

CLIMATE CHANGE AND RENAL HEALTH

Awareness and Education Toolkit For Healthcare Providers

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A toolkit to increase professional awareness and knowledge of climate change, including risk factors, signs and symptoms, social determinants of health, and patient quality of care issues.

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INTRODUCTION

Climate Change and Renal Health Awareness and Education Toolkit For Healthcare Providers (HCPs) targets climate change and kidney disease. The Toolkit will be launched in September 2021 to help the Central Texas Veterans Health Care System (CTVHCS), Temple facility move forward with efforts to inform both staff and Veterans of ways to prepare for projected climate change-heat impact on renal health.

This toolkit is designed to increase awareness of kidney disease and the seriousness of the disease, as well as to improve and expand kidney disease education to include the effects of climate change on health for both patients and HCPs, to help support providers, and ultimately to advance the quality of care for patients with kidney disease.

The Integrative Model for Environmental Health, which is a model designed to facilitate looking at environmental health problems in a comprehensive way, is utilized to help address kidney disease through the lens of climate change (Figure 1). Additionally, climate change and health care experts, nephrology and climate-health activists' input was integral in identifying areas of focus.

The project is conceived as a pilot project with an evaluation component to assess uptake and usability; if successful, the toolkit's production pipeline could be expanded to include other types of climate-health related conditions for daily clinical practice use and recommended as a cost-effective means of sharing locally-developed innovations across VA.

Globally, temperatures are not getting any cooler and kidney disease numbers are not getting smaller. Therefore, we must plan appropriately to manage this growing threat by raising HCP awareness about climate change and renal health, so that our communities, organizations, and patients can take action toward prevention and early detection.

The Toolkit is based on work supported, in part, by the Department of Veterans Affairs, but does not necessarily represent the views of the Department of Veterans Affairs or the United States Government.

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Jane Dixon, PhD, Ann Kurth, PhD, CNM, MPH, FAAN, Ricardo Correra-Rotter, MD, Fredrick Finkelstein, MD, Professor of Medicine and Nephrology, Jason Glaser, Founder and CEO of La Isla Network, and Chris Browne, PhD, Senior Lecturer and Sub Dean The Australian National University.

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One thing that I appreciate about CTVHCS team members, given your investment in primary care services, we all agree that our patients' health and well-being are of utmost importance. We want to ensure our patients and future generations have clean air to breathe, a safe place to live and play, and clean water to drink. That is why this toolkit is being implemented today.

It is my hope that this toolkit will not only inform and educate about the connection between climate change and health, but that it will also serve as a reference and an inspiration to ignite your professional journey in addressing and preparing your patients and the VA for related health impacts where all can flourish.

Christie Torres

Figure 1.

Working List of Questions for Analyzing an Environmental Health Problem

(from Dixon, J. K., & Dixon, J. P. (2002))

Domain	Core Questions and Example Questions
Physiological	<p>What is the problem?</p> <ul style="list-style-type: none">• What are actual or potential health effects?• What are the biological, chemical and physical properties of the agent?• How do people get exposed?• What happens in the body—that is, is there any accumulation in body tissue or measurable physiological changes?
Vulnerability	<p>Who is affected?</p> <ul style="list-style-type: none">• Are there groups of special concern, such as children, elderly, or people living in poor communities?• Are there individual characteristics (such as age, gender, health status) which may put people at special risk?• Are there community, socio-demographic, or cultural characteristics (such as race, ethnicity, SES, residence location) which may put people at special risk?• Do public policies allow or even promote different levels of risk?
Epistemological	<p>How does everyone know about this?</p> <ul style="list-style-type: none">• What is the common knowledge and level of public concern?• What messages come from corporations, environmental organizations, the media, health professionals, etc?• How do these messages relate to what is known or not known through science?• How might affected people acquire their sense of what is true?
Health Protection	<p>What do people do about it?</p> <ul style="list-style-type: none">• What do concerned people do to avoid exposure to the hazard or reduce own risk?• What do people do collectively to reduce the hazard and improve the healthiness of the environment for the community?• What can health care providers do?

Using the Toolkit

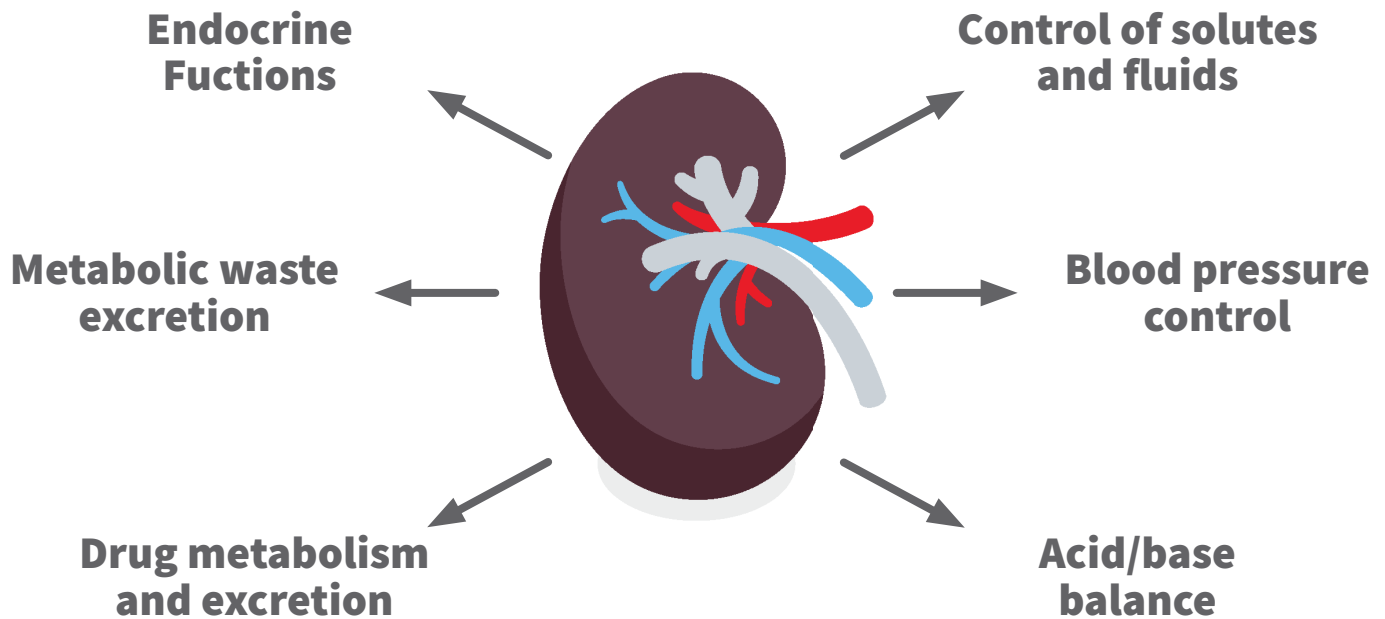
This toolkit was designed to be used as an electronic educational resource. The Toolkit is hosted on a VA intranet SharePoint site accessible to all staff. Links are identified by blue text and an underline. To access any of these electronic links, simply click on the blue underlined text to be taken to the appropriate location, either with the document or the web.

List of acronyms used in this toolkit

AKI	acute kidney injury	IPCC	Intergovernmental Panel on Climate Change
AMA	American Medical Association	ISN	International Society of Nephrology
AAFP	American Academy of Family Physicians	KDIGO	Kidney Disease Improving Global Outcomes
ASN	American Society of Nephrology	NIDDK	National Institute of Diabetes and Digestive and Kidney Diseases
CDC	Centers for Disease Control and Prevention	NIH	National Institute of Health
CKD	chronic kidney disease	NIOSH	National Institute for Occupational Safety and Health
CKDu	chronic kidney disease of unknown origin	NSAIDs	non-steroidal anti-inflammatory drugs
eGFR	estimated glomerular filtration rate	PAHO	Pan American Health Organization
ESRD	end stage renal disease	SDOHs	social determinants of health
HCPs	healthcare professionals	QI	Quality Improvement
HEDIS	Health Plan Employer Data Information Set	WBGT	Wet Bulb Globe Temperature
HI	Heat Index	WHO	World Health Organization
HELI	Health and Environment Linkages Initiative		
ICN	International Council of Nurses		

THE FUNCTION OF THE KIDNEYS ILLUSTRATION

In general, the role of the kidney is to maintain blood volume to support blood pressure as well as extracellular and intracellular osmolarity that allows for normal metabolism. Another important function of the kidney is urinary concentration, in which it minimizes fluid loss while assuring the excretion of nitrogenous wastes.



The Functions of the kidneys.(2019). Retrieved July 29, 2021, from: <https://www.news-medical.net/health/What-do-Kidneys-do.aspx>

KIDNEY DISEASE DEFINITION AND OVERVIEW

The 2012 Kidney Disease Improving Global Outcomes (KDIGO) defines kidney disease as a general term for a group of disorders affecting kidney structure and function. Abnormalities in kidney function greater than 3 months is chronic, while 3 months or less is defined as acute. ¹

Overview

Kidney disease is a worldwide health crisis and is one of the most common diseases worldwide. More than 1 in 7, U.S. adults or 37 million people, are estimated to have some form of kidney disease.² As many as 9 in 10 adults with kidney disease do not know they have kidney disease.² Because kidney disease can silently progress to advanced stages, early detection is critical for initiating timely interventions.^{2,3}

Although often considered a consequence of other chronic conditions such as diabetes (DM) or hypertension (HTN), the roles of social, economic, and environmental in the kidney disease epidemic are becoming increasingly apparent. Kidney disease is also impacted by socioeconomic disparities, including limited access to good health care and sub-standard housing; as well as environmental factors such as poor hydration in people who perform activities in hot environments for prolonged periods of time.⁴

Regardless of the cause for kidney disease, all types of kidney diseases share a common feature that result in persistent abnormalities in renal structure and/or estimated glomerular filtration rate (eGFR).⁴ The etiology of kidney disease consists of 3 main mechanisms: prerenal, intrinsic, and obstructive.

