# GIMME SHELTER

## A Physician's Guide to Identifying the Unique Medical Needs of the Homeless


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**Dedicated to the entire Z Mansion Team and the thousands of guests we are fortunate enough to call friends**

## THE CERTIFIED COMMUNITY HEALTH SPECIALIST (CCHS) TEAM

There are are over 500 CCHS-certified team members stretching across the globe. Many of their experiences with the homeless and marginally-housed are shared in this book.

We would like to take this opportunity to specifically recognize a number of them for their contributions to our program:

**Kelly M. Fath, MSN, FNP-BC, CCHS-4**
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**Than Truc Le, EMT, CCHS-2**
**Jacob Marczak, CCHS-2**

"multitudo sapientium sanitas orbis"

# CONTENTS



# A BRIEF STORY

A 50-something appearing homeless woman is brought to your clinic in apparent distress. You've never met her before, but your staff assures you she is a "frequent flyer" and an obvious hypochondriac.

Recognizing you are new to the clinic, the patient is exceptionally relieved when you are the one to see her.

"Thank God I get to see someone who cares!" she exclaims. "They all think I'm nuts. They all think nothing is wrong with me. They all say I'm just some crazy homeless woman. I know because I can hear them at night talking about me. Thank God YOU'RE here."

You greet the patient in a calm and supportive manner and then ask her how you can help.

"Help? Help? Wouldn't that be nice. To begin with – and I've got a lot going on I can tell you – I'm so damn tired even my hair can't stand up straight," she complains pointing to the hair on her forearm. "Tired, tired, tired. I'm so tired, my period doesn't have enough energy to stop. It just keeps dripping. Dripping, dripping, dripping.

"We've gotta talk," she whispers to you as she points to a pair of staffers who are assessing another patient. "They're the ones who are in on it. I told them my legs were beginning to swell – just look at them – and they did nothing about it except they made jokes about them later in their cars. I heard them, They think I can't hear them, but I heard them. They refuse to do shit for me. So, doc, what are YOU going to do for me?"

You pause for a moment and then calmly and still supportively ask her a series of questions:

"May I ask how old you are?"

"Sure. 34."

"And are you currently homeless?"

"Does it look like I live in a mansion in the foothills? Of course, I'm homeless. Have been for over 10 years."

"Those curled hairs on your arm, how long ago did they start?"

"I don't know. About a month ago I guess."

"And the little red marks around some of them?"

"About the same time I suppose."

"And how long have you been missing your bottom teeth?"

"Oh, that's easy. My boyfriend broke my jaw 4 years ago last month. He should be out of jail anytime now."

"You're not on any medicines to thin your blood, are you?"

She nods "No" and you turn to your computer and schedule her for a series of blood tests including one to check her levels of Vitamin C.

**What Did You Know**
**About How The Homeless Present Differently?**

*While 9% of the housed population is Vitamin C deficient, studies have found that over 90% of the homeless are Vitamin C deficient.*[1] *Fatigue, health-related anxiety, psychosis, coiled body hairs, perifollicular hemorrhages, menorrhagia, and leg edema are all known signs of Vitamin C deficiency with loss of teeth a major risk factor.*[2,3]



1 Malmauret, L, JCh Leblanc, I Cuvelier, and Philippe Verger. "Dietary Intakes and Vitamin Status of a Sample of Homeless People in Paris." European Journal of Clinical Nutrition 56 (May 1, 2002): 313–20. https://doi.org/10.1038/sj.ejcn.1601312.

2 Hirschmann, J. V., and Gregory J. Raugi. "Adult Scurvy." Journal of the American Academy of Dermatology 41, no. 6 (December 1, 1999): 895–910. https://doi.org/10.1016/S0190-9622(99)70244-6.

3 Brown, Thomas M. "Neuropsychiatric Scurvy." Psychosomatics 56, no. 1 (January 1, 2015): 12–20. https://doi.org/10.1016/j.psym.2014.05.010.

## CHAPTER 1

# THE WORLD OF THE HOMELESS IS VIOLENT

How many times in the past year have you suffered a TBI, a traumatic brain injury? How many times have you been raped?

These are not questions generally asked of housed patients, but they are important questions for any patient who is or has been unsheltered.

Here are your bullet points:

## RAPE

• 86% of homeless women at a residential "safe house" in southern California reported a history of sexual trauma.[1]

• In a survey taken in 60 homeless shelters and meal programs in Los Angeles County, 13% of the women reported being raped during the previous year, and half of these women were raped at least twice in that year.[2]

• A Canadian street health survey found that 1 in 5 homeless women had been raped or sexually assaulted in the past 12 months and 94% of the women surveyed had been sexually harassed more than one time.[3]

**Quick take**

**20% of your homeless female patients are likely to have have been raped in the past year**

## TBI

• A 2020 systematic review and meta-analysis concluded that more than half of homeless and marginally housed individuals have a lifetime history of TBI, and that almost a quarter have a history of moderate or severe TBI.[4]

• A large study of 1190 homeless or vulnerably housed individuals in Canada found that 17.1% to 19.4% of participants reported a minimum of 1 incident TBI in the previous year, while during the 3-year follow-up period, a total of 37.2% of participants reported at least 1 incident TBI.[5]

**Quick take**

**About 1 in 5 of your homeless patients are likely to have have had a traumatic brain injury in the past year**

1 Weinrich, Sally, Sally Hardin, Dale Glaser, Mary Barger, Jill Bormann, Cabiria Lizarraga, Micheal Terry, Jeeni Criscenzo, and Carolyn B. Allard. "Assessing Sexual Trauma Histories in Homeless Women." Journal of Trauma & Dissociation 17, no. 2 (March 14, 2016): 237–43. https://doi.org/10.1080/15299732.2015.1089968.

2 Wenzel, Suzanne L, Barbara D Leake, and Lillian Gelberg. "Health of Homeless Women with Recent Experience of Rape," GEN INTERN MED 15, 265–268 (2000.)

3 Cowan, Laura, et al. "The Street Health Report 2007." Toronto, ON: Street Health (2007).

4 Stubbs, Jacob L, Allen E Thornton, Jessica M Sevick, Noah D Silverberg, Alasdair M Barr, William G Honer, and William J Panenka. "Traumatic Brain Injury in Homeless and Marginally Housed Individuals: A Systematic Review and Meta-Analysis." The Lancet Public Health 5, no. 1 (January 1, 2020): e19–32. https://doi.org/10.1016/S2468-2667(19)30188-4.

5 "Incidence and Associated Risk Factors of Traumatic Brain Injury in a Cohort of Homeless and Vulnerably Housed Adults in 3 Canadian Cities," n.d. https://oce-ovid-com.ezproxy4.library.arizona.edu/article/00001199-201707000-00011/HTML.

## The View from The Streets:

Faced with an unforgivingly violent world, the homeless compensate in any way they can. This can lead to an array of possible misassessments. Here's what the problem looks like when a homeless patient, as described by Tim below, presents at an ED with a TBI:

**1) Cognitive impairment is a common consequence of TBI.**[6]

**2) Cognitive impairment (typified by agitation and confusion) is frequently mistaken for alcohol or drug intoxication.**[7]

**3) The "intoxicated" homeless patient's actions are seen as "drug-seeking behavior" and patient requests are ignored. (Even when studies show the "classic" drug-seeking behaviors are unreliable guides to such behavior.)**[8]

**4) The patient is called a "difficult patient," the issue is untreated, and the medical problem grows in severity and complexity.**

**5) The even-sicker patient again seeks help and is, again, identified as a "difficult patient" aka GOMER (Get Out of My Emergency Room).**[9]

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6 Wortzel, Hal S., and David B. Arciniegas. "Treatment of Post-Traumatic Cognitive Impairments." Current Treatment Options in Neurology 14, no. 5 (October 2012): 493–508. https://doi.org/10.1007/s11940-012-0193-6.

7 "The Impaired Trauma Patient: Separating Intoxication from Medical Condition - Mayo Clinic." Accessed June 17, 2022. https://www.mayoclinic.org/medical-professionals/trauma/news/the-impaired-trauma-patient-separating-intoxication-from-medical-condition/mqc-20527306.

8 Grover, Casey A., Joshua W. Elder, Reb JH. Close, and Sean M. Curry. "How Frequently Are 'Classic' Drug-Seeking Behaviors Used by Drug-Seeking Patients in the Emergency Department?" Western Journal of Emergency Medicine 13, no. 5 (November 2012): 416–21. https://doi.org/10.5811/westjem.2012.4.11600.

9 "Excerpt From 'The Secret Language of Doctors,'" March 26, 2015. https://www.medpagetoday.com/publichealthpolicy/generalprofessionalissues/50678.

*Tim (pictured above) was thrown out of an emergency room when the agitation and confusion caused by his recent TBI led the medical staff to identify him as a "difficult patient."*

**See Tim's story at: https://youtu.be/-1BiKMePt3E**

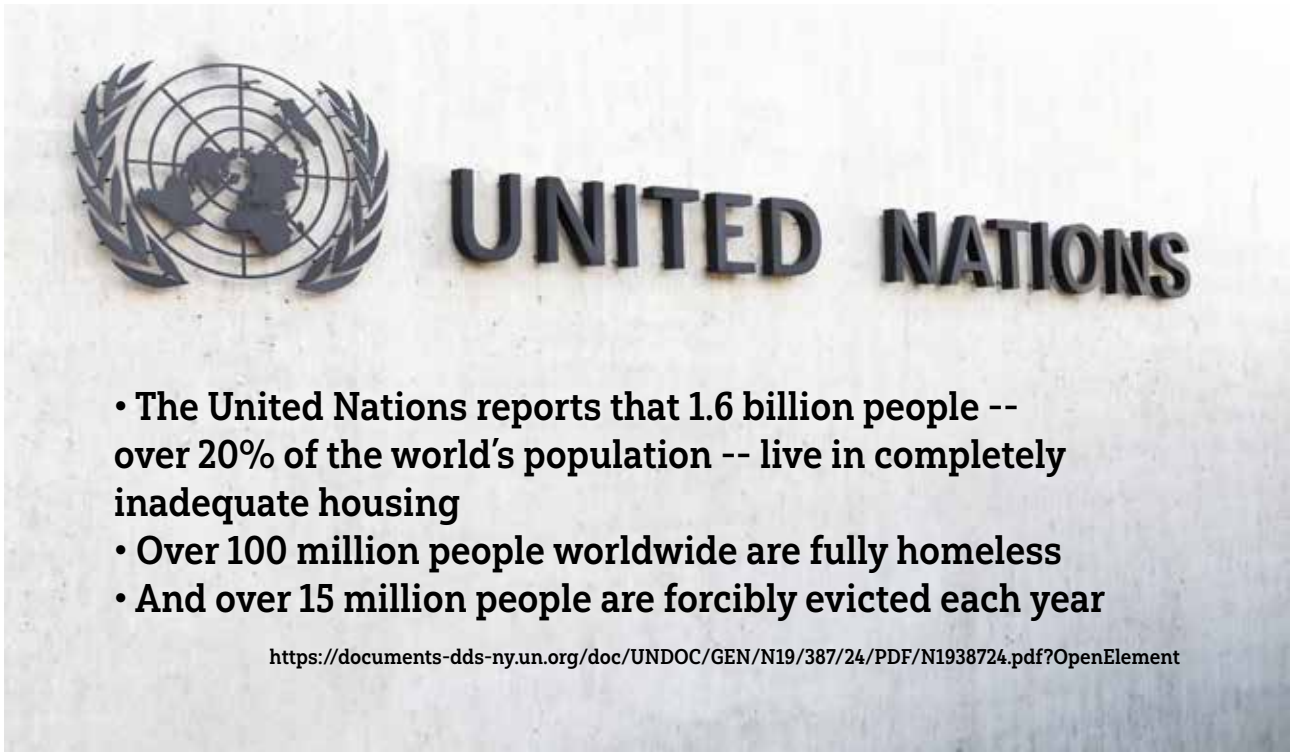
**In each chapter, we will consider a root cause for a number of conditions. For example, this chapter looks at the extreme violence that faces the unsheltered.**

**After the root cause is identified, 10 of the conditions it causes will be examined by asking "How does this condition present differently in the unsheltered?" and "How can a physician more accurately assess/prevent this condition in those living on the streets?"**

*Understanding these issues is vital as one-fifth of the people in the world face constant threats of violence due to dangerously inadequate housing. And that figure is expected to rise dramatically. UN-Habitat estimates that, by 2030, 3 billion people, about 40 per cent of the world's population, will need access to adequate housing. This means that one in four people will live in conditions that threaten their health and safety.*

https://unhabitat.org/topic/housing






**• The United Nations reports that 1.6 billion people -- over 20% of the world's population -- live in completely inadequate housing**
**• Over 100 million people worldwide are fully homeless**
**• And over 15 million people are forcibly evicted each year**

**https://documents-dds-ny.un.org/doc/UNDOC/GEN/N19/387/24/PDF/N1938724.pdf?OpenElement**

# Root cause:
## Violence -- and the constant threat of violence -- on the streets

## The top conditions that present differently because of this root cause:

1. Opioid overdose
2. Traumatic intracranial hemorrhage
3. Jaw fracture/Strangulation
4. Skull fracture
5. Bacterial meningitis
6. Urinary/Fecal incontinence
7. Scaphoid fracture
8. Boxer's fracture
9. Femoral fracture
10. Pulmonary Barotrauma



*Freedom (pictured above) describes how the extreme violence on the streets causes so many homeless people to turn to drugs and alcohol for escape.*
**See Freedom's story at: https://youtu.be/Xm6bi7AbwoQ**

# Opioid overdose

This is how an opioid overdose presents differently in those who are unsheltered:

- Members of the housed population see homeless overdose patients and fail to act and/or call 911 due to fear of the homeless.
- The homeless themselves see a homeless overdose patient and fail to call EMS because of a fear of arrest due to such issues as outstanding warrants.
- Because of this, homeless overdose patients are brought in for help closer to death than housed overdose patients.
- However, the majority of homeless fatal overdose patients had previously sought help but were not given medication-assisted treatment like buprenorphine.

