first aid-CPR trained person is available.
- An employee is showing symptoms of possible heat exhaustion (such as dizziness or pale, clammy skin) or heat stroke (like convulsions, seizures and mental confusion).
- An employee does not improve with cooling and hydration, or if changes in mental state are observed.

Also, please remember to:

- Notify your supervisor.
- Call 911, if possible from a land line.
- Make sure to provide medical emergency personnel with the right address and directions to locate the sick worker within the facility.
- Have one person stay with the sick worker while another calls for help.

The employer's procedures should also include taking immediate steps to keep a stricken employee cool and comfortable once emergency service responders have been called. The goal is to reduce the progression to more serious illness (which can be rapid and include symptoms such as loss of consciousness, seizures and mental confusion).

Understanding the Causes of Heat Illness

1. Weather Conditions

Weather conditions refer to the surrounding air temperature, the humidity (water vapor in the air) and whether there is any air movement.

- ✓ Air Temperature: This is how hot (or cold) the air around us is.
- ✓ Humidity: This is the amount of water vapor in the air. Under hot and humid conditions, a person will sweat but the sweat will not evaporate as quickly because the air is filled with water vapor. Less evaporation means less cooling.
- ✓ Air Movement: Moving air that is cooler than the skin helps the body release heat. Placing exhaust systems over hot equipment, using local ventilation systems to supply cool air, opening windows when it is cooler outside, and using central air conditioning all can help cool a hot work area.

2. Workplace Conditions

- ✓ The physical plant: Lack of ventilation, lack of easy access to water, and machines or equipment generating heat can combine to produce a hotter work environment. In certain situations, a central air system will not be effective because there are sources of high heat present in the workplace. If there are many heat-generating machines in the workplace, local exhaust ventilation systems should be used along with central air conditioning.
- ✓ How the work is done: Additional factors that contribute to the risk of heat illness are a fast pace of work, insufficient breaks or recovery periods, unrealistic production standards, and no acclimatization periods.
- ✓ Easy access to water: If a worker does not drink enough water, he or she will become dehydrated. In hot working conditions, a person can get dehydrated quickly. Drinking water needs to be readily available, and workers should be encouraged to drink water regularly when it is hot, even if they do not feel thirsty.
- ✓ Safety Practices: Practices that reduce the risk of heat illness are training on heat illness prevention; frequent breaks, particularly during the hot season; reminders to workers to drink water, take breaks, watch out for each other and use the buddy system for strenuous work.
- ✓ Acclimatization: The body needs time to adapt to working in hotter environments so that it gradually gets used to the new conditions. A person just starting to work in a hot environment, or a person returning to work after a period of time away from work, is more

likely to suffer a heat illness. New workers need a period of time to gradually get used to heat, such as working shorter schedules.

3. Personal factors

Some workers are more susceptible to heat than others. It is important to know the personal factors that may increase the risk of a worker developing a heat illness, such as medical conditions, obesity, physical fitness and lack of acclimatization. With careful planning, workers can minimize the risks of heat illness by:

- ✓ **Being well hydrated:** Drinking plenty of water at work and at home, and avoiding drugs and alcohol help workers remain well hydrated and maintain better health. Drinking plenty of water is particularly important in a hot climate.
- ✓ **Being physically fit:** Regular activity, such as walking, running and cycling, combined with proper nutrition and adequate rest, helps workers remain healthy and strong. The human cardiovascular system – heart, arteries and veins – is involved in keeping the body cool and benefits from physical activity.

Who is at a greater risk?

- Workers who wear personal protective equipment (PPE).
- Workers who have had a heat-related illness in the past.
- New workers or workers who have not had sufficient time to get used to the hot working conditions. (Be aware that during a heat wave, all workers are at a greater risk of suffering heat illnesses).
- Workers who have pre-existing medical conditions. Medical treatment or drugs may put a worker at an increased risk for heat illness. For example, workers taking medication for high blood pressure or taking anti-depressants have been found to be more susceptible to heat.³ Tell your doctor if you work in a hot environment and speak with your supervisor to take any additional preventive measures that may be necessary.
- Workers who take over-the-counter or prescribed medications (such as blood pressure-control medicines, antidepressants, diuretics or water pills).
- Workers who are overweight.
- Workers who use drugs and alcohol.

³ See information on the CDC website: <http://www.bt.cdc.gov/disasters/extremeheat/faq.asp>

Indoor Heat Illness Checklist

An indoor heat illness checklist can be used in a workplace inspection to look for anything that may cause heat illnesses in indoor work environments. This includes problems with the facility, equipment and processes; jobs that require significant exertion or use of personal protective equipment; and how effective the employer's heat illness prevention policies and procedures are. Some of the items below require only direct observation; others will be best captured by also having a conversation with workers and supervisors. Workplace safety committee members, worker leaders and supervisors can use this checklist as a tool to evaluate heat hazards in their workplace as part of preventive efforts.

