

Heat Stress

Division of Safety & Hygiene (DSH)

Learning Objectives

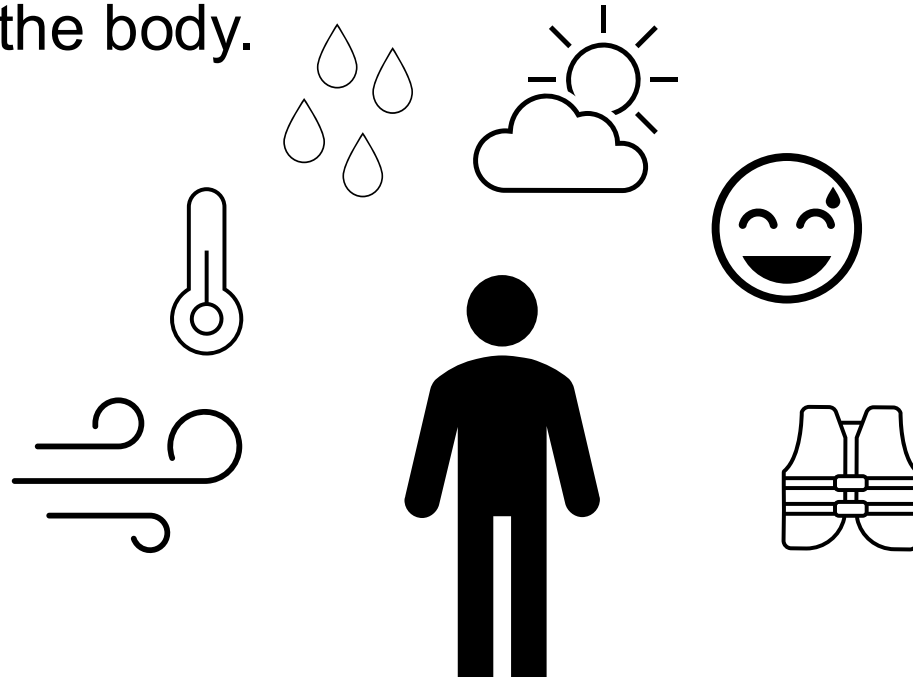
- List two types of heat illnesses, their symptoms, and their first aid actions
- Identify three practical methods for mitigating heat stress in the workplace

Agenda

- What is heat stress?
- Who is impacted by heat stress?
- How can we mitigate it?

What is heat stress?

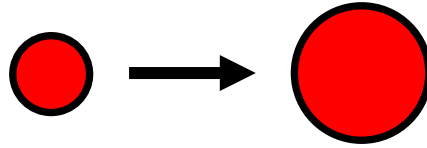
When exposure to heat results in increased heat storage in the body.



**What part of your brain
controls your body's
response to heat stress?**

Hypothalamus

How does your body get rid of heat?



- Sweat
- Dilating capillaries
- Increased heart rate



Heat Risk Factors: Demographics



Who is more likely to have poor heat tolerance?

- children
- older employees
- pregnant employees*



Heat Risk Factors: Health

What kinds of conditions are associated with poor heat tolerance?*

- sedentary lifestyle
- diabetes
- hypertension (high blood pressure)
- heart disease
- kidney disease
- medications that affect thermoregulation, central nervous system function, and/or sodium balance
- obesity

What is the most serious heat illness?

Heat stroke

Heat Rash

- **Cause:** irritation due to excessive sweating
- **Symptoms:** red bumps or patches, often in the creases of joints or on the chest
- **First Aid:** apply powder (not ointment/cream), decrease humidity if possible

Heat Cramps

- **Cause:** Low sodium due to excessive sweating
- **Symptoms:** Muscle cramps
- **First Aid:** Drink water and have a snack that replaces electrolytes
- Seek help if symptoms do not stop after **1 hr**

Heat Exhaustion

- **Caused:** by loss of salt through sweating
- **Symptoms:** headache, nausea, dizziness, weakness, irritability, thirst, heavy sweating, elevated body temperature, decreased urine output ([NIOSH](#))
- **First Aid:** Move worker to a cooler area and encourage them to take frequent sips of cool water. Remove unnecessary clothing (including shoes and socks)
- May be necessary to seek medical care, call 911

Heat Stroke

- **Cause:** excessive heat overwhelms the body's ability to manage
- **Symptoms:** confusion, altered mental status, slurred speech, loss of consciousness (coma), hot, dry skin or profuse sweating, seizures, very high body temperature ([NIOSH](#))
- **First Aid: Call 911.** Move the worker to a cool, shaded area and remove outer clothing. Cool the worker.

Steps to Mitigate Heat Stress

Resource for Recommendations

Heat Safety in the Workplace: Modified Delphi Consensus to Establish Strategies and Resources to Protect the US Workers

The recommendations represent outcomes from patient-oriented trials in literature.

Heat Hygiene (Health)

- Wellness programs to minimize heat stress risk factors
- Train workers and supervisors to identify heat stress and heat illness in themselves and others. Train and audit knowledge of responses to heat illnesses.