Pre-renal injury is associated with renal hypoperfusion and decreased eGFR more commonly occurs in the setting of gastrointestinal losses or heat stress and dehydration. Medications like diuretics and nonsteroidal anti-inflammatory drugs also lower renal perfusion.

Intrinsic renal injury includes diseases of the kidney itself, predominately affecting the glomerulus or tubule.

Post-renal injury is caused by urinary obstruction, such as kidney stones. Obstruction of the urinary tract initially causes an increase in tubular pressure, which decreases the filtration driving force.

<https://www.aafp.org/afp/2000/0401/p2077.html>

Kidney disease is:

- complex
- with several potential causes
- classified according to elevations in serum creatinine and/or urine output
- with a variety of different clinical presentations
- under-recognized by both patients and health care professionals when compared with awareness of DM or HTN

Once kidney disease is detected, primary care management should consider reversible cause and reducing risk factors, with the ultimate goal to slow kidney decline and maintain kidney function.⁴ Although kidney function usually returns back to normal after an acute kidney injury, patients may progress to chronic kidney disease (CKD) and even end stage renal disease (ESRD) and require advanced therapy like dialysis; therefore, regular follow-up in primary care is recommended. ^{2,3}

Click here to read: *The Lancet Kidney Campaign*

<https://www.thelancet.com/campaigns/kidney>

The Lancet Kidney Campaign builds on the International Society of Nephrology's initiative to eliminate preventable deaths from acute kidney injury by 2025.

MEASURING THE BURDEN OF KIDNEY DISEASE

The purpose of this section is to provide sources for statistical information concerning the occurrence of and mortality associated with kidney disease, heat-associated kidney disease resulting from occupational and environmental trends, and the regional impact of climate change.

Internet Resources

AGENCY FOR HEALTHCARE RESEARCH AND QUALITY

STATE DASHBOARD

<https://nhqrnet.ahrq.gov/inhqrdr/Texas/dashboard>

The State Dashboard allows one to compare the different states and their CKD performance measures.

AMERICAN SOCIETY OF NEPHROLOGY (ASN)

ASN KIDNEY DISEASE STATISTICS – UPDATED ANNUALLY

<https://www.asn-online.org/policy/fact-sheets.aspx>

MONITORING KIDNEY DISEASE PUBLIC AWARENESS AND ABSTRACT

<https://www.asn-online.org/education/kidneyweek/2020/program-abstract.aspx?controlId=3464251>

The American Society of Nephrology works with governmental agencies to derive their annual statistics for kidney diseases. This update also includes data on burden, risk factors, and care of kidney disease in the U.S.

CENTERS FOR DISEASE CONTROL AND PREVENTION

CDC'S ESRD SURVEILLANCE SYSTEM BY STATE

<https://nccd.cdc.gov/ckd/detail.aspx?Qnum=Q69>

FASTSTATS

<https://www.cdc.gov/nchs/fastats/kidney-disease.htm>

This online site includes at-a-glance statistics on kidney disease mortality, health care use, and mortality. Web links to the data sources are included, as well as related links.

PICTURE OF AMERICA AND KIDNEY DISEASE QUICK FACTS

https://www.cdc.gov/pictureofamerica/pdfs/picture_of_america_chronic_kidney_disease.pdf

HEAT CAN IMPACT OUR HEALTH IN MANY WAYS

https://www.cdc.gov/climateandhealth/pubs/EXTREME-HEAT-Final_508.pdf

PROJECTING CLIMATE-RELATED DISEASE BURDEN

https://www.cdc.gov/climateandhealth/pubs/projectingclimaterelateddiseaseburden1_508.pdf

This section presents data for climate-related disease burden, including extreme heat and kidney disease.

HEALTH, UNITED STATES

<https://www.cdc.gov/nchs/hus/index.htm>

A detailed report of the health of those living in the U.S. that can be used to address social health determinants, as well as provides an annual snapshot of the health of the entire Nation.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

THE REGIONAL IMPACTS OF CLIMATE CHANGE: AN ASSESSMENT OF VULNERABILITY

<https://www.ipcc.ch/report/the-regional-impacts-of-climate-change-an-assessment-of-vulnerability/>

The IPCC has become standard works of reference, widely used by policymakers, scientists and other experts. This report explores the regional impacts of climate and the vulnerabilities of each region as a result of climate change.

NATIONAL CENTER FOR HEALTH STATISTICS

<https://www.cdc.gov/about/organization/cio-orgcharts/nchs.html>

The National Center for Health Statistics' website is another resource of information regarding the health of the Nation—a critical element of public health and public health policy.

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

<https://www.niddk.nih.gov/health-information/health-statistics/kidney-disease>

The NIDDK focuses its efforts on kidney disease in order to reduce the burden of disease and improve public health. NIDDK achieves its mission to lower the incidence and impact of kidney disease by developing outreach programs, calling for continued research efforts, and educating both health care professionals and the general public about kidney disease.

CLIMATE CHANGE AND RENAL HEALTH QUESTIONS

Because the kidney has a unique role in providing protection from heat and dehydration and is an important site of heat stress related illness, a significant concern is climate change. Given the rise in higher temperatures and health impacts, it is important for HCPs to understand how climate change influences health and what symptoms are aggravated by changes in the environment. This toolkit will review the impact of the rising temperatures and more frequent heat waves on renal health.



If you are unable to answer all the questions, then it's time to start talking about climate change and renal health!

WHAT IS THE PROBLEM?

The World Health Organization calls climate change, resulting in higher temperatures and health impacts, one of the top 10 public health threats. The increasing exposures to poor air quality, extreme weather events, heat waves, and vector-borne diseases, affect population health and well-being and estimate to cause over 150,000 deaths annually each year.^{7,8}

THE HEALTH AND ENVIRONMENT LINKAGES INITIATIVE (HELI)

<https://www.who.int/heli/risks/climate/climatechange/en/>

WHOS TOP 10 THREATS TO GLOBAL HEALTH

<https://www.advisory.com/en/daily-briefing/2020/01/15/who-health-challenges>

THE FOURTH NATIONAL CLIMATE ASSESSMENT REPORT

<https://nca2018.globalchange.gov/chapter/front-matter-guide/>

WATCH A SHORT VIDEO ABOUT CLIMATE-RELATED HEALTH EFFECTS AND WHAT COMMUNITIES CAN DO TO PREPARE

<https://youtu.be/k6rhk-MlYxs>

Extreme Heat and Heat Waves

According to CDC, extreme heat is defined as temperatures that are hotter and/or humid than average during summer months. Extreme summer heat is increasing in the U.S., and climate projections indicate that extreme heat events will be longer, more severe, and more frequent in coming decades. Single events of heat waves can last weeks and result in significant excess heat-related injury and mortality.

In general, there is no universally accepted definition of a heat wave. However, as used in the public health arena, heat waves, are generally understood to be acute periods of extreme heat for a given area, lasting at least 48 hours, and are associated with a focus on their impacts on human health.⁹

What Are The Actual or Potential Health Effects?

Extreme heat can cause heat stress and heat stroke, and other pollutants in the air can trigger asthma, and exacerbate kidney, cardiovascular and respiratory diseases. Extreme heat may also result in reduced access to fresh nutritious foods, water insecurity, fewer opportunities for physical activity, greater exposure to environmental toxins, and stress to mental health and well-being (see Figure 2).¹⁰ Heat waves are also associated with increased hospital admissions for cardiovascular, kidney, and respiratory disorders.

Click here to read more about Extreme Heat:

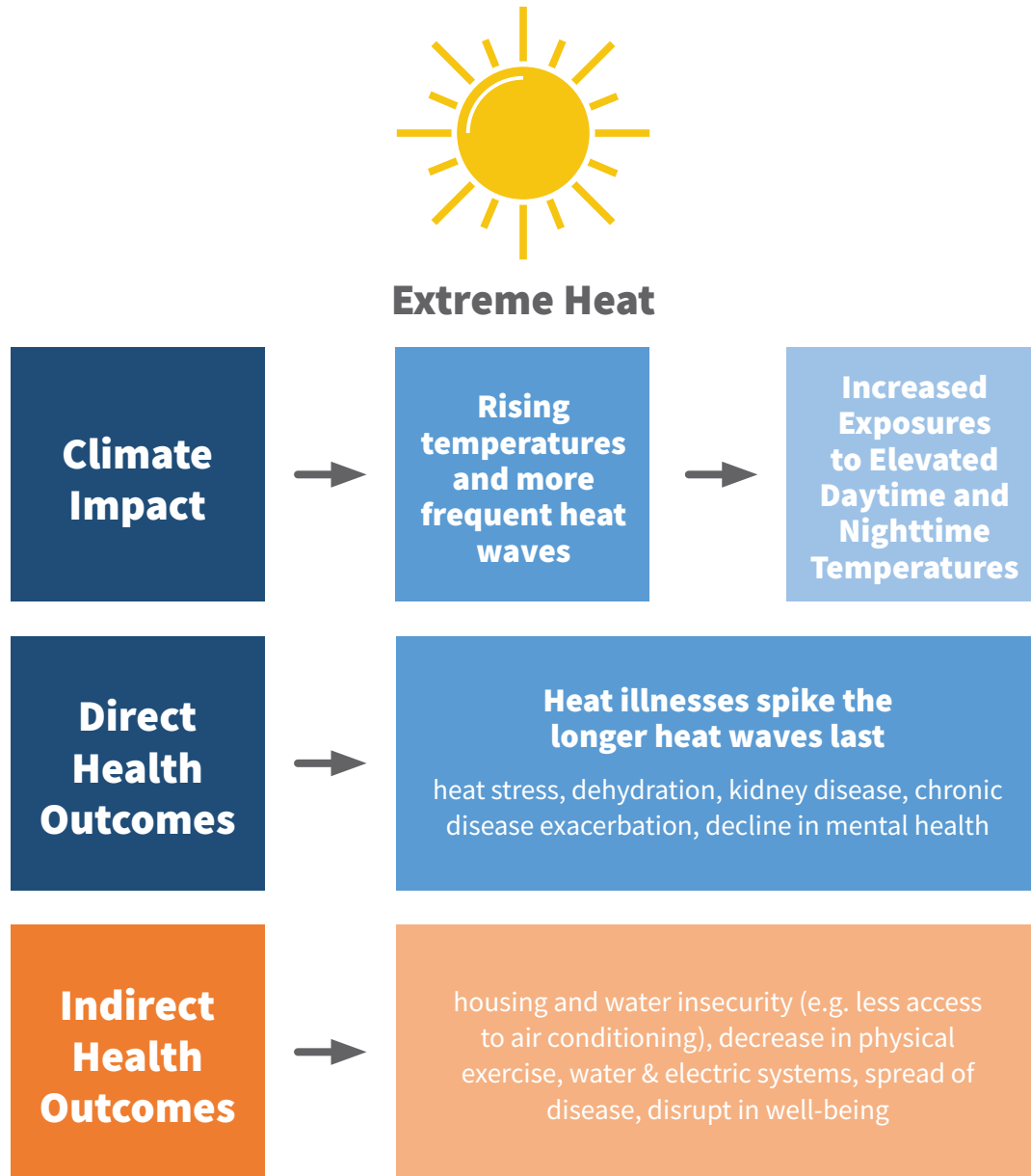
https://www.cdc.gov/disasters/extremeheat/heat_guide.html