Date: _____ **Time** _____

Facility or Work Area: _____

Number of workers: _____

Legal Requirements

Some workplace conditions and practices that help prevent heat illness are required under Title 8, California Code of Regulations:

Yes No

 Is there drinking water readily available on the site and is it maintained in a clean and sanitary condition?

 Is there a safety plan (IIPP) and do workers know about it? Does the plan include:

 Procedures to identify sources of heat, such as inspections?

 Actions taken to control heat, such as providing ventilation?

 Employee health and safety training?

 Have effective medical provisions been made in advance for prompt medical treatment in the event of a serious injury or illness?

 Has anybody had first aid training?

 Are first aid supplies and equipment available?

 Do workers know the employer's emergency plan?

Workplace Conditions that Relate to Heat Hazards

Yes No

- Are there any machines or equipment that generate heat, such as steam pipes, ovens, dryers or dip tanks?
Which machinery or equipment? _____
- Are hot pipes or hot surfaces insulated?
- If your workplace has general ventilation (i.e., central heat or air conditioning), is it being inspected and maintained at least annually?
- Is there any local exhaust to vent heat sources (i.e., hoods over ovens, exhaust ducts over hot process equipment, etc.)?
- Are there any portable floor fans or wall-mounted air conditioning in the workplace?
- Are they functional?
- Can windows be opened? (If this does not interfere with air conditioning).
- Are there any areas of the workplace that are particularly hot?
Which areas? _____
Why? _____
- Is there an area with good ventilation where workers can take rest breaks to seek relief from the heat?
- Are there any particularly hot tasks?
Which work tasks are the hottest?

(Rank this in order, with 1 being the hottest)
In which areas of the plant do these occur? _____

Best practices to prevent heat illness

Yes No

- Are workers in hot, strenuous jobs rotated?
- Is the work pace slowed down on very hot days?

- Are schedules changed during hot weather?
- Do new workers have a period of time to get used to working in the heat?
(This is known as acclimatization; it includes assigning lighter work or working shorter shifts)
- Can workers take a break in an area with good ventilation to seek relief from the heat?
- Are workers encouraged to participate in heat stress prevention activities, such as drinking water, watching out for each other, monitoring heat, conducting inspections, taking rest breaks, etc.?
- Are there restrictions or obstacles for workers to drink water?
- Are workers encouraged to drink water often and not wait until they feel thirsty when it is hot?
- Are drinking cups or drinking fountains provided?
- During the hot season, or if the workplace is hot, is there an ice dispenser available?
- Is training provided to workers on heat illness prevention, including:
 - How to recognize heat illness symptoms and how to respond to emergencies;
 - The importance of immediately reporting to their supervisor symptoms or signs of heat illness in themselves or in co-workers;
 - The employer's procedures for responding to symptoms of possible heat illness;
 - That personal factors increase the risk of heat-related illnesses (clothing, hydration, and physical fitness, use of some medications, drugs and alcohol)?
- Do workers use the "buddy system" to recognize signs of heat illness in each other (including weakness, unsteady pace, irritability, disorientation, and changes of skin color)?
- Are workers able to notify their supervisor when feeling ill?
- Are workers encouraged to notify their supervisor when feeling ill?
- Do supervisors know how to respond if a worker gets ill from the heat?
- Are workers informed about procedures for contacting emergency medical services (i.e., who is authorized to make the call)?
- Do workers know how to contact emergency services?

- Is there equipment to monitor air temperature and humidity which is visible to all?

Use of Personal Protective Equipment

Yes **No**

- Do workers who wear personal protective equipment (PPE) get more frequent breaks? (In very hot weather, breaks should be taken in a cool or air-conditioned area, if feasible.)
- Are breaks long enough for workers to take their PPE off and put it back on as needed?
- Are workers provided with water or air-cooled garments and an ice-packet vest when using PPE in extremely hot environments?

Notes

Mapping out heat in the workplace

As a way to help prevent indoor heat illness, workers and employers can draw a floor plan of the workplace or of specific work areas. On the map, they can mark all sources of heat. For example, if there is good ventilation; if there is heat-generating machinery and equipment, such as dryers, steamers and ovens; and tasks in the work process, such as physically demanding tasks, which can contribute to the body heat load. Then they can evaluate which of these conditions contribute to heat illness by using different colors. Once the map is finished, it can be used as a tool to determine priority hazards to control. This method can be used to evaluate previous heat illness incidents.