Recommended Daily Heat Readiness Checklist (Part A)

- If any of the below are true, you may be at increased risk of heat-related illness:
 - dehydrated
 - didn't get enough sleep
 - are still fatigued from yesterday/didn't get recovery time
 - are experiencing digestive system discomfort
 - haven't eaten yet or are fasting
 - have a lot of psychological stress



Recommended Daily Heat Readiness Checklist (Part B)

- If any of the below are true, you need to consult a doctor before working:
 - you have a cold or respiratory infection
 - you have a fever
 - you have diarrhea
 - you are vomiting
 - you have medications that affect your ability to dissipate heat, impact your central nervous system, or your sodium balance (e.g. beta-blockers)*



Hydration



- Have cool drinking water available to workers
- Have clean restrooms available
- Have a fluid replacement strategy
 - If heavy physical work in a hot, humid environment exceeds two hours, include electrolyte drinks. If not, water is most appropriate.
 - Share this strategy during on-boarding
- Educate workers on healthy hydration

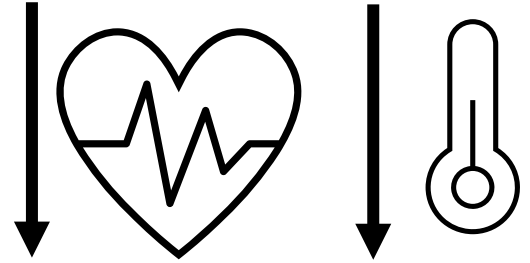
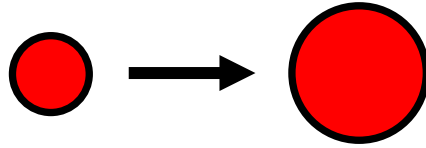
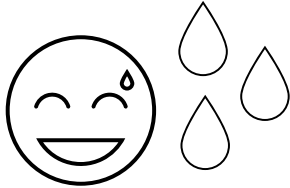
**When do the majority of
heat illnesses happen?**

During the first week of work

Heat Acclimation

- Health, fit workers should have at least two hours of continuous exposure to working conditions for five out of the prior seven days to be considered acclimated.
- You can lose some acclimation after four days and all acclimation after three weeks.
- Keep an eye on new workers or those returning from extended vacation.

How does acclimation effect the body?



- Sweat sooner, more volume, less salt
- Capillaries expand at a lower heart rate
- Heart rate goes down, internal temperature goes down

Environmental Monitoring

- If possible, take readings on site (wet-bulb globe temperature is the gold standard)
- Follow all manufacturers instructions if using your own instrument.
- If you can't take direct measurements, use the NIOSH/OSHA Heat Index Tool or equivalent data source
- Take the environmental conditions into account when planning work activities (more rest breaks? more frequent breaks?)

Physiological Monitoring

- Use with caution
- Best methods are still thermometer or thermal pill.
- There may be concerns about data privacy



Body Cooling

- Have a rest, cooling, and hydration center with accessible, fresh cooling tools
- When ambient temperature is $<104^{\circ}\text{F}$, fans can be used
- If PPE can be removed, provide cooling towels to place on the wrist/forearm
- Use cooling strategies before, during, and after work



Textiles and Personal Protective Gear

- Workers should wear PPE that protects from hazards but is as light weight and heat dissipative as possible
 - Use PPE with ventilated openings where feasible
- PPE should be removed during rest periods to enhancing cooling*
- When doing physical fitness or skills testing, applicants should wear PPE/work outfit



What are some keys to an effective **Emergency Action Plan (EAP)**?

Emergency Procedures and EAPs

- EAPs need to have a section that addresses medical emergencies due to heat stress
- EAPs should be understood by all workers and rehearsed annually
- After a heat related illness, a return to work protocol should be used. Ideally the protocol will be designed with a healthcare professional familiar with heat stress/illness

Scenarios

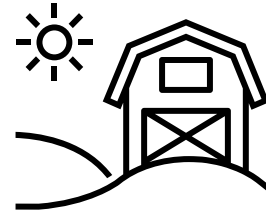
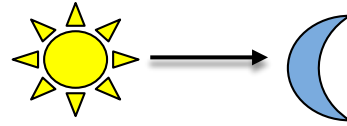
What is important to consider for the heat stress plan?



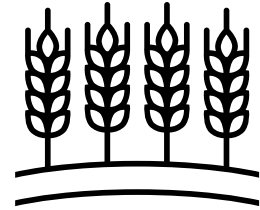
Farmer Jane



Old tractor
with no AC

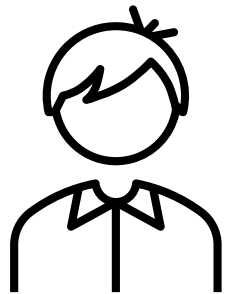


Long day



Harvest

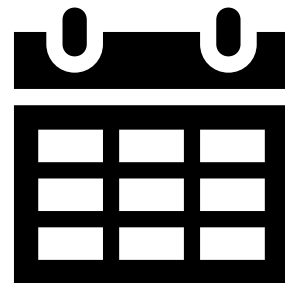
What is important to consider for the heat stress plan?



Home from college

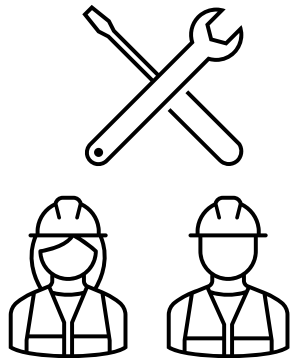


Landscaping crew



Mid-June

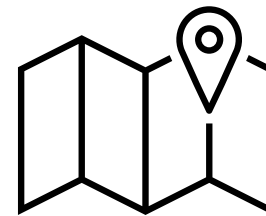
What is important to consider for the heat stress plan?



Maintenance
crew



Plant
turnaround



Louisiana in the
summer

Resources

- BWC [written safety program templates](#)
- BWC safety talk on [heat stress](#)
- BWC safety and industrial hygiene [consultation](#)
- Morrissey, M.C., Casa, D.J., Brewer GJ, Adams, WM, Hosokawa, Y., Benjamin, C.L., et al. (2021). **Heat safety in the workplace: Modified Delphi consensus to establish strategies and resources to protect the US Workers.** *GeoHealth*, 5, e2021GH000443.

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Contact Information

Megan Steele

Industrial Hygiene Technical Advisor

e: megan.s.2@bwc.state.oh.us

c: 937-765-3428