**Sleeping? Overdose? Victim of assault?**

## HOMELESS PEOPLE FEAR BEING ARRESTED BECAUSE MANY HAVE OUTSTANDING WARRANTS

• A city review of the Portland, Oregon Police Bureau found that about half of all arrests made in 2017-18 were of people without a fixed address. Of those arrested, 60% involved outstanding arrest warrants.[1]

## MOST PEOPLE WITH WARRANTS DON'T CALL 911 DURING AN OVERDOSE

• In the majority of overdose reversals described in a Denver, Colorado study, no EMS call was made. The top reason for NOT calling 911 was the fear that, despite the Good Samaritan law, a police response would result in arrest of the victim and/or witness for outstanding warrants.[2]

## "ME CALL 911? ARE YOU CRAZY? THE HOMELESS ARE DANGEROUS"

• A 2016 article details how the homeless are ignored even in an emergency situation.[3] A 2019 study found a possible reason: homeless men -- especially black homeless men -- are perceived to be exceptionally dangerous.[4]

## HOMELESS ADDICTS DIE BECAUSE THEY AREN'T GIVEN THE DRUGS THAT COULD HELP THEM

• Most fatal homeless overdose victims (63%) in a Boston study had sought treatment for their addiction, but very few (4.3%) had received buprenorphine.[5]

1 opb. "Review: Half Of PPB's 2017-18 Arrests Were Of People Experiencing Homelessness." Accessed June 21, 2022. https://www.opb.org/news/article/portland-police-homeless-arrests-half-review-2018/.

2 Koester, Stephen, Shane R. Mueller, Lisa Raville, Sig Langegger, and Ingrid A. Binswanger. "Why Are Some People Who Have Received Overdose Education and Naloxone Reticent to Call Emergency Medical Services in the Event of Overdose?" The International Journal on Drug Policy 48 (October 2017): 115–24. https://doi.org/10.1016/j.drugpo.2017.06.008.

3 EBONY. "Stepping Over 'Them':Why Do We Ignore the Homeless? • EBONY," July 22, 2016. https://www.ebony.com/news/stepping-over-them-why-do-we-ignore-the-homeless-302/.

4 Markowitz, Fred, and Jeffrey Syverson. "Race, Gender, and Homelessness Stigma: Effects of Perceived Blameworthiness and Dangerousness." Deviant Behavior 42 (December 18, 2019): 1–12. https://doi.org/10.1080/01639625.2019.1706140.

5 Bauer, Leah K., Jennifer K. Brody, Casey León, and Travis P. Baggett. "Characteristics of Homeless Adults Who Died of Drug Overdose: A Retrospective Record Review." Journal of Health Care for the Poor and Underserved 27, no. 2 (2016): 846–59. https://doi.org/10.1353/hpu.2016.0075.

## Opioid overdose

This is how an opioid overdose can be prevented/assessed in those living on the streets:

- The unsheltered have an elevated risk of TBI, sexual assault, and PTSD. Because of this, they should be evaluated for substance use disorders which are significantly higher in those groups.
- Over 75% of homeless overdose deaths are in patients who do not inject drugs. For this reason, physicians should not rely on the presence of injection "tracks" when assessing a homeless patient.
- Homeless patients seek treatment for addiction but die at a higher rate from overdoses partly because physicians are less likely to consider medication-assisted treatment. Please understand that medication-assisted treatment can be successful in homeless patients even with intermittent treatment.

### HOMELESS PEOPLE WITH A HISTORY OF TBI SHOULD BE EVALUATED FOR SUBSTANCE USE DISORDER (SUD)

• TBI and substance abuse share a bi-directional relationship: substance abuse is a risk for TBI and TBI is a risk for substance abuse. A 2017 study found that 42.7% of those with a history of TBI experienced substance use disorder.[1]

### HOMELESS PEOPLE WITH A HISTORY OF SEXUAL ASSAULT SHOULD BE EVALUATED FOR SUD

• A 2015 study found that exposure to gender-based violence was associated with a 2.5–3.6 fold elevated risk of developing a substance use disorder.[2]

### HOMELESS PEOPLE WITH PTSD SHOULD BE EVALUATED FOR SUD

• A 2019 study found that PTSD is associated with opioid use disorder in non-cancer pain patients.[3]

### PHYSICANS SHOULD NOT COUNT ON THE ABSENCE OF "TRACKS" TO RULE OUT THE RISK OF AN OPIOID OVERDOSE

• Only 24.7% of homeless adults who died from an overdose in a 2016 study had a history of injection drug use.[4]

### PHYSICANS SHOULD CONSIDER MEDICATION-ASSISTED TREATMENT FOR THEIR HOMELESS PATIENTS WITH OPIOID USE DISORDER EVEN IF FOLLOW-UP IS LIKELY TO BE INTERMITTENT

• A 2019 study found that a low barrier buprenorphine pilot program for homeless patients with opioid use disorder was successful in engaging and retaining a subset of patients in care and in continued treatment with buprenorphine -- even with intermittent treatment.[5]



1 McHugo, Gregory J., Sarah Krassenbaum, Sachiko Donley, John D. Corrigan, Jennifer Bogner, and Robert E. Drake. "The Prevalence of Traumatic Brain Injury Among People With Co-Occurring Mental Health and Substance Use Disorders." Journal of Head Trauma Rehabilitation 32, no. 3 (May 2017): E65–74. https://doi.org/10.1097/HTR.0000000000000249.

2 Walsh, Kate, Katherine M. Keyes, Karestan C. Koenen, and Deborah Hasin. "Lifetime Prevalence of Gender-Based Violence in US Women: Associations with Mood/Anxiety and Substance Use Disorders." Journal of Psychiatric Research 62 (March 2015): 7–13. https://doi.org/10.1016/j.jpsychires.2015.01.002.

3 López-Martínez, Alicia E, Ángela Reyes-Pérez, Elena Rocío Serrano-Ibáñez, Rosa Esteve, and Carmen Ramírez-Maestre. "Chronic Pain, Posttraumatic Stress Disorder, and Opioid Intake: A Systematic Review." World Journal of Clinical Cases 7, no. 24 (December 26, 2019): 4254–69. https://doi.org/10.12998/wjcc.v7.i24.4254.

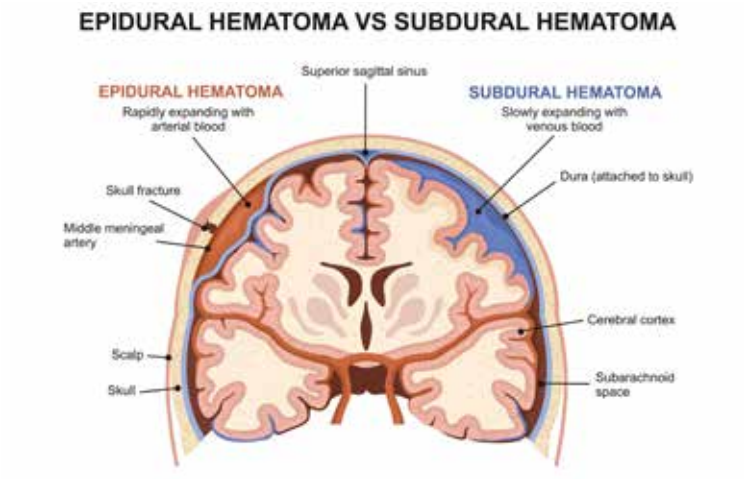
4 Bauer, Leah K., Jennifer K. Brody, Casey León, and Travis P. Baggett. "Characteristics of Homeless Adults Who Died of Drug Overdose: A Retrospective Record Review." Journal of Health Care for the Poor and Underserved 27, no. 2 (2016): 846–59. https://doi.org/10.1353/hpu.2016.0075.

5 Carter, Jamie, Barry Zevin, and Paula J. Lum. "Low Barrier Buprenorphine Treatment for Persons Experiencing Homelessness and Injecting Heroin in San Francisco." Addiction Science & Clinical Practice 14, no. 1 (May 6, 2019): 20. https://doi.org/10.1186/s13722-019-0149-1.

# Traumatic intracranial hemorrhage (TICH)

This is how a traumatic intracranial hemorrhage presents differently in those who are unsheltered:

- TICH in the homeless and marginally-housed are generally more severe than in the housed population.
- However, due to high rates of co-occurring intoxication, the signs of TICH may be mistaken for intoxication.
- In addition, the psychiatric manifestations of TICH in a homeless patient may be misinterpreted as "psychosis."
- Once an assessment of TICH is made, physicians may feel that a homeless patient is less likely to respond to aggressive intervention. This is simply not true as homeless TICH patients respond as well as housed patients.




## HEAD INJURIES IN HOMELESS PATIENTS TEND TO BE MUCH MORE SEVERE

- Glasgow Coma Scale scores tend to be worse (64% ≤ 12) but the severity of the injury may be misinterpreted due to co-ocurring acute intoxication in greater than half of cases.[1,2]

## ACUTE SUBDURAL HEMATOMA IS THE MOST COMMON TICH AND MOST HOMELESS PATIENTS HAVE A TBI AT LEAST ONCE A YEAR

- A study of homeless neurosurgical patients found that subdural hematomas occured more commonly in homeless TBI patients at a rate of nearly 50%. The same study also found that over 10% had evidence of previous craniotomy.[3] A 2022 study found that 51% of marginally-housed people had at least one TBI each year.[4]

## IF TREATED , HOMELESS OUTCOMES FOR TICH ARE EQUAL TO HOUSED PATIENT OUTCOMES

- In a 2007 study, the mortality rate for homeless patients with moderate to severe head injury was 22% while the mortality rate for similar housed head injury patients was 25%.[5]

## HOMELESS TICH PATIENTS MAY BE MISASSESSED AS EXPERIENCING "PSYCHOSIS"

- Psychiatric manifestations of acute and chronic subdural hematomas are well-documented [6].



1 Kim, Dae-Ki, Cheol-Su Jwa, Gang-Hyeon Kim, and Jae-Kyu Kang. "An Experience of Management of Homeless Neurosurgical Patients." Journal of Korean Neurosurgical Society 42, no. 3 (2007): 191–94.

2 O'Connor, Tiffany A., William J. Panenka, Emily M. Livingston, Jacob L. Stubbs, Julia Askew, Charanveer S. Sahota, Samantha J. Feldman, et al. "Traumatic Brain Injury in Precariously Housed Persons: Incidence and Risks." EClinicalMedicine 44 (February 1, 2022): 101277. https://doi.org/10.1016/j.eclinm.2022.101277.

3 Kim, Dae-Ki, Cheol-Su Jwa, Gang-Hyeon Kim, and Jae-Kyu Kang. "An Experience of Management of Homeless Neurosurgical Patients." Journal of Korean Neurosurgical Society 42, no. 3 (2007): 191–94.

4 O'Connor, Tiffany A., William J. Panenka, Emily M. Livingston, Jacob L. Stubbs, Julia Askew, Charanveer S. Sahota, Samantha J. Feldman, et al. "Traumatic Brain Injury in Precariously Housed Persons: Incidence and Risks." EClinicalMedicine 44 (February 1, 2022): 101277. https://doi.org/10.1016/j.eclinm.2022.101277.

5 Kim, Dae-Ki, Cheol-Su Jwa, Gang-Hyeon Kim, and Jae-Kyu Kang. "An Experience of Management of Homeless Neurosurgical Patients." Journal of Korean Neurosurgical Society 42, no. 3 (2007): 191–94.

6 Kar, Sujita Kumar, Deepak Kumar, Paramjeet Singh, and Pankaj Kumar Upadhyay. "Psychiatric Manifestation of Chronic Subdural Hematoma: The Unfolding of Mystery in a Homeless Patient." Indian Journal of Psychological Medicine 37, no. 2 (Apr-Jun 2015): 239–42. https://doi.org/10.4103/0253-7176.155656.