Rising Temperatures and Kidney Disease

As previously mentioned, exposure to high heat temperatures, can increase one's risk for kidney disease. In fact, there is extensive evidence that shows extreme heat due to climate change is a huge threat to renal health. Heat stress and associated dehydration can exacerbate existing renal disease and may be linked to new epidemics of kidney disease among individuals around the world without other traditional risk factors.

Figure 2.

Climate Change and Direct & Indirect Impacts On Health Illustration



It is worth to talk to your patients about climate-health!

Internet Resources

The complex connections between climate change, heat extremes and health are easily explained with the fact-based resources which you can view and/or download below:

ALLIANCE OF NURSES FOR HEALTHY ENVIRONMENTS

CLIMATE CHANGE

The Alliance of Nurses for Health Environments is a national organization and offers many helpful resources to support healthcare professionals engaged in clinical practice, education, and research. This website includes an education section, webinars, videos, and opportunities to participate in climate health and policy Work-Groups. Any and all nurses who are interested in the environment are welcome to join the Work Group sessions that best reflect their interests.

AMERICAN FAMILY PHYSICIAN

THE CHANGING CLIMATE: MANAGING HEALTH IMPACTS

<http://bentonfranklincms.com/wp-content/uploads/2020/02/Article-shared-by-Dr.-Cate.pdf>

Overview of climate health impacts and resources for HCPs.

CENTERS FOR DISEASE CONTROL

PREPARING FOR THE REGIONAL HEALTH IMPACTS OF CLIMATE CHANGE IN THE UNITED STATES

https://www.cdc.gov/climateandhealth/docs/Health_Impacts_Climate_Change-508_final.pdf

CDC is recognized as the nation's premiere health promotion, prevention, and preparedness agency, and provides access to health news and content to the public as well as access to tools and risk assessments. This section of the website includes a basic overview and summary by the CDC's Climate and Health Program, which supports states, counties, cities, tribes, and territories to assess how climate change will affect individual communities, vulnerable population groups, and climate change preparedness.

STORY MAP

<https://storymaps.arcgis.com/stories/8654cd23dc114cabbfbe8abaa7f00ffb>

CDC's Climate and Health Program Story Map show how some community and health systems are partnering together to prepare and respond to the increasing temperatures.

CLIMATE CENTRAL

EXTREME HEAT

<https://www.climatecentral.org/gallery/graphics/2020-days-above-thresholds>

Climate Central is aimed at providing resources and a forum for the community, as well as professionals engaged in clinical practice, education, and research related to the impacts of climate change on health. The site will include clinical updates, professional journals, and interactive links to other informational sites, such as featured research.

HEALTH VOICES FOR CLIMATE ACTION

U.S. CALL TO ACTION ON CLIMATE, HEALTH, AND EQUITY: A POLICY ACTION AGENDA

<https://climatehealthaction.org>

This section lists ten policy recommendations for our nation's leaders and HCPs to address climate change, health, and equity.

INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

FIFTH ASSESSMENT REPORT

<https://www.ipcc.ch/assessment-report/ar5/>

SIXTH ASSESSMENT REPORT

https://www.ipcc.ch/site/assets/uploads/2020/05/2020-AC6_en.pdf

IPCC is the leading international body for the assessment of climate change, with a goal to provide the world a scientific review of the current state of knowledge on climate change.

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASE (NIDDK)

CHRONIC KIDNEY DISEASES IN AGRICULTURAL COMMUNITIES

<https://www.niddk.nih.gov/news/meetings-workshops/2018/chronic-kidney-diseases-in-agricultural-communities-2018>

Short summary on the significant increase in the global burden of CKDu, primarily in agricultural communities.

NATIONAL INSTITUTES OF HEALTH (NIH)

KIDNEY DISEASE IN THE SETTING OF CLIMATE CHANGE

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4978060/>

Extensive overview of climate change and low water intake, in which are increasing our risk for dehydration-associated kidney diseases, including kidney stones, heat stroke, and CKD.

UNITED STATES GLOBAL CLIMATE REPORT PROGRAM (USGCRP)

IMPACTS, RISKS, AND ADAPTATION IN THE UNITED STATES: FOURTH NATIONAL CLIMATE ASSESSMENT

https://nca2018.globalchange.gov/downloads/NCA4_Report-in-Brief.pdf

USGCRP comprises of 13 federal agencies that conducts research on global change to help people and organizations across the country respond to the changes in the environment. This section of the website reviews the direct and indirect impacts of extreme heat on health.

CLIMATE CHANGE IMPACTS IN THE UNITED STATES: CLIMATE TRENDS AND REGIONAL IMPACTS

<https://www.globalchange.gov/sites/globalchange/files/NCA3-climate-trends-regional-impacts-brochure.pdf>

WORLD HEALTH ORGANIZATION (WHO)

CLIMATE CHANGE AND HEALTH

<https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>

The WHO Climate Change and Health Website offers basic information about climate change and health, with downloadable fact sheets.

THE 17 SUSTAINABLE DEVELOPMENT GOALS (SDG) AND THEIR RELEVANCE TO KIDNEY HEALTH

<http://www.who.int/bulletin/volumes/96/6/17-206441>

The section summaries kidney health-related opportunities to achieve SDG. In particular, SDG 7 reviews climate change likely increase the risk of kidney disease through multiple mechanisms, e.g. increases in food insecurity, the incidences of heat-related illness and infectious diseases.

WHO CALLS FOR URGENT ACTION TO PROTECT HEALTH FROM CLIMATE CHANGE-SIGN THE CALL.

<https://www.who.int/news/item/06-10-2015-who-calls-for-urgent-action-to-protect-health-from-climate-change-sign-the-call>

This section of the Climate Change and Health of the website includes information for HCPs on ways to promote climate health actions to improve and protect population health and well-being.

HOW DO PEOPLE GET EXPOSED?

The purpose of this section is to provide information to identify the various risk factors for heat-related kidney disease (both those that can be modified and those that cannot) and to explain the correlation between each risk factor and how that risk factor can lead to kidney disease.

Overview

You may be asking whether the increasing temperatures due to climate change affect kidney disease? The answer is yes. Heat extreme temperatures when combined with dehydration is a threat to renal health--directly causing or aggravating pre-existing kidney disease and increasing exposure to risk factors for kidney disease, particularly, acute kidney injury (AKI), chronic kidney disease (CKD), and kidney stones.^{14,15,16} It's because of this threat, experts predict the burden of kidney disease will likely rise if climate change continues, making the intersection of climate change and health a highly relevant clinical problem.

Climate-related health risks are unevenly distributed and create new inequities and exacerbate those that already exist. Most of these risks are projected to increase with the increasing temperatures.

Climate change will affect individuals and groups differently. Certain groups of people are particularly more sensitive to climate change impacts. Knowing all the risk factors for kidney disease is significant, because environmental risk factors related to recurrent heat stress and poor fluid intake can lead to heatstroke.

Some factors that might increase the risk of developing a heat-related kidney disease include:

AGE

Older adults are particularly more vulnerable to heat-related health impacts due to potential increase in chronic existing medical condition(s) that changes normal body responses to high heat temperatures, dependency on nursing care, and the intake of certain medications like diuretics, as well as older adults living alone and with minimal family support.

PRE-EXISTING KIDNEY DISEASE

People in poor health, including individuals with chronic disease and/or pre-existing disease, mental health illness, or physical disabilities and/or mobility constraints are sensitive to the heat impacts.

POVERTY

Adults living in inequitable living conditions and/or with housing insecurity, often do not have air conditioning (AC) at home, as well as unsheltered homelessness-such as those sleeping in parks and vehicles or on streets are often impacted by heat extreme temperatures.

REGIONALLY

People in certain locations may be more exposed to climate change threats, other factors to consider include humidity, wind, and local level of climate preparedness for heat conditions.

PREGNANT WOMEN

Pregnant women, the developing baby, and young children are considered most vulnerable against the impact of heat extremes, in which are already marginalized in many countries around the world.

