SURVEILLANCE BRIEF

Wisconsin Occupational Health and Safety Surveillance Program MAY 2024

HEAT-RELATED ILLNESS ON THE JOB:

A LOOK AT WORKER'S COMPENSATION CLAIMS IN WISCONSIN (2010–2022)

By Wendy Fall, PHD, Maggie Thelen, MPH, Komi Modji, MPH, MD, and Kate McCoy, PHD

Wisconsin Bureau of Environmental and Occupational Health

SUMMARY — Heat and heat-related illnesses are a rising concern for workers in Wisconsin. By examining Worker's Compensation claims, we found a high number of heat-related illness claims among people in manufacturing, and high rates in the waste management, public administration, wholesale, and construction industries. Heat-related illnesses are preventable, and failure to adequately prepare for heat exposure has negative consequences for both employers and workers. Due to the potential for heat-related illnesses to cause disability or death, it is important for workers and employers to take heat exposure seriously, to take effective protective measures, and to treat someone with symptoms of a heat-related illness right away.

BACKGROUND

Heat-related illness (HRI) is a condition due to heat exposure resulting in a rapid rise of body temperature as the body becomes unable to properly cool itself.[1] Caused by a combination of metabolic heat, environmental factors, dehydration, and clothing, HRI can range widely in both severity and presentation (heat stroke, heat exhaustion, rhabdomyolysis [rhabdo], heat syncope, heat cramps, or heat rash). HRI can cause a variety of symptoms including rash, muscle cramps, fainting, fatigue, seizure, headache, nausea, weakness, dizziness, irritability, rapid pulse, and confusion.[2]

While heat rash, heat cramps, and heat syncope can usually be resolved with basic first aid, heat stroke, heat exhaustion and rhabdo require immediate evaluation and treatment.[2]

In many parts of the United States, heat-related emergency department visits and deaths are on the rise, and the Midwest has seen the sharpest recent increases.[3] Wisconsin emergency department visits have been steadily increasing, peaking in summer 2012 with 27 heat-related fatalities throughout the state.[4] Further analysis of extreme heat risk factors in Wisconsin concluded that males were far more likely to have higher rates of heat illness than females.

In Wisconsin, ambient temperatures and the annual number of extreme heat days are projected to rise in coming years due to climate change. The Wisconsin Initiative on Climate Change Impacts projects that by 2050, the state's annual average temperature will increase by 3-9°F, and the number of days above 90°F will triple.[5]

In the absence of prudent prevention strategies, we can expect the number of workplace HRI to rise as temperatures do. Wisconsin employers and employees should, therefore, prepare for more exposure to extreme heat, as well as a rise in the number of warm days each year.

People who work outside are most at risk for HRI on the job. Out of all outdoor workers, new hires are at the highest risk. Human bodies require time to adjust to high temperatures—a process called acclimatization. For this reason, people can be particularly susceptible to HRI on the first few days they work outside, even if temperatures are not extreme. Most outdoor heat-related occupational fatalities (50% to 70%) occur in the first few days of working in warm or hot environments.[6]

A person's risk of HRI is complicated by a number of factors beyond ambient temperature. Some underlying conditions (high blood pressure, diabetes, heart disease), risk factors (obesity, lower levels of physical fitness, alcohol and illicit drug use), and therapeutics (medications—especially diuretics or drugs that make it hard to sweat or feel heat) are more likely to increase a person's susceptibility to HRI.[7] At the same time, some heart and kidney conditions are exacerbated by exposure to heat.[7,8]

In addition, inequalities can play a significant role in a person's risk of HRI.[9] People who have historically faced discrimination are more likely to experience unequal exposures to climate hazards including heat stress. For example, they are more likely to work outdoors. Wages also play a role: people with higher incomes have easier access to cool space at work or home, while people with lower-incomes are more likely to be exposed to heat, and more likely to work outdoors.[10]

There is also a direct relationship between exertion and heat stress. People who are performing difficult physical tasks like heavy lifting, climbing, or moving quickly in a warm or hot place are more at risk for HRI than those with more sedentary jobs.[11]