## TICH

This is how a traumatic intracranial hemorrhage can be assessed in those living on the streets:

- Symptoms of a subdural hematoma may appear far later than expected.
- Especially in older male homeless patients, symptoms of a chronic subdural may take weeks to appear.
- Those symptoms are also likely to manifest as "behavorial issues," not as neurological problems.
- In addition, bleeding time values are likely to be higher in homeless patients with a history of alcohol use disorder.
- Maintain a high degree of suspicion of both acute and chronic subdural hematomas after any TBI in an unsheltered or marginally-housed patient

## THINK CHRONIC -- NOT JUST ACUTE -- WHEN ASSESSING A POTENTIAL SUBDURAL HEMATOMA

• Chronic subdural hematomas are steadily increasing in incidence especially for older, male patients.[1]

## THE MEAN INTERVAL FOR SYMPTOMS TO APPEAR IN CHRONIC SUBDURAL HEMATOMAS (CSDH) IS 49.1 DAYS

• A retrospective study of 1,000 patients with confirmed chronic subdural hematomas found the mean time from trauma to manifestation of symptoms was 49 days.[2]

## THE MOST COMMON PRESENTING SYMPTOMS FOR A CSDH ARE BEHAVIORAL NOT NEUROLOGICAL

• While neurological symptoms that affect only one side of the body are common, the most common symptoms of a CSDH are behavioral disturbances followed by headaches.[3]

## AGAIN, THE HOMELESS DO JUST AS WELL WHEN TREATED BY SDH EVACUATION AS DO HOUSED PATIENTS

• A poster presentation at the 2021 American Academy of Neurological Surgeons virtual conference found that inpatient mortality and 30-day admission rates for homeless patients are NOT greater after SDH evacuation. In fact, the authors concluded, "These findings support the notion that equitable neurosurgical care is attainable in this population."[4]

## ALCOHOLICS ARE PRONE TO LOWER PLATELET COUNTS AND LONGER BLEEDING TIMES. MAINTAIN A HIGH DEGREE OF SUSPICION OF A SDH

• A 2020 study found that patients with TBI and alcohol use disorder had longer bleeding time values and lower platelet counts compared with those with TBI and no history of AUD.[5]



1 Gelabert-González, Miguel, Miguel Iglesias-Pais, Alfredo García-Allut, and Ramón Martínez-Rumbo. "Chronic Subdural Haematoma: Surgical Treatment and Outcome in 1000 Cases." Clinical Neurology and Neurosurgery 107, no. 3 (April 1, 2005): 223–29. https://doi.org/10.1016/j.clineuro.2004.09.015.

2 Gelabert-González, Miguel, Miguel Iglesias-Pais, Alfredo García-Allut, and Ramón Martínez-Rumbo. "Chronic Subdural Haematoma: Surgical Treatment and Outcome in 1000 Cases." Clinical Neurology and Neurosurgery 107, no. 3 (April 1, 2005): 223–29. https://doi.org/10.1016/j.clineuro.2004.09.015.

3 Gelabert-González, Miguel, Miguel Iglesias-Pais, Alfredo García-Allut, and Ramón Martínez-Rumbo. "Chronic Subdural Haematoma: Surgical Treatment and Outcome in 1000 Cases." Clinical Neurology and Neurosurgery 107, no. 3 (April 1, 2005): 223–29. https://doi.org/10.1016/j.clineuro.2004.09.015.

4 "AANS | E-Poster Abstract." Accessed June 23, 2022. https://www.aans.org/meetings.

5 Tsitsopoulos, P. P., N. Marklund, E. Rostami, P. Enblad, and L. Hillered. "Association of the Bleeding Time Test with Aspects of Traumatic Brain Injury in Patients with Alcohol Use Disorder." Acta Neurochirurgica 162, no. 7 (July 1, 2020): 1597–1606. https://doi.org/10.1007/s00701-020-04373-y.

# Jaw fracture/ Strangulation

This is how a traumatic jaw fracture presents differently in those who are unsheltered:

- The homeless (as shown previously) are frequently victims of assault.
- Assault is the leading cause of jaw fractures.
- Over half of patients with a jaw fracture have multiple jaw fractures.
- Over 1/4 of these fractures involve the condyle or subcondylar area.
- Any head, neck, or face injury in a woman is a red flag for sexual violence.
- Low-income women who are victims of sexual violence are frequently victims of strangulation.
- Strangulation is a massive red flag for the risk of future death by homicide.


## ASSAULT IS THE LEADING CAUSE OF JAW FRACTURES (42%)

• In a 2015 review of 13,142 jaw fractures in the US, assault was the leading cause at 42% of all fractures.[1]

## OVER HALF OF PATIENTS WITH A JAW FRACTURE PRESENT WITH MULTIPLE JAW FRACTURES

• A 2019 study of patients with jaw fractures found that most were from assault (56.3%) and most patients had multiple fractures to the jaw (also 56.3%).[2]

## CONDYLE FRACTURES ARE COMMON (27.4%)

• In a 2015 review of 13,142 jaw fractures in the US, condyle fractures were common: condyle (14.8%), subcondylar (12.6%) [see IMAGE from study above].[3]

## HEAD-NECK-FACE INJURIES IN WOMEN ARE RED FLAGS FOR SEXUAL VIOLENCE

• A 2010 study found that injuries to the head, neck, and/or face of women were associated in 30% of the cases with intimate partner violence.[4]

## LOW-INCOME WOMEN EXPERIENCING SEXUAL VIOLENCE FACE A HIGH RISK OF STRANGULATION AND DEATH

• A 2018 study examining associations between IPV (Intimate Partner Violence) and strangulation found that lower income women were at a much higher risk of strangulation (39.31%).[5]

• A 2007 study found that non-fatal strangulation increased a women's chance of homicide by seven times.[6]



1 "The Epidemiology of Mandibular Fractures in the United States, Part 1: A Review of 13,142 Cases from the US National Trauma Data Bank - ClinicalKey," n.d. https://www-clinicalkey-com.ezproxy3.library.arizona.edu/#!/content/playContent/1-s2.0-S0278239115004929?returnurl=null&referrer=null.

2 Buron, Corentin, Christian Mounier, Carine Guiavarc'h, Cédric Lansonneur, Matthieu Conan, Kim Bouillon, and Guy Le Toux. "Management of Jaw Fractures in Oral Surgery in Public and Private Practice: A Retrospective Study from 2006 to 2017." Journal of Oral Medicine and Oral Surgery 26, no. 1 (2020): 3. https://doi.org/10.1051/mbcb/2019035.

3 "The Epidemiology of Mandibular Fractures in the United States, Part 1: A Review of 13,142 Cases from the US National Trauma Data Bank - ClinicalKey," n.d. https://www-clinicalkey-com.ezproxy3.library.arizona.edu/#!/content/playContent/1-s2.0-S0278239115004929?returnurl=null&referrer=null.

4 "Orofacial Injuries as Markers for Intimate Partner Violence - ClinicalKey," n.d. https://www-clinicalkey-com.ezproxy1.library.arizona.edu/#!/content/playContent/1-s2.0-S1042369910000233?returnurl=null&referrer=null.

5 Mittal, Mona, Kathryn Resch, Corey Nichols-Hadeed, Jennifer Thompson Stone, Kelly Thevenet-Morrison, Catherine Faurot, and Catherine Cerulli. "Examining Associations between Strangulation and Depressive Symptoms in Women with Intimate Partner Violence Histories." Violence and Victims 33, no. 6 (December 2018): 1072–87. https://doi.org/10.1891/0886-6708.33.6.1072.

6 Glass, Nancy, Kathryn Laughon, Jacquelyn Campbell, Anna D. Wolf Chair, Carolyn Rebecca Block, Ginger Hanson, Phyllis W. Sharps, and Ellen Taliaferro. "Non-Fatal Strangulation Is an Important Risk Factor for Homicide of Women." The Journal of Emergency Medicine 35, no. 3 (October 2008): 329–35. https://doi.org/10.1016/j.jemermed.2007.02.065.

## A SIMPLE TONGUE BLADE TEST IS SENSITIVE FOR A JAW FRACTURE

• A 2012 study using CT scans, found that a simple tongue blade test (easily performed in the field) has a sensitivity of 95% and a specificity of 68% when assessing for a mandible fracture.[1]

## BUT NON-FATAL STRANGULATION ASSESSMENT IS NOT SIMPLE AS 40% OF CASES HAVE NO EXTERNAL SIGNS

• A 2019 study found that most patients who survive strangulation have no injuries or minor injuries. Because of this, clinicians need to have a high index of suspicion "as they would for sub-arachnoid hemorrhages or thoracic aortic dissections."[2]

## MANY HOMELESS ARE AFRAID TO LOOK "WEAK" OR "INJURED" AND MAY REFUSE TREATMENT

• A 2021 study examining the homeless in Los Angeles found that criminal victimization of the homeless is growing exponentially.[3] A 2019 study found that fear of victimization among the homeless is linked to stress and that stress may create a reluctance to engage in health-protective actions.[4]

## NON-TREATMENT OF A JAW FRACTURE = POOR HEALING = CHRONIC ISSUES

• A 2008 study warned, "Mandible fractures may lead to deformities, either due to displacement of the fracture fragments or non-restored bone losses .... Consequences of an untreated or inappropriately treated mandibular fractures may be severe, both cosmetically and functionally."[5]

## NON-FATAL STRANGULATION IS LINKED TO A HIGH RISK OF HOMICIDE

• A 2019 study concluded social work involvement in non-fatal strangulation is warranted due to a 7.5 times higher risk of murder.[6]

## Jaw fracture/ Strangulation

This is how a traumatic jaw fracture can be assessed in those living on the streets:

- Physicians can use a simple tongue blade test for a 95% sensitive test for a jaw fracture.
- Especially for homeless women presenting with any facial injury, a careful assessment for sexual violence is called for including a thorough assessment for any evidence of strangulation.
- Strangulation is often missed during an assessment as 40% of patients have no external signs.
- Use this opportunity to build trust with your patient as they are likely to refuse immediate treatment but may consider later treatment.

1 "Re-Evaluating the Diagnostic Accuracy of the Tongue Blade Test: Still Useful as a Screening Tool for Mandibular Fractures?" The Journal of Emergency Medicine 45, no. 1 (July 1, 2013): 8–12. https://doi.org/10.1016/j.jemermed.2012.11.078.

2 De Boos, Julia. "Review Article: Non-Fatal Strangulation: Hidden Injuries, Hidden Risks." Emergency Medicine Australasia 31, no. 3 (2019): 302–8. https://doi.org/10.1111/1742-6723.13243.

3 Shah, Ovais Rehman, Lori Willoughby, and Nicholas Bowersox. "Tackling homelessness through AI powered social innovations: A novel and ground-breaking assessment of criminal victimization of homeless populations in los angeles employing predictive analytics and machine learning models such as ARIMA and LSTM." Issues in Information Systems 22.3 (2021).

4 Odoh, Chisom, Michael S. Businelle, Tzu-An Chen, Darla E. Kendzor, Ezemenari M. Obasi, and Lorraine R. Reitzel. "Association of Fear and Mistrust with Stress Among Sheltered Homeless Adults and the Moderating Effects of Race and Sex." Journal of Racial and Ethnic Health Disparities 7, no. 3 (June 2020): 458–67. https://doi.org/10.1007/s40615-019-00674-w.

5 Thapliyal, GK, R Sinha, PS Menon, and A Chakranarayan. "Management of Mandibular Fractures." Medical Journal, Armed Forces India 64, no. 3 (July 2008): 218–20. https://doi.org/10.1016/S0377-1237(08)80096-2.

6 De Boos, Julia. "Review Article: Non-Fatal Strangulation: Hidden Injuries, Hidden Risks." Emergency Medicine Australasia 31, no. 3 (2019): 302–8. https://doi.org/10.1111/1742-6723.13243.

# Skull fracture

This is how a traumatic skull fracture presents differently in those who are unsheltered:

- The homeless have FIVE TIMES the risk of hospitalization from a head injury.
- Those head injuries are likely to have been caused by assault.
- Many of those head injuries will be severe as the assailants, quite literally, tried to kill the patient.
- Expect to find multiple skull fractures in any homeless patient with a suspected skull fracture.
- A higher risk of repeat assault remains for any homeless patient discharged to the streets.
- Especially when a homeless patient presents with a basal skull fracture, expect a CSF leak and a concomitant higher risk of meningitis.

## THE HOMELESS HAVE FIVE TIMES THE RISK OF HOSPITALIZATION FROM A HEAD INJURY

• In a 2014 study, the prevalence of admission to a hospital with head injury in the homeless was 5.4 times higher than in the housed population. The standardized mortality ratio for the homeless with hospitalized head injury aged 15-34 was shockingly high (17.54).[1]

## MULTIPLE SKULL FRACTURES ARE COMMON IN THE HOMELESS WHO ARE HOSPITALIZED FOR A HEAD INJURY

• The same 2014 study found "A total of 78.5% of the 214 homeless with a hospitalized head injury had diagnostic codes indicating intracranial injury (n = 130), skull fracture (n: 19), or concussion (n: 19). Twenty-five homeless people had a total of 60 skull fractures."[2]

## HOMELESS HEAD INJURY PATIENTS ARE MUCH MORE LIKELY TO BE VICTIMS OF ASSAULT AND REPEAT ASSAULT

• A 2021 study found ""Forty percent of all homeless patients were victims of assault compared with just 15% of patients discharged to home ... [and] the window for overnight assault risk resulting in TBI is extended for these patients compared to patients discharged to home."[3]

## CSF LEAKS ARE COMMON EVEN IN "MILD" HEAD INJURY PATIENTS WITH ANY BASAL SKULL FRACTURE

• A 2018 study found that 63% of mild head injury patients with a skull base fracture (diagnosed by CT) had CSF rhinorrhea. It further projected that 10% to 25% of patients with CSF rhinorrhea will go on to develop meningitis.[4]

1 Mcmillan, Thomas, Marie Laurie, Michael Oddy, Mark Menzies, Elaine Stewart, and Jessica Wainman-Lefley. "Head Injury and Mortality in the Homeless." Journal of Neurotrauma 32 (July 10, 2014). https://doi.org/10.1089/neu.2014.3387.