If there is a health and safety committee in the workplace, hazard mapping can be a tool to re-energize the committee and work with management to control heat. This is a dynamic activity that can be used to get everyone involved in the workplace injury and illness prevention plan.

Hazard/Color Key	
Hot Areas 	<ul style="list-style-type: none"> • Areas near heat-generating machines or equipment • Areas with high humidity • Areas near hot pipes • Areas where there is little or no air movement • Areas where hot air comes in from outside
Hot Jobs 	<ul style="list-style-type: none"> • Working with hot materials • Jobs that demand strenuous physical effort • Jobs that have to be done quickly • Jobs that require uniforms or protective clothing
Poor Working Conditions 	<ul style="list-style-type: none"> • Ineffective or no ventilation system (air conditioning, fans, vents, windows) • No easy access to drinking water • No insulation on heat sources, such as dryer exhaust ducts • No monitoring of heat or humidity levels • Steam leaks and other broken equipment generating heat

Making the Workplace Safer—What Employers Can Do

Although Cal/OSHA’s Heat Illness Prevention standard (Title 8, Section 3395) requirements apply only to outdoor environments, employers are still required to prevent hazardous exposure to high indoor temperatures under the California Injury and Illness Prevention Program standard (Title 8, Section 3203). Additional requirements apply to workplaces regarding mechanical ventilation (Title 8, Sections 5142-3), provision of drinking water (Title 8 CCR Section 3363), sanitary facilities (Title 8, Sections 3364-5), washing facilities (Title 8, Section 3366), and medical services and first aid (Title 8, Section 3400).

The Cal/OSHA’s Injury and Illness Prevention Program (IIPP) standard applies to heat illness prevention through its requirements for timely and ongoing hazard identification and control, safety policies and procedures, worker and supervisor training, and management leadership and commitment in the development and implementation of the IIPP.

Regular inspections with checklists and hazard mapping are good ways to identify hazards. Once heat hazards are identified, all sources of heat should be addressed. There are various methods or controls that can be used to provide effective protection.

The Hierarchy of Controls

There are several, commonly recognized methods for injury and illness prevention. These methods are organized into a hierarchy according to their effectiveness. The most effective methods eliminate the hazard; the least effective ones help reduce or block hazards. These methods should be combined for best protection.

First Choice: Eliminating Heat Hazards

Engineering controls are changes to equipment, machinery, materials or to the work processes that eliminate, reduce or isolate hazards. They are the most effective because they do not depend on people to provide protection against hazards. These are changes that address the actual source of heat and eliminate the exposure to workers.

Engineering controls include:

- ✓ Installing and maintaining ventilation systems.
- ✓ Providing equipment to do a strenuous job more easily (i.e., a pallet jack or conveyor belt).
- ✓ Enclosing hot machinery and pipes.
- ✓ Installing local exhaust systems to remove heat.
- ✓ Installing local ventilation to provide cool air.
- ✓ Fixing steam leaks and repairing other broken equipment generating heat.

Second Choice: Reducing Heat Hazards

If it is not possible or practical to eliminate sources of high heat in the workplace, employers can establish work policies and procedures to reduce the amount of worker exposure to heat hazards.

Administrative controls are safe work practices, policies and procedures that change how the work is done. These are considered to be the second most effective way to control hazards.

Administrative controls demand careful supervision and ongoing efforts to ensure workers are informed and motivated so that they follow safety rules.

Administrative controls include:

- ✓ Providing adequate rest breaks in a cool area.
- ✓ Providing and encouraging workers to drink water frequently.
- ✓ Rotating workers to reduce exposure to high heat.
- ✓ Arranging work schedules to minimize exposure to high heat.
- ✓ Providing training on how to prevent heat illness to workers and supervisors.

Third Choice: Blocking Heat Hazards

A third method for protecting workers from hazards is to use **personal protective equipment or PPE**. PPE includes different types of protective devices worn on the body. PPE does not eliminate or reduce the actual hazard; it is simply **a barrier** between the hazard and the worker. Workers who need to wear PPE to be protected against other hazards may be at greater risk of heat illness because PPE usually increases the body's heat load.

- ✓ There are very few PPE options to help protect workers from heat illness, apart from “cooling vests,” which are not appropriate for many situations.