OUTDOOR AND MANUAL WORKERS

Outdoor laborers (i.e. farmers, agricultural workers, construction workers, postal workers, firefighters) are at greatest risk, especially if work tasks involve heavy exertion.

MEDICATIONS

Click below for a list of medications that impact thermoregulation.

<https://www.aafp.org/afp/2005/0601/p2133.html>

Read the Journal of Clinical Pharmacy and Therapeutics, Medicines can affect thermoregulation and accentuate the risk of dehydration and heat-related illness during hot weather. This is an article, which gives a succinct overview and lists medications that can increase the risk of dehydration and heat-related illness.

Access the article here: <https://onlinelibrary.wiley.com/doi/full/10.1111/jcpt.12294>

A list of medication commonly seen in the primary care setting associated with an increased risk of heat-related illness.

Antidepressants

- Tricyclic antidepressants (TCAs)
For example, amitriptyline.
These medications have strong anticholinergic effects.
- Selective serotonin reuptake inhibitors (SSRIs)
For example, sertraline, citalopram and escitalopram.
These medications has the potential to reduce alertness, judgement, and perception of hot weather.
- Serotonin and noradrenaline reuptake inhibitors (SNRIs)
For example, venlafaxine, duloxetine and desvenlafaxine.

Anticonvulsants

For example, pregabalin, gabapentin.
These medications have the potential to reduce alertness, judgement and perception of hot weather.

Diuretics, ACE inhibitors, ARBS, and other medications for hypertension

These medications can cause hypovolemia, dehydration, electrolyte imbalances, as well as reduced thirst sensation.

Benzodiazepines and opioids

These medications reduce alertness, judgement and perception of hot weather.

Other medications

Laxatives
Morphine
Metformin
Oral anticoagulants
Oxycodone

Internet Resources

CENTERS FOR DISEASE CONTROL AND PREVENTION

EXTREME HEAT AND RISK FACTORS

<https://www.cdc.gov/climateandhealth/pubs/extreme-heat-guidebook.pdf>

Overview of climate-health risk factors, including several fact sheets.

<https://www.cdc.gov/niosh/mining/UserFiles/works/pdfs/2017-125.pdf>

Overview of heat stress risk factors, including case study and lessons learned.

<https://www.cdc.gov/niosh/topics/heatstress/heatapp.html>

Overview of the National Institute for Occupational Safety and Health (NIOSH) Heat Safety Tool App, which can be utilized as a patient resource in planning outdoor work activities.

HEAT & HEAT-RELATED ILLNESS

<https://www.cdc.gov/nceh/tracking/topics/Heat.htm>

The basics on heat stress, including links to other sections of the website related to temperature and heat projections, heat-related mortality, and heat-related hospitalizations.

FAMILY PRACTICE NOTEBOOK

<https://fpnotebook.com/ER/Environ/HtllnsRskFctrs.htm>

Extensive overview of heat illness and risk factors and vulnerable populations.

NATIONAL COLLABORATING CENTRE FOR ENVIRONMENTAL HEALTH

VULNERABLE POPULATIONS

<https://nceh.ca/content/vulnerable-populations>

Climate-health resources for health care professionals.

NATIONAL LIBRARY OF MEDICINE

MEDLINEPLUS-NIDDK SECTION

<https://magazine.medlineplus.gov/nih/niddk/>

Medline Plus also contains extensive information about climate change and health impacts.

More readings on kidney disease that can be downloaded and used to explain the correlation between risk factors and heat extremes and lessons learned.

<https://pubmed.ncbi.nlm.nih.gov/21005411/>

Pierce and Bloom (1945), one of the first observations linking occupational heat exposure with kidney stones among American troops, found a high prevalence of kidney stones among troops in a desert than that in a mountainous area.

<https://pubmed.ncbi.nlm.nih.gov/16890219/>

The European heat wave of 2003, thought to be that continent's warmest period of extreme heat, the confirmed all-cause mortality due to extreme heat was between 29,817 and 30,617 with kidney failure and dehydration recognized as prominent causes among the elderly.

SIGNS AND SYMPTOMS

The purpose of this section is to list the signs and symptoms of heat stress/dehydration for rapid identification and treatment in the prevention of kidney disease. Heat-related kidney disease is PREVENTABLE!

Overview

Heat stress can manifest in a variety of ways such as fatigue, headache, muscle cramps, weakness, nausea, vomiting, tachycardia, hypotension, and altered mental status. It is variable and is affected by heat acclimation, pre-existing diseases like diabetes, clothing, age and level of physical activity.

Internet Resources

CENTERS FOR DISEASE CONTROL AND PREVENTION

AVOID SPOT TREAT: HEAT STROKE & HEAT EXHAUSTION

<https://www.cdc.gov/cpr/infographics/ast-heat.htm>

Signs and symptoms poster that can be downloaded and printed.

LEARN TO RECOGNIZE HEAT STRESS

<https://www.cdc.gov/disasters/extremeheat/warning.html>

This website includes general information about heat stress, including a fact sheet on heat stress signs and symptoms.

Fact Sheet: <https://www.cdc.gov/niosh/docs/2010-114/pdfs/2010-114.pdf>

NORTH CAROLINA FARMWORKER HEALTH MODULES

QUIZ ON HEAT ILLNESS

<https://www.ncfhp.org/wp-content/uploads/2016/09/Heat-Illness.pdf>

Do you know all the heat stress warning signs? Take this quiz and find out!

UNITED STATES DEPARTMENT OF LABOR

WATER, REST SHADE

<https://www.osha.gov/heat>

This website includes free educational heat stress resources for both the public and health care professionals, including infographics that can be downloaded and printed.

Heat stress happens fast. Most people have two or more signs. The most common signs are:

Sudden dizziness

Sudden nausea

Sudden confusion

Sudden loss of consciousness

Sudden hot, red, dry or damp skin

Sudden fast, strong pulse

Sudden heavy sweating during intense exercise

Sudden muscle pain or spasms

HEAT STRESS AND KIDNEY DISEASE ILLUSTRATION

To illustrate how extreme heat impacts renal health—whether it be a patient that works in construction during heat wave periods, or farming, or maybe you have a patient with inadequate home cooling methods—heat-related kidney disease happen when the body is not able to properly cool itself.

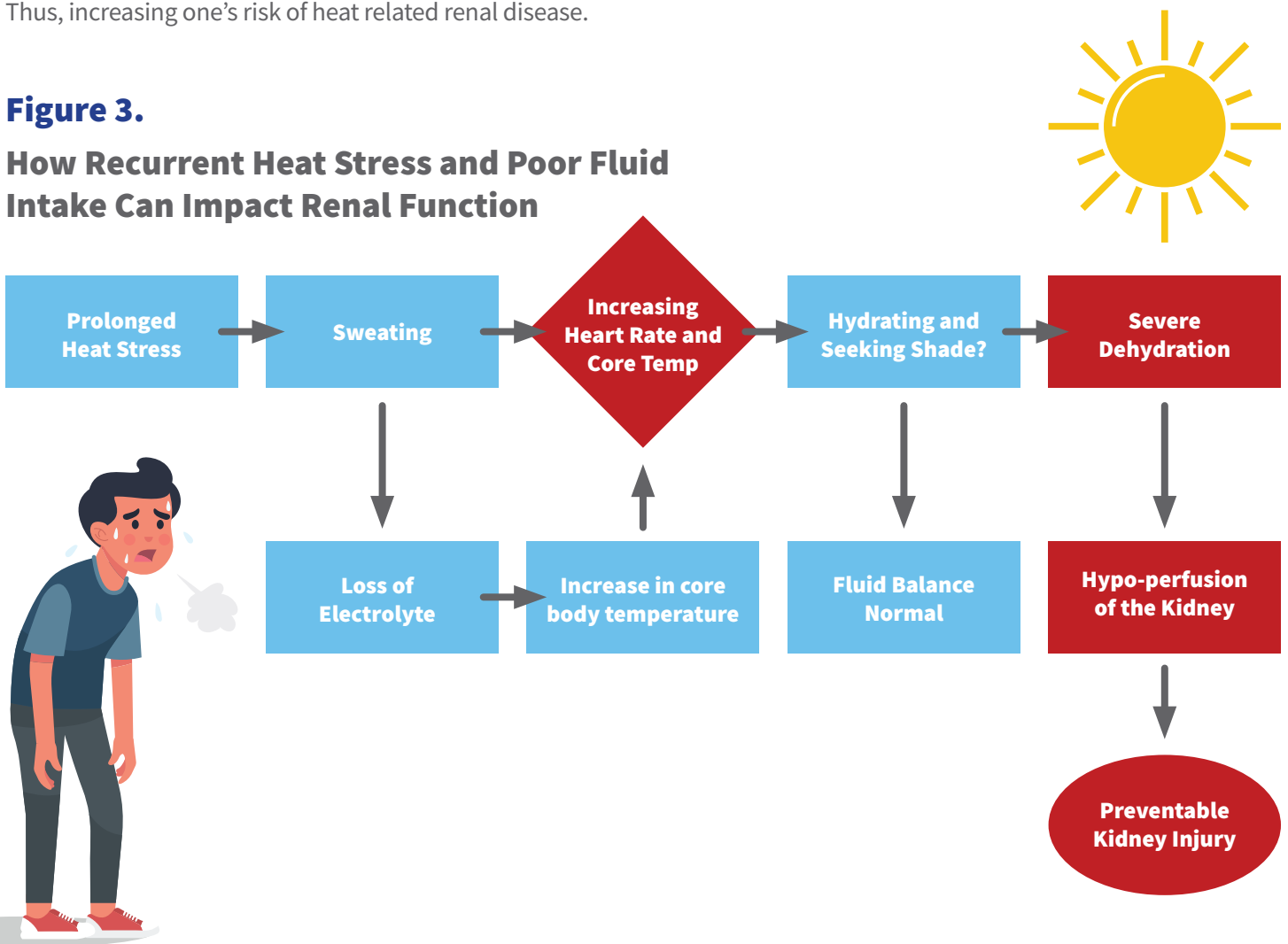
For example, the evaporation of sweat leads to the loss of vital electrolytes and body water—which both are responsible for body fluid balance.