2 Mcmillan, Thomas, Marie Laurie, Michael Oddy, Mark Menzies, Elaine Stewart, and Jessica Wainman-Lefley. "Head Injury and Mortality in the Homeless." Journal of Neurotrauma 32 (July 10, 2014). https://doi.org/10.1089/neu.2014.3387.

3 Dell, Kristine C., Jason Staph, and Frank G. Hillary. "Traumatic Brain Injury in the Homeless: Health, Injury Mechanisms, and Hospital Course." Brain Injury 35, no. 10 (August 24, 2021): 1192–1200. https://doi.org/10.1080/02699052.2021.1958009.

4 Kalhoro, Aurangzeb, Abdul Samad, and Lal Rehman. "Frequency of Traumatic Cerebrospinal Fluid Rhinorrhoea in Mild Head Injury with Pneumo-Encephalus," n.d., 4.

## A SIMPLE FIELD TEST IS SENSITIVE FOR SKULL FRACTURE ASSESSMENT

• A 2020 systematic review and meta-analysis found the Canadian CT Head Rules (easily assessed in the field) have a 89.8% sensitivity in predicting positive CT findings in a head injury patient and a 92.5% sensitivity in the prediction of clinically important TBI in mild TBI patients.[1]

## "CLASSIC" CLINICAL SIGNS ARE NOT RELIABLE, ESPECIALLY IN THE FIRST 48 HOURS

• A 2018 study found that using just the "classic" skull fracture signs of raccoon eyes, Battle's sign, otorrhea, and rhinorrhea for the early detection of BSF had low accuracy (55.9%) and specificity (52.8%), and even lower positive predictive value (25.7%).[2]

## HOMELESS TBI PATIENTS WITH A PSYCHIATRIC HISTORY ARE VERY, VERY LIKELY TO BE AGITATED

• A 2019 study of hospitalized TBI patients found that men have twice as much probability of developing agitation In addition, a psychiatric history quadruples the chances of agitation.[3]

## WHEN DEALING WITH AN AGITATED PATIENT, GENTLY DESCRIBE EACH ASSESSMENT TECHNIQUE AND GENTLY ASK FOR CONSENT BEFORE EACH STEP THEN REPEAT AS MANY TIMES AS NECESSARY

• A 2012 study found that de-escalation of the agitated patient begins with a gentle verbal loop. Per the study, "De-escalation frequently takes the form of a verbal loop in which the clinician listens to the patient, finds a way to respond that agrees with or validates the patient's position, and then states what he wants the patient to do, eg, accept medication, sit down, etc. The loop repeats as the clinician listens again to the patient's response. The clinician may have to repeat his message a dozen or more times before it is heard by the patient. Yet, beginning residents, and other inexperienced clinicians, tend to give up after a brief attempt to engage the patient, reporting that the patient won't listen or won't cooperate."[4]

## Skull fracture

This is how a traumatic skull fracture can be assessed in those living on the streets:

- Use a validated assessment tool like the Canadian CT Head Rules to assess for the risk of a skull fracture.
- Understand that the "classic" signs of a skull fracture (raccoon eyes, Battle's sign, otorrhea, rhinorrhea) have a low predictive value when used in isolation.
- Expect agitation in your homeless TBI patient.
- In a homeless male TBI patient, expect double the risk of agitation. If they have a psychiatric history, that risk quadruples.
- Use patience and a de-escalatory verbal loop during your assessment. Be sure to describe every step in advance and to receive consent before each step.

1 Alzuhairy, Abeer Kadum Abass. "Accuracy of Canadian CT Head Rule and New Orleans Criteria for Minor Head Trauma; a Systematic Review and Meta-Analysis." Archives of Academic Emergency Medicine 8, no. 1 (September 8, 2020): e79.

2 Solai, Cibele Andres, Cristiane de Alencar Domingues, Lilia de Souza Nogueira, and Regina Marcia Cardoso de Sousa. "Clinical Signs of Basilar Skull Fracture and Their Predictive Value in Diagnosis of This Injury." Journal of Trauma Nursing 25, no. 5 (October 9, 2018): 301–6. https://doi.org/10.1097/JTN.0000000000000392.

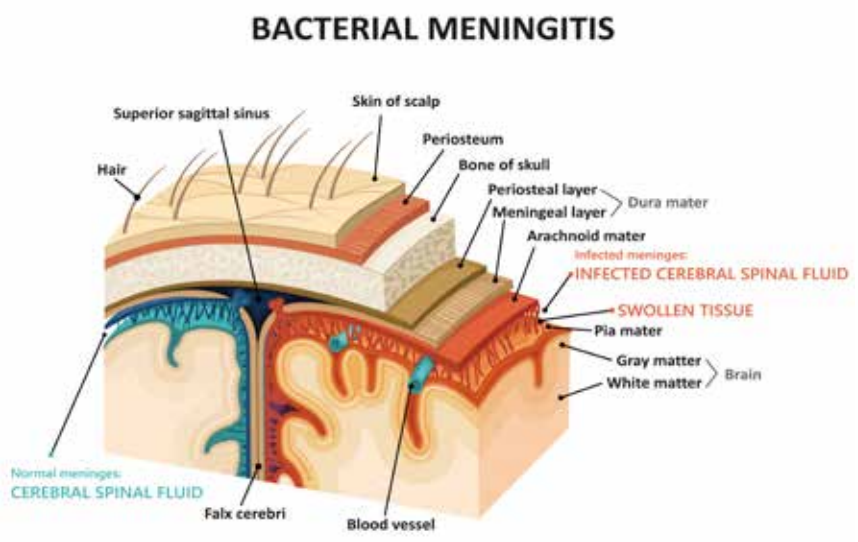
3 Jehane H. Dagher, Jennifer Massad, Julie Lamoureux, Elaine de Guise, and Mitra Feyz. "A Retrospective Review on Post Traumatic Agitation Predictors in Hospitalized Patients with Acute Traumatic Brain Injury." Journal of Basic & Applied Sciences 15 (January 5, 2019): 106–13. https://doi.org/10.29169/1927-5129.2019.15.13.

4 Richmond, Janet S, Jon S Berlin, Avrim B Fishkind, Garland H Holloman, Scott L Zeller, Michael P Wilson, Muhamad Aly Rifai, and Anthony T Ng. "Verbal De-Escalation of the Agitated Patient: Consensus Statement of the American Association for Emergency Psychiatry Project BETA De-Escalation Workgroup." Western Journal of Emergency Medicine 13, no. 1 (February 2012): 17–25. https://doi.org/10.5811/westjem.2011.9.6864.

# Bacterial meningitis

This is how bacterial meningitis presents differently in those who are unsheltered:

- The homeless have FIVE TIMES the risk of hospitalization from a head injury.
- CSF leaks are common even in "mild" TBI.
- 10% to 25% of patients with CSF rhinorrhea will develop meningitis.
- Time is dramatically important when assessing and treating meningitis in this population.
- A 2 hour delay to antibiotics DOUBLES the risk of mortality.




## THE HOMELESS HAVE FIVE TIMES THE RISK OF HOSPITALIZATION FROM A HEAD INJURY

• In a 2014 study, the prevalence of admission to a hospital with head injury in the homeless was 5.4 times higher than in the housed population. The standardized mortality ratio for the homeless with hospitalized head injury aged 15-34 was shockingly high (17.54).[1]

## CSF LEAKS ARE COMMON EVEN IN "MILD" HEAD INJURY PATIENTS. UP TO 25% OF THESE PATIENTS MAY DEVELOP MENINGITIS

• A 2018 study found that 63% of mild head injury patients with a skull base fracture (diagnosed by CT) had CSF rhinorrhea. It further projected that 10% to 25% of patients with CSF rhinorrhea will go on to develop meningitis.[2]

## TIME IS OF THE ESSENCE. A 2 HOUR DELAY TO ANTIBIOTICS IS ASSOCIATED WITH A DOUBLING OF MORTALITY IN COMMUNITY-ACQUIRED BACTERIAL MENINGITIS

• A 2022 study of adults with community-acquired bacterial meningitis found the risk of death associated with a treatment delay of just two hours more than doubled (2.29 adjusted odds ratio). This risk then continued to increase substantially thereafter.[3]

1 Mcmillan, Thomas, Marie Laurie, Michael Oddy, Mark Menzies, Elaine Stewart, and Jessica Wainman-Lefley. "Head Injury and Mortality in the Homeless." Journal of Neurotrauma 32 (July 10, 2014). https://doi.org/10.1089/neu.2014.3387.

2 Kalhoro, Aurangzeb, Abdul Samad, and Lal Rehman. "Frequency of Traumatic Cerebrospinal Fluid Rhinorrhoea in Mild Head Injury with Pneumo-Encephalus," n.d., 4.

3 Eisen, Damon P., Elizabeth Hamilton, Jacob Bodilsen, Rasmus Køster-Rasmussen, Alexander J. Stockdale, James Miner, Henrik Nielsen, et al. "Longer than 2 Hours to Antibiotics Is Associated with Doubling of Mortality in a Multinational Community-Acquired Bacterial Meningitis Cohort." Scientific Reports 12, no. 1 (January 13, 2022): 672. https://doi.org/10.1038/s41598-021-04349-7.

## ANY SUSPICION OF MENINGITIS MEANS YOUR HOMELESS PATIENT SHOULD BE TREATED AS IF THEY HAD MENINGITIS

• A 2018 article emphatically warned that bacterial meningitis is a medical emergency and further cautioned, "A patient who presents with recent onset of headache, fever, neck stiffness or altered mental state would prompt most clinicians to consider the possibility of meningitis. At least two of these four features will be present in 95% of patients with bacterial meningitis and should lead to urgent diagnostic work-up for this condition. The classic triad of bacterial meningitis consists of fever, neck stiffness and altered mental state; however, reliance on all three of these signs being present will result in more than 50% of cases of bacterial meningitis being missed."[1]

## STAY WITH YOUR PATIENT. HOMELESS PATIENTS LEAVE BEFORE ASSESSMENT AT VASTLY HIGHER RATES

• A 2017 study found the homeless leave EDs before assessment almost three times as often as housed patients (40% of ED attendances vs 15% of ED attendances in housed individuals).[2]

## ACTIVELY ENCOURAGE VACCINATION AGAINST MENINGOCOCCAL DISEASE IN HOMELESS AND REFUGEE PATIENTS

• A 2022 study found that households with low socioeconomic status have the highest risk of invasive meningococcal disease, but also have the lowest coverage rates of MenACWY and MenB vaccines. In addition, very high risk groups such as migrants and the homeless may not even be considered in these studies.[3]

## Bacterial meningitis

This is how bacterial meningitis can be assessed in those living on the streets:

• DO NOT LEAVE YOUR PATIENT. The homeless leave before an assessment is completed nearly three times as often as housed patients.
• DO NOT LEAVE YOUR PATIENT. A 2 hour delay in treatment doubles patient mortality.
• VACCINATE YOUR PATIENTS. Vaccines are safe and effective against meningococcal disease but marginalized populations have the lowest rates of vaccination.



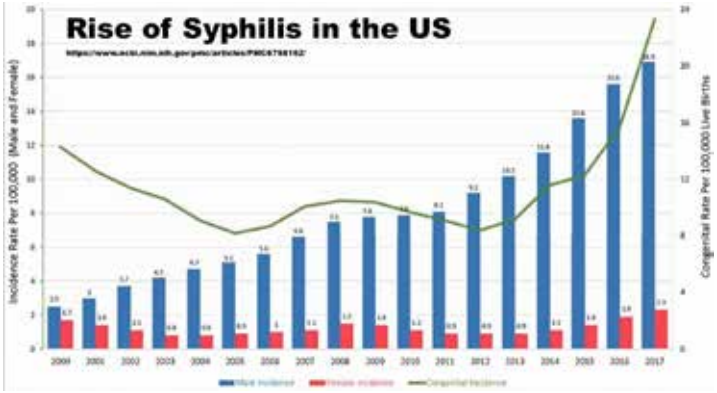
1 Young, Nicholas, and Mark Thomas. "Meningitis in Adults: Diagnosis and Management." Internal Medicine Journal 48, no. 11 (2018): 1294–1307. https://doi.org/10.1111/imj.14102.
2 Ní Cheallaigh, Clíona, Sarah Cullivan, Jess Sears, Ann Marie Lawlee, Joe Browne, Jennifer Kieran, Ricardo Segurado, et al. "Usage of Unscheduled Hospital Care by Homeless Individuals in Dublin, Ireland: A Cross-Sectional Study." BMJ Open 7, no. 11 (November 2017): e016420. https://doi.org/10.1136/bmjopen-2017-016420.
3 Taha, Muhamed-Kheir, Federico Martinon-Torres, Ralph Köllges, Paolo Bonanni, Marco Aurelio Palazzi Safadi, Robert Booy, Vinny Smith, Stéphanie Garcia, Rafik Bekkat-Berkani, and Véronique Abitbol. "Equity in Vaccination Policies to Overcome Social Deprivation as a Risk Factor for Invasive Meningococcal Disease." Expert Review of Vaccines 21, no. 5 (May 4, 2022): 659–74. https://doi.org/10.1080/14760584.2022.2052048.