Making the Workplace Safer—What Workers Can Do

- ✓ Learn about workers' basic rights and responsibilities and actively participate in all training provided by their employer.
- ✓ Learn to recognize the symptoms of heat illnesses and what to do when they or a co-worker is experiencing heat exhaustion or heat illness.
- ✓ Report incidents of heat illness to a supervisor or the employer.
- ✓ Understand how the body cools down and how heat illness can be prevented.
- ✓ Talk to other workers to identify heat hazards in the workplace, and talk about what Cal/OSHA regulations may apply.
- ✓ Gather information to document heat hazards in the workplace.
- ✓ Actively participate in safety programs, suggest effective changes and advocate for changes in their workplace.
- ✓ Ask management to make changes.
- ✓ Work collectively to present facts to management and push for changes to make the workplace safer.
- ✓ Get involved in the workplace health and safety committee.
- ✓ Talk to their union representative, if they have one.
- ✓ File a complaint with Cal/OSHA if their employer does not address indoor heat hazards.

Filing a Complaint with Cal/OSHA

If their employer does not correct hazardous conditions, workers have the right to contact Cal/OSHA to file a complaint. In the complaint, workers should focus on the heat-related job hazards onsite. Heat-related hazards include no access to drinking water, lack of effective ventilation and of rest breaks, lack of training to recognize symptoms, lack of emergency procedures, and lack of effective evaluation and control of heat hazards.

Cal/OSHA onsite inspections are conducted when workers give Cal/OSHA their name. Cal/OSHA never tells the employer who called, as this is against the law. In other words, all complaints are confidential.

For more information about how to file a Cal/OSHA complaint call your local office or visit the Cal/OSHA complaint website: <http://www.dir.ca.gov/dosh/Complaint.htm>

Making the Workplace Safer—What Workers Can Ask Their Employer to Do

- ✓ Monitor indoor temperatures, particularly during the hot season.
- ✓ Inspect and maintain all ventilation systems.
- ✓ Provide cool and easily accessible water.
- ✓ Provide frequent breaks and a cool room to rest.
- ✓ Make sure that workers are aware of any hazards present in the workplace.
- ✓ Respect workers' rights under the law.
- ✓ Find out about regulations and ask for help from Cal/OSHA.
- ✓ Stay in compliance with regulations to provide a safe and healthy workplace.
- ✓ Have an effective Injury and Illness Prevention Program that includes concrete measures to monitor and control excessive indoor heat.
- ✓ Have an effective emergency response plan and train workers about it.
- ✓ Provide training for the health and safety committee members so they can conduct regular inspections.
- ✓ Train workers and supervisors to recognize the signs and symptoms of heat-related illnesses.
- ✓ Establish and practice written and clear emergency procedures for when a worker is experiencing a heat illness.
- ✓ Support and encourage workers to get involved.
- ✓ Conduct inspections at different times of the day to evaluate heat hazards, such as temperature, humidity, work pace, etc.
- ✓ Use a checklist and combine it with other methods, such as doing a hazard map, to evaluate heat hazards.
- ✓ Provide a safe environment for workers to ask questions and raise concerns.

Steps for Action Planning

A good training should end with a plan for putting what was learned to use for improving working conditions. An action plan helps workers and employers come up with effective steps to prevent injuries and illnesses. The steps to action planning are:

- Gather Information about the problem: For example, use a checklist or a hazard map to identify the sources of heat, keep a record of incidents related to heat, interview affected workers, etc.
- Decide what your goals are: Once you have identified that there are indoor heat hazards in your workplace, list problems and possible solutions using the hierarchy of controls. Decide what you would like to accomplish and in what order you should tackle the problems identified.
- Identify the support you would need to achieve your goals.
- Identify what are the obstacles to achieving your goals.
- Come up with specific steps to solve the problem. Think of the hierarchy of controls.
- Write up who will do what and by when.

Example of an Action Plan:

Problem: Workers have reported there is no drinking water near the work area.

Solutions you suggest: Set up water fountains throughout.

Support (what can help):

- There is a health and safety committee.
- The health and safety committee has asked everyone for suggestions to improve health and safety.

Obstacles (what would need to be addressed)

- The employer says water is available because workers can walk to the bathroom and drink from the sink.
- Workers don't know that high heat can cause heat illnesses and even death.

Tasks, who will do them, and by when:

What?	Who	By when
Find out where would the best place to put water fountains; ask workers for ideas.	Xavier, worker leader	Next week
Find out about best prices, services, installation and write up arguments for time savings.	Ana, health and safety committee member	Next week
Copy the Title 8 regulation that prohibits drinking water from bathroom sinks and requires clean and sanitary water dispensers.	Eugene, from the committee	On Friday
Present this information to management. (Before the meeting, choose who will present the information to employers, who will keep notes, and who will inform the rest of the workers of any decision made).	All	Next staff meeting