If in this next step, it is not corrected and prolonged and/or recurrent heat stress continues, the body cannot get rid of excess heat quick enough—and sweat evaporation is then insufficient for cooling the body.

This then, can lead to the body’s increasing heart rate and core temperature, as well as the depletion of water and sodium—which, as of consequence leads to heat exhaustion and heatstroke and hypo-perfusion of the kidneys.

Thus, increasing one’s risk of heat related renal disease.

Figure 3.
How Recurrent Heat Stress and Poor Fluid Intake Can Impact Renal Function



CHRONIC KIDNEY DISEASE OF UNKNOWN ORIGIN

The purpose of this section is to raise awareness to Chronic kidney disease of unknown origin (CKDu), a form of CKD (or heat stress nephropathy) that remains largely unknown to the developed world even as it results in significant mortality and clustering of cases in the developing world.

This is important for you to know for several reasons. First, for most of the year in Texas, outdoor work is conducted in temperatures greater than 90 degrees. Next, the amount of growth with new construction is another factor of importance. In fact, in 2019, construction jobs were the number one labor for Texas Veterans. Last, there is movement from people living along border towns in South Texas moving and settling in Central Texas in search of work.



Click on the following 2019 report to read a summary on the top jobs found among Texas Veterans:

<https://gov.texas.gov/uploads/files/organization/twic/Veterans-Summary-2021.pdf>

Overview

Evidence suggests that CKDu is a disease of occupational origin that can be brought on by a combination of exposures: hot environments, physically demanding outdoor labor, recurrent dehydration, and effects of other nephrotoxic agents.^{17,18,19} Currently, the strongest hypothesis for CKDu is the heat stress due to climate change.



One of the major sites of this disease is along the Pacific Coast of Central America, developing among young, male sugarcane workers and others working in poor agricultural communities.^{21,22} The most vulnerable age group for CKDu is 40 to 60 years. The rates of CKD in these regions are higher than in the corresponding age-matched populations in the US.²³

There is no cure for CKDu; thus, a diagnosis of CKDu may constitute a death sentence for those living in communities where treatment is unavailable or unaffordable. If neither dialysis nor kidney transplantation is an option, the only treatment for CKDu is supportive care to maintain kidney function as much as possible, thereby, preventing further decline in kidney function.

Therefore, the International Society of Nephrology (ISN), the National Institute of Health (NIH), the WHO, and the Pan American Health Organization (PAHO) have issued statements emphasizing the need for international awareness of CKDu and it being a global research priority.

Now click on the following links to read more about CKDu:

BORDERLANDS ROAD TRIP: CHRONIC KIDNEY DISEASE OF UNKNOWN ORIGIN IN TEXAS

<https://www.migrantclinician.org/blog/2017/jul/borderlands-road-trip-chronic-kidney-disease-of-unknown-origin-in-texas.html>

LA ISLA NETWORK

<https://laislanetwork.org/media/gallery/>

CLIMATE CHANGE AND THE EPIDEMIC OF CKD FROM HEAT STRESS IN RURAL COMMUNITIES:

THE CASE FOR HEART STRESS NEPHROPATHY

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4974898/>

Internet Resources

CONSORTIUM FOR THE EPIDEMIC OF NEPHROPATHY IN CENTRAL AMERICA AND MEXICO (CENCAM)

MESOAMERICAN NEPHROPATHY/CKDU

<https://cencam.net>

CENCAM is an organization with a mission to contribute to knowledge on CKDu. This website provides engaging webinar series on CKDu and other important related to epidemiological studies as well.

INTERNATIONAL SOCIETY OF NEPHROLOGY

CKDu

<https://www.theisn.org/initiatives/what-is-ckdu/>

Overview of CKDu, its risk factors, and regional impact.

LA ISLA NETWORK

<https://laislanetwork.org>

La Isla Network is an organization focused on achieving macro-level change across continents to support and execute evidence-driven solutions to end CKDu. This website details the enormous health impact of CKDu. This is an interactive site that provides news and press coverage information, including a photo gallery and shared stories and knowledge from regions affected by the CKDu epidemic.

<https://laislanetwork.org/about-ckdu/>

This website includes general information about CKDu with links to additional resources.

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASES

CHRONIC KIDNEY DISEASE IN AGRICULTURAL COMMUNITIES

[https://www.kidney-international.org/article/S0085-2538\(19\)30781-1/fulltext](https://www.kidney-international.org/article/S0085-2538(19)30781-1/fulltext)

A report from a workshop from the Second International Workshop on CKDu

https://www.niehs.nih.gov/news/events/pastmtg/2019/ckd_2019/index.cfm

A report from a workshop from the Third International Workshop on CKDu

BRIDGING THE GAP ILLUSTRATION

Overview

Population exposure to heat is increasing due to climate change, and this trend will continue. Let's start bridging the gaps between the scientific knowledge of climate change, the health effects, and social justice. This is what bridging the gaps look like and it starts with YOU!

Figure 4.

Bridging the Gap

SCIENTIFIC KNOWLEDGE

Extreme heat is the number one weather-related cause of mortality each year in the United States and is among the top 10 worldwide causes of death by natural disasters. Heat extreme temperatures due to climate change combined with dehydration is a threat to renal health.

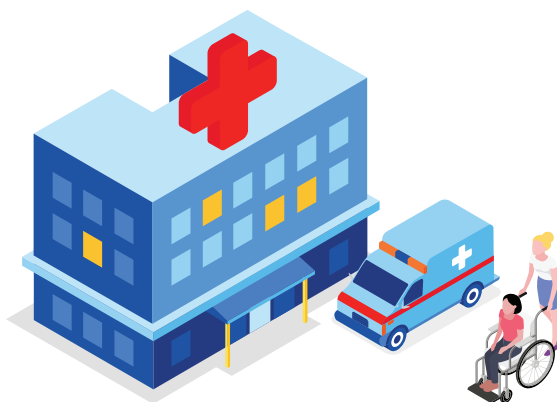
SOCIAL JUSTICE AND HEALTH EQUITY



COMMUNITY



HEALTH FACILITY



EXPOSURE TO EXTREME HEAT IS PREVENTABLE

We have a huge role to play in human health and care. Today, we are serving many people living in the community already—in the primary care clinic, as well as in people's workplaces, homes, schools, and faith-based organizations.

Environmental health is now in the domain of the health care professionals' role and practice in supporting patient care. We have immense potential in educating our patients about the human health impacts of climate change and the relationship between the exposures of climate change and where people live, work, labor and play.

HEAT EXTREME TEMPERATURES: CHARTS

The purpose of this section is to provide information on heat index and Wet Bulb Globe Temperature (WBGT) to determine when extra precautions are needed to protect patients from environmental contributions to heat-related illness.

Overview

The heat index and WBGT are both used to measure environmental temperature.

Heat index factors in actual air temperature and humidity-- and because its values are made to be used for shaded and light wind conditions, the exposure to full sun has the potential to increase heat index values by up to 15°F, limiting its usefulness when activities are being conducted in direct sunlight.

On the other hand, WBGT takes several variables into account to measure environmental heat stress. These variables include:

Temperature	Wind Speed	Humidity	Cloud Cover	Direct Radiant Sunlight	Activity
-------------	------------	----------	-------------	-------------------------	----------

Additionally, let's not forget that humidity has a major effect on cooling the body. In areas of high humidity, sweat on the surface of the skin does not evaporate as quickly, slowing the cooling of the body. In contrast in areas of low humidity, one's risk of dehydration is increased as a result of increased sweat evaporation. This is important because, impermeable chemical protective clothing and other personal protective equipment can affect the body's cooling by preventing sweat from evaporating. This is of high relevance for agricultural and outdoor workers—creating a dilemma of whether protective equipment is more risky or more protective. See charts below to help guide counseling efforts on exposure to extreme heat conditions and the prevention of heat stress, as well as the use of protective equipment depending on the WBGT reading during periods of extreme heat.

When to Use Heat Index

The heat index is recommended to be used as a screening tool, so that outdoor workers can more easily recognize when additional preventive options should be implemented—its simplicity of use and interpretation makes it an excellent option to talk to patients about heat stress prevention.

For example, as the heat index increases, HCPs can take the opportunity to discuss and raise awareness on the importance of rest breaks, shade, and hydration during outdoor activity.

Climate Change and Renal Health Script Example

“We are seeing more hot days in *insert your region or city, or state here* and the extreme heat is definitely a concern for people who work outdoors for long periods of time. I would like to take this time to briefly discuss with you some ways to make sure you are prepared and to make sure you are safe in this heat.”

A quick online communication guidance resource for HCP on climate change and health, click here:

https://climateforhealth.org/wp-content/uploads/2020/05/3_letstalk_health_and_climate.pdf

The below charts are also available in PDF format at:

<https://blogs.cdc.gov/niosh-science-blog/files/2017/05/heat-index.png>

<https://www.dtn.com/forget-heat-index-wet-bulb-globe-temperature-is-where-its-at/>

The National Weather Service uses the heat index values to issue the following heat alerts:

Figure 5.