# Urinary/Fecal incontinence

This is how urinary and/or fecal incontinence presents differently in those who are unsheltered:

• NO ONE wants to smell of urine or feces. The smell of urine or feces is an important physical sign that MUST be assessed.
. There are many causes of urinary and fecal incontinence in your homeless patient. Some of them -- like sexual abuse -- may indicate your patient's life is in immediate danger.
• Other causes -- like neurodegenerative disease -- may indicate your patient needs immediate referral to appropriate care.
• Again, smelling of urine or feces is NOT a moral failure. It is an important physical sign of illness or trauma.






## MORE THAN HALF OF HOMELESS WOMEN REPORT INTIMATE PARTNER ABUSE AND NEARLY HALF REPORT CHILDHOOD SEXUAL ABUSE. BOTH ARE STRONGLY LINKED TO BLADDER CONTROL PROBLEMS

• A 2012 study of homeless women found that 58% report intimate partner abuse and 44% report childhood sexual abuse.[1] A 2003 study found that 71% of female sexual abuse survivors had bladder control problems.[2]

## PTSD AND EMOTIONAL VIOLENCE ARE ALSO STRONGLY ASSOCIATED WITH URINARY INCONTINENCE IN OLDER WOMEN

• A 2020 study found the strongest and most consistent associations with urinary incontinence were seen in older women with emotional intimate partner violence and PTSD symptoms.[3]

## A WIDE RANGE OF DISEASES ARE ASSOCIATED WITH FECAL INCONTINENCE INCLUDING DIABETES AND SYPHILIS

• According to the National Institute of Diabetes and Digestive Kidney Diseases, there are many diseases that cause fecal incontinence including inflammatory bowel disease, dementia, multiple sclerosis, Parkinson's disease, stroke, and type 2 diabetes.[4] Syphilis can also cause fecal incontinence[5] and, according to the World Health Organization, syphilis currently infects over 5% of sex workers in 11 of 32 reporting countries and over 10% in 4 other countries.[6]

1 Green, Harold D., Joan S. Tucker, Suzanne L. Wenzel, Daniela Golinelli, David P. Kennedy, Gery W. Ryan, and Annie J. Zhou. "Association of Childhood Abuse with Homeless Women's Social Networks." Child Abuse & Neglect 36, no. 1 (January 1, 2012): 21–31. https://doi.org/10.1016/j.chiabu.2011.07.005.

2 Davila, G. WILLY, FRANCIE Bernier, JONATHON Franco, and STACY L. Kopka. "Bladder Dysfunction in Sexual Abuse Survivors." The Journal of Urology, Part 1 of 2, 170, no. 2, Part 1 (August 1, 2003): 476–79. https://doi.org/10.1097/01.ju.0000070439.49457.d9.

3 Boyd, Brittni A.J., Carolyn J. Gibson, Stephen K. Van Den Eeden, Brigid McCaw, Leslee L. Subak, David Thom, and Alison J. Huang. "Interpersonal Trauma as a Marker of Risk for Urinary Tract Dysfunction in Midlife and Older Women." Obstetrics and Gynecology 135, no. 1 (January 2020): 106–12. https://doi.org/10.1097/AOG.0000000000003586.

4 National Institute of Diabetes and Digestive and Kidney Diseases. "Symptoms & Causes of Fecal Incontinence | NIDDK." Accessed June 27, 2022. https://www.niddk.nih.gov/health-information/digestive-diseases/bowel-control-problems-fecal-incontinence/symptoms-causes.

5 Toptan, Tugce, Betul Ozdilek, Gulay Kenangil, Mustafa Ulker, and Fusun Mayda Domac. "Neurosyphilis: A Case Report." Northern Clinics of Istanbul 2, no. 1 (April 24, 2015): 66–68. https://doi.org/10.14744/nci.2015.96268.

6 "Sex Workers with Active Syphilis." Accessed June 27, 2022. https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/sex-workers-with-active-syphilis.

## Urinary/Fecal incontinence

This is how urinary and/or fecal incontinence can be assessed in those living on the streets:

- Assume your patient has PTSD and a prior history of sexual assault.
- Follow best practices for trauma-informed care, such as those in the EMPOWER (Engage, Motivate, Protect, Organize, self-Worth, Educate, Respect) Clinic at Gouverneur Health in New York, NY.
- Be prepared to provide a safe space for your patient and for your team as the perpetrator of intimate partner violence is likely to have accompanied your patient to their visit.
- Adult diapers of all sizes -- especially large and extra-large diapers -- should be easily available.

### FOLLOW TRAUMA-INFORMED CARE GUIDELINES WHEN ASSESSING YOUR PATIENT

• Many examples of trauma-informed care exist including those described in a 2019 study at the Engage, Motivate, Protect, Organize, self-Worth, Educate, Respect (EMPOWER) Clinic for Survivors of Sex Trafficking and Sexual Violence located at Gouverneur Health in New York, New York. One key aspect is to take an informed patient history. Per the study, "Four trauma-specific questions are explicitly asked: 1) when the trauma occurred, 2) the timing and duration of trauma, 3) the identity of the perpetrator in relation to the survivor (eg, family member, stranger, romantic partner), and 4) whether the patient is currently safe from the perpetrator or is in contact with the perpetrator."[1]

### PREPARE TO OFFER A SAFE SPACE FOR YOUR PATIENT AS ABUSERS FREQUENTLY ACCOMPANY THEIR HOMELESS PARTNERS TO FEEDING PROJECTS AND CLINICS

• A 2005 research report found that over 25% of homeless women reported having been stalked by their abuser.[2]

### BE VERY AWARE OF YOUR SAFETY AND THAT OF YOUR STAFF AS 20% OF INTIMATE PARTNER HOMICIDE VICTIMS ARE COROLLARY VICTIMS

• A 2014 study looked at 4470 persons who died in the course of 3350 intimate partner violence–related homicide incidents. Corollary victims -- victims other than the intimate partner -- represented 20% of those homicide victims.[3]

### THE HOMELESS HAVE A SIGNIFICANT NEED FOR ADULT DIAPERS, BUT VERY LITTLE ACCESS TO THEM

• Homeless projects, like Thrive DC in Washington, DC report a large need for adult diapers in their population but further report finding adult diapers is an ongoing struggle.[4]

1 "An Integrated, Trauma-Informed Care Model for Female Survivors of Sexual Violence: The Engage, Motivate, Protect, Organize, Self-Worth, Educate, Respect (EMPOWER) Clinic." Accessed June 27, 2022. https://oce-ovid-com.ezproxy3.library.arizona.edu/article/00006250-201904000-00029/HTML.

2 Jasinski, Jana L., et al. "The experience of violence in the lives of homeless women: A research report." National Institute of Justice: Washington, DC (2005).

3 Smith, Sharon G., Katherine A. Fowler, and Phyllis H. Niolon. "Intimate Partner Homicide and Corollary Victims in 16 States: National Violent Death Reporting System, 2003–2009." American Journal of Public Health 104, no. 3 (March 2014): 461–66. https://doi.org/10.2105/AJPH.2013.301582.

4 Intern, Communications. "Adult Diapers." Thrive DC (blog), April 19, 2018. https://www.thrivedc.org/adult-diapers/.

# Scaphoid fracture

This is how a scaphoid fracture presents differently in those who are unsheltered:

- In the housed, a scaphoid fracture is commonly from a low-energy fall on an outstretched hand.
- In the homeless, a scaphoid fracture is frequently from a high energy cause: either from being thrown to the ground during an assault or from a blow from a club or pipe against upraised hands.
- The high energy nature of the assault means that, in addition to a scaphoid fracture, other fractures are also likely to occur especially in the fingers, radius, and shoulder.
- In the case of an "isolated" radius fracture, look for a scaphoid fracture as well.

## UPPER EXTREMITY FRACTURES FROM ASSAULT ARE UNDER-DIAGNOSED

• A 2022 study looked at more than 2 million ED visits for upper extremity fractures (UEF) -- the second most common site of fractures after head and neck -- and concluded, "Our results showed that among women 15–54 years old, only 1.7% of all UEF were reported to result from IPV even though 27.2% of all IPV related fractures occur in the upper extremity. With one in five women experiencing a severe form of physical violence from an intimate partner in their lifetime, these numbers are consistent with previous reports of significant under-diagnosis."[1]

## SCAPHOID FRACTURES FROM ALL CAUSES ARE FREQUENTLY MISSED. IF YOU FIND A RADIUS FRACTURE, THINK SCAPHOID FRACTURE

• A 2019 research article looked at a series of studies and determined, "Scaphoid fractures ... account for 2.4% of wrist fractures in the United States. Not only is the overall incidence of this fracture notable, it is also a diagnosis that is missed at initial presentation up to 40% of the time." The same study also determined that in patients aged 18 to 30, a scaphoid fracture occurred with a radius fracture 10% of the time.[2]

## ELDERLY WRIST INJURY? THINK ASSAULT. HOMELESS ELDERLY HAVE THREE TIMES THE RISK OF INJURY FROM ASSAULT

• A 2010 study examined the homeless in New York City and concluded, "Nearly 12% (3,645) of all homeless hospitalizations were due to injury associated with assault. ... Hospitalizations for assault were more than threefold higher in homeless compared with low SES [socioeconomic status] housed elderly."[3]

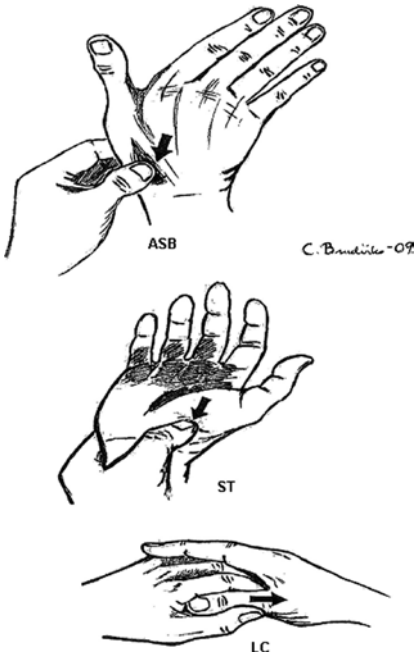
1 Khurana, Bharti, Ali Raja, George S. M. Dyer, Steven E. Seltzer, Giles W. Boland, Mitchel B. Harris, Paul Tornetta, and Randall T. Loder. "Upper Extremity Fractures Due to Intimate Partner Violence versus Accidental Causes." Emergency Radiology 29, no. 1 (February 1, 2022): 89–97. https://doi.org/10.1007/s10140-021-01972-9.

2 Williams, Robert, Daniel C. Jupiter, and Nicholas H. Maassen. "The Incidence and Risk Factors of Scaphoid Fracture Associated With Radial Head and Neck Fracture in Trauma Patients." JAAOS Global Research & Reviews 3, no. 5 (May 2019): e055. https://doi.org/10.5435/JAAOSGlobal-D-19-00055.

3 Frencher, Stanley K. Jr, Camilla M. B. Benedicto, Tiffany D. MSPT Kendig, Daniel DSW Herman, Barbara Barlow, and Joyce C. Pressley. "A Comparative Analysis of Serious Injury and Illness Among Homeless and Housed Low Income Residents of New York City." Journal of Trauma-Injury Infection & Critical Care 69, no. 4 (October 2010). https://doi.org/10.1097/TA.0b013e3181f1d31e.

## A SIMPLE FIELD TEST IS HIGHLY SENSITIVE FOR A SCAPHOID FRACTURE

• A 2014 study determined a simple three-step physical exam for a scaphoid fracture had a negative predictive value of 96% and a sensitivity of 77%. In addition, among experienced doctors, both the sensitivty and specificity of the test rose to 100%.[1]




## PAIN SCORES ARE NOT HELPFUL IN ASSESSING A SCAPHOID FRACTURE

• A 2015 study warns against using a pain score as part of your assessment criteria. Per the study, "Based on statistical analysis in this study, pain score of patients with suspected scaphoid fracture based on symptoms and with normal radiograph of the wrist would not be a good way to help identify."[2]

## PREPARE TO OFFER A SAFE SPACE FOR YOUR PATIENT AS ABUSERS FREQUENTLY ACCOMPANY THEIR HOMELESS PARTNERS TO FEEDING PROJECTS AND CLINICS

• A 2005 research report found that over 25% of homeless women reported having been stalked by their abuser.[3]

## INITIAL X-RAYS MISS SCAPHOID FRACTURES OVER 20% OF THE TIME

• A 2020 systematic review found that "the overall incidence of scaphoid fractures missed on X-ray and diagnosed on advanced imaging was 21.8%."[4]

## Scaphoid fracture

This is how a scaphoid fracture can be assessed in those living on the streets:

- Assume your patient has PTSD.
- Assume your patient has both a prior history and a recent history of assault.
- Your patient will be in pain BUT a pain score is an unreliable indicator for a scaphoid injury.
- Be prepared to provide a safe space for your patient and for your team as the perpetrator of intimate partner violence is likely to have accompanied your patient to their visit.
- Be prepared to provide follow-up to your patient as scaphoid fractures are missed on x-ray more than 20% of the time.