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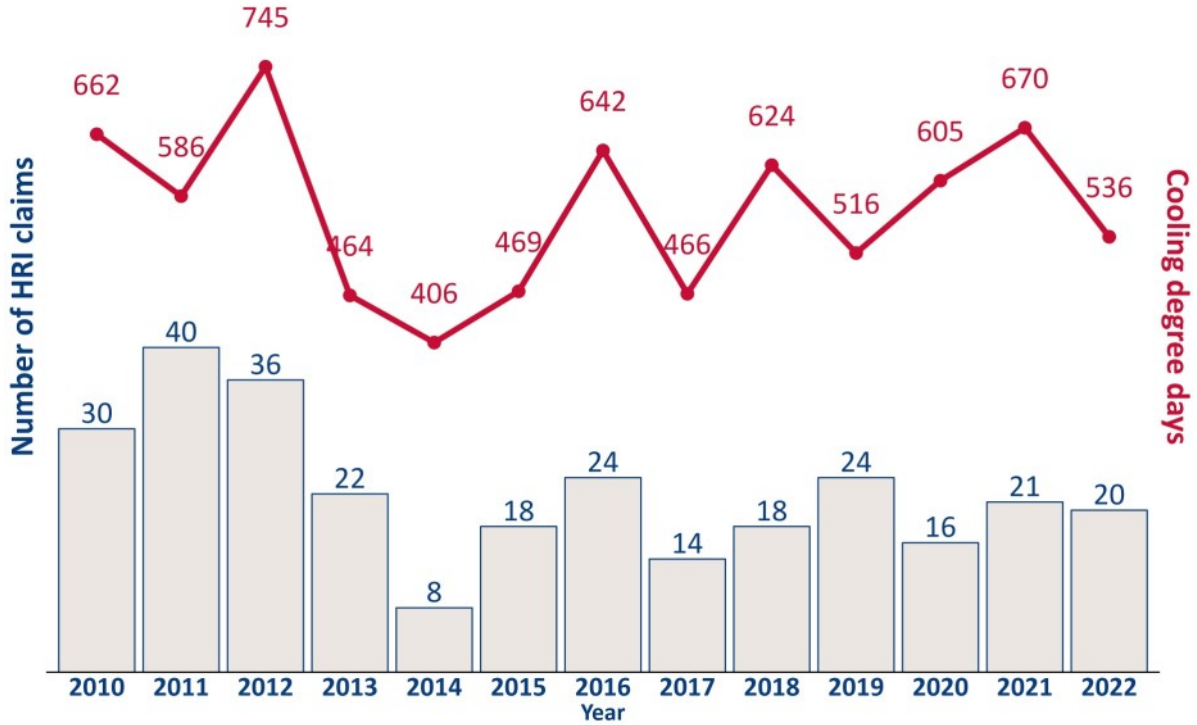
DATA AND ANALYSES

The primary data of this analysis are the lost work time Worker's Compensation claims reported to the Department of Workforce Development by insurance carriers or self-insured employers. Secondarily, we used cooling degree days (CDD) data from the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI). The CDD calculation is a good way to understand how heat impacts working conditions. Cooling degree days refer to days when air conditioning, fans or other interventions are needed to alleviate heat. Cooling degree days are compared with claimed days of lost work in Figure 1.

FIGURE 1. Heat-related illness claims and cooling degree days (2010–2022)



CDD are calculated by comparing the mean outdoor temperatures recorded for a location to a standard temperature—we use 65°F in the United States. Each day the difference between 65°F and that day's mean temperature above 65°F is reported as a CDD. A day with a mean temperature of 80°F has 15 CDD. If the next day has a mean temperature of 83°F, it has 18 CDD. The total CDD for the two days is 33 CDD. If a person works outdoors or in a space that cannot be cooled, these are days when they are likely to be exposed to heat. In Figure 1, we can see that the number of work days lost to HRI in the Worker's Compensation data generally tracks with the number of CDD each year.

As previously noted, a person's risk for HRI varies by type of work and workplace. Figure 2 shows how the claim count and rate vary by industry (in descending order by rate). Claims are categorized according to the 2012 North American Industry Classification System (NAICS). Industries or occupations with unstable rates were removed according to methods established by the National Center for Health Statistics.

FIGURE 2. Cumulative heat-related illness claim count and rate by industry sector (2010–2022)

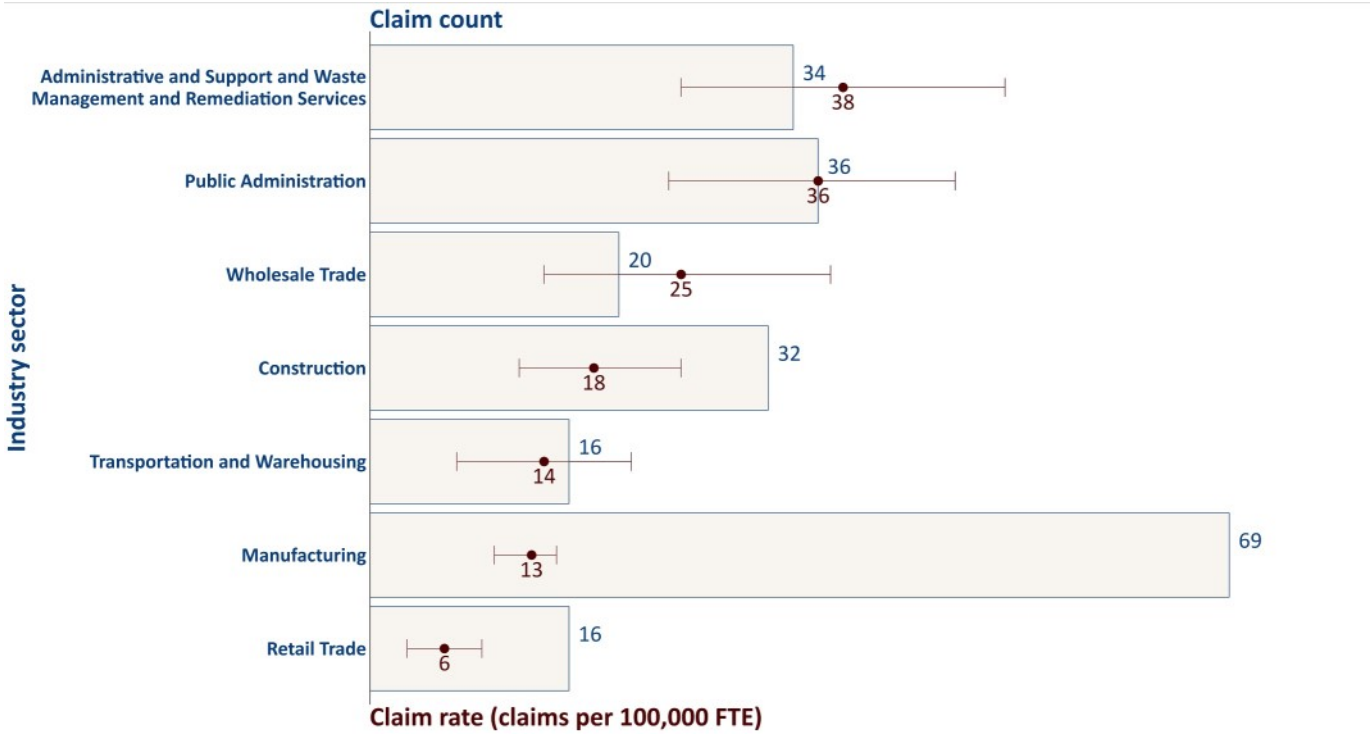


Figure 2 shows both the claim rate and claim count by industry sector for HRI during 2010–2022. The bars with blue outlines show the total count of claims, while the red dots with confidence intervals (95%) depict the claim rate per 100,000 workers. When we consider claim count and rate, the industry sectors with the highest burden were Administrative and Support and Waste Management and Remediation Services, and Public Administration. These industry sectors had relatively high claim counts and the highest rates. Manufacturing, one of the largest industry sectors in the state, had the highest claim count.

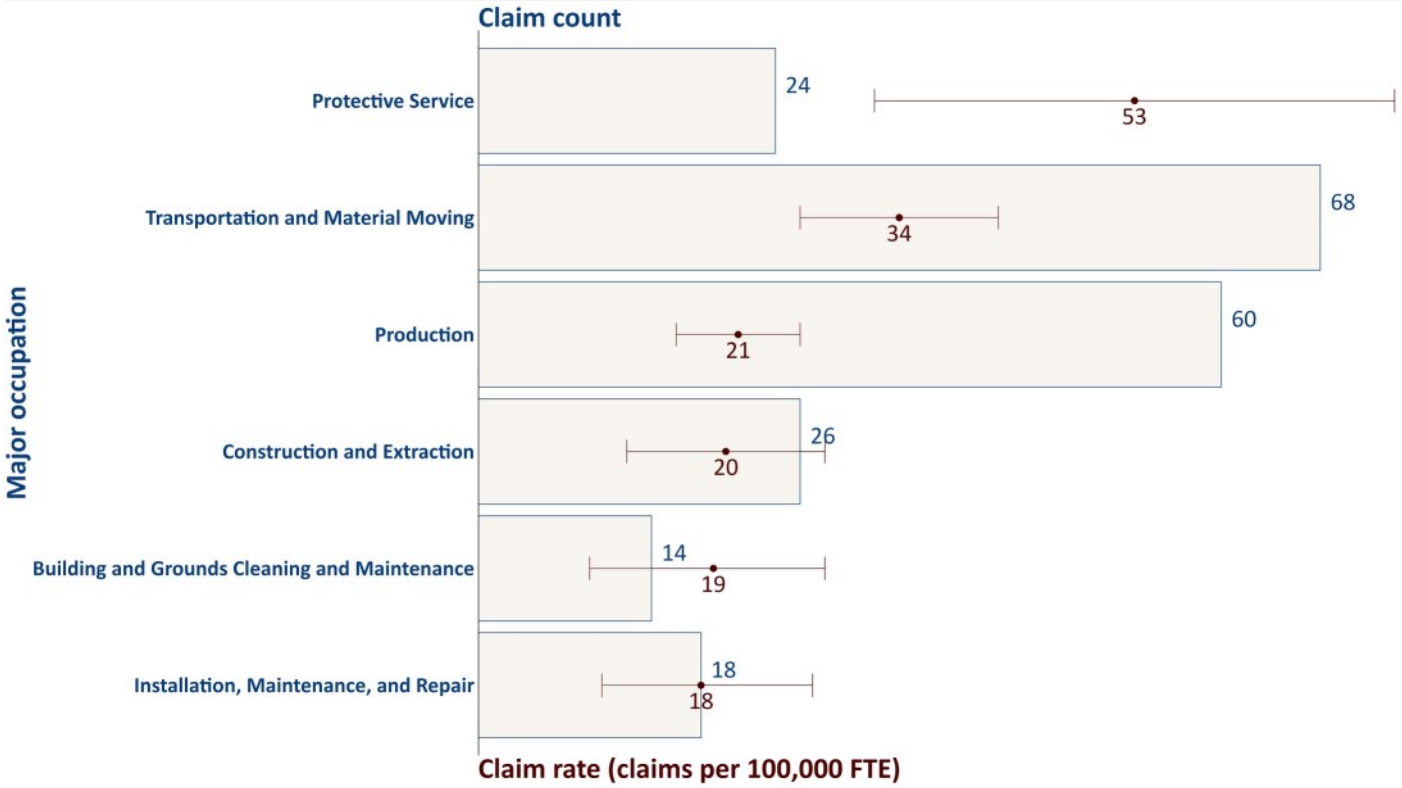
Although working outdoors in the heat places people at risk for HRI, it's important to understand that heat can build up in enclosed spaces, too, and thereby affect industries where work takes place indoors. Heat-producing processes and equipment that generates

steam, generates heat, or uses combustion can increase ambient temperature and contribute to heat stress in indoor work settings.[12]

Lack of adequate indoor climate control can also contribute to occupational heat exposure since indoor settings can increase in temperature and humidity as outdoor temperatures rise, particularly if there is no relief for process- or task-related heat production.[12]

The type of work someone does within their industry certainly has an effect on their exposure to heat, and therefore their likelihood of filing a HRI Worker's Compensation claim. In these data, occupations are labeled according to the 2018 Standard Occupation Codes (SOC) via the NIOSH Industry and Occupation Computerized Coding System (NIOCCS). Claim counts and rates for major occupation groups are shown in Figure 3.

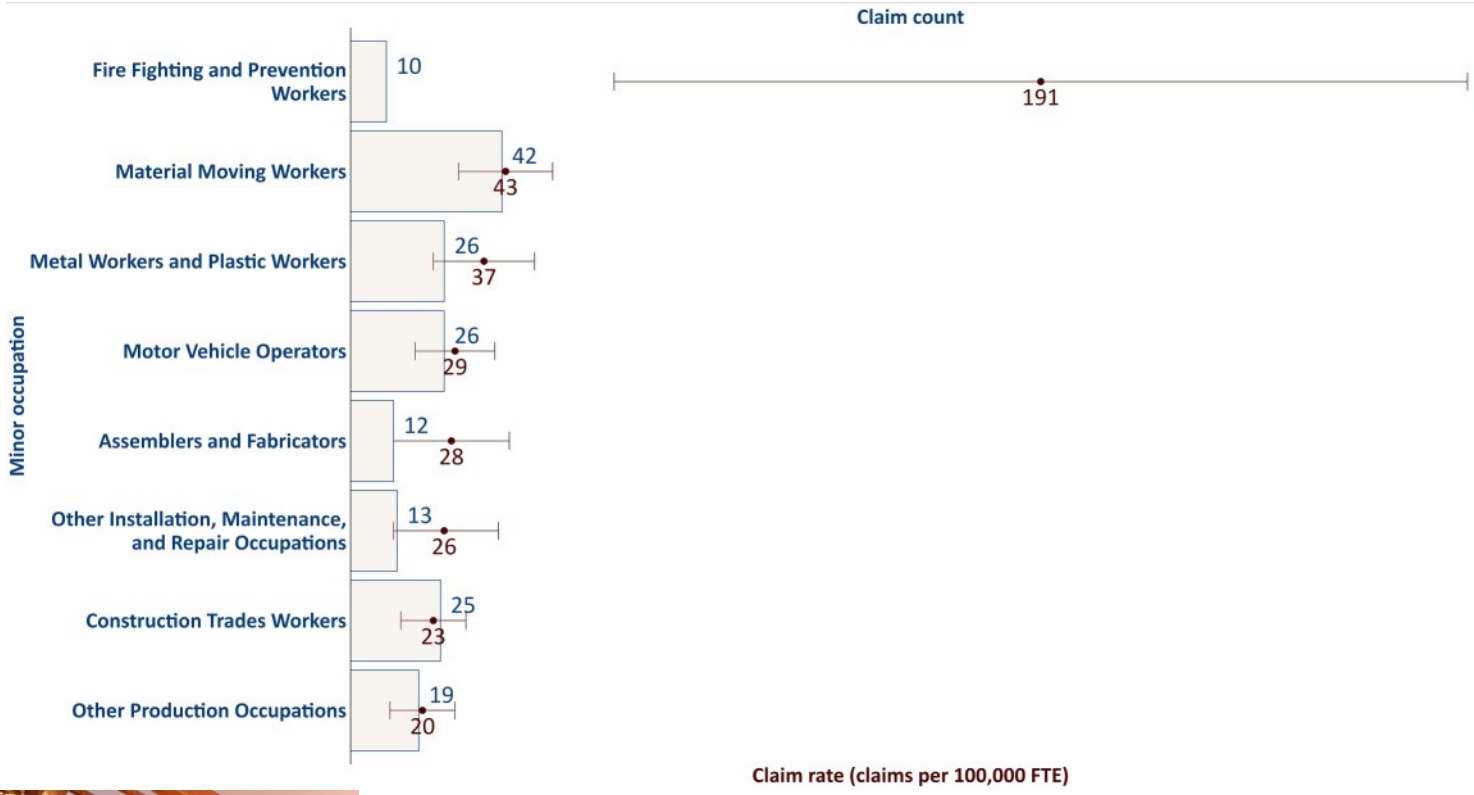
FIGURE 3. Cumulative heat-related illness claim count and rate by major occupation groups (2010–2022)



Among the major occupation groups, Transportation and Material Moving stands out in Figure 3 with the largest count of workers with HRI claims. It is important to remember that this occupation group includes people who work in enclosed vehicles with or without air conditioning, as well as operators of many different kinds of vehicles, including delivery trucks and forklifts, which do not protect the driver from the weather.[13] Production is also an occupation in which many people report claims. Workers in production facilities may work around hot equipment or machinery that raises the temperature in their work space.

Protective service occupations have the highest claim rates in Figure 3. This occupational group encompasses firefighters, law enforcement workers, and many others. We can identify the types of work represented in these data more clearly by looking at a smaller classification group as shown in Figure 4.

FIGURE 4. Cumulative heat-related illness claim count and rate by minor occupation groups (2010–2022)



Here the counts are highest among the Material Moving Workers. That minor occupation group includes people like crane and tower operators, hoist and winch operators, industrial tractor workers, refuse and recyclable material collectors, and laborers who move freight and stock, either by machine or by hand. The highest claim rates are found among the firefighting and prevention workers (protective services)—the same group with such high rates in Figure 3. This minor occupation group includes firefighters themselves, along with fire inspectors and investigators. Firefighters often perform arduous physical labor while they endure the compounding effects of heat exposure from multiple sources, heavy protective equipment, and difficult terrain.[14]

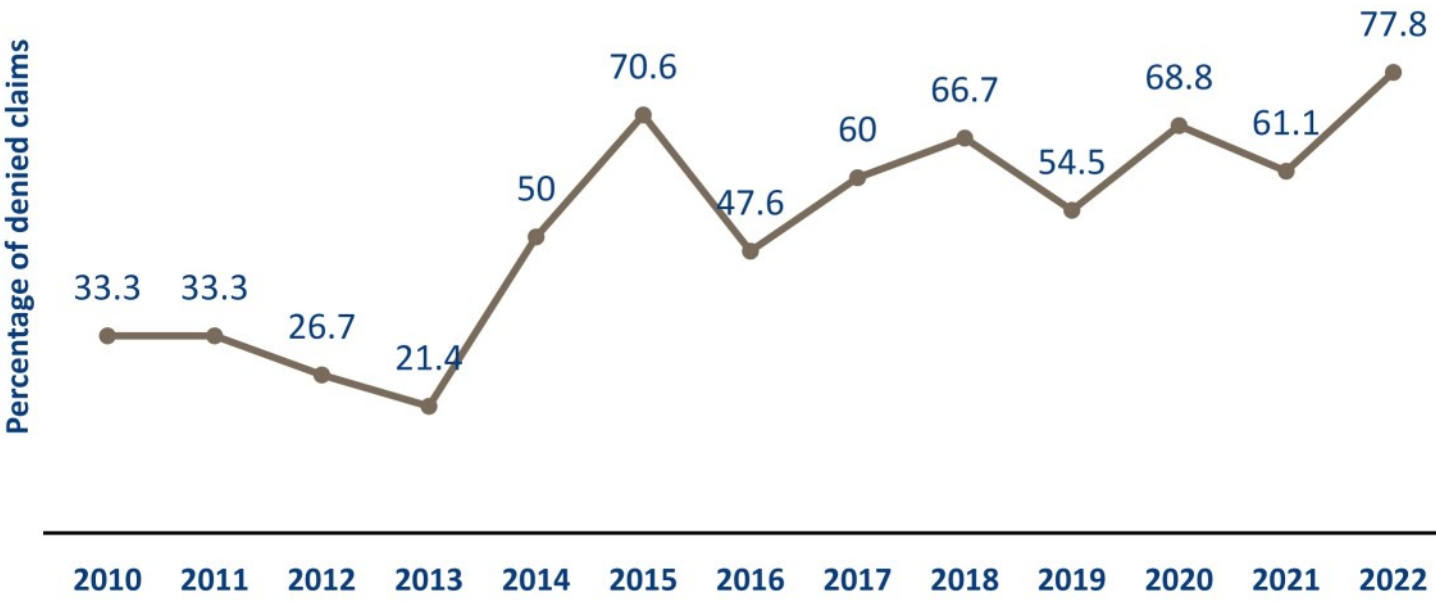
To understand the broader ramifications of HRI for affected workers and their employers, it is useful to consider the amount of work time lost. HRI can keep a person off the job for days at a time. The median lost time due to HRI during 2010–2022 was 12 days (among those who missed more than three days), with the extremes ranging from 4 days to 1 year.

Aside from the harm and lost income to the person who filed the claim, this lost work time presents operational challenges for the employer that could be prevented with effective planning.

It's safe to assume that many workers with less severe illness or even some with severe illness did not file a claim, so they aren't represented. As Figure 6 shows, though, workers who did file claims were often denied compensation.

Although during the 2011 and 2012 heat waves the majority of Worker's Compensation claims for HRI were paid, the proportion of denied claims rose sharply after 2013. Figure 5 shows a progressive increase in denied claims. This is a worrisome trend in a warming world.

FIGURE 5. Percentage of denied heat-related illness claims by year (2010–2022)



CONCLUSION

Heat-related illnesses are a growing problem that strongly affects people Wisconsin workers and their employers. One thing to note about Worker's Compensation claim analysis is that it only provides us with information when someone has filed a claim. These tend to be the most severe work-related illness cases that resulted in three or more days of time lost from work. It is likely that many more cases were not captured with this method. Workers' reluctance to file Worker's Compensation claims is well documented. The progressive increase in the proportion of denied Worker's Compensation claims should be alarming to workers, employers, and policymakers. This data suggests an urgent need to remove barriers to compensation for people who are made sick by heat stress at work.

RECOMMENDATIONS

For workers

- Know your work environment (identify heat stress hazards and risk factors) by using OSHA's Heat Stress Calculator. Download the NIOSH/OSHA Heat Safety Tool via the App Store or Google Play.
- Always go slowly and allow your body to acclimatize when starting a new job or task, or when the weather suddenly heats up. Ask your employer about their acclimatization plan.
- Know yourself and your personal heat-related risk factors (therapeutic drugs, over-the-counter medications, supplements, alcohol, or caffeine, obesity, and some health conditions).
- Check yourself when you are working in a hot environment (body temperature, heart rate and body water loss). If you have a smart watch or fitness tracker, you can use that to see your heart rate.
- Stay hydrated. For instance, drink a cup of water (about 8 oz.) every 15 to 20 minutes if you have been in the heat for up to 2 hours and involved in moderate work activities.
- Wear a hat and light-colored, loose-fitting, breathable clothing if possible. Workers with health conditions should refer to their medical or occupational health provider for clothing recommendations.
- Become familiar with the signs and symptoms of HRI and how to do first aid in case you or others need it.
- If you are affected by a HRI, make sure you see a medical provider who can document your case for you. You'll need documentation that you were exposed to heat at work, and became sick from it in order to make a successful Worker's Compensation claim. HRI may have long-term effects on your health, so it's important to start documenting it early.

Under the OSH Act, employers are responsible for providing workplaces free of known health and safety hazards, including heat exposure.

For employers

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The slogan for OSHA's heat illness prevention campaign is **"water, rest, shade"**—those are the key pillars of heat illness prevention. Below are more specific recommendations and resources.

- Develop a heat illness prevention plan. WisCon has a template that employers can use to create their plan.
- Pay attention to heat risk and plan accordingly. OSHA has a Heat Safety Tool App that provides a risk level for that day and appropriate protective measures. OSHA's Heat Safety Brochure allows you to see the recommendations at different heat index risk levels.
- Implement cooling measures such as fans, air conditioning, shade and other engineering controls to counteract heat.

- Modify work practices to lower workers' risk. This includes breaks, schedule changes, reduced physical demands when heat illness risk is high. Think: water, rest, shade.

- Take extra precautions to protect new workers. Lack of acclimatization represents a major risk factor for fatal outcomes. New workers should follow an employer-provided acclimatization plan when taking on a new job in the presence of heat. OSHA recommends a rule of 20 percent for new workers: of an 8 hour day, new workers should begin with only 1 hour and 40 minutes per day, then gradually ramp up their exposure.

- Institute a medical monitoring program for all people who are or may be exposed to heat stress above the NIOSH recommended alert limits (RAL) at work. Provide medical monitoring without cost to them, without loss of pay, and at a reasonable time and place.

- Train supervisors and staff to control and recognize heat hazards, including the signs and symptoms of heat-related illness. OSHA has a simple training guide that employers can use. WisCon also has a recorded one-hour webinar on heat illness prevention.

- Post readily visible and clear warning signs at the entrance of high heat risk areas. All hazard signs should be printed in both English and the predominant languages of workers who do not read English. OSHA offers signs, infographics, and other materials on their web site.

- Implement a buddy system in which people are responsible for observing their colleagues for early signs and symptoms of heat intolerance, such as weakness, unsteady gait, irritability, disorientation, changes in skin color, or general malaise.

- Empower each worker throughout each workday to assess whether total heat stress is too high. When doing this, consider both the conditions of that day and the heat exposure that may carry over from a person's life before they arrive at work. Give workers the ability to slow down, rest, or get water as needed if they feel unwell or have risk factors. People's health and heat tolerance differ. There is no one-size-fits-all solution for heat. Even with the implementation of a good preventative plan, some people will be affected by heat more than others, and should be accommodated.

- Implement appropriate first aid procedures. Make sure your worksite can be easily accessed by emergency personnel if a worker develops signs or symptoms of heat stroke.

- Assess each workers' ability to wear and use any protective clothing and equipment (including respirators) correctly, even on warm or hot days. Consider the use of cooling devices as personal protective equipment.

- Check OSHA's web site to learn more about preventing HRI, or to review your responsibilities.

For government and policymakers

Heat affects everyone in Wisconsin, and people in every industry. Policies and operations within state and local governments can be improved to better support public sector workers in occupations often affected by HRI.

- Federal and state-level protections are needed to keep people safe from heat at work.

- Protections should prevent people from being sent to work in hot weather if they are not acclimatized to it, and to ease them gradually into the heat.

- Public sector supervisors should be trained properly to follow a plan to prevent HRI if they supervise anyone exposed to heat.

- Workers and employers in the private sector shouldn't have to weather heat on their own. Government investments to slow climate change can prevent worsening heat outcomes. Investments in mitigation strategies can help businesses and workers avoid the worst outcomes from today's climate, too. For a list of options, see the United Nations 170 Actions to Combat Climate Change.

- Policymakers can help address the rising number of HRI cases in Wisconsin by supporting efforts to ensure sustainable access to emergency medical services,

even if someone lives or works in a rural area. Quick medical assistance for a HRI can make the difference between a short-term illness, long-term disability, and death.

- Keep cooling solutions in mind as your community's needs change. The EPA provides smart strategies you can consider that will make your infrastructure and the people you govern more resistant to heat.
- Policy change can make it easier for people to receive Worker's Compensation when they are affected by occupational HRI.

OTHER RECOMMENDED RESOURCES

NCOSH's HRI prevention materials in multiple languages.

Heat.gov from the National Integrated Heat Health Information System.

NIOSH's heat stress education page.

Wisconsin Department of Health Services' Climate and Health program and their video on HRI prevention.

Wisconsin Environmental Public Health Tracking's heat-related illness data.

Mobile users: download the OSHA/NIOSH Heat Safety tool from the App Store or Google Play.

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ABOUT WISCONSIN OCCUPATIONAL HEALTH AND SAFETY PROGRAM

The Wisconsin Occupational Health and Safety Program is funded by the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH).

Wisconsin Occupational Health and Safety Surveillance Program

Phone | 608-267-2488

Web | dhs.wisconsin.gov/occupational-health

Email | dhsocchealth@wi.gov