NOAA's National Weather Service Heat Index

Temperature °F (°C)

	80(27)	82(28)	84(29)	86(30)	88(31)	90(32)	92(34)	94(34)	96(36)	98(37)	100(38)	102(39)	104(40)	106(41)	108(43)	110(47)
40	80(27)	81(27)	83(28)	85(29)	88(31)	91(33)	94(34)	97(36)	101(38)	105(41)	109(43)	114(46)	119(48)	124(51)	130(54)	136(58)
45	80(27)	82(28)	84(29)	87(31)	89(32)	93(34)	96(36)	100(38)	104(40)	109(43)	114(46)	119(48)	124(51)	130(54)	137(58)	
50	80(27)	83(28)	85(29)	88(31)	91(33)	95(35)	99(37)	103(39)	108(42)	113(45)	118(48)	124(51)	131(55)	137(58)		
55	80(27)	84(29)	86(30)	89(32)	93(34)	97(36)	101(38)	106(41)	112(44)	117(47)	124(51)	130(54)	137(58)			
60	82(28)	84(29)	88(31)	91(33)	95(35)	100(38)	105(41)	110(43)	116(47)	123(51)	129(54)	137(58)				
65	82(28)	85(29)	89(32)	93(34)	98(37)	103(39)	108(43)	114(46)	121(49)	128(53)	136(58)					
70	82(28)	86(30)	90(32)	95(35)	100(38)	105(41)	112(46)	119(48)	126(52)	134(57)						
75	84(29)	88(31)	92(33)	97(36)	103(39)	109(43)	116(47)	124(51)	132(56)							
80	84(29)	89(32)	94(34)	100(38)	106(41)	113(45)	121(49)	129(54)								
85	84(29)	90(32)	96(36)	102(39)	110(43)	117(47)	129(54)	135(57)								
90	86(30)	91(33)	98(37)	105(41)	113(45)	122(50)	135(57)									
95	86(30)	93(34)	100(38)	108(42)	117(47)	127(53)										
100	87(31)	95(35)	103(39)	112(44)	121(49)	132(56)										

Adapted from NOAA (2012).

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

CAUTION	EXTREME CAUTION	DANGER	EXTREME DANGER
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Figure 6.

Wet Bulb Globe Temperature (WBGT)

Temperature °F (°C)

	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95	96.8	98.6	100.4	102.2	104.0	105.8	107.6	109.4	111.2	113.0	114.8	116.6	118.4	120.2	122.0								
0	59.0	60.8	62.6	64.4	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2	104.0	105.8	107.6	109.4	111.2	113.0	114.8	116.6	118.4	120.2	122.0			
5	60.8	62.6	64.4	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2															
10	62.6	64.4	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2																
15	64.4	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2																	
20	66.2	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2																		
25	68.0	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2																			
30	69.8	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2																				
35	71.6	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4	102.2																					
40	73.4	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																							
45	75.2	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																								
50	77.0	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																									
55	78.8	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																										
60	80.6	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																											
65	82.4	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																												
70	84.2	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																													
75	86.0	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																														
80	87.8	89.6	91.4	93.2	95.0	96.8	98.6	100.4																															
85	89.6	91.4	93.2	95.0	96.8	98.6	100.4																																
90	91.4	93.2	95.0	96.8	98.6	100.4																																	
95	93.2	95.0	96.8	98.6	100.4																																		
100	95.0	96.8	98.6	100.4																																			

This table is compiled from an approximate formula which only depends on temperature and humidity. The formula is valid for full sunshine and a light wind. Table adapted from Bureau of Meteorology.

Figure 7.

Guidelines for athletes and those working outside depending on the WBGT

WBGT Reading	Level	Practice Hours	Activity and Break Guidelines	Fluids
Under 82.0	Green	Resume normal activities	Normal activities: Provide at least three separate rest breaks each hour of minimum duration of 3 minutes each during workout	Water or electrolyte drinks
82.0 - 86.9	Yellow	Use discretion for intense or prolonged exercise; watch at-risk players carefully	Provide at least three separate rest breaks each hour of a minimum of four minutes duration each	Water or electrolyte drinks
87.0 - 89.9	Orange	Maximum practice time is two hours	For Football: players restricted to helmet, shoulder pads, and shorts during practice. All protective equipment must be removed for conditioning activities. For all sports: provide at least four separate rest break each hour of a minimum of four minutes each.	Water or electrolyte drinks
90.0 - 92.0	Red	Maximum length of practice is one hour	No protective equipment may be worn during practice and there may be no conditioning activities. There must be 20-minutes of rest break provided during the hour of practice.	Water or electrolyte drinks
Over 92.1	Black	No outdoor workouts	Cancel exercise; delay practices until a cooler WBGT reading occurs	Water or electrolyte drinks

WHAT CAN PEOPLE DO ABOUT IT?

This purpose of this section is to explain the relevance of proper lifestyle modifications to help minimize the risk of heat-related kidney disease.

Overview

There is currently a drive for greater emphasis on climate change and health and the reduction of inequalities of health by engaging in patient education, providing behavioral change counseling, and screening for disease prevention. The use of climate-smart practices in the health care sector has the potential to save lives. Counseling patients on climate-health and targeting kidney disease during periods of heat extreme temperatures can lead to improved outcomes and advance health equity among susceptible individuals.

In fact, major professional organizations, such as the American Medical Association (AMA), the CDC, the IPCC, the United Nations Human Rights Council, the International Council of Nurses (ICN) and WHO, have issued statements emphasizing the need to educate the public and health care professionals about the health risks posed by climate change and to incorporate climate solutions into all health care and public health systems to improve human health outcomes and improve chronic disease prevention efforts—which should help to create and support a cultural shift to normalize climate health discussions, risk assessments, screenings and treatments among HCPs in the primary care setting.

Any member of the health care team who advocates for climate-smart practices can increase climate-health awareness to patients. Primary HCPs are trained professionals who guide care based on evidence-based information and have an opportunity to recognize health patterns and problems, connecting the dots between climate change and health.

In most cases, heat-related kidney disease is largely preventable. Kidney disease prevention efforts have largely focused on strategies to identify and screen those with traditional risk factors, like DM and HTN. An upstream approach within the spectrum of environmental health and increasing our focus on the social determinants of health (SDOH) as a factor in renal health may help create vital linkages between climate change and kidney disease—with the goal to have a more sustainable and equitable health care system that protects patients' health.

Social Determinants of Health

The American Academy of Family Physicians (AAFP) define SDOH as the conditions under which people are born, grow, live, work, and age. Addressing patients' SDOH by counseling patients on climate-related health risks is far better than the treatment of kidney disease and can advance health equity.

Determinants of Health	Risks	Addressing SDOH
<p>Physical Environment</p>	<ul style="list-style-type: none"> • Unsheltered homelessness-such as those sleeping in parks and vehicles or on streets • Adults living in inequitable living conditions and with limited access to cooling methods 	<ul style="list-style-type: none"> • Emphasize the prevention of heat stress, including moving to public cooling centers during heat waves, recognizing early symptoms and taking appropriate actions • Promote safe drinking water and adequate hydration
<p>Income and Social Status</p>	<ul style="list-style-type: none"> • Poverty 	<ul style="list-style-type: none"> • Addressing SDOH • Assess for housing insecurity and food and/or water insecurity
<p>Employment and Working Conditions</p>	<ul style="list-style-type: none"> • Hot environments, physically demanding outdoor labor and recurrent dehydration 	<ul style="list-style-type: none"> • Counsel patients about rest and shade • Promote protective gear and to avoid agrochemical exposure • Counsel on adequate heat acclimation, physical fitness, and the wearing of light-loose clothing during extreme heat events • Counsel patients to assess heat index before outdoor activity or work
<p>Social Support Networks</p>	<ul style="list-style-type: none"> • Older adults living alone and with minimal family support 	<ul style="list-style-type: none"> • Encourage family and caretakers to check in on vulnerable patients (i.e. older adults and homeless patients during extreme heat events)
<p>Personal Behavior and Coping Skills</p>	<ul style="list-style-type: none"> • Substance use and mental health issues 	<ul style="list-style-type: none"> • Counsel patients on the avoidance of nephrotoxic and herbal medications • Promote the avoidance of rehydrating with sodas and alcohol

Internet Resources

AMERICAN ACADEMY OF FAMILY PHYSICIANS

THE EVERYONE PROJECT: ADVANCING HEALTH EQUITY IN EVERY COMMUNITY

https://www.aafp.org/dam/AAFP/documents/patient_care/everyone_project/team-based-approach.pdf

The EveryOne Project: Advancing Health Equity in Every Community for Primary Care, published by the American Academy of Family physicians, is an overview of addressing SDOH in the primary care setting, in which includes AAFP's Framework for Addressing SDOH in Primary Care and other SDOH Resources.

UNITED STATES DEPARTMENT OF HEALTH AND HUMAN SERVICES: OFFICE OF DISEASE PREVENTION AND HEALTH PROMOTION

SOCIAL DETERMINANT OF HEALTH

<https://health.gov/healthypeople/objectives-and-data/social-determinants-health>

This site includes an overview of social determinant of health, including brochures, fact sheets, and resources with links for additional information.

REDUCE DISEASES AND DEATHS RELATED TO HEAT

<https://health.gov/healthypeople/objectives-and-data/browse-objectives/environmental-health/reduce-diseases-and-deaths-related-heat-eh-d02>

WORLD HEALTH ORGANIZATION

SOCIAL DETERMINANTS OF HEALTH

https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1

Comprehensive website with interactive sections and with links to downloadable publications on addressing SDOH and improving health disparity.

RENAL HEALTH RISKS DUE TO CLIMATE CHANGE

Health Equity

Vulnerable Population Groups

Addressing climate change represents a significant opportunity to improve public health and advance health equity.

Substance use and
mental health issues

Unsheltered
homelessness-such
as those sleeping in
parks and vehicles
or on streets

Older adults
living alone and
with minimal
family support

Adults living in
inequitable living
conditions and with
limited access to
cooling methods

50% of patients'
health can be
attributed to their
social, economic,
and physical
environment

Social Determinants of Health

The negative health consequences of climate change are rooted in social inequities in the **resources and opportunities needed to be as healthy as possible**.

The impact of climate change compound and exacerbate existing community vulnerabilities and prevent individuals facing structural disadvantage from achieving optimal health.

In fact, research shows that individuals and communities most vulnerable to the impacts of climate change are the least resourced to manage and recover from its effects.

This is particularly true for the elderly living alone and with minimal family support, individuals living in poverty or in communities with inequitable living conditions, such as people with limited access to cooling methods.

Other potential social determinants of health such as limited health literacy and limited access to good health care and clean water also increase one's vulnerability to renal health effects of climate change.

What You Can Do

Effectively preparing for and reducing the burden of climate-sensitive health outcomes requires explicit and intentional attention to addressing inequities in the social determinants of health –the conditions in which people are born, grow, work, live, and play.

- **SUPPORT** climate-smart practices
- **ENGAGE** in climate change and renal health patient education
- **PROVIDE** climate-health counseling among high-risk patients in the clinic setting
- **SCREEN** for kidney disease prevention

HEALTH CARE PROFESSIONAL EDUCATION

The purpose of this section is to provide resources for ongoing professional education to promote current knowledge of climate change and kidney care in the primary care setting.

Overview

HCPs have an important and timely role to promote renal health by raising awareness to prevent and control risk factors for kidney disease by expanding prevention efforts through the lens of climate change. They can educate patients about how climate change is affecting their health and how to adjust daily routines to heat waves (i.e. improved hydration and ways to reduce the negative effects of chronic heat exposure). HCPs role in climate-health is important because they have the opportunity to elevate climate change as a visible health priority in the clinic setting, making the connection between climate change and health.

HCPs with climate change and renal health training are more likely to identify and closely monitor susceptible patients, to advise on risk-reducing strategies and to send out clinical reminders to reduce heat exposures shortly prior to, during, and following heatwaves. Helping patients to recognize climate-health risk factors is the quickest way to reduce heat-related kidney disease, death, and the immense cost of its treatment.²⁵

Internet Resources

ALLIANCE OF NURSES FOR HEALTHY ENVIRONMENTS

<https://envirn.org/climate-change/>

<https://envirn.org/getting-started-a-guide-for-nurses/>

CENTER FOR CLIMATE CHANGE AND HEALTH

<https://climatehealthconnect.org>

<https://climatehealthconnect.org/%20resources/physicians-guide-climate-%20change-health-equity/>

CENTER FOR DISEASE CONTROL AND PREVENTION

https://www.cdc.gov/climateandhealth/pubs/extreme-heat-final_508.pdf

HEAT & HEALTH TRACKER

<https://ephtracking.cdc.gov/Applications/heatTracker/>

CLIMATE, HEALTH, AND NURSING TOOL (CHANT)

<https://envirn.org/nurses-climate-survey/>

A survey to measure perceptions, motivations, awareness of and engagement with climate change as a health issue.

CLIMATE CHANGE, HEATWAVES AND HEALTH

<https://www.hsph.harvard.edu/c-change/subtopics/climate-change-heatwaves-and-health/>

CLIMATE CHANGE AND HEALTH CERTIFICATE

<https://ysph.yale.edu/cchcert/>

CLIMATE CHANGE PRIMARY HEALTH CARE

<https://www.croakey.org/wp-content/uploads/2021/06/200712Blashki.pdf>

CLIMATE CHANGE: DIRE EFFECTS ON KIDNEY HEALTH

<https://climatehealthconnect.org/wp-content/uploads/2017/01/PhilippineNewsOped-.pdf>

FREE eBook: THE GOOD GUIDE TO GETTING EDUCATED ABOUT CLIMATE CHANGE

<https://www.joingoodside.com/guides/climate-change-education?gclid=CjwKCAjw0qOIBhBhEiwAyyVcf6RMg7eChktRVS LC4n1s7QOSk1qsA MVEZrEX-ssvxwMJGXBhIKJfxoCMooQAvD BwE>

GLOBAL CONSORTIUM ON CLIMATE AND HEALTH EDUCATION

<http://www.publichealth.columbia.edu/research/global-consortium-climate-and-health-education>

KIDNEY CARE UK

<https://www.kidneycareuk.org/news-and-campaigns/news/advice-risk-kidney-patients-during-heatwave/>

LIPPINCOTT NURSING CENTER

https://yaleedu-my.sharepoint.com/:p:/r/personal/christie_torres_yale_edu/_layouts/15/Doc.aspx?sourcedoc=%7BBAB7EC78A-1C9F-47FF-BAF9-F05923F6FADD%7D&file=VARenalHealthtoolkit_12510.pptx&action=edit&mobileredirect=true&cid=5e808c3f-5c3b-4a68-a682-24f7134f7a58&refreshcount=1

NATIONAL INSTITUTE OF DIABETES AND DIGESTIVE AND KIDNEY DISEASE

<https://www.niddk.nih.gov/health-information/kidney-disease>

NURSES CLIMATE CHALLENGE

<https://nursesclimatechallenge.org>

In collaboration with Health Care Without Harm, Nurses Climate Challenge is a program to motivate nurses to learn and teach about climate change and health.

PAN AMERICAN HEALTH ORGANIZATION

<https://iris.paho.org/handle/10665.2/52930>

PHYSICIANS COMMITTEE FOR RESPONSIBLE MEDICINE

<https://www.pcrm.org/news/blog/survey-most-health-care-professionals-want-climate-change-education>

PHYSICIANS FOR SOCIAL RESPONSIBILITY

<http://www.publichealth.columbia.edu/research/global-consortium-climate-and-health-education>

PUBLIC HEALTH INSTITUTE

<https://climatehealthconnect.org/wp-content/uploads/2016/09/FullGuideTEMP.pdf>

WEBMD CLIMATE AND HEALTH

<https://www.webmd.com/healthy-aging/news/20090513/report-climate-change-threatens-health#1>

YALE CLIMATE CONNECTIONS

<https://yaleclimateconnections.org/2019/09/nine-climate-change-books-for-educators/>

YALE PROGRAM ON CLIMATE CHANGE COMMUNICATION

<https://climatecommunication.yale.edu/about/projects/global-warmings-six-americas/>

Click below to take the short Six Americas Quiz!

Six Americas Super Short Survey (SASSY) is a 4-item questionnaire to help health care professionals better understand their own climate change and health views.

<https://climatecommunication.yale.edu/about/projects/global-warmings-six-americas/>

POWERPOINT PRESENTATION

American Academy of Pediatrics has developed a basic PowerPoint slide presentation that can be modified for use with both healthcare professionals and patients. It includes a brief overview of the information presented in this toolkit, with an emphasis on the impacts of rising temperatures, climate change and health awareness, and the need for urgent climate-health action.

QUALITY IMPROVEMENT FOR PATIENT CARE

The purpose of this section is to explain the relevance that ongoing quality improvement has in guiding care and management of patients with climate-health risks.

Overview

Quality improvement (QI) consists of continuous actions that lead to measurable improvement in health care services and the health of patients. In the prevention of kidney disease resulting from the impacts of climate change, consistency in climate-health counseling is the measure or standard that is being examined to help ensure that each patient at risk receives the same level of care based on their needs available at the facility to which they receive care services. The rationale for utilizing climate-health counseling is that the provision of educational resources to anyone who wants or needs them and the screening of patients for high-risk occupations and their access to cool environments can improve the quality and consistency of climate-related health discussions and help prepare for projected climate change impacts.

Moving forward, heat extreme temperatures are expected to increase requiring the optimization of prevention efforts. A study published in the [Lancet Planetary Health journal](#) shows that inadequate climate health action creates missed opportunities to improve the health of populations around the world today and in the future. Variance from the standard invites errors and missed opportunities.

Let's not miss the opportunities, leveraging on teachable moments—we can't get them back!

Additionally, evidence-based climate health counseling is cost effective. The savings can add up quickly; prevention of complications and/or hospitalizations will also lead to cost saving. Despite the potential savings, it is also important to note, that benefits go well beyond cost alone to include the value of quality of care and the benefits that are not captured by pure dollars including organizational metrics such as increased patient satisfaction, as well as improved quality of life.

Medicare will inevitably be impacted by climate change because of the vulnerable population it serves. Therefore, In order to track performance in high quality and equitable care to include climate-health counseling, the use of an electronic clinical reminder tool is a must for consistency in the reported data for the overall improvement in renal care. Reporting of this data is a useful way to show performance, identify gaps in care, and document successes. For example, creating electronic clinical alert reminders for HCPs to screen for heat-related kidney disease risk factors (e.g. age, housing security, occupation, pre-existing kidney disease) has demonstrated to improve renal health care in high-risk patients.

Click below to access the article, titled, Improved Management of Acute Kidney Injury in Primary Care Using E-Alerts and An Educational Outreach Program:

<https://pubmed.ncbi.nlm.nih.gov/29718171/>

Click below to access Lancet Planetary Health:

[https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196\(20\)30249-7/fulltext](https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30249-7/fulltext)

Click below to read about the different impacts projected to affect healthcare and what experts say leaders should be doing now to prepare:

<https://www.fiercehealthcare.com/special-report/how-business-healthcare-changing-climate-change>

Click below to take the Health Care Action Pledge:

Meeting the Climate Challenge: A Leadership pledge by hospitals, health centers and health systems from across the globe is an opportunity to show that we will do our part to prepare for climate impacts as a team.

<https://www.greenhospitals.net/join-climate-challenge/>

Click below to read The Sustainable and Climate-Resilient Health Care Facilities Toolkit. This toolkit is designed with health care leaders in mind and provides an overview guide, various online tools, and resources, in which highlight best practices for developing sustainable and climate-resilient health care facilities.

<https://toolkit.climate.gov/topics/human-health/building-climate-resilience-health-sector>

Internet Resources

CENTERS FOR DISEASE CONTROL AND PREVENTION

CDC'S CLIMATE AND HEALTH PROGRAM

<https://www.cdc.gov/climateandhealth/default.htm>

This program provides training to health care professionals who provide services to people with climate-health risks, and has created a variety of communication products and guidance resources to help health care professionals better communicate with patients about climate-health impacts.

INSTITUTE FOR HEALTHCARE IMPROVEMENT

THE TRIPLE AIM: CARE, HEALTH, AND COST

<http://www.ihi.org/resources/Pages/Publications/TripleAimCareHealthandCost.aspx>

In response to rising healthcare costs, the Institute for Healthcare Improvement developed the IHI Triple Aim. The Triple Aim set its sights on a framework with three goal: (1) to improve the patient experience of quality and satisfaction in healthcare; (2) to improve the health of an entire population; and (3) to reduce the costs of providing healthcare. Efforts to train staff on the impacts of climate change on health across the country are increasingly being implemented to improve quality of care and health outcomes, while reducing healthcare costs.

NATIONAL COMMITTEE FOR QUALITY ASSURANCE

HEALTH PLAN EMPLOYER DATA INFORMATION SET

<https://www.ncqa.org/videos/the-future-of-hedis-digital-measures-and-health-equity/>

The Health Plan Employer Data Information Set (HEDIS) is a set of standardized performance measures used to evaluate and drive health care quality. The performance measures in HEDIS address many public health issues, like cancer, heart disease, diabetes, colon cancer, and smoking. The section of the website includes several videos and PowerPoint presentations on upcoming performance measures in HEDIS to include health equity and the social determinants of health in its health care quality measurement.

PATIENT EDUCATION

The purpose of this section is to explain the importance of continuing climate-health and renal care education and to assist the health care professional by providing various resources and teaching aids which can be used in this process.

Overview

Public health guidance messages regarding kidney care during periods of extreme heat has been widely broadcasted and can lead to improved health outcomes and advance health equity among vulnerable individuals.^{26,27} The resources in this section can help facilitate meaningful discussions of climate change and kidney care in the clinic setting –by providing health information that informs and supports patients to make knowledgeable health decisions and follow best practice guidance recommendations.

Internet Resources

CENTER FOR CLIMATE CHANGE AND HEALTH

CLIMATE AND HEALTH POSTER: CLIMATE CHANGE, HEAT & YOU

<https://climatehealthconnect.org/resources/posters/>

Downloadable posters are available for free. Search on climate change and health topic. Posters & Brochures.

CLIMATE FOR HEALTH

LET’S TALK HEALTH & CLIMATE: COMMUNICATION GUIDANCE FOR HEALTH PROFESSIONALS

https://climateforhealth.org/wp-content/uploads/2020/05/3_letstalk_health_and_climate.pdf

Based on academic research and climate message testing, this practical guide was developed and designed to increase climate-health awareness among health care professionals and support climate communications in the clinic setting.

- Research on Awareness and Attitudes
- Successful Climate and Health Messages
- Key Talking Points with Patients
- How Health Care Professionals Can Engage Patients in Climate-Health Discussions

HEALTH CARE WITHOUT HARM

CLIMATE AND HEALTH PATIENT EDUCATION

<https://noharm-uscanada.org/content/us-canada/climate-and-health-patient-education>

Health care Without Harm is a that aims to foster climate resilient health systems and provides public education to both patients and professionals to address climate change as a public health issue.

- Downloadable patient brochures
- Downloadable Waiting Room posters
- Newsletter
- Social Media to include Facebook, Instagram, Twitter, YouTube

THE MEDICAL SOCIETY CONSORTIUM

CLIMATE AND HEALTH: ASTHMA AND HEAT RESOURCES

<https://medsocietiesforclimatehealth.org/educate/patients/>

Downloadable patient education materials and climate-health action posters are available for free and could be used to display in the clinic setting, such as office wall, waiting room areas, and patient waiting rooms. Infographics are also available to share on social media. Some materials are also in Spanish.

- Brochures
- Climate Action Posters
- Fact Sheets
- Patient Education Materials
- Toolkit
- Video

THE U.S. HEALTHCARE CLIMATE COUNCIL

EXTREME HEAT BROCHURE AND POSTER

<https://practicegreenhealthgc.wufoo.com/forms/z1mbygg10hcq0zu/>

The free materials were developed in collaboration with health care professionals and climate change and health communications experts, with the goal to motivate and educate community members to take action to protect their health. The brochure is available in both English and Spanish.

UNIVERSITY OF CALIFORNIA SAN FRANCISCO

CLIMATE CHANGES HEALTH

https://sustainability.ucsf.edu/get_involved_stay_informed/climate_changes_health_posters

This free poster series includes six posters on the following topics: air quality, pollen, cardiovascular disease, floods, air pollution, infectious disease, extreme heat, and algae—able to request customization.



Ideas to Increase Climate Change and Renal Health Awareness and Education Activities

In The Hospital

- Display already available promotional material (posters and brochures) sent out in early May communicating with the target population to remind on heat risks
- Have a risk factor screenings at health fair.
- Set up an educational climate change and renal health display (e.g. World Kidney Day) for visitors (see “Patient Education Materials” section of this toolkit).
- Set up a climate change and renal health awareness day and have HCPs perform risk assessments on patients.
- Post information about climate-renal health during summer months and warning signs on the hospital website.
- Document climate-renal health education and share results with other HCPs and team members across the health system as part of quality improvement initiatives.

Patient Check In

- Have team ask about climate change and renal risk factors related to preventative care screenings.
- Hand out climate change and health educational material.

During Visit

- Ask patients about living and working conditions (access to cooling methods and hydration).
- Review medications if any increase health risks in the heat.
- Inform patients about the symptoms that may be related to heat stress.
- Ask high-risk patients what they know about the effects of extreme heat on their renal health.
- Ask patients about hobbies such as sports.
- Promote the avoidance of rehydrating with sodas and alcohol.
- Counsel patients to monitor air quality, early warning heat system advisories, limit time outdoors, and avoid intense or prolonged exertion outdoors.
- Ask patients to describe their family support system.
- Encourage family and caretakers to check in on vulnerable patients (i.e. older adults and homeless patients) during extreme heat events.
- Ask patients if there is a family history of kidney disease.
- Encourage patients to communicate changes in living or places of employment with primary care team.
- Direct patients to specialty care and/or non-clinical services, if needed.
- Develop a plan together, revise as needed.

At Check Out

- Schedule next follow-up appointment (i.e. telephone or onsite visit) for high-risk patients during summer heat months.
- Follow up on renal tests and make sure they are completed in a timely manner.

In The Community

- Use a PowerPoint presentation to give public talks about climate change and health in the community.

Ideas For Leaders At System Level

- Incorporate into existing programs, events, and health promotion campaigns (where appropriate) climate-renal health awareness activities.
- Create automated electronic alerts, such as clinical reminders to be used by HCPs for climate-health screenings (e.g. age, housing security, occupation, pre-existing kidney disease).
- Provide readily available climate change and health materials and training among HCPs.
- Perform a community assessment to enhance surveillance and mapping of demographic changes, with a focus on SDOH and climate-risk factors.
- Support community engagement and inform the public about the connection between climate change and heat-related diseases, like kidney disease, and the benefits of climate action.
- Partner with local businesses and other professional organizations to promote climate change and health awareness.

Climate Change and Renal Health Counseling Checklist

Effective climate change and renal health counseling has the following characteristics:

- Includes **any member of the health care team** supporting patient. Recommendations are up to date on the latest evidence and adapts to local climate needs
- ASK** about climate-renal health risks
- ADVISE** change of specific behaviors (i.e. rest and shade)
- ASSESS** and collaboratively set goals
- ASSIST** in addressing barriers and securing specialty care and/or social support
- ARRANGE** follow-up

The 5 As

The 5As counseling framework can be used as a way to teach and evaluate the quality of climate change and renal health counseling.³³ The 5As framework can guide HCPs to ASK about climate-renal health risks, ADVISE change of specific behaviors, ASSESS and collaboratively set goals, ASSIST in addressing barriers and securing specialty care and/or social support, and ARRANGE for follow-up.³³

Click here for more key Primary Care counseling strategies:
<https://www.aafp.org/afp/2018/1215/afp20181215p719.pdf>



HEALTHCARE PROVIDER FACT CARDS

It's that TIME!

This resource is intended to be a pocket reminder card. Please print and use as a reminder to counsel patients about climate change and renal health risks.

Everyone Needs an Equal Chance (EEQC)!

Educate patients about how climate change is affecting their health and how to adjust daily routines to heat waves (i.e. improved hydration and ways to reduce the negative effects of chronic heat exposure)

Engage patients in climate change and renal health counseling so that patients have an equal opportunity to be healthy

Question patients about their exposures to heat extreme temperatures and any relationship to symptoms being experienced.

Choose to be a climate-health advocate to expand kidney disease prevention efforts to include climate-health risks.

We Got the Eye of a Climate Change Champion—and we're gonna help them SOAR!

HEAT-RELATED KIDNEY DISEASE IS PREVENTABLE.

Patients with the greatest risk are:

older than 65

with kidney disease

work in the heat

take certain medications

athletes and heat training

are homeless

live in sub-standard housing

with minimal social support



WE CAN MAKE A DIFFERENCE



The goal is to make screening and climate change and renal health counseling part of routine clinical care.

HEALTHCARE PROVIDERS, TAKE THE KIDNEY HEALTH PLEDGE



We know you're busy. Having a conversation with patients is one of the first steps in increasing awareness of kidney disease. So, take the PLEDGE and make talking about climate change and renal health a priority.

“I will take every opportunity to lead by example and will commit to talking to my patients about the link between climate change and kidney disease, especially those most at risk.”

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