1 Bergh, Torbjørn Hiis, Tommy Lindau, Lars Atle Soldal, Soosaipillai V. Bernardshaw, Mehdi Behzadi, Knut Steen, and Christina Brudvik. "Clinical Scaphoid Score (CSS) to Identify Scaphoid Fracture with MRI in Patients with Normal x-Ray after a Wrist Trauma." Emergency Medicine Journal 31, no. 8 (August 1, 2014): 659–64. https://doi.org/10.1136/emermed-2012-202219.

2 Sharifi, Mohammad Davood, Hamid Zamani Moghaddam, Hosein Zakeri, Mohsen Ebrahimi, Hesamoddin Saeedian, and Amir Masoud Hashemian. "The Accuracy of Pain Measurement in Diagnosis of Scaphoid Bone Fractures in Patients with Magnetic Resonance Imaging: Report of 175 Cases." Medical Archives 69, no. 3 (June 2015): 161–64. https://doi.org/10.5455/medarh.2015.69.161-164.

3 Jasinski, Jana L., et al. "The experience of violence in the lives of homeless women: A research report." National Institute of Justice: Washington, DC (2005).

4 Bäcker, Henrik Constantin, Chia H. Wu, and Robert J. Strauch. "Systematic Review of Diagnosis of Clinically Suspected Scaphoid Fractures." Journal of Wrist Surgery 9, no. 1 (February 2020): 81–89. https://doi.org/10.1055/s-0039-1693147.

# Boxer's fracture

This is how a boxer's fracture presents differently in those who are unsheltered:

- Boxer's fractures of the fourth and fifth metatarsal are common in the homeless. So common they are seen as "ho-hum" kind of injuries.
- Because boxer's fractures in the homeless frequently come from high-energy fights, additional hidden fractures are also common.
- Boxer's fractures -- especially in women -- are red flags for underlying psychiatric conditions that may not have been previously recognized.
- Over one-quarter of your homeless boxer's fracture patients are likely to re-injure their hands. This should be seen as an opportunity to get your patient appropriate care for anger management and/or other mental health issues.

## A VERY COMMON FRACTURE IN THE HOMELESS

• A 2007 study in England found, "... a clear and significant relationship between the incidence of hand trauma and socioeconomic deprivation in the second decade of life and in young and middle aged adults." [1]

## HALF OF WOMEN PRESENTING WITH A BOXER'S FRACTURE HAVE UNDERLYING MENTAL ILLNESS

• A 2011 study concluded, "One-fifth of the patients presenting for punch injuries are women and although women are less likely to incur fractures from punch injury, about 10% do in fact suffer fractures. Almost half of these patients also carry an underlying psychiatric diagnosis."[2]

## OVER ONE-QUARTER OF YOUR BOXER'S FRACTURE PATIENTS ARE LIKELY TO HAVE RECURRENT FRACTURE INJURIES

• A 1999 study found, "Ninety-two percent of BF [boxer's fracture] patients were men compared with 58% of all injured. Thirty-eight of 62 (61%) BF injuries were sustained after intentional punches of an object/person. Seventeen of 62 (27%) BF patients were injury recidivists."[3]

1 HORTON, T. C., J. J. DIAS, and F. D. BURKE. "SOCIAL DEPRIVATION AND HAND INJURY." Journal of Hand Surgery (European Volume) 32, no. 3 (June 1, 2007): 256–61. https://doi.org/10.1016/J.JHSB.2006.10.005.

2 Jeanmonod, Rebecca K., Donald Jeanmonod, Sara Damewood, Cheryl Perry, Marwan Powers, and Vicky Lazansky. "Punch Injuries: Insights into Intentional Closed Fist Injuries." Western Journal of Emergency Medicine 12, no. 1 (February 2011): 6–10.

3 "Boxer's Fracture: An Indicator of Intentional and Recurrent Injury." The American Journal of Emergency Medicine 17, no. 4 (July 1, 1999): 357–60. https://doi.org/10.1016/S0735-6757(99)90086-4.

## Boxer's fracture

This is how a boxer's fracture can be assessed in those living on the streets:

- A higher percentage of boxer's fractures in homeless patients come from hitting a person, as opposed to hitting a wall or solid object.
- Because of this, and because of the lack of sanitation in the world of the homeless, the risk of wound contamination is also higher.
- Carefully examine your homeless patient's hand for:
  1) evidence of fractured teeth or other foreign objects
  2) signs of blood -- both your patient's blood and the blood of the person they hit
  3) signs of human and animal bites.
- When applying buddy taping in an uncomplicated fracture, explain to your patient the extreme need to regularly look for any signs of infection that might be hidden beneath the bandaging.

## LOOK FOR TEETH IN THE WOUND. THAT'S RIGHT. TEETH

• Boxer's fractures in the homeless are frequently very dirty and very involved. Careful examination of the injury is absolutely required as detailed in this 2020 study: "While examining a potential fifth metacarpal fracture, a clinician must give special attention to check for any breaks in the skin (fight bites), neurovascular status, pseudo clawing, or rotational alignment, and the uninjured hand should be compared. Early thorough debridement and antibiotics are required for patients with fight bites, as amputation might be required in certain cases with chronic bone and tendon sheath infection."[1]

## IN CASE OF "FIGHT BITES," EXPECT A COMPLICATION RATE OF OVER 10%. AND THAT'S WHEN YOUR PATIENT IS CAREFULLY TREATED IN AN ED

• A 2019 study found that the complication rate for "fight bites" to the hand (e.g. persistent pain, stiffness, recurrent infection, osteomyelitis) was 12% even after treatment with antibiotics, and/or irrigation and expectant wound care, and/or irrigation and debridement. The same study also determined that "Treatment is often inadequate, with nearly 25% to 40% of patients failing to receive tetanus prophylaxis, hepatitis B vaccine, or antibiotics."[2]

## "BUDDY TAPING" MAY BE APPROPRIATE FOR AN UNCOMPLICATED BOXER'S FRACTURE, BUT IT IS NOT APPROPRIATE FOR OLDER PATIENTS, THOSE WITH OPEN WOUNDS, OR THOSE WITH SEVERELY ANGULATED FRACTURES

• A 2019 study concluded, "A 2005 Cochrane review determined that studies comparing strategies for boxer's fracture management were inadequately powered to definitively recommend one strategy. Including this trial, two randomized control trials and a systematic review have re-examined this question for adult patients. All three studies support the use of buddy taping as an alternative to preserve functional outcomes, and that, as a treatment strategy, it may confer other advantages over plaster immobilization. It is important to recognize that these findings do not apply to older patients, or those with open injuries or severely angulated fractures."[3]

1 Hussain, Malik Hatim, Ali Ghaffar, Qaisar Choudry, Zafar Iqbal, and Muhammad Noman Khan. "Management of Fifth Metacarpal Neck Fracture (Boxer's Fracture): A Literature Review." Cureus 12, no. 7 (July 28, 2020). https://doi.org/10.7759/cureus.9442.

2 Harper, Carl M., Arriyan Samandar Dowlatshahi, and Tamara D. Rozental. "Challenging Dogma: Optimal Treatment of the 'Fight Bite.'" Hand (New York, N.Y.) 15, no. 5 (September 2020): 647–50. https://doi.org/10.1177/1558944719831238.

3 Golby, Riley, Andrew Guy, and Frank X. Scheuermeyer. "Is Buddy Taping as Effective as Plaster Immobilization to Manage Adult Boxer's Fractures?" CJEM 22, no. 2 (March 2020): 161–62. https://doi.org/10.1017/cem.2019.445.

# Femoral fracture

This is how a femoral fracture presents differently in those who are unsheltered:

- Violent assaults on the homeless are common.
- One especially brutal assault happens when the homeless are kicked while sleeping.
- This far-too-common type of assault leads to high-energy fractures especially of the skull and femur.
- These fractures are frequently seen in homeless diabetics.
- This type of assault also leads to femoral fractures in elderly homeless women and men.
- Even given the pain of a femoral fracture, your homeless patient is likely to discount the severity of their injury.



## THE HOMELESS ARE FREQUENTLY BRUTALLY KICKED WHILE SLEEPING

• Clinic reports and news reports regularly describe homeless men and women being brutally kicked and assaulted while they are sleeping [Video linked above].[1][2]

## HOMELESS PATIENTS WITH TYPE 1 DIABETES HAVE QUADRUPLE THE RISK OF A HIP FRACTURE

• A 2015 meta-analysis concluded that the "the pooled relative risk for hip fracture was 4.51" in patients with type 1 diabetes.[3]

## HOMELESS PATIENTS WITH TYPE 2 DIABETES EXPERIENCE "HIGHLY COMPROMISED" FRACTURE HEALING

• A 2018 study found, "The process of bone healing after fracture is highly compromised by different factors altered by T2DM."[4]

## THIS COMBINATION OF FACTORS PLACES HOMELESS NATIVE AMERICANS AT EXTREME RISK

• A 2016 study among American Indians and Alaska Natives (AI/AN) found that this population has higher rates of diabetes than all other groups (14.1%) resulting in diabetes being the fifth leading cause of death among AI/AN ages 45 to 54 with the ratio of diabetes deaths among AI/AN to whites at 3.4 to 1.[5]

In addition, homeless native women are at an especially high risk of assault. According to a 2010 survey of native women in Seattle, 53.4% were homeless and 93.9% were rape survivors.[6]

1 •. "Police Seek 3 Suspects Who Kicked Homeless Man Sleeping on Church Steps." NBC New York (blog). Accessed June 29, 2022. https://www.nbcnewyork.com/news/local/homeless-man-kicked-church-steps-saint-nicholas-tolentine-bronx/2019284/.

2 Murphy, Neil. "Well-Dressed 'businessman' Viciously Kicks Homeless Man before Strolling Off." mirror, June 8, 2018. https://www.mirror.co.uk/news/us-news/smartly-dressed-man-briefcase-viciously-12665553. [IMAGE from article]

3 Shah, Viral N, Chirag S. Shah, and Janet K Snell-Bergeon. "Type 1 Diabetes and Risk for Fracture: Meta-Analysis and Review of the Literature." Diabetic Medicine : A Journal of the British Diabetic Association 32, no. 9 (September 2015): 1134–42. https://doi.org/10.1111/dme.12734.

4 Marin, Carlos, Frank P. Luyten, Bart Van der Schueren, Greet Kerckhofs, and Katleen Vandamme. "The Impact of Type 2 Diabetes on Bone Fracture Healing." Frontiers in Endocrinology 9 (2018). https://www.frontiersin.org/article/10.3389/fendo.2018.00006.

5 Anderson, Kermyt G., Paul Spicer, and Michael Peercy. "Obesity, Diabetes, and Birth Outcomes among American Indians and Alaska Natives." Maternal and Child Health Journal 20, no. 12 (December 2016): 2548–56. https://doi.org/10.1007/s10995-016-2080-3.

6 The Seattle Times. "Nearly Every Native American Woman in Seattle Survey Said She Was Raped or Coerced into Sex," August 23, 2018. https://www.seattletimes.com/seattle-news/homeless/survey-reveals-high-rates-of-sexual-assault-among-native-american-women-many-of-them-homeless/.

## Femoral fracture

This is how a femoral fracture can be assessed in those living on the streets:

- In resource poor settings, access to radiographic imaging of any kind can be difficult.
- In settings where imaging is available, getting a homeless patient to an imaging center can also be difficult.
- In the case of a suspected femoral fracture, the Patellar Pubic Percussion Test (PPPT) has been found to be valuable in determining the likely need for additional imaging.
- The PPPT may also be valuable in determining the risk of periacetabular, ileo-pubic and ischio-pubic ramus fractures.

### THE RISK FOR A FEMORAL FRACTURE CAN BE EASILY ASSESSED IN THE FIELD USING THE PATELLAR PUBIC PERCUSSION TEST (PPPT)

• A 2018 study found "the patellar pubic percussion test (PPPT) is a simple bedside diagnostic tool that is sensitive in detecting clinically straight forward hip fractures as well as occult hip fractures. ... A 85% sensitivity, a 70% specificity, a 0.94 positive predictive value and a 0.47 negative predictive value of the PTTT were calculated."[1]

### THE PPPT CAN BE MADE EASIER TO INTERPRET IN HIGHER NOISE ENVIRONMENTS BY USING A 128 HZ TUNING FORK

• A 2012 study using a 128Hz tuning fork and an elctronic stethoscope found, "There was a significant difference in the amplitude reduction of the sound waves when comparing normal to fractured hips."[2]

### THE PPPT MAY ALSO BE USEFUL IN DETECTING A VARIETY OF PELVIC FRACTURES INCLUDING FRACTURES THAT DON'T INITIALLY APPEAR ON X-RAY

• A 2016 case report of two patients with negative radiographs for any fracture, found that -- using the PPPT -- "the PPPT seemed to be a useful diagnostic tool to identify periacetabular, ileo-pubic and ischio-pubic ramus fractures."[3]



1 Smeets, Stef Jozef Marie, Wouter Vening, Michiel Bernard Winkes, Gerrit Paulus Kuijt, Gerrit Dirk Slooter, and Percival Victor van Eerten. "The Patellar Pubic Percussion Test: A Simple Bedside Tool for Suspected Occult Hip Fractures." International Orthopaedics 42, no. 11 (November 2018): 2521–24. https://doi.org/10.1007/s00264-018-4036-2.

2 Jawad, Z., A. Odumala, and M. Jones. "Objective Sound Wave Amplitude Measurement Generated by a Tuning Fork. An Analysis of Its Use as a Diagnostic Tool in Suspected Femoral Neck Fractures." Injury 43, no. 6 (June 1, 2012): 835–37. https://doi.org/10.1016/j.injury.2011.09.030.

3 "Is the Patellar Pubic Percussion Test Useful to Diagnose Only Femur Fractures or Something Else? Two Case Reports." Manual Therapy 21 (February 1, 2016): 292–96. https://doi.org/10.1016/j.math.2015.08.010.

# Pulmonary Barotrauma

This is how pulmonary barotrauma presents differently in those who are unsheltered:

- Pulmonary barotrauma in the housed is a rare condition usually associated with scuba diving. or mechanically-ventilated patients.
- Pulmonary barotrauma in the homeless is a much more common condition usually associated with meth smoking due to forceful deep breathing or deep inhalation followed by a Valsalva maneuver.
- Especially for homeless sex workers, pulmonary barotrauma may be caused by extreme mouth-to-mouth positive pressure when sharing meth smoke.
- This latter technique is known on the streets as "shotgunning."



## "SHOTGUNNING" EXPLAINED

• According to a 2012 study, "'Shotgunning' or 'doing a shotgun' refers to the practice of one individual forcibly exhaling (blowing) smoke into the mouth (or, rarely, nose) of another. The term may have originated from the practice of using an actual shotgun to smoke illicit drugs during the Vietnam War. Currently, this practice is more commonly performed by one individual drawing smoke into his or her mouth, holding it there temporarily and exhaling it directly into another individual's mouth ... with the lips of the individuals touching directly ...."[1]

## METH USE IS RISING AMONG HOMELESS DRUG USERS WITH A SEVENFOLD INCREASE IN THOSE WHO SMOKE METH

• A 2008 study found found a tripling of current methamphetamine use among homeless and marginally-housed persons with a sevenfold increase in smoked methamphetamine use.[2]

## METH USE INCREASES RISKY SEXUAL BEHAVIOR

• A 2022 laboratory-controlled study found, "Both anecdotal reports and decades of correlational research suggest that methamphetamine is associated with risky sexual behavior, and the prevalence of HIV/AIDS is notably higher among methamphetamine users compared to others. Despite these relations, the present study is the first to show that there is a causal link between methamphetamine administration and increased sexual desire in a placebo-controlled design. Methamphetamine caused orderly dose-dependent and time-dependent trends in increases in sexual desire, similar to previous work with cocaine (M. W. Johnson et al., 2017). In some cases, this increase in desire was associated with decreased condom use and may therefore have direct implications for linking methamphetamine use with sexual risk behavior."[3]

1 Welsh, Christopher, Richard Goldberg, Stephanie Tapscott, Deborah Medoff, Stanley Rosenberg, and Lisa Dixon. "'Shotgunning' in a Population of Patients with Severe Mental Illness and Comorbid Substance Use Disorders." The American Journal on Addictions 21, no. 2 (2012): 120–25. https://doi.org/10.1111/j.1521-0391.2011.00201.x.

2 Das-Douglas, Moupali, Grant Colfax, Andrew R. Moss, David R. Bangsberg, and Judith A. Hahn. "Tripling of Methamphetamine/Amphetamine Use among Homeless and Marginally Housed Persons, 1996–2003." Journal of Urban Health 85, no. 2 (March 2008): 239–49. https://doi.org/10.1007/s11524-007-9249-4.

3 Berry, Meredith S., Natalie R. Bruner, Evan S. Herrmann, Patrick S. Johnson, and Matthew W. Johnson. "Methamphetamine Administration Dose Effects on Sexual Desire, Sexual Decision Making, and Delay Discounting." Experimental and Clinical Psychopharmacology 30, no. 2 (April 2022): 180–93. https://doi.org/10.1037/pha0000398.

## Pulmonary Barotrauma

This is how pulmonary barotrauma can be assessed in those living on the streets:

- If any signs or symptoms of pulmonary barotrauma are suspected, a trauma-informed patient history should be taken.
- The most common presenting symptoms include: Subcutaneous emphysema (65%), Pericardial crunch (52%), and Chest pain (47%).
- Special attention should be given to a history of meth, cocaine, or MDMA use.
- Special attention should also be given to any history or suspicion of Covid-19 infection.
- The use of an anatomy app (like Essential Anatomy) is highly recommended when explaining what pulmonary barotrauma is and how it may occur.

## IN THE HOMELESS DRUG USING POPULATION, BAROTRAUMA IS NOT A "ZEBRA"

• A 2018 study recruited 236 clients dually diagnosed with SMI (serious mental illness) and substance use disorders who were receiving services at one of four community mental health programs in Baltimore. 61% of the participants reported they had previously shotgunned. The study also found that, "Shotgunning was also significantly correlated with high-risk behaviors including ever injecting drugs, sharing needles, having unprotected sex in exchange for drugs, and reporting a sexually transmitted disease."[1]

## BAROTRAUMA CAN PRESENT AS A WIDE RANGE OF PULMONARY CONDITIONS

• A 2014 study found that, "Barotrauma and subsequent pulmonary consequences such as pneumomediastinum, pneumopericardium, and pneumothorax have been associated with cocaine, amphetamine, and MDMA ('ecstasy') usage. ... The presenting symptoms included chest pain in 47%, dyspnea in 18%, and throat discomfort in 18% of these patients. Hamman's sign or a pericardial crunch was heard in 52% of these patients. Subcutaneous emphysema was found in 65%, and a small pneumothorax was found in 11% of these patients."[2]

## COVID-19 IS ALSO ASSOCIATED WITH PULMONARY BAROTRAUMA

• A 2022 study found that pulmonary barotrauma was found in 1 out of 25 hospitalized COVID-19 patients. This was the rate for patients NOT on mechanical ventilation. Per the study, "Pneumothorax and pneumomediastinum have been previously associated with coronavirus pneumonia during the SARS epidemic of 2002–2004. The incidence of barotrauma during the 2002–2004 epidemic varied from 5 to 34%. Barotrauma has been increasingly recognized and reported from the onset of the COVID-19 pandemic. One of the reasons for the higher incidence could be attributed to the broader use of chest computed tomography (CT) and its sensitivity to detect extra-alveolar gas collections. We observed a linear association of increased barotrauma incidence with increasing disease severity observed as 4.2% (2.4–7.3%) among [non-critically ill and/or mechanically ventilated] hospitalized patients."[3]

1 Welsh, Christopher, Richard Goldberg, Stephanie Tapscott, Deborah Medoff, Stanley Rosenberg, and Lisa Dixon. "'Shotgunning' in a Population of Patients with Severe Mental Illness and Comorbid Substance Use Disorders." The American Journal on Addictions 21, no. 2 (2012): 120–25. https://doi.org/10.1111/j.1521-0391.2011.00201.x.

2 Tseng, Will, Mark E. Sutter, and Timothy E. Albertson. "Stimulants and the Lung." Clinical Reviews in Allergy & Immunology 46, no. 1 (February 1, 2014): 82–100. https://doi.org/10.1007/s12016-013-8376-9.

3 Shrestha, Dhan Bahadur, Yub Raj Sedhai, Pravash Budhathoki, Ayush Adhikari, Nisheem Pokharel, Richa Dhakal, Satyasuna Kafle, et al. "Pulmonary Barotrauma in COVID-19: A Systematic Review and Meta-Analysis." Annals of Medicine and Surgery 73 (January 1, 2022): 103221. https://doi.org/10.1016/j.amsu.2021.103221

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## CHAPTER 2

# THE WORLD OF THE HOMELESS LACKS CLEAN WATER

How many days have you gone without water? How many times have you been violently ill from drinking the water you were able to find?

These are not questions generally asked of housed patients, but they are important issues for any patient who is or has been unsheltered.

Here are your bullet points:

## LIMITED ACCESS TO WATER

• Recent estimates that focused on the homeless and marginally-housed determined that at least 930,000 people in US cities lack sustained access to at least basic sanitation and 610,000 to at least basic water access.[1]

• The current situation is bad. The effects of climate change are highly likely to make things much, much worse. Per a 2009 study, "Homeless individuals have higher rates of underlying disease, greater exposure and poorer protection from the elements, and are more likely to occupy high-risk urban areas. This could result in greater rates of illness and death due to increases in heat waves, air pollution, storms and floods, and vector-borne diseases resulting from climate change."[2]

**Quick take**

**Lack of access to clean water is deadly for the homeless and is only going to get worse.**

## BIG EXPOSURE TO ILLNESS

• A 2019 study described a devastating Hepatitis A outbreak that primarily hit the homeless population. The cause of the outbreak? Lack of access to clean water and basic sanitation. Per the study, "From 2017 to 2018, the United States witnessed a devastating outbreak of Hepatitis A Virus (HAV). ... In total, 12 U.S. states experienced outbreaks of HAV between 2017 and 2018, resulting in more than 7000 cases, 2800 hospitalizations, and 60 deaths. According to the CDC, most cases occurred among people experiencing homelessness who may have lacked adequate sanitation at shelters and in public spaces."[3]

**Quick take**

**Lack of access to clean water and basic sanitation creates a huge risk of illness for the homeless.**



1 Capone, Drew, Oliver Cumming, Dennis Nichols, and Joe Brown. "Water and Sanitation in Urban America, 2017–2019." American Journal of Public Health 110, no. 10 (October 2020): 1567–72. https://doi.org/10.2105/AJPH.2020.305833.

2 Ramin, Brodie, and Tomislav Svoboda. "Health of the Homeless and Climate Change." Journal of Urban Health 86, no. 4 (July 2009): 654–64. https://doi.org/10.1007/s11524-009-9354-7.

3 Frye, Elizabeth A., Drew Capone, and Dabney P. Evans. "Open Defecation in the United States: Perspectives from the Streets." Environmental Justice 12, no. 5 (October 2019): 226–30. https://doi.org/10.1089/env.2018.0030.

# The View from The Streets:

Even though the United Nations asserts that sufficient, safe, and available water is a fundamental human right, that right is not available to far too many people on the streets:[1]

**1) Even if a muncipality says they have public water spigots and drinking fountains, the vast majority are unlikely to work.**[2]

**2) Relying on storm run off and pooled water is a sure way to get very sick very fast.**[3]

**3) In addition to carrying pathogens, road runoff tastes like it contains "chemicals and sh*t that humans should never put in their bodies."**[4]

**4) There is shockingly little clean water to wash hands -- let alone any soap. So how can someone on the streets stop the spread of diseases like Hepatitis A or COVID-19?**[5]

**5) The homeless are stigmatized and ridiculed for their lack of hygiene when, in the majority of cases, the clean water needed for hygiene simply does not exist.**[6]

1 "International Decade for Action 'Water for Life' 2005-2015. Focus Areas: The Human Right to Water and Sanitation." Accessed July 1, 2022. https://www.un.org/waterforlifedecade/human_right_to_water.shtml.

2 The Colorado Sun. "Opinion: Access to Water Is a Human Right, Unless You're Unhoused in Denver," September 27, 2021. https://coloradosun.com/2021/09/27/homeless-water-restrooms-parks-opinion/.

3 Ahmed, Warish, Kerry Hamilton, Simon Toze, Stephen Cook, and Declan Page. "A Review on Microbial Contaminants in Stormwater Runoff and Outfalls: Potential Health Risks and Mitigation Strategies." The Science of the Total Environment 692 (November 20, 2019): 1304–21. https://doi.org/10.1016/j.scitotenv.2019.07.055.

4 Huber, Maximilian, Antje Welker, and Brigitte Helmreich. "Critical Review of Heavy Metal Pollution of Traffic Area Runoff: Occurrence, Influencing Factors, and Partitioning." Science of The Total Environment 541 (January 2016): 895–919. https://doi.org/10.1016/j.scitotenv.2015.09.033.

5 "Show Me the Science - Why Wash Your Hands? | Handwashing | CDC," September 10, 2020. https://www.cdc.gov/handwashing/why-handwashing.html.

6 Kim, Nathan J., Jessica Lin, Craig Hiller, Chantal Hildebrand, and Colette Auerswald. "Analyzing U.S. Tweets for Stigma against People Experiencing Homelessness." Stigma and Health, April 26, 2021. https://doi.org/10.1037/sah0000251.

*Joshua (pictured above) is facing the extreme heat of summer with life-threatening temperature and fluid dysregulation issues. The cause of the dysregulation? A TBI resulting from when he was brutally attacked while sleeping.*

**See Joshua's story at: https://youtu.be/RciO0SG2MVY**


1 Capone, Drew, Oliver Cumming, Dennis Nichols, and Joe Brown. "Water and Sanitation in Urban America, 2017–2019." American Journal of Public Health 110, no. 10 (October 2020): 1567–72. https://doi.org/10.2105/AJPH.2020.305833.

# Root cause:
## Lack of clean water

**The top conditions that present differently because of this root cause:**

1. Heat-related illness
2. Hyponatremia
3. Hypotension and hypertension
4. Atrial fibrillation
5. Stroke
6. Myocardial infarction
7. Heart failure
8. Acute kidney injury
9. Urinary tract infections
10. Acute abdominal pain




*Some cities enact strategies to keep the homeless from seeking shellter from life-threatening summer heat in local parks.*
**See this story at:** https://youtu.be/d8bGT0IlROc

# Heat-related illness

This is how heat-related illness presents differently in those who are unsheltered:

- Homeless patients with a pre-existing psychiatric diagnosis have triple the risk of death from extreme heat.
- Homeless people with a history of TBI are at a much higher risk of temperature dysregulation issues.
- Neither the homeless nor the public recognizes the extent of the danger of heat-related illness.
- Due to all of these factors, homeless patients are likely to present in much worse condition from heat-related illness than a housed patient.

## HOMELESS PATIENTS WITH PSYCHIATRIC ILLNESS HAVE TRIPLE THE RISK OF DEATH FROM EXTREME HEAT

• A 2009 study details the range of risks involved: "The homeless are vulnerable because the risk factors for mortality and morbidity from heat correlate closely with the characteristics of homeless individuals. Pre-existing psychiatric illness has been shown to triple the risk of death from extreme heat. Other risk factors for death during heat waves include cardiovascular disease, pulmonary disease, advanced age, living alone, being socially isolated, not using air conditioning, alcoholism, using tranquilizers, and cognitive impairment. These are all characteristics which are more common amongst homeless individuals.."[1]

## PAST TBI MAY CAUSE TEMPERATURE DYSREGULATION

• Patients with a history of TBI are at a much higher risk of developing poikilothermia. Poikilothermia refers to the inability to regulate core body temperature.[2] Per *The Handbook of Clinical Neurology,* "There is evidence to suggest that temperature instabilities following head injury are due to direct damage of the hypothalamus, abnormal CBF, and vascular changes that limits heat dispersion ...."[3]

## HOMELESS DEATHS FROM HEAT ARE A 'MASS-CASUALTY EVENT'

• A 2022 ABC news story concluded: "Just in the county that includes Phoenix, at least 130 homeless people were among the 339 individuals who died from heat-associated causes in 2021.

"'If 130 homeless people were dying in any other way it would be considered a mass casualty event," said Kristie L. Ebi, a professor of global health at the University of Washington.'"[4]

1 Ramin, Brodie, and Tomislav Svoboda. "Health of the Homeless and Climate Change." Journal of Urban Health 86, no. 4 (July 2009): 654–64. https://doi.org/10.1007/s11524-009-9354-7.

2 PM&R KnowledgeNow. "Impaired Thermoregulation," February 24, 2017. https://now.aapmr.org/impaired-thermoregulation/.

3 Gowda, Ram, Matthew Jaffa, and Neeraj Badjatia. "Chapter 49 - Thermoregulation in Brain Injury." In Handbook of Clinical Neurology, edited by Andrej A. Romanovsky, 157:789–97. Thermoregulation: From Basic Neuroscience to Clinical Neurology, Part II. Elsevier, 2018. https://doi.org/10.1016/B978-0-444-64074-1.00049-5.

4 News, A. B. C. "Sweltering Streets: Hundreds of Homeless Die in Extreme Heat." ABC News. Accessed July 1, 2022. https://abcnews.go.com/US/wireStory/sweltering-streets-hundreds-homeless-die-extreme-heat-85656048

## Heat-related illness

This is how heat-related illness can be assessed in those living on the streets:

- The majority of those on the streets do not recognize the most common signs of heat-related illness. Because of this, they will generally wait until their condition is much worse to seek treatment.
- Do not discount signs of confusion. Any altered mental status should be seen as a possible sign of heat stroke.
- It doesn't take long for a heatwave to become deadly. For example, the second day of a heatwave has been found to be especially deadly for your homeless patients.

### EXPECT CONFUSION. THE MAJORITY OF THOSE ON THE STREETS DON'T KNOW THE SIGNS OF HEAT-RELATED ILLNESS

• A 2016 study of homeless veterans found that less than half of those surveyed were able to identify the following signs of heat-related illness: sweating, paleness, muscle cramps, tiredness, weakness,, headache, nausea/vomiting, and fainting. This was despite the fact that heat-related illnesses are the leading cause of mortality among weather related natural disasters in the United States.[1]

### EXPECT CONFUSION. ALTERED MENTAL STATUS IS A RED FLAG FOR LIFE-THREATENING HEAT-RELATED ILLNESS

• According to a 2019 review article, "The overall morbidity and mortality for heat-related illness is extremely low if treatment is initiated without delay. Any person with suspected heat-related illness should immediately cease activity and move to a cool shaded or indoor area. Excessive clothing or gear should be removed. Hyperthermia with altered mental status should prompt suspicion for heat stroke. Survival in these cases depends on prompt cooling, ideally initiated in the field."[2]

### BEWARE THE SECOND DAY OF A HEATWAVE

• A 2022 study found a significant risk for heat-related illness in the homeless occurred during the second day of a heatwave. Per the study, "We found a consistent positive signal between heat waves and the risk of ED visits of people experiencing homelessness for the majority of heat wave definitions considered. The strongest precise signal detected was 2-day heat waves defined at the 99th percentile using maximum temperature, which increased odds of an ED visit by 1.29 (95% confidence interval … . Generally, odds of an ED visit increased with longer heat waves at more extreme temperature thresholds, particularly on the second day of 2-day heat waves."[3]

1 Nicolay, Michael, Lisa M. Brown, Raine Johns, and Anna Ialynytchev. "A Study of Heat Related Illness Preparedness in Homeless Veterans." International Journal of Disaster Risk Reduction 18 (September 1, 2016): 72–74. https://doi.org/10.1016/j.ijdrr.2016.05.009.

2 Gauer, Robert, and Bryce K. Meyers. "Heat-Related Illnesses." American Family Physician 99, no. 8 (April 15, 2019): 482–89.

3 Schwarz, Lara, Edward M. Castillo, Theodore C. Chan, Jesse J. Brennan, Emily S. Sbiroli, Gabriel Carrasco-Escobar, Andrew Nguyen, Rachel E. S. Clemesha, Alexander Gershunov, and Tarik Benmarhnia. "Heat Waves and Emergency Department Visits Among the Homeless, San Diego, 2012-2019." American Journal of Public Health 112, no. 1 (January 2022): 98–106. https://doi.org/10.2105/AJPH.2021.306557.

# Hyponatremia

This is how hyponatremia presents differently in those who are unsheltered:

- Constantly faced with water insecurity, those on the streets tend to "binge drink" water when it is available.
- Because they may not have had food that day -- or for several days -- that overhydration flushes the sodium out of their system increasing the risk for hyponatremia.
- Many homeless have cirrhosis which also places them at a much higher risk for hyponatremia.
- Because the symptoms of hyponatremia may include lightheadedness, fatigue, headache, nausea, vomiting, and altered mental status, the homeless patient may appear intoxicated.
- Because hyponatremia may be mistaken for "public drunkenness," your homeless patient is likely to present in worse shape than a housed patient.



## WATER AND FOOD INSECURITY PUTS THE HOMELESS AT HIGH RISK FOR HYPONATREMIA

• After hours or even days without water, the homeless compensate by overhydrating. Because they may lack adequate food, this overhydration reduces systemic sodium much like EAH in endurance athletes. Per a 2022 article, "Exercise-associated hyponatremia [EAH] develops due to increased total body free water relative to total body sodium via two major mechanisms. Firstly, before and during strenuous physical activity, athletes often increase their intake of hypotonic fluids such as water and sports drinks due to conditioned behaviors, leading to increased total body water. Secondly, physical exertion itself may result in inappropriate non-osmotic antidiuretic hormone (ADH) secretion, leading to free water retention."[1]

## CIRRHOSIS IS COMMON IN THE HOMELESS

• A 2022 found that 17% of the homeless patients in their study population had cirrhosis.[2]

## HYPONATREMIA IS COMMON IN CIRRHOSIS

• A 2020 study describes the danger of hyponatremia in cirrhosis patients: "Hyponatremia is frequently seen in patients with ascites secondary to advanced cirrhosis and portal hypertension. Although not apparent in the early stages of cirrhosis, the progression of cirrhosis and portal hypertension leads to splanchnic vasodilation, and this leads to the activation of compensatory mechanisms .... These compensatory mechanisms lead to impairment of the kidneys to eliminate solute-free water in decompensated cirrhosis. Nonosmotic secretion of antidiuretic hormone (ADH), also known as arginine vasopressin, further worsens excess water retention and thereby hyponatremia."[3]

1 Buck, Emily, Rebecca Miles, and Jeremy D. Schroeder. "Exercise-Associated Hyponatremia." In StatPearls. Treasure Island (FL): StatPearls Publishing, 2022. http://www.ncbi.nlm.nih.gov/books/NBK572128/.

2 Hashim, Ahmed., Stephen Bremner, Jane I. Grove, Stuart Astbury, Manuela Mengozzi, Margaret O'Sullivan, Lucia Macken, et al. "Chronic Liver Disease in Homeless Individuals and Performance of Non-Invasive Liver Fibrosis and Injury Markers: VALID Study." Liver International 42, no. 3 (2022): 628–39. https://doi.org/10.1111/liv.15122.

3 Alukal, Joseph, , et al. "Hyponatremia in Cirrhosis: An Update". The American Journal of Gastroenterology, vol. 115, no. 11, November 2020, pp. 1775-1785. doi: 10.14309/ajg.0000000000000786.

## Hyponatremia

This is how hyponatremia can be assessed in those living on the streets:

- Is it dehydration or hyponatremia? Should you give fluids or withhold them? Because the "classic" signs and symptoms of dehydration do not assess well in the field, focus on the signs and symptoms of hyponatremia.
- Think of your homeless patient as an endurance athlete. They may spend up to 8 hours in the heat each day carrying heavy bags large distances simply to find food and shelter.
- Any neurological symptoms in your homeless patient -- including but not limited to altered mental state -- should be treated as a medical emergency.
- Any evidence of attention deficit, history of falls, and gait imbalance -- when assessed in the field -- should also be treated as a medical emergency.

## THE 'CLASSIC' SIGNS AND SYMPTOMS USED TO ASSESS DEHYDRATION DO NOT WORK WELL IN THE FIELD

• A 2010 study concluded, "Sensitivity, specificity, positive predictive values and negative predictive values for all variables [altered skin turgor, dry oral mucous membranes, sunken eyes, an inability to spit and the sensation of thirst] were poor. Reduced skin turgor was the sign with the strongest correlation with percentage weight loss, but of those who exhibited this sign only 51% would actually have dehydration, only narrowly outperforming a coin toss."[1]

## TO DETERMINE DEHYDRATION VS. HYPONATREMIA, FOCUS ON THE SIGNS AND SYMPTOMS OF HYPONATREMIA

• According to a 2019 study, "During prolonged endurance performance, symptoms of hyponatremia may be different after five to six hours, since hyponatremia can develop fast or slow. ... [M]alaise, mild headache, vomiting, and fatigue appear in the early stages of EAH. These symptoms are very non-specific and can also occur with other problems such as fatigue, indigestion, dehydration, or overheating. The clinical appearance of hyponatremia may look like heat stroke, hypoglycemia, stress-related collapse, muscle cramps, or even altitude sickness. The plasma sodium concentration should then have fallen to values <125 mmol/L. Symptoms at a plasma sodium concentration >125 mmol/L are rare. In some cases, vomiting is the only clinical sign that distinguishes hyponatremia from exercise-induced collapse."[2]

## 'ASYMPTOMATIC' HYPONATREMIA IS NOT ASYMPTOMATIC

• "Mild" or "chronic" hyponatremia is not, as some believe, asymptomatic. According to a 2018 study, "Chronic hyponatremia will usually manifest as malaise, weakness, and confusion. Until the last decade, it was believed that mild chronic hyponatremia was asymptomatic and carried little neurological dysfunction. Studies by our team and others revealed that chronic hyponatremia is associated with significant subtle neurological abnormalities, including attention deficit, falls, and gait imbalance. Patients with chronic hyponatremia have a much higher risk of falls, which seems to more marked in older adult patients."[3]

1 McGarvey, J., J. Thompson, C. Hanna, T. D. Noakes, J. Stewart, and D. Speedy. "Sensitivity and Specificity of Clinical Signs for Assessment of Dehydration in Endurance Athletes." British Journal of Sports Medicine 44, no. 10 (August 1, 2010): 716–19. https://doi.org/10.1136/bjsm.2008.053249.

2 Knechtle, Beat, Daniela Chlíbková, Sousana Papadopoulou, Maria Mantzorou, Thomas Rosemann, and Pantelis T. Nikolaidis. "Exercise-Associated Hyponatremia in Endurance and Ultra-Endurance Performance–Aspects of Sex, Race Location, Ambient Temperature, Sports Discipline, and Length of Performance: A Narrative Review." Medicina 55, no. 9 (August 26, 2019): 537. https://doi.org/10.3390/medicina55090537.

3 Gankam Kengne, Fabrice, and Guy Decaux. "Hyponatremia and the Brain." Kidney International Reports 3, no. 1 (January 1, 2018): 24–35. https://doi.org/10.1016/j.ekir.2017.08.015.

# Fluid-related Hypotension & Hypertension

This is how hypotension and hