



Working together to improve health care quality, outcomes, and affordability in Washington State.

Heat and Wildfire Smoke Report and Guidelines 2024

Executive Summary..... 3

Stakeholder Guidelines 5

 Washington Health Care Authority 5

 Washington Department of Health..... 5

 Washington Department of Social and Human Services 6

 Washington Labor & Industries..... 7

 Health Plans 7

 Clinicians 9

 Health Delivery Systems..... 11

 Administrators..... 11

 Outpatient Clinic Healthcare Staff..... 14

 Urgent Care Clinics 15

 Hospitals and Emergency Departments..... 16

 Long-term care facilities..... 17

 Employer Purchasers..... 19

 Local Public Health Jurisdictions 20

 Emergency Medical Services (EMS) Pre-hospital Healthcare 21

 Schools 21

Appendix A. Bree Collaborative Background 23

Appendix B. Methods..... 25

Appendix C. Evidence Review 26

Appendix D. Guideline and Resource Review 32

Appendix E. Tracking and Measurement 33

Appendix F. Patient and Family-Directed Guidelines 37

Appendix G. Key Points of Outdoor Heat and Wildfire Smoke Rules..... 40

Appendix H. Bree Collaborative Members..... 42

Appendix I. Workgroup Charter & Roster 43

References..... 46

Executive Summary

Exposure to extreme heat, or summertime temperatures that are much hotter and/or humid than average,ⁱ is a serious threat to population health and well-being. 2024 was the warmest year on record, with global temperatures 2.30 degrees Fahrenheit (1.28 degrees Celsius) above the National Aeronautics and Space administration's (NASA) 20th century baseline.ⁱⁱ The number and length of heat waves has increased significantly since the 1960s.ⁱⁱⁱ These trends are projected to continue and worsen in the coming decades, exposing more people to the harmful consequences of heat.

According to official records, 126 Washingtonians died due to heat-related causes between June 26th and July 2nd, 2021.^{iv} Additionally, results from a report on excess mortality in 2021 found that excess mortality was significantly higher during the heat dome weeks compared to all other weeks in 2021 (205 vs. 132).^v Excess deaths can include those where heat may have played a role, such as in cases of kidney failure or cardiac arrest, even if heat was not the direct cause of death. Excess heat impacts emergency response systems, significantly increasing emergency visits for acute heat illnesses, increasing 911 call volume, and costing the nation billions of dollars annually.^{vi}

Higher air temperatures increase wildfire likelihood, posing a serious threat to human health, ecosystems, and infrastructure. Wildfire smoke is comprised of a mixture of pollutants, including fine particulate matter (PM_{2.5}), carbon monoxide, nitrogen oxides, formaldehyde, benzene and others. Wildfire smoke exposure increases all-cause mortality, impacts respiratory health, and may co-occur and interact with heat exposure to impact cardiorespiratory morbidity and mortality.^{vii viii ix x} As a result of a warming climate, wildfires are becoming larger, more destructive, and more difficult to control, which will drastically increase the impact on heat and health.

Certain groups are more vulnerable to both environmental exposures including:

- **People disproportionately exposed to heat, sensitive to heat or with limited adaptive capacity** (*people experiencing homelessness, people with chronic medical conditions including mental health, people who use drugs, people with disabilities, people who are incarcerated, people with low income, marginalized communities such as those subjected to historical redlining, people who rent*)
- **People physically active outdoors or in hot indoor spaces** (*athletes, outdoor and some indoor workers, emergency responders*)
- **Ages and life stages** (*infants and children, young adults, pregnant people, older adults*)

This report's main aim is to **reduce morbidity and mortality related to extreme heat and wildfire smoke**. Heat-related illnesses and health impacts due to poor air quality can be prevented or reduced by implementing evidence-informed, coordinated efforts across sectors, such as early detection and warning systems, education and communication, and standardized protocols for responding to heat-related illnesses and exacerbations. Addressing the underlying social and environmental determinants of health that make certain populations more vulnerable to heat and wildfire smoke can reduce disparities and promote health equity in the face of our changing climate.

The workgroup identified five focus areas to guide evidence review and following workgroup discussions. These focus areas cover education, planning & preparedness, equity, incentives and investments, and tracking and measurement. This is a broad framework for stakeholder specific actions applicable to clinicians, delivery sites, plans, employers, state agencies and a few other stakeholders. This will help align stakeholders in efforts to prevent health impacts from heat and wildfire smoke in Washington state.

Focus Area	Elements
Education	<ul style="list-style-type: none"> Public education and targeted education tailored to populations at highest risk Health professional education on prevention, identification, treatment, and management of heat-related illness & exacerbations of illness due to heat and wildfire smoke exposures
Planning & Preparedness	<ul style="list-style-type: none"> Systematic weather monitoring using validated tools during warmer or drier months Facility, staff, and patient early preparation for heat and wildfire smoke events Individual, organizations and jurisdictional action plans
Equity	<ul style="list-style-type: none"> Identification of population at highest risk of negative health impacts of heat and wildfire smoke Resource allocation (e.g., portable air filters, cooling centers) to communities most impacted by heat and wildfire smoke Partnering with communities to communicate and build capacity to protect against health impacts of heat and wildfire smoke
Incentives and Investments	<ul style="list-style-type: none"> Sustainable operations of public health level interventions Investments in energy efficient infrastructure such as AC
Tracking and Measurement	<ul style="list-style-type: none"> Integration of data sources used to identify high risk populations Data sharing agreements to facilitate further understanding of impacts of heat and wildfire smoke

See [Appendix A](#) for a background on the Bree Collaborative and a list of members

See [Appendix B](#) for a summary of our methods

See [Appendix C](#) for a summary of reviewed evidence and more detailed background on heat and wildfire smoke.

See [Appendix D](#) for a guidelines and available stakeholder resources.

See [Appendix E](#) for a more information on tracking and measurement

See [Appendix I](#) for the workgroup charter and roster

Please see additional appendices for more information.

Stakeholder Guidelines

Washington Health Care Authority

Education

- Educate health care professionals on the availability of equipment to mitigate impacts of heat & wildfire smoke

Tracking & Measurement

- As able, **develop an additional dataset with Medicaid data to supplement the [emPOWER map](#)** (only able to be utilized when an emergency is declared) to facilitate state and regional emergency planning that includes all data elements of emPOWER dataset. Engage with DOH on how they use the emPOWER dataset information.
- In partnership with the Department of Health, analyze claims (e.g. APCD) data to identify populations and geographic areas in Washington state that are more vulnerable to morbidity and mortality from heat and wildfire smoke, and distribute findings to relevant organizations for use or emergency management planning.
 - Consider investigation into heat and wildfire smoke related health outcomes associated with medications that may place individuals at higher risk of heat-related illness or exacerbations of chronic conditions.

Incentives & Investments

- **Utilizing MTP 2.0 1115 waiver authority (or other funds) to develop air conditioner/heat pumps and filter program to distribute cooling devices and high quality air filtration device** for at highest risk of morbidity and/or mortality from heat and wildfire smoke (e.g., adults living alone, older adults, those with chronic conditions and those living with disabilities) and living in areas most impacted by heat and [wildfire smoke](#). See Oregon's Air Conditioner and Air Filter Deployment Program [here](#).
 - Consider using Washington census tracts with highest historical wildfire smoke burden (Wildfire Smoke Cumulative Score) through the DOH's [Washington Tracking Network](#)
 - Consider [Department of Health guidance](#) on selecting air filtration devices
 - Consider partnering with Department of Health and local health jurisdictions to be a distribution partner (CHWs, promotores/as)

Washington Department of Health

Education

- **Promote public awareness and education of heat and wildfire smoke risk** on signs, symptoms and appropriate response for heat-related illnesses and smoke exposure.
 - **Partner with community-based organizations** to disseminate culturally and linguistically appropriate messages and materials.
 - **Coordinate with the Department of Labor and Industries** on amplifying messaging, communication, and resources for at-risk workers and their supervisors.

- **Coordinate with healthcare coalitions to** amplify messaging on preventive actions for healthcare delivery systems and communities, and policy changes and mitigation at the state level.
- **Consider partnering with community organizations** (e.g., [healthcare coalitions](#)) to develop training for healthcare systems on how to identify and document when health impacts from heat and wildfire smoke occur.
- **Partner with health professional associations to identify and/or develop educational opportunities for clinicians** such as ways to identify patients who are particularly vulnerable to heat-related illness or wildfire smoke exposure and how to make individualized plans to reduce risk for their patients.

Planning & Preparedness

- **Develop state-level heat and wildfire smoke action plans** to support local health jurisdictions (LHJs) when they activate an IMT response. See the state Comprehensive Emergency Management Plan.

Tracking & Measurement

- **Pursue a data sharing agreement with the Health Care Authority** to use All-Payers Claims Database (APCD) to conduct analyses on the health outcomes and healthcare utilization associated with heat or wildfire smoke exposure. This could include exploring the relationship between specific medications and negative health outcomes, as well as other analyses as identified.
- Consider making heat-related illnesses a Washington Department of Health (DOH) **Notifiable Condition** in the state.
- Track and monitor ED visits, hospitalizations and deaths due to heat-related illness and exacerbation of chronic conditions during warmer months, (e.g., seasonal hazard dashboards);
 - **partner with healthcare coalitions and local health jurisdictions to identify gaps in information and data sharing** and consider sharing heat and wildfire-smoke related data to support regional planning and response.

Washington Department of Social and Human Services

Education

- **Consider partnering with community organizations to develop or adopt heat and wildfire smoke educational materials or training for home care aides.** The training should include how to identify populations most vulnerable to heat and wildfire smoke, understand the way medicines interact differently during heat, how to prevent heat or wildfire smoke-related illnesses and death, and how to connect clients to social services that can reduce their exposure to heat and smoke, such as electricity assistance programs and non-electric methods (umbrellas, reflective curtains, etc.). (Example [here](#).)

Washington Labor & Industries

Planning & Preparedness

- **Update heat and wildfire smoke rules regularly** in accordance with latest evidence-based worker protections, and with input from employees, employers, and impacted state agencies, including DOH and ECY.

Health Plans

Education

- **Educate members** on how to stay safe and reduce exposure to heat and wildfire smoke during warmer months.

Incentives & Investments

- **Explore mechanisms of reimbursement for equipment that mitigates harmful exposure to heat and wildfire smoke with considerations for priority populations.**
 - Air conditioners, and/or portable heat pumps
 - Portable air cleaners
 - mini-fridge or other similar cooling device for medications
 - portable power supply for durable medical equipment
- **Build network of community organizations** that can provide equipment to mitigate harmful exposure to heat and wildfire smoke that cannot be covered internally
- **Cover screening for social determinants of health** and explore pathways to cover interventions for identified social needs related to heat and wildfire smoke (e.g., transportation benefits)
- **Partner with other stakeholders to advocate for or create quality measures** associated with heat and wildfire smoke related emergency room visits, hospitalizations and deaths.
- **Consider ways to incent delivery systems** to reduce the number of heat-related illnesses and exacerbations of chronic conditions occurring during warmer months.

Planning & Preparedness

- **Monitor heat and air quality using the NWS [Heat Risk tool](#) and Air Quality Index (including [WA Smoke Blog](#) and Ecology's [Air Monitoring Map](#))** and alert coordination staff and members about impending or current concerns in temperature or air quality.
- **Promote existing resources to members to monitor temperature and air quality for members and receive alerts** (e.g., Washington DOH [emergency alerts](#), [Air Now](#), etc.)
 - If unable to sign up, ensure ability to provide outreach to members not able to receive alerts or unable to use cell phones
- **Institute 90-day refill policy** for all possible medications (e.g., exceptions for controlled medications.)
- **Add members at higher risk to an internal registry and refer at risk members to care coordinators** through a standardized pathway to provide outreach to higher risk patients before and during heat and wildfire smoke episodes.

- **Consider expediting authorizations for transitions of care** for transfers to lower acuity settings to facilitate increased capacity for inpatient.
- **Participate in ongoing heat and wildfire smoke planning efforts** between public health departments, emergency response teams and healthcare delivery systems

Equity

- Stratify claims data using race, ethnicity, language, zip code, and other relevant factors to identify and address disparities in heat and wildfire smoke related outcomes through quality improvement initiatives

Tracking & Measurement

- Track and monitor visits, hospitalizations and deaths due to heat-related illness and exacerbation of chronic conditions during warmer months. See the **Bree Collaborative Heat and Wildfire Smoke Evaluation Framework** for further instruction.
- **Analyze claims data** to identify members with past visits or admissions for heat-related illnesses or exacerbations of at-risk chronic conditions during warmer months.

Clinicians

Education

- Understand and learn how to communicate with patients about climate's impact on health and health equity. See resources in [Appendix D](#), And patient and family guidelines in [Appendix F](#)
- Understand heat risk severity scale ([NWS HeatRisk](#)) and air quality index scale ([AQI](#)) and impacts on health

Planning & Preparedness

- **Ask all patients about their risk factors for vulnerability to heat and wildfire smoke as part of social history during clinical encounters.**
 - Use a tool such as the CDC's [CHILL'D OUT](#) or AmeriCares's toolkit for [Wildfire Smoke](#) and Health to identify risk factors for heat and wildfire smoke.
 - **For patients with outdoor occupational exposure to heat and/or wildfire smoke**, identify and document key factors such as the patient's industry and occupation, whether new to the job, work clothing/personal protective equipment, workload, environmental conditions, and any workplace controls such as hydration, shade, air-conditioning, rest breaks, respirators, or adjustments to work pace or hours.
- **Discuss how heat and wildfire smoke can be harmful to health using plain language.** Provide anticipatory guidance and specific guidance related to their specific health conditions and risk factors. (Resource: [Heat](#) and [Wildfire Smoke](#))
 - Explain that poor air quality can exacerbate risk from heat, and vice versa
 - Discuss with patient and support system the signs and symptoms to watch for, and when and how to seek help.
 - Use tools such as the [HeatRisk](#) tool, [AirNow](#), and WA Smoke Blog
- **Co-develop an individualized action plan with the patient and their support system to prevent exposure to heat and wildfire smoke.** Example action plans can be found [here](#).
 - As appropriate, delegate counseling to most appropriate members of the interdisciplinary team. (*E.g., if available, involve community health workers/promotoras for patients who primarily speak Spanish*)
 - Involve the patient's support system in planning as able with patient consent.
 - Make a plan for patients who live alone, with cognitive impairment, or people with disabilities that cause mobility concerns to have someone to check on them.
 - Make a plan for if the power goes out, especially for patients using electricity dependent DME or people with disabilities.
 - **For patients with chronic conditions, (such as heart disease, diabetes, kidney disease, stroke, dementia, asthma, COPD)** consider condition specific considerations for action planning such as medication management and adjusting fluid intake. See [Appendix D](#) for resources.
 - Make a plan for safe attendance at dialysis sessions for patients with kidney disease or other necessary appointments.

- Make a plan for evacuation, transport, loss of power, poor air quality due to wildfire smoke and needed supplies for people with disabilities, especially those whose mobility is impacted
- Parents of young children should know signs and symptoms to watch for in heat and wildfire smoke and how reduce exposure. Determine [when to restrict outdoor activities](#).
- Ensure pregnant patients or patients who may become pregnant understand their risk
- Pharmacists or prescribers: **As part of their individualized action plan, discuss with patients and support system how to manage medications in extreme heat.** See CDC guidance [here](#).
 - Counsel patients and/or their family on increased risk and, as applicable, symptoms that may indicate drug interaction with heat.
 - Consider adjustments to doses for medications most likely to interact with heat, especially for older patients taking multiple medications, patients on diuretics and patients on psychiatric medications.
 - If taking medications that may lead to dehydration or affect electrolyte balance, consider evaluation of baseline hydration status, discuss monitoring at home (blood pressure, weight, hydration) and adjustment to fluid restriction or intake during periods of extreme heat.
 - Counsel patients on storing heat-sensitive medications properly and planning for how heat waves or other climate events may impact storage of medications, like insulin.
- **Document action plan in medical record and make copy easily accessible for patients and their support system** using appropriate language and reading level.
 - **When screening performed**, consider using code G0136 when screening for social needs to document screening

Equity

- **Refer patients to programs/staff** (e.g., social worker, case manager, community health worker) that assist with health-related social needs. Follow the Foundation for Health Care Quality's reports and guidelines on [Social Need Screening](#) and [Social Need Intervention](#).
- If patient has FSA/HSA, consider writing note of medical eligibility for an air conditioning unit as needed.

Health Delivery Systems

All delivery systems should have organizational action plans^{xi} that involve actions to take year-round and actions for before or during an event. These strategies are adopted from the Northwest Healthcare Response Network's resources for Extreme Heat and Wildfire Smoke, AmeriCares's Climate [Resilience for Frontline Clinics Toolkit](#), and the [U.S. Climate Resilience Toolkit](#).

Administrators

Education

- **Ensure healthcare staff understand how to recognize, prevent and treat heat-related illnesses and wildfire smoke-related illnesses** (e.g., asthma, COPD, and exacerbations of other chronic conditions), and to consider if an exacerbation of a chronic condition might be attributable to heat or wildfire smoke during warmer months.
- **Train healthcare staff** recognizing exacerbations of chronic conditions due to heat and wildfire smoke as able
- **Conduct trainings/drills/exercises** to familiarize staff with emergency response plans.
- See resources in [Appendix D](#).

Planning & Preparedness

- **Consider designating a facility leadership role and backup to lead weather resilience efforts.**
 - Resource: [Organizational Structure for Sustainability](#)
 - Resource: [Proven Practices for Sustainability Governance in Health Care: Structure & Staffing](#)
- **Develop an organizational action plan to prepare and respond to heat and wildfire smoke** and integrate with other emergency response plans.
 - **Prepare your facilities for [power outages](#) due to heat and wildfires**
- **Review system vulnerabilities ahead of warmer months** (June – September) including HVAC systems, air conditioners/heat pumps, IT servers, communication systems and sensitive medical equipment.
 - **Use high-efficiency air filters** (e.g., MERV 13 or higher) and/or portable air cleaners with HEPA filters
- **Ensure adequate equipment and staffing to assess and treat a likely surge of patients** with heat-related illnesses and exacerbations of conditions related to heat and wildfire smoke
- **Ensure ability to [maintain indoor air quality](#).** Assess how well indoor air quality is maintained using an air quality monitor. See EPA's [Air Sensor Toolbox](#) as well.
 - For technical assistance: airquality@doh.wa.gov
- **Develop protocols to protect staff and patients.**
 - **Reduce heat and wildfire smoke exposure for patients and staff** (e.g., setting up hydration and cooling stations, air filtering systems, cancelling outdoor activities, [portable air cleaner units in each room](#), etc.)
 - **Ensure an evacuation plan is in place** in case of power loss or HVAC malfunction.
 - **Develop clear downtime procedures for extreme heat and wildfire smoke events** to maintain service delivery

- **Integrate weather monitoring into facility protocols** for warmer months (e.g. June-September) with clear communication protocols to alert staff and patients to anticipate heat and wildfire smoke.
- **Integrate heat and wildfire smoke emergencies into existing emergency patient communications plans.**
 - **For systems that serve patients who work in heat and/or poor air quality**, partner with or ensure occupational & environmental medicine (OEM) capacity, evidenced-based care, and medical monitoring. See resources [here](#) and [here](#).
- **Offer telehealth appointment alternatives.**
- **During warmer months, monitor weather conditions on a regular basis** using the [NWS Heat Risk](#) tool, [AirNow](#) and [WA Smoke Blog](#).
- **Monitor temperature and indoor PM2.5 concentrations in care areas and patients' rooms** and take steps to ensure PM levels are acceptable. See guidance on air quality monitors [here](#).
- **Send automated, timely and relevant messages to all** patients alerting them to extreme heat and/or poor air quality in which geographic regions and how to reduce exposure to heat and wildfire smoke. Use local health jurisdiction/Department of Health materials.
- **Post and distribute informational materials** (e.g., posters, pamphlets, etc.) within clinics on how to stay safe during heat and/or poor air quality due to wildfire smoke. See examples from Department of health ([heat](#), [wildfire smoke](#)).
 - Consider including how to report workplace concerns, which can be filed anonymously, including by the healthcare provider (see [here](#)).
- **Participate in regional planning and response by identifying and connecting with your local healthcare coalitions** (or other convening bodies) to support other facilities in your area.
- **Iteratively improve upon organizational action plan.** Perform after action reviews on performance during heat and wildfire smoke.

Incentives & Investments

- **Take steps to make your facility more resilient to extreme weather**
 - diversifying power sources
 - implementing renewable energy
 - on-site battery storage, and creating a more efficient and protective building envelope. See [U.S. Climate Resilience Toolkit](#)
 - Consider applying for government grant funds to improve infrastructure resiliency as available

Equity

- **Participate in collaborative planning for heat and wildfires with local health jurisdictions and healthcare coalitions.** Look up your regional healthcare coalition [here](#).
- **Develop partnerships with community-based organizations** to offer screening and interventions for social needs. (e.g., transportation, housing, air conditioning). Follow the Foundation for Health Care Quality's report on social need interventions [here](#).
- **Stratify any registries or outcome tracking efforts by demographic information** (e.g., race, ethnicity, language, zip code, payor, etc.) to identify and address inequities

- **Use an equity lens in any quality improvement efforts around heat and wildfire smoke** (e.g.,: [HCA Health Equity Lens Toolkit](#), [Kaiser Permanente COVID-19 Vaccine Equity Toolkit](#))

Tracking & Measurement

- **Integrate heat and air quality monitoring into electronic medical record** with available integrated tools. (resource: [Heat-Related Illness Management in EHR Systems Implementation Guide - NACHC](#))
- **Integrate automatic flags into EHR systems** based on patient risk factors for indicating patients at higher risk for heat-related illness or exacerbations of illness due to chronic conditions (e.g., heart failure, chronic obstructive pulmonary disease, cardiovascular disease, etc.). Consider implementing protocols external to EHRs
- **Implement a protocol to collect self-reported standardized patient work information** that can be documented into EHRs. Important information to document includes employment status, retirement dates, jobs (industry and occupation) and usual or longest-held work. (Example [here](#).)
- Perform organizational level evaluations of response to heat and wildfire smoke. See **Bree (Collaborative Heat and Wildfire Smoke Evaluation Framework** for further instruction.

Outpatient Clinic Healthcare Staff

In addition to the above guidelines, clinics (i.e. primary care, pediatrics, perinatal) should engage in the following activities:

Education

- Understand and learn how to communicate with patients about climate's impact on health and health equity. See resources in [Appendix D](#).
- Understand heat risk severity scale ([NWS HeatRisk](#)) and air quality index scale ([AQI](#)) and impacts on health

Planning & Preparedness

- **Send refills of essential medications as early as possible before heat and wildfire smoke.** Alert patient and/or support system to pick up the medication.
 - Counsel patients working in heat on exercising rights and required protections. For patients working in the heat. (see resource [here](#))
- **During heat or poor air quality due to wildfire smoke, a designated individual** (care manager or similar) **on the care team should be responsible for outreach to at-risk patients, providing guidance and coordination support to access needed resources** (e.g., transportation to cooling centers, meds, etc.)
- Include planning for home heat and smoke refuge as necessary, especially for people with mobility concerns.
- **Know where local cooling centers** are in your area to direct patients if necessary. ([Washington 211](#)) Encourage spending at least a couple hours each day in air conditioned/cooler space if unable to go to cooling center.

Equity

- **Develop a workflow to identify patients** that are at higher risk for heat-related illness and exacerbations of conditions due to heat and wildfire smoke
 - Consider using ICD-10 codes, prescription information and demographic information to automatically flag and add to registry
- **Add patients at higher risk to a registry.**
- **Take measures to protect privacy of patient information**
- **During warmer months, direct patients on the registry to a care manager (or similar professional)** to for personalized outreach before and during extreme heat and poor air quality due to wildfire smoke
 - **Consider tailored educational messaging for higher risk populations triggered automatically during heat or wildfire smoke.**
- **For patients working in the heat**, teach patients how to find out about local (e.g., State) policies on heat and air quality triggers for workplace health and safety protections

Tracking & Measurement

- **Track and monitor high risk patients on registry** for ED visits or hospitalizations for heat related illness and chronic condition exacerbations during warmer months.

Urgent Care Clinics

In addition to the above guidelines, urgent care clinics should engage in the following activities

Planning & Preparedness

- **Standardize protocols for early identification**, triage and treatment of heat-related illness. See example for [Heat Stroke](#).
 - Integrate a heat alert trigger for clinicians integrated into EHR
 - Ensure appropriate equipment is available on site for rapid cooling, including for cold water immersion.
- **Support patients and families in identifying a safe discharge location** with access to cooling and/or air filtration during heat and/or poor air quality. Include planning for home heat and smoke refuge if necessary, especially for people with mobility concerns.
- **Know where local cooling centers** are in your area to direct patients if necessary. ([Washington 211](#)) Encourage spending at least a couple hours each day in air conditioned/cooler space if unable to go to cooling center.

Equity

- **Participate in collaborative planning for heat and wildfires with local health jurisdictions and healthcare coalitions.** Look up your regional healthcare coalition [here](#).

Tracking & Measurement

- Send information to patient's primary care provider if visiting or admitted for heat-related illness or exacerbation of chronic condition.

Hospitals and Emergency Departments

In addition to the above health facility administrator guidelines, hospitals should engage in the following activities:

Planning & Preparedness

- **Standardize protocols for early identification, triage and treatment of heat-related illness.** See example for [Heat Stroke](#).
 - Integrate a heat alert trigger for clinicians integrated into EHR
 - Ensure appropriate equipment is available on site for rapid cooling, including for cold water immersion.
- **Support patients and families in identifying a safe discharge location** with access to cooling and/or air filtration during heat and/or poor air quality. Include planning for home heat and smoke refuge if necessary.
- **Implement risk factor screening and action plan into discharge processes** during warmer months
- Help patients and their support system plan for home heat and smoke refuge, especially for people with mobility concerns.
- **Know where local cooling centers are** to refer patients/family. ([Washington 211](#)) Encourage spending at least a couple hours each day in air conditioned/cooler space if unable to go to cooling center.

Tracking & Measurement

- **Send information to patient's primary care provider** if visiting or admitted for heat-related illness or exacerbation of chronic condition.
- **Implement a protocol to collect self-reported standardized patient work information** that can be documented into EHRs. Important information to document includes employment status, retirement dates, jobs (industry and occupation) and usual or longest-held work. Example [here](#).

Long-term care facilities

Older adults are particularly impacted by heat and wildfire smoke due to the intersection of several factors (age, chronic conditions, reduced mobility, cognitive impairment, social isolation). These factors make older adults more at risk for heat-related illness, exacerbations of chronic conditions such as cardiovascular disease, respiratory disease, and kidney disease, and mental distress. Long-term care facilities are critical to maintaining and improving the health and safety of older adults in Washington state. By planning ahead, implementing evidence-based interventions and coordinating with local partners, long-term care facilities can reduce the risk and impact of heat and wildfire smoke events in their community. Long-term Care Facilities should follow the guidelines under Health Delivery Systems in addition to the guidelines written below:

Education

- **Ensure healthcare staff understand** how to recognize, prevent and treat heat-related illnesses and wildfire smoke-related illnesses, and exacerbations of chronic conditions due to heat and wildfire smoke.
- **Conduct trainings/drills/exercises to familiarize staff** with overall weather event readiness and emergency response plans
- See resources in [Appendix D](#).

Planning & Preparedness

- **Follow most updated guidance from Washington State DSHS.** (e.g., [Preparing for Wildfire and Extreme Heat in LTC Settings](#)) and consider and AmeriCares/Harvard [Climate Resilience Toolkit](#) for resources to support.
- **Make facility climate resilient.** See [Climate Resilience Toolkit](#) for more details.
- Ensure cooling systems are on generator power and validate reserve fuel levels before heat events.
- **Install air conditioners/heat pumps and air filtration with high quality air filters (MERV 13 or higher)** and/or portable air filtration devices (see [Department of Health guidance](#))
- **Ensure adequate patient and staff supplies** (masks, water, medications, etc.).
- **Develop an organizational action plan for heat and wildfire smoke.**
- **Integrate weather monitoring with tools like [NWS HeatRisk tool](#) and [AirNow](#), [WA Smoke Blog](#)** that offer specific guidance at different temperatures and AQI.
- **Monitor temperature and indoor PM2.5 concentrations in care areas and residents' rooms** and take steps to ensure PM levels are acceptable. See guidance on air quality monitors [here](#).
- Move residents to cooler spaces or spaces with improved air filtration in the facility if necessary.
- **Protect staff and patients** from exposure by:
 - limiting time outdoors,
 - ensuring lightweight clothing,
 - closing windows and doors when air quality is poor
 - maintaining adequate fluid intake
 - reducing sources of air pollutants (e.g., cooking)
 - using respirators when necessary
 - protocols to monitor for signs and symptoms of heat-related illnesses or exacerbations due to heat or wildfire smoke.

- **Develop evacuation plans and destination.** Engage with local emergency management for mass sheltering locations, and coordinate with local healthcare coalitions to assist with placements.
 - Do not send medically stable patients to a hospital.
 - Have vehicles fueled, equipment packed, and transport coordinated for those requiring Basic Life Support/Advanced Life Support.

Employer Purchasers

Education

- Educate employees on how to reduce their exposure to heat and wildfire smoke during warmer months (Resource: Health Action Alliance [Extreme Heat](#) & [Unhealthy Air Quality](#))

Incentives & Investments

- Support coverage of air conditioners/heat pumps and air filtration/purification devices in employee benefits (HSA, health plan, etc.)
- Offer counseling in employee assistance programs for members impacted by heat and wildfire smoke event

Planning & Preparedness – For employers with workers exposed to heat and wildfire smoke

- **Involve workers in workplace safety planning for heat and wildfire smoke.**
- **Follow best practices to protect indoor and outdoor workers from heat and wildfire smoke exposure.** ([CDC/NIOSH](#), ACGIH)
 - **Consider resources for training supervisors and employers ([OSHA](#))**
- Maintain indoor air quality. (resource [here](#) and [here](#))
- **Develop a heat-alert system to communicate exposure information** to workers, supervisors and other relevant staff in advance of heat and wildfire smoke that is linguistically appropriate.
- **Integrate tools such as weather forecasts and Air Quality Index** to monitor and plan for dangerous levels of heat and air quality.
- **Test emergency response and evacuation plans annually**
- **Implement [acclimatization protocols](#)** for new workers and workers returning from extended time off.
- **Have a pre-placement and periodic monitoring program** where a healthcare provider evaluates workers to determine fitness for duty, monitors over time, and determines accommodations.
- **Evaluate heat and wildfire smoke prevention plans and management programs** for continual reduction in incidents of heat-related illnesses and illnesses related to wildfire smoke exposure through tracking incidents and claims information and iteratively reviewing and improving prevention plans.
- Encourage workers to report signs and symptoms of illness and injury.
- **Follow required WA State Rules for [heat](#) and [wildfire](#) smoke to protect worker health.** See [Appendix D](#) for further details on current outdoor heat exposure and wildfire smoke exposure rules.

Local Public Health Jurisdictions

Planning & Preparedness

- **Develop heat and wildfire smoke response plans integrated with other emergency response plans.** Follow guidance provided from Washington Department of Health (wildfire smoke [partner toolkit](#), [extreme heat](#)) and please see county level examples here for [heat](#) and [wildfire smoke](#).
- **When setting up cooling centers, consider Washington State Department of Health guidance once available.** Ensure the building is able to stay cool, there are areas to rest, extended hours into the evening, and it's a space near transit with accessibility for differently abled individuals.
- **Work with partners to embed guidance** for extreme heat and wildfire smoke into processes for human services organizations active in your region.
- **Develop and send messaging to health care facility leadership** when extreme heat or poor air quality is expected
- **Engage with healthcare coalitions** for planning and response

Equity

- **Identify health facilities and public organizations in your area and include them in response planning and activation.** These include long-term care facilities, local shelters, schools, outdoor camps, libraries, community-based and faith-based organizations, local public transportation, emergency management, local clean air agency (or Department of Ecology if no local clean air authority), etc.
- **Partner with community members to communicate and build capacity to protect against health impacts of heat and wildfire smoke.** Engage representatives from various communities in response planning and implementation.
 - **Develop public education for heat and wildfire smoke that is tailored to the community's needs.** (e.g., 6th grade reading level, multiple languages reflecting communities they serve, other communication strategies beyond written communications)
- **Coordinate outreach teams to check on people in the community and deliver water to communities most at risk** (e.g., those living alone, people experiencing homelessness, low-income housing, people with mobility issues, disabilities, etc.) Consider and prioritize those who might not have the ability to move somewhere cooler or with better air quality.

Given the reach of heat and wildfire smoke's impact across the state, the workgroup felt it necessary to provide guidelines for other audiences in the state

Emergency Medical Services (EMS) Pre-hospital Healthcare

Education

- **Integrate and ensure relevant staff understand evidence-based protocols for heat-related illnesses that include recognition, rapid cooling and supportive care.**
 - Improve capacity to perform evaporative cooling while transporting patients.
- **Planning, training exercise for responding to impacts at a community level such as evacuation, surge in ED visits, etc.**
- **For agencies engaged in parahealth/community health services**, engage in public messaging, prevention and mitigation efforts for community members

Planning & Preparedness

- **Employers are required to follow State Rules for [heat](#) and [wildfire smoke](#)** to protect worker health but should also follow additional best practices to protect workers' health.
- **Engage with community partners** (e.g., healthcare coalitions, local health jurisdictions, public health departments, healthcare delivery systems) on readiness and response coordination efforts, including setting up cooling and clean air centers.

Tracking & Measurement

- **Work with the Department of Health** to improve documentation heat-related and wildfire smoke-related incidents and documentation of work-relatedness, industry, and occupation variables in WEMESIS.

Schools

Education

- Train school administrators and staff on health impacts of heat and wildfire smoke relevant to youth

Planning & Preparedness

- **Use a standard protocol for temperature and air quality** to reduce student and staff exposure to heat and wildfire smoke.
- **During warmer months, monitor weather conditions on a regular basis** using the [NWS Heat Risk tool](#), [AQI tools](#) and [WA Smoke Blog](#).
- **Monitor indoor air quality** and take steps to ensure PM2.5 levels are acceptable. See guidance on air quality monitors [here](#) and [here](#).
- Plan for sports and protocols to keep student athletes safe, and follow the Department of Health's [Children and Youth Activities Guide for Air Quality](#) for wildfire smoke.

Incentives & Investments

- **Install air conditioners/heat pumps and air filtration with high quality air filters (MERV 13 or higher) and/or portable air filtration devices (see [Department of Health guidance](#))**
- **Consider shading over play structures**

Appendix A. Bree Collaborative Background

The Dr. Robert Bree Collaborative was established in 2011 by Washington State House Bill 1311 “...to provide a mechanism through which public and private health care stakeholders can work together to improve quality, health outcomes, and cost effectiveness of care in Washington State.” The Bree Collaborative was named in memory of Dr. Robert Bree, a leader in the imaging field and a key member of previous health care quality improvement collaborative projects.

Members are appointed by the Washington State Governor and include public health care purchasers for Washington State, private health care purchasers (employers and union trusts), health plans, physicians and other health care providers, hospitals, and quality improvement organizations. The Bree Collaborative is charged with identifying health care services annually with substantial variation in practice patterns, high utilization trends in Washington State, or patient safety issues. For each health care service, the Bree Collaborative identifies and recommends best-practice, evidence-based approaches that build upon existing efforts and quality improvement activities to decrease variation. In the bill, the legislature does not authorize agreements among competing health care providers or health carriers as to the price or specific level of reimbursement for health care services. Furthermore, it is not the intent of the legislature to mandate payment or coverage decisions by private health care purchasers or carriers.

Recommendations are sent to the Washington State Health Care Authority for review and approval. The Health Care Authority (HCA) oversees Washington State’s largest health care purchasers, Medicaid, and the Public Employees Benefits Board Program, as well as other programs. The HCA uses the recommendations to guide state purchasing for these programs. The Bree Collaborative also strives to develop recommendations to improve patient health, health care service quality, and the affordability of health care for the private sector but does not have the authority to mandate implementation of recommendations.

For more information about the Bree Collaborative, please visit:

<https://www.qualityhealth.org/bree/>

Bree Collaborative members identified diabetes care as a priority improvement area and convened a workgroup to develop evidence-informed standards. The workgroup met from January 2024-January 2025.

Member	Title	Organization
June Altaras, MN, NEA-BC, RN	Executive Vice President, Chief Quality, Safety and Nursing Officer	MultiCare Health System
Gary Franklin, MD, MPH	Medical Director	Washington State Department of Labor and Industries
Colin Fields, MD, AAHIVS	Medical Director, Government Relations & Public Policy	Kaiser Permanente
Dary Jaffe, MN, ARNP, NE-BC, FACHE	Senior Vice President Safety and Quality	Washington State Hospital Association

Sharon Eloranta, MD	Medical Director, Performance Measurement and Care Transformation	Washington Health Alliance
Norifumi Kamo, MD, MPP	Internal Medicine	Virginia Mason Franciscan Health
Kristina Petsas, MD, MBS, MLS	Market Chief Medical Officer – WA, OR, MT, AK, and HI	UnitedHealthcare, Employer & Individual
Greg Marchand	Director, Benefits, Policy and Strategy	The Boeing Company
Kimberly Moore, MD	Associate Chief Medical Officer	Franciscan Health System
Carl Olden, MD	Family Physician	Pacific Crest Family Medicine, Yakima
Nicole Saint Clair, MD	Executive Medical Director	Regence BlueShield
Mary Kay O’Neill, MD, MBA	Partner	Mercer
Kevin Pieper, MD	Chief Medical Officer	Kadlec Medical Center
Susanne Quistgaard, MD	Medical Director, Provider Strategies	Premera Blue Cross
Colleen Daly, PhD	Director, Occupational Health, Safety and Research	Microsoft
Emily Transue, MD (Chair)	Chief Clinical Officer	Comagine Health
Judy Zerzan-Thul, MD	Medical Director	Washington State Health Care Authority
Jake Berman, MD, MPH	Medical Director for Population Health Integration	UW Medicine and UWM Primary Care and Population Health

Appendix B. Methods

This report and set of guidelines address actions to reduce the health impact of heat and wildfire smoke in Washington state. These action statements are based on credible evidence and workgroup collaboration (expert opinion and discussion) and literature review.

Monthly Workgroup Discussions.

Bree Collaborative staff convened a workgroup that met monthly from January 2024 to January 2025. Workgroup members and attendees included an array of individuals from community-based organizations, large integrated health care systems, health plans, in and out-patient delivery organizations, the state medical and hospital associations, local and state agencies, and others. The workgroup charter and roster are presented in [Appendix I](#).

Each workgroup meeting focused on a different audience and their role in reducing health impact of heat and wildfire smoke, focusing on topics within the focus areas. The workgroup also provided feedback on draft guidelines and helped shape the focus area framework. A list of agendas, meeting minutes, and materials reviewed in the workgroup is available on the Bree website [here](#)

Evidence Review

Staff compiled research, evidence and resources on the health impacts of heat and wildfire smoke. The research on heat and wildfire smoke focused on populations most impacted by heat and wildfire smoke, population level interventions to prevent heat-related illnesses or exacerbations related to chronic conditions vulnerable to heat and wildfire smoke, interventions to improve health system resilience, evidence-based care for heat-related illness and health workforce training. A list of articles reviewed can be found on our webpage under Evidence Review.

Appendix C. Evidence Review

Exposure to extreme heat, or summertime temperatures that are much hotter and/or humid than average,^{xii} is a serious threat to population health and well-being. The number and length of heat waves has increased significantly since the 1960s.^{xiii} The year 2020 was the second-warmest year on record globally,^{xiv} and the warmest year on record for the contiguous United States.^{xv} These trends are projected to continue and worsen in the coming decades, exposing more people to the harmful consequences of heat.

According to official records, 126 Washingtonians died due to heat-related causes between June 26th and July 2nd, 2021.^{xvi} Additionally, results from a report on excess mortality in 2021 found that excess mortality was significantly higher during the heat dome weeks compared to all other weeks in 2021 (205 vs. 132).^{xvii} Excess deaths can include those where heat may have played a role, such as in cases of kidney failure or cardiac arrest, even if heat was not the direct cause of death. The regional temperature was on average 30°F warmer than the hottest 3 months in the previous decade. Excess heat impacts emergency response systems, significantly increasing emergency visits for acute heat illnesses, increasing 911 call volume, and costing the nation billions of dollars annually.^{xix} While everyone is susceptible to increased heat, it doesn't impact everyone in the same ways.

Higher air temperatures increase wildfire likelihood, posing a serious threat to human health, ecosystems, and infrastructure. Wildfire smoke is comprised of a mixture of pollutants, including fine particulate matter (PM_{2.5}), carbon monoxide, nitrogen oxides, formaldehyde, benzene and others. Wildfire smoke exposure increases all-cause mortality, impacts respiratory health, and may co-occur and interact with heat exposure to impact cardiorespiratory morbidity and mortality.^{xx xxii xxiii} Certain workers are disproportionately co-exposed, such as agricultural populations, who may experience high concurrent heat and PM_{2.5} exposures.^{xxiv} As a result of a warming climate, wildfires are becoming larger, more destructive, and more difficult to control, which will drastically increase the impact on heat and health.

Tools for Heat and Air Quality Monitoring

The workgroup generally endorses use of standardized tools to indicate thresholds for action for heat and wildfire smoke. [The National Weather Service's HeatRisk Tool](#) is a color-numeric-based index that provides a forecast risk of heat-related impacts to occur over a 24-hour period. HeatRisk takes into consideration not just the flat temperature at a given time, but how unusual the heat is for the time of year, the duration of the heat in both daytime and nighttime temperatures and if those temperatures pose an elevated risk of heat-related impacts based on Centers for Disease Control (CDC) data. The HeatRisk tool has not been validated specifically in worker populations. The figure below shows the different levels and risk of heat-related impacts by threshold:

Category	Risk of Heat-Related Impacts
Green 0	Little to no risk from expected heat.
Yellow 1	Minor - This level of heat affects primarily those individuals extremely sensitive to heat, especially when outdoors without effective cooling and/or adequate hydration.
Orange 2	Moderate - This level of heat affects most individuals sensitive to heat, especially those without effective cooling and/or adequate hydration. Impacts possible in some health systems and in heat-sensitive industries.
Red 3	Major - This level of heat affects anyone without effective cooling and/or adequate hydration. Impacts likely in some health systems, heat-sensitive industries and infrastructure.
Magenta 4	Extreme - This level of rare and/or long-duration extreme heat with little to no overnight relief affects anyone without effective cooling and/or adequate hydration. Impacts likely in most health systems, heat-sensitive industries and infrastructure.

Image taken from [National Weather Services HeatRisk](#)^{xxv}

The Air Quality Index (AQI) provides information on levels of air pollutants and health effects. The AQI was developed by the Environmental Protection Agency (EPA) and is based on national air quality standards for six criteria pollutants: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen dioxide, and lead. The AQI assigns a color and a number from 0 to 500 to each pollutant, with higher numbers indicating higher levels of pollution and greater health risks though health effects do not increase linearly with the AQI; rather, many health effects occur within the Moderate and Unhealthy for Sensitive Groups categories of the AQI. The dominant pollutant in the area dictates the AQI. In Washington state, particulate matter less than 2.5 microns in diameter (PM2.5), almost always dictates the AQI level. There is no healthy amount of PM2.5, and there is evidence to suggest that wildfire smoke may be more toxic than transportation-related pollution.^{xxvi} PM2.5, and thus the AQI, is a good proxy for the level of wildfire smoke in the air during a wildfire smoke event. The AQI can be used to plan outdoor activities, reduce exposure to unhealthy air, and protect sensitive groups such as people with asthma, heart disease, or lung disease. Air quality can be monitored via [AirNow.gov](#), with detailed information down to zip code about air quality. The figure below describes the health

impacts by air quality threshold.

AQI Basics for Ozone and Particle Pollution			
Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Image taken from U.S. Environmental Protection Agency AQI Basics^{xxvii}

Some additional resources to support monitoring air quality and wildfire smoke below:

- The EPA Fire and Smoke map on the [Washington Smoke Blog](#)
 - a partnership between state, county, and federal agencies, and Tribes. They coordinate to collectively share information for Washington communities affected by wildfire smoke.
- Washington DOH’s [Children and Youth Activities Guide for Air Quality](#)
 - Quick reference guide for what children’s activities are safe for each air quality index level
- Washington DOH’s [Air Quality Guide for Particle Pollution](#)
 - Quick reference guide to know what to do for each air quality index level, and how to reduce exposure

Populations Most Impacted by Heat and Wildfire Smoke

Heat has a greater impact on some populations. This is in part determined by a person’s exposure, which varies depending living in an urban vs rural area, housing quality, access to cooling, air pollution; sensitivity to heat stress, which depends on age, medical conditions, medication use, hydration; and a person’s adaptive capacity, a person’s ability of people to cope with and recover from heat stress influenced by social drivers of health such as social support, income, education, housing, transportation and access to health care. For workers and athletes, heat stress is a combination of environmental exposure, non-breathable clothing or personal protective equipment that inhibits heat loss, and metabolic heat generation from physical activity. More vulnerable population categories include:

- **People disproportionately exposed to heat, sensitive to heat or with limited adaptive capacity (*people experiencing homelessness, people with chronic medical conditions, people with disabilities, people who are incarcerated, people with low income, people who rent, marginalized communities, outdoor workers*):** These groups may face multiple barriers to accessing cooling, hydration, health care, or social support during heat events. People experiencing homelessness may lack shelter, clothing, or personal belongings that can protect them from heat. People with chronic medical conditions such as diabetes, heart disease, kidney disease, or mental illness may have impaired thermoregulation, increased fluid loss, or may have adverse reactions to medications due to heat.^{xxviii} For example, cardiovascular disease is a primary cause of increased risk of death during heatwaves, and respiratory disease (particularly COPD) predisposes individuals to experience death by respiratory disease, and a secondary cause of death during higher temperatures. Wildfire smoke exposure increases ischemic events, as well as worsens heart failure and arrhythmias. Cerebrovascular disease is the tertiary cause of death during heatwaves mostly caused by heat-related reductions in cerebral blood flow and damage to the blood-brain barrier. Heat can cause dehydration, which can lead to or facilitate kidney fibrosis and potential failure. Chronic kidney disease can predispose individuals to cardiovascular events during heat, and wildfire smoke increases excess same-day mortality for dialysis patients, decreases renal function and hastens progression to end-stage renal disease. Diabetes reduces skin blood flow and sweating during heat waves. Mental health conditions can increase risk of contracting heat-related illness due to physiological thermoregulatory inhibitions from medications or behavioral changes which influence adaptive capacity. Patients with asthma, chronic obstructive pulmonary disease and other chronic respiratory conditions are particularly vulnerable to smoke, and can experience increased respiratory symptoms, emergency room visits or hospitalization. Besides chronic conditions, other factors influence adaptive capacity; people with disabilities may have reduced mobility, communication, or self-care abilities that can limit their adaptive capacity to heat. People who are incarcerated may be confined in overcrowded, poorly ventilated, or uncooled facilities that can increase their heat exposure and stress.
- **People physically active outdoors or in hot indoor spaces (*athletes, outdoor and some indoor workers, emergency responders*):** These groups have higher exposure to heat and may exert themselves physically, which can increase the risk of heat exhaustion, heat stroke, dehydration, and cardiovascular events. These groups are at particular risk if they are unacclimatized, which can occur if new to the job, returning from a prolonged absence, or during sudden increases in heat stress. Higher exposure to wildfire smoke for outdoor workers can increase risks of negative impacts especially without adequate protection. Workers in occupations such as agriculture, construction, public administration (e.g., firefighters), and utilities may face additional hazards such as musculoskeletal hazards from heavy equipment, pesticides, or electric shocks that can compound the effects of heat. Emergency responders may encounter situations where they must wear protective gear, work in confined spaces, or assist people in distress, which can increase their heat stress. Workers in precarious work arrangements may have less protections from heat and wildfire smoke, and those paid by the piece (amount of work accomplished) may have a financial incentive not to take breaks to cool down.

- **Ages and life stages (*infants and children, young adults, pregnant people, older adults*):** These groups have higher physiological sensitivity to *heat and wildfire smoke* and may have limited ability to regulate body temperature, seek shelter, or access health care. Infants and children are more likely to experience dehydration, fever, and electrolyte imbalance due to heat, or respiratory symptoms like coughing, wheezing, decreased lung function or pneumonia. Children's lungs are continue to develop into their early 20's, and are thus more vulnerable to impacts of wildfire smoke. Younger children also breathe more air per body weight compared to adults, so their inhaled dose of wildfire smoke is greater than that of adults, placing them at additional risk. Young adults (18-34 years old) have been found to account for a disproportionate share of heat-related deaths, which can be attributable to a combination of factors including income, outdoor activity, and occupational protections, among others.^{xxix} Pregnant people are at increased risk of severe maternal morbidity (SMM), preterm birth, and low birth weight due to heat, and wildfire smoke may increase the risk of low birth weight or preterm birth. Older adults are more likely to have chronic medical conditions, reduced mobility, cognitive impairment, or social isolation that can exacerbate the effects of heat and wildfire in addition to a reduced ability to regulate their body temperature.

Drivers of Inequitable Impact

While anyone can be impacted by heat and wildfire smoke, certain groups of people experience a higher level of impact. Our communities do not experience heat and wildfire smoke in the same way. Social drivers of health compound the impact of climate change for specific groups of people. For example, lack of access to adequate and affordable housing; people who have lower incomes are more likely to live in older, substandard, and overcrowded housing units that lack insulation, ventilation, air conditioning, and other cooling devices. These housing conditions can create indoor heat islands that exacerbate the effects of outdoor heat waves and increase the risk of heat-related illness and death. Redlining, or the discriminatory practice of denying or limiting services to specific neighborhoods based on their racial or ethnic background, pushed marginalized groups to live in neighborhoods with less green space, fewer buildings that could provide cooling centers, and areas with worse housing quality. Studies have shown that redlined neighborhoods experience higher levels of heat stress, heat-related hospitalizations, and mortality than non-redlined areas, as well as greater exposure to PM 2.5 and other air pollutants. Redlining also affects access to health care, social services, transportation, and education, creating multiple barriers for residents to cope with and recover from climate-related health impacts.

People belonging to marginalized racial and ethnic groups are also disproportionately exposed to occupational heat stress. People from BIPOC communities and immigrants are overrepresented in outdoor and indoor occupations that involve high levels of physical exertion, such as agriculture, construction, landscaping, manufacturing, and warehousing. These workers often lack adequate protection, training, and access to water, shade, and rest breaks, increasing their risk of heat exhaustion, heat stroke, and other heat-related illnesses. Furthermore, these workers may face economic and social pressures to continue working despite the heat, such as fear of losing income, job security, or immigration status. Occupational heat stress can also affect the health and well-being of workers' families and communities, as workers may suffer from chronic conditions or experience increased mental distress during heat and wildfire smoke. Outdoor workers are at a heightened risk of developing chronic conditions due to prolonged exposure to heat; the combined environmental exposure, non-breathable

clothing, and physical exertion can exacerbate underlying health conditions and may facilitate the onset of new chronic conditions. Also, workers already with chronic conditions can experience exacerbation or worsening of those conditions if proper precautions or accommodations are not provided.

Appendix D. Guideline and Resource Review

Source	Guideline/Resource
Centers for Disease Control and Prevention (CDC)	Chill'd OUT Questionnaire Quickstart Guide for Clinicians on Heat and Health Heat and Medications – Guidance for Clinicians How to use the Heat Risk Tool and Air Quality Index Clinical Overview of Heat and Children and Teens with Asthma Clinical Overview of Heat and Cardiovascular Disease Wildfire Smoke and Pregnancy Heat and Pregnancy
Clinical Kidney Journal	Kidney Disease and Extreme Heat,
American Journal of Kidney Disease	Heat-related Acute Kidney Disease
Climate Psychiatry Alliance	Extreme Heat and Mental Illness Tool Kit for Mental Health Care Providers
Americares	Climate Resilient Health Clinics Americares
Clinician Education	
World Health Organization (WHO)	Communicating on climate change and health,
National Academies of Medicine (NAM)	Climate Change and Human Health - National Academy of Medicine
Agency for Healthcare Research & Quality (AHRQ)	AHRQ Health Literacy Universal Precautions Toolkit
Centers for Disease Control and Prevention (CDC)	Clinical Guidance for Heat Health Heat Health CDC Wildfire Smoke and Your Patients' Health (updating 2025)
Environmental Protection Agency (EPA)	A Story of Health - A Multi-media eBook - Western States PEHSU (ucsf.edu) Wildfire Smoke and Your Patients' Health US EPA Smoke and Extreme Heat Fact Sheet
Americares	Climate Resilient Health Clinics Americares
Administrator Resources	
Practice Greenhealth	Organizational structure for sustainability Practice Greenhealth Proven practices for sustainability governance in health care: Structure & staffing Practice Greenhealth
ASHRAE	Protecting Building Occupants From Smoke During Wildfire and Prescribed Burn Events

Appendix E. Tracking and Measurement

ICD-10 Coding

There are notable challenges in utilizing ICD-10 coding for conditions related to heat and wildfire smoke. At the clinician level, many clinicians may feel uncomfortable attributing a patient’s presentation to a particular hazard. The majority of ICD-10 codes for climate-related hazards are categorized as external cause codes, and the current iteration does not capture the full spectrum of harms related to climate hazards. Improved specificity would allow for greater attribution and allocation of resources. Since many clinicians are not used to using climate hazard-related ICD-10 coding, any implementation of this coding would need to come with robust recommendations for educating staff on their use and reimbursement attached to incentivize use. Also, expanding beyond the clinician in coding for social determinants or environmental hazards can improve uptake.

Below are a list of ICD-10 codes related to heat and wildfire smoke exposure and heat-related illness. See the National Syndromic Surveillance Program for the use of ICD-10 codes in [monitoring heat-related illness](#). Note that the ICD-10 codes below are related to smoke in general, not specifically wildfire smoke. There are currently no ICD-10 codes related to wildfire smoke.

Heat or Wildfire Smoke Related Concern	ICD-10 Code
Heat-related illness	T67.0- Heatstroke and sunstroke
	T67.1-, heat syncope
	T67.2-, heat cramp
	T67.3-, heat exhaustion, anhidrotic
	T67.4-, heat exhaustion due to salt depletion
	T67.5-, heat exhaustion, unspecified
	T67.6-, heat fatigue, transient
	T67.7-, heat edema
	T67.8-, other effects of heat and light
	T67.9-, effect of heat and light, unspecified
Dehydration	E860 Dehydration
	P741 Dehydration of a newborn
Exposure to Heat	X30 Exposure to natural excessive heat
Exposure to Fire/Smoke	X010XX, A Exposure to flames in uncontrolled fire, not in building or structure, initial encounter
	X011XX, A Exposure to smoke in uncontrolled fire, not in building or structure, initial encounter
	X018XX, A Other exposure to uncontrolled fire, not in building or structure, initial encounter
Natural	X398XX, A Other exposure to forces of nature, initial encounter
Smoke and Poor Air Quality	Z77.110 Contact with and (suspected) exposure to air pollution
	X08.8 Exposure to other specified smoke, fire
Disaster	Z655 – Exposure to disaster, war, and other hostilities

Occupation	Z5739, Occupational exposure to other air contaminants
	Z576, Occupational exposure to extreme temperature

Below is a non-comprehensive list of ICD-10 codes that if documented may indicate an increased risk of negative impacts of heat and wildfire smoke. These codes can be used to build registries in delivery systems and health plans to target interventions and track outcomes for vulnerable patient populations.

Condition	ICD-10 Code
Chronic Conditions	N18.XX - Chronic Kidney Disease
	I20-25 - Ischemic Heart Disease
	I30-52 – Other forms of heart disease
	E08-E13 Diabetes mellitus
	J45 – Asthma, J46 Status asthmaticus
	J44 – COPD; J40-47 chronic lower respiratory diseases; J60-70 lung diseases due to external agents;
Diseases of the Respiratory System	J30-39 Other diseases of upper respiratory tract
	J70.5 Respiratory conditions due to smoke inhalation
	J80-84 Other respiratory diseases principally affecting the interstitium
Pregnancy	O09: Supervision of high-risk pregnancy
	O10-O16: Edema, proteinuria, and hypertensive disorders in pregnancy, childbirth, and the puerperium
	O80-O82: Encounter for delivery
Social Determinants of Health	Z55: Problems related to education and literacy
	Z56: Problems related to employment and unemployment
	Z57: Occupational exposure to risk factors
	Z59: Problems related to housing and economic circumstances
	Z60: Problems related to social environment
	Z62: Problems related to upbringing
	Z63: Other problems related to primary support group, including family circumstances
	Z64: Problems related to certain psychosocial circumstances
	Z65: Problems related to other psychosocial circumstances
Behavioral health	Z65: Problems related to other psychosocial circumstances
	F10-F19: Mental and behavioral disorders due to psychoactive substance use

	F20-F29: Schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders
	F30-F39: Mood [affective] disorders
	F40-F48: Anxiety, dissociative, stress-related, somatoform, and other nonpsychotic mental disorders
	F50-F59: Behavioral syndromes associated with physiological disturbances and physical factors
	F60-F69: Disorders of adult personality and behavior
	F70-F79: Intellectual disabilities
	F80-F89: Pervasive and specific developmental disorders
	F90-F98: Behavioral and emotional disorders with onset usually occurring in childhood and adolescence
	F99: Unspecified mental disorder

The ICD-10 coding system must be adaptable to emerging health issues, especially those linked to climate change. As the frequency and intensity of extreme heat and wildfires increase, the health impacts are likely to evolve. The current coding system does not fully account for new or emerging conditions, leading to gaps in data and hindering effective public health responses. Regular updates and revisions to the ICD-10 codes are essential to address these evolving challenges adequately. Furthermore, standardized coding is vital for billing and reimbursement processes, helping to avoid discrepancies and ensuring that healthcare providers are adequately compensated for their services. In the context of climate-related health impacts, such as heat-related illnesses or respiratory conditions exacerbated by wildfire smoke, standardized ICD-10 coding allows for the effective monitoring and analysis of trends, enabling timely interventions and policy-making to mitigate these impacts.

Registries

Registries are used internally for delivery sites and health plans for managing patients with particular diseases or populations. Registries tracking chronic conditions over time, such as for patients with diabetes or depression, have been shown to improve quality of care for learning-oriented health systems and individual outcomes. Using a registry to identify patients that are more susceptible to the impacts of heat and wildfire smoke can support delivery systems and health plans with quality improvement processes and make the case for future investments. Registries are helpful when tracking intervenable characteristics of a defined and reachable population, and while healthcare teams may not be able to directly address the underlying source of higher risk (e.g., zip code) there are tangible, practical strategies that individuals and their families can take to reduce the risk of experiencing negative health outcomes from heat and wildfire smoke. Washington state maintains statewide dashboards on disparities that draw from community-level and individual level data sources, and many community-based organizations are using referral management platforms that may collect information on referrals for social service needs that are relevant to increased risk for heat and wildfires. Washington state

agencies should consider developing a registry that combines sources to provide a comprehensive picture of increased risk for heat and wildfire smoke to be shared for quality improvement projects.

Social Determinants of Health (SDOH) Data Collection, Workflows and Interoperability

The Foundation for Health Care Quality published a report on [Social Determinants of Health and Health Equity](#) in 2021, including guidelines for collecting and tracking SDOH data. Populations with identified health-related social needs may be at higher risk for heat-related illnesses and exacerbations of chronic conditions due to heat and wildfire smoke. While SDOH data is vital for understanding these risks, it is sensitive and patients or members may have valid concerns about privacy and potential biased treatment. These concerns must be met with clear and communicated best practices for data privacy, patient perceived stigma, and information autonomy, including dynamic consent and transparency throughout healthcare delivery.

SDOH data collection can be integrated into the electronic health records, which can increase visibility of this information for care teams and facilitate conversations about risks and action plans to avoid heat and wildfire smoke. Several vendors have integrated SDOH screening tools such as PRAPARE to collect information in a standardized way which facilitates interoperable exchange of information between systems.

Appendix F. Patient and Family-Directed Guidelines

- **Know your heat and wildfire smoke risk.** Many people are at increased risk of negative health impacts related to heat and wildfire smoke, including older adults, children, people with chronic conditions like cardiovascular disease, kidney disease, heart failure, asthma, people who are pregnant, and people with certain occupations like agriculture or construction
- **Know the signs of heat-related illness and smoke exposure**– See below table
- When a period of high temperatures (e.g., heat wave) or wildfire smoke is expected, **make a plan with your household members to reduce exposure to heat and smoke.** Example [here](#).
- During high temperatures, heat waves and/or when the air quality is poor:^{xxx}
 - See [quick reference guide](#) for poor air quality.
 - **Stay out of the heat and indoors to avoid exposure to wildfire smoke.** Avoid going outside or doing strenuous activity. Stay in the shade, spend 2-3 hours during the day in a cool place.
 - **Keep your home or building cool.** When air quality is good, use the night air to cool down your home by opening your windows after dark. During the day, close windows and cover them with blinds or shutters to block direct sunlight (consider mylar emergency or space blankets as available). Turn off electrical devices if possible and safe. Postpone vacuuming until air quality improves. Use electric fans **when temperatures are below 104F/40C.** If using air conditioning, set the thermostat to 81F and turn on an electric fan.^{xxxi}
 - **Smoke and heat can make each other worse.**
 - **Keep your body cool and hydrated.** Use light, loose-fitting clothing and bed linens, take cool showers or baths. Wet your skin using a damp cloth, spray or wet light clothing. Drink water regularly.
 - **Regularly check in with neighbors and vulnerable people in your circle** – especially those over 65, those with heart, lung or kidney conditions, mobility concerns or those who live alone.
 - Protect infants and children. **Never leave children or animals in a parked vehicle for any amount of time.** Avoid direct exposure to the sun during peak hours, seeking shade or staying indoors instead. Never cover an infant stroller or pram with dry fabric – this makes it hotter inside the carriage; instead use a thin wet cloth and rewet as necessary to lower the temperature. Dress children in lightweight loose-fitting clothing that covers the skin, and use wide-brimmed hats, sunglasses and sunscreen to protect them.
- **If you work outside, your employer is required to protect you from heat and wildfire smoke.**
 - Review Washington Labor & Industries [educational pamphlet](#) and [Be Heat Smart](#) website and [Wildfire Smoke](#) website and resources

Heat-Related Illness Signs and Symptoms

Illness	Signs/Symptoms	What to Do
Heat Stroke	High body temperature (103F or higher) Hot, red, dry or damp skin Fast, strong pulse Headache Dizziness Nausea Confusion Losing consciousness (passing out)	Call 911 right away , heat stroke is a medical emergency Move the person to a cooler place Help lower body temperature with cool cloths or a cool bath Do not give them anything to drink
Heat exhaustion	Heavy sweating Cold, pale, clammy skin Fast, weak pulse Nausea or Vomiting Muscle cramps Tiredness or weakness Dizziness Headache Fainting (passing out)	Move to a cool place Loosen clothes Put cool wet cloths on body or take a cool bath Sip water Get medical help right away if: vomiting, symptoms get worse or last longer than 1 hour
Heat Cramps	Heavy sweating during intense exercise Muscle pains or spasms	Stop physical activity and move to a cool place Drink water or sports drinks Wait for cramps to go away before doing any more physical activity Get medical help right away if: cramps last longer than 1 hour, you're on a low sodium diet or you have heart problems
Heat Syncope	Dizziness, lightheadedness, and fainting, particularly after prolonged standing or sudden rising from a lying or sitting position. The skin may appear pale and feel cool and moist to the touch.	Lie down in a cool place Elevate legs to improve blood flow to the brain Drink water or sports drinks to rehydrate Seek medical attention if symptoms persist or worsen
Heat Rash	Red clusters of pimples or small blisters on the skin, often in areas where clothing causes friction, such as the neck, chest, groin, and elbow creases. It typically occurs in hot, humid conditions and can be itchy or cause a prickling sensation	Move to a cooler, less humid environment Keep the affected area dry and avoid further sweating Wear loose, light clothing to prevent irritation Apply cold compresses or take cool baths to soothe the skin Use calamine lotion or hydrocortisone cream to relieve itching and discomfort

		Seek medical attention if symptoms persist or worsen
Rhabdomyolysis	Muscle pain, weakness, and swelling, often accompanied by dark, tea-colored urine. Other symptoms may include nausea, vomiting, confusion, and irregular heartbeat	<p>Seek medical attention immediately, as this can lead to kidney injury</p> <p>Stop any activity that may have caused the condition.</p> <p>Stay hydrated by drinking plenty of water</p> <p>Avoid taking nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen, as they can further harm the kidneys.</p> <p>At home, monitor urine color and volume, and report any changes to a healthcare professional.</p>

Appendix G. Key Points of Outdoor Heat and Wildfire Smoke Rules

At the time of this reports publication, WA Labor & Industries Wildfire Smoke Rules were undergoing their rule-making process. Please refer to WA Labor & Industries website for more updated information.

- **Follow required WA State Rules for [heat](#) and [wildfire](#) smoke to protect worker health.**
 - **Current Outdoor Heat Exposure rules** include requirements to:
 - Address outdoor heat exposure safety as part of the required Accident Prevention Program. An example template, which can be tailored to a specific workplace, can be found [here](#).
 - Provide annual training to employees and supervisors on symptoms of outdoor heat exposure and policies in place to prevent heat-related illness.
 - Provide both a sufficient amount of cool drinking water to employees along with opportunities to drink the water.
 - Provide adequate shade (or alternative cooling methods) at all times to allow for access to prevent or respond to heat illness.
 - Encourage and allow workers to take paid, preventative cool down rest periods so they don't overheat. When temperatures are 90°F or hotter, require workers to take additional paid, cool down rest periods of at least 10 minutes every 2 hours. Longer and more frequent breaks are indicated when temperatures continue to rise to 100°F.
 - Closely observe employees not acclimatized to the heat, including new employees, those returning from absences, and all workers during a heat wave.
 - Have emergency procedures to respond appropriately to any employee with symptoms of heat-related illness.
 - Make sure supervisors and employees always have a way to communicate with each other so they can promptly report heat illness and get medical assistance.
 - **Wildfire Smoke rules** use PM2.5 and AQI measures, as indicated in the table below from the [Washington Department of Labor & Industries](#). There are additional rules for specific groups like Firefighters – follow the rules that apply to your populations.

Current PM _{2.5} (µg/m ³)	NowCast Air Quality Index for PM _{2.5} Beginning May 6, 2024	Required Protections
0.0 - 20.4	0 - 71	<ul style="list-style-type: none"> • Prepare a written wildfire smoke response plan. • Provide wildfire smoke training to employees. • Watch the PM_{2.5} conditions and forecasts. • Prepare a two-way communication system. • Make provisions for prompt medical attention and permit that medical attention without retaliation.
20.5 - 35.4	72 - 100	All of the above and: <ul style="list-style-type: none"> • Notify employees of PM_{2.5} conditions. • Ensure only trained employees work outdoors. • Consider implementing exposure controls • Consider providing voluntary use respirators.

35.5 - 250.4	101 - 350	All of the above and: <ul style="list-style-type: none"> • Implement exposure controls. • Make N95 respirators available for voluntary use.
250.5 - 500.3	351 - 848	All of the above and: <ul style="list-style-type: none"> • Ensure workers experiencing symptoms requiring immediate medical attention be moved to a location that ensures sufficient clean air. • Directly distribute N95 respirators to employees for voluntary use.
500.4 - 554.9	849 - 956	All of the above and: <ul style="list-style-type: none"> • Implement a complete required use respiratory protection program, including fit-testing, medical evaluations, requiring employees to be clean-shaven, and requiring the use of particulate respirators.
555 or more	957 or more	All of the above and: <ul style="list-style-type: none"> • Require respirators with an assigned protection factor (APF) of 25 or more.

Appendix H. Bree Collaborative Members

Member	Title	Organization
June Altaras, MN, NEA-BC, RN	Executive Vice President, Chief Quality, Safety and Nursing Officer	MultiCare Health System
Gary Franklin, MD, MPH	Medical Director	Washington State Department of Labor and Industries
Colin Fields, MD, AAHIVS	Medical Director, Government Relations & Public Policy	Kaiser Permanente
Dary Jaffe, MN, ARNP, NE-BC, FACHE	Senior Vice President Safety and Quality	Washington State Hospital Association
Sharon Eloranta, MD	Medical Director, Performance Measurement and Care Transformation	Washington Health Alliance
Norifumi Kamo, MD, MPP	Internal Medicine	Virginia Mason Franciscan Health
Kristina Petsas, MD, MBS, MLS	Market Chief Medical Officer – WA, OR, MT, AK, and HI	UnitedHealthcare, Employer & Individual
Greg Marchand	Director, Benefits, Policy and Strategy	The Boeing Company
Kimberly Moore, MD	Associate Chief Medical Officer	Franciscan Health System
Carl Olden, MD	Family Physician	Pacific Crest Family Medicine, Yakima
Nicole Saint Clair, MD	Executive Medical Director	Regence BlueShield
Mary Kay O’Neill, MD, MBA	Partner	Mercer
Kevin Pieper, MD	Chief Medical Officer	Kadlac Medical Center
Susanne Quistgaard, MD	Medical Director, Provider Strategies	Premera Blue Cross
Colleen Daly, PhD	Director, Occupational Health, Safety and Research	Microsoft
Emily Transue, MD (Chair)	Chief Clinical Officer	Comagine Health
Judy Zerzan-Thul, MD	Medical Director	Washington State Health Care Authority
Jake Berman, MD, MPH	Medical Director for Population Health Integration	UW Medicine and UWM Primary Care and Population Health

Appendix I. Workgroup Charter & Roster

Problem Statement

Climate change is widespread, rapid, and intensifying with a direct impact on health on a regional level.¹ Washington has seen an increase in climate related illnesses including but not limited to heat related illnesses, especially during extreme heat events. During the heat dome of 2021, over 400 Washingtonians lost their lives due to heat related illnesses. Extreme heat disproportionately impacts children, pregnant individuals, the elderly, outdoor workers, people with disabilities, low-income communities and historically marginalized communities.² Coordinated efforts across sectors are needed to prevent and respond to the health effects of extreme heat, including early detection and warning systems, preventative education and communication with communities at highest risk, and standardized clinical protocols for reducing risk related to heat exposure.

Aim

To prevent and reduce heat-related disease burden in Washington state, especially for vulnerable groups.

Purpose

To propose evidence-informed guidelines to the full Bree Collaborative on practical and evidence-informed methods for reducing heat-related disease burden, including:

- Defining topic area and scope.
- Improving access to and use of protocols for clinicians and healthcare teams to identify patients at risk for heat-related illness, evidence-informed patient education and counseling, and strategies to reduce risk, especially for heat vulnerable groups.
- Improve uptake of extreme heat resilience for health systems, including identification of heat vulnerable populations, planning for uninterrupted delivery of healthcare services, and infrastructure.
- Amplify effective and culturally and linguistically appropriate communication and education strategies to increase patient and public awareness around health risks associated with heat.
- Communication, coordination and data sharing across systems, organizations and jurisdictions to prevent and respond to negative health impacts of extreme heat.
- Funding mechanisms for high-quality care and public health strategies for extreme heat, such as cooling centers and air conditioners
- Reinforce guidelines pertaining to the effects of urban heat islands and considerations for rural communities.
- Review and uplift concerns for populations with overlapping inequities who are disproportionately affected by climate change (e.g., comorbidities, social and economic drivers of health)
- Address wildfire smoke considerations as they overlap with the considerations for extreme heat.

Duties & Functions

The workgroup will:

- Research evidence-informed and expert-opinion informed guidelines and best practices (emerging and established).
- Identify current barriers and future opportunities for implementing interventions.
- Consult relevant professional associations and other stakeholder organizations and subject matter experts for feedback, as appropriate.
- Meet for approximately nine to twelve months, as needed.
- Provide updates at Bree Collaborative meetings.
- Post draft report(s) on the Bree Collaborative website for public comment prior to sending report to the Bree Collaborative for approval and adoption.
- Present findings and recommendations in a report.
- Recommend data-driven and practical implementation strategies including metrics or a process for measurement.
- Revise this charter as necessary based on the scope of work.
- Identifying measures and metrics that are meaningful to understand the effectiveness of guidelines.
- Identifying implementation strategies for guidelines

Structure

The workgroup will consist of individuals confirmed by Bree Collaborative members or appointed by the chair of the Bree Collaborative. The Bree Collaborative director and program coordinator will staff and provide management and support services for the workgroup. Less than the full workgroup may convene to: gather and discuss information; conduct research; analyze relevant issues and facts; or draft recommendations for the deliberation of the full workgroup. A quorum shall be a simple majority and shall be required to accept and approve recommendations to send to the Bree Collaborative.

Meetings

The workgroup will hold meetings as necessary. Bree Collaborative staff will conduct meetings, arrange for the recording of each meeting, and distribute meeting agendas and other materials prior to each meeting. Additional workgroup members may be added at the discretion of the Bree Collaborative director.

Name	Title	Organization
Christopher Chen, MD (chair)	Medical Director for Medicaid	Washington Health Care Authority
Brad Kramer, PhD	Program Manager	Public Health Seattle King County
Kristina Petsas	Chief Medical Officer for Employer and Individual Plans	UnitedHealthcare
Bre Holt	Senior Director Population Health	Comagine Health
Jessi Kelly	Research Coordinator	UW Collaborative for Extreme Event Resilience
Stefan Wheat, MD	Emergency Medicine Physician	University of Washington

Raj Sundar, MD	Family Medicine Physician	Kaiser Permanente
Jessica Symank/Amy Anderson	Senior Director, Safety and Quality and Rural Programs/Director, Opioid Harm Prevention and Hospital Quality	Washington State Hospital Association
Kelly Naismith	Climate Change and Health Epidemiologist Supervisor	Department of Health
LuAnn Chen, MD, MHA	Medical Director	Community Health Plan of Washington
June Spector, MD, MPH	Internal Medicine Physician/Scientist	Washington Labor & Industries
Mary Beth Bennett, MD	General Pediatrician	Kaiser Permanente
Seth Doyle, MA	Director of Strategic Initiatives/President	Northwest Regional Primary Care Association/Washington Association of Public Health
Raymond Moeller		Medical Reserve Corps
Yonit Yogev		Medical Reserve Corps, Thurston County
Brian Henning, MD	Director	Gonzaga Institute for Climate, Water, and the Environment
Onora Lien	Executive Director	Northwest Healthcare Response Network

References

- ⁱ Centers for Disease Control and Prevention. (n.d.). Extreme heat and your health. Retrieved from <https://www.ready.gov/heat>
- ⁱⁱ National Aeronautics and Space Administration (NASA). (n.d.). Temperatures rising: NASA confirms 2024 warmest year on record. Retrieved from <https://www.nasa.gov/news-release/temperatures-rising-nasa-confirms-2024-warmest-year-on-record/>
- ⁱⁱⁱ National Oceanic and Atmospheric Administration. (2021). Heat wave: A major summer killer. Retrieved from [Severe Weather Awareness - Heat Waves](#)
- ^{iv} Center for Health Statistics. (2023, April). Mortality data. Division of Disease Control & Health Statistics, Washington State Department of Health
- ^v Washington State Department of Health. (2023). *Excess mortality report brief*. Retrieved from [Excess Mortality Report Brief \(wa.gov\)](#)
- ^{vi} University of Washington. (2023). *CIG report: Heat*. Retrieved from <https://www.uw.edu/CIG-Report-Heat-202-pages.pdf> [CIG-Report-Heat-202-pages.pdf \(uw.edu\)](#)
- ^{vii} Liu, Y., & Sinsky, E. (2020). *Mortality associated with wildfire smoke exposure in Washington State, 2006–2017: A case-crossover study*. *Environmental Health*. Retrieved from <https://link.springer.com/article/10.1186/s12940-020-00682-5>
- ^{viii} Gan, R. W., Ford, B., Lassman, W., Pfister, G., Vaidyanathan, A., Fischer, E., Volckens, J., Pierce, J. R., & Magzamen, S. (2017). Comparison of wildfire smoke estimation methods and associations with cardiopulmonary-related hospital admissions. *GeoHealth*, 1(3), 122–136. <https://doi.org/10.1002/2017GH000073>
- ^{ix} Chen C, Schwarz L, Rosenthal N, Marlier ME, Benmarhnia T. Exploring spatial heterogeneity in synergistic effects of compound climate hazards: Extreme heat and wildfire smoke on cardiorespiratory hospitalizations in California. *Sci Adv*. 2024 Feb 2;10(5):eadj7264. doi: 10.1126/sciadv.adj7264. Epub 2024 Feb 2. PMID: 38306434; PMCID: PMC10836726.
- ^x Ma Y, Zang E, Liu Y, Wei J, Lu Y, Krumholz HM, Bell ML, Chen K. Long-term exposure to wildland fire smoke PM2.5 and mortality in the contiguous United States. *medRxiv [Preprint]*. 2024 Jun 11:2023.01.31.23285059. doi: 10.1101/2023.01.31.23285059. PMID: 36778437; PMCID: PMC9915814.
- ^{xi} Hess, J. J., Errett, N. A., McGregor, G., Busch Isaksen, T., Wettstein, Z. S., Wheat, S. K., & Ebi, K. L. (2023). Public Health Preparedness for Extreme Heat Events. *Annual review of public health*, 44, 301–321. <https://doi.org/10.1146/annurev-publhealth-071421-025508>
- ^{xii} Centers for Disease Control and Prevention. (n.d.). Extreme heat and your health. Retrieved from <https://www.ready.gov/heat>
- ^{xiii} National Oceanic and Atmospheric Administration. (2021). Heat wave: A major summer killer. Retrieved from [Severe Weather Awareness - Heat Waves](#)
- ^{xiv} World Meteorological Organization. (2021). 2020 was one of three warmest years on record. Retrieved from [2020 was one of three warmest years on record \(wmo.int\)](#)
- ^{xv} National Oceanic and Atmospheric Administration. (2021). Assessing the U.S. climate in 2021. Retrieved from [Assessing the U.S. Climate in 2021 | News | National Centers for Environmental Information \(NCEI\) \(noaa.gov\)](#)
- ^{xvi} Center for Health Statistics. (2023, April). Mortality data. Division of Disease Control & Health Statistics, Washington State Department of Health
- ^{xvii} Washington State Department of Health. (2023). *Excess mortality report brief*. Retrieved from [Excess Mortality Report Brief \(wa.gov\)](#)
- ^{xviii} U.S. Department of Agriculture Climate Hubs. (2021). *2021 Northwest heat dome: Causes, impacts and future outlook*. Retrieved from [2021 Northwest Heat Dome: Causes, Impacts and Future Outlook | USDA Climate Hubs](#)
- ^{xix} University of Washington. (2023). *CIG report: Heat*. Retrieved from <https://www.uw.edu/CIG-Report-Heat-202-pages.pdf> [CIG-Report-Heat-202-pages.pdf \(uw.edu\)](#)
- ^{xx} Liu, Y., & Sinsky, E. (2020). *Mortality associated with wildfire smoke exposure in Washington State, 2006–2017: A case-crossover study*. *Environmental Health*. Retrieved from <https://link.springer.com/article/10.1186/s12940-020-00682-5>

- ^{xxi} Gan, R. W., Ford, B., Lassman, W., Pfister, G., Vaidyanathan, A., Fischer, E., Volckens, J., Pierce, J. R., & Magzamen, S. (2017). Comparison of wildfire smoke estimation methods and associations with cardiopulmonary-related hospital admissions. *GeoHealth*, 1(3), 122–136. <https://doi.org/10.1002/2017GH000073>
- ^{xxii} Chen C, Schwarz L, Rosenthal N, Marlier ME, Benmarhnia T. Exploring spatial heterogeneity in synergistic effects of compound climate hazards: Extreme heat and wildfire smoke on cardiorespiratory hospitalizations in California. *Sci Adv*. 2024 Feb 2;10(5):eadj7264. doi: 10.1126/sciadv.adj7264. Epub 2024 Feb 2. PMID: 38306434; PMCID: PMC10836726.
- ^{xxiii} Ma Y, Zang E, Liu Y, Wei J, Lu Y, Krumholz HM, Bell ML, Chen K. Long-term exposure to wildland fire smoke PM2.5 and mortality in the contiguous United States. *medRxiv [Preprint]*. 2024 Jun 11:2023.01.31.23285059. doi: 10.1101/2023.01.31.23285059. PMID: 36778437; PMCID: PMC9915814.
- ^{xxiv} Austin E, Kasner E, Seto E, Spector J. Combined Burden of Heat and Particulate Matter Air Quality in WA Agriculture. *J Agromedicine*. 2021 Jan;26(1):18-27. doi: 10.1080/1059924X.2020.1795032. Epub 2020 Jul 30. PMID: 32730190; PMCID: PMC8171194.
- ^{xxv} **National Weather Service. (n.d.). NWS HeatRisk. Weather Prediction Center.** Retrieved January 15, 2025, from <https://www.wpc.ncep.noaa.gov/heatrisk/>
- ^{xxvi} Aguilera, R., Corringham, T., Gershunov, A. et al. Wildfire smoke impacts respiratory health more than fine particles from other sources: observational evidence from Southern California. *Nat Commun* 12, 1493 (2021). <https://doi.org/10.1038/s41467-021-21708-0>
- ^{xxvii} **U.S. Environmental Protection Agency. (n.d.). AQI Basics. AirNow.** Retrieved January 15, 2025, from <https://www.airnow.gov/aqi/aqi-basics/>
- ^{xxviii} The Lancet. (2021). *Hot weather and heat extremes: Health risks*. Retrieved from [Hot weather and heat extremes: health risks - The Lancet](#)
- ^{xxix} Andrew J. Wilson et al. ,Heat disproportionately kills young people: Evidence from wet-bulb temperature in Mexico.*Sci. Adv.*10,eadq3367(2024).DOI:10.1126/sciadv.adq3367
- ^{xxx} World Health Organization. (2024). *Heat and health*. Retrieved from [Heat and health \(who.int\)](#)
- ^{xxxi} World Health Organization. (2024.). **Climate change and health: Heat and health**. Retrieved January 7, 2025, from <https://www.who.int/news-room/fact-sheets/detail/climate-change-heat-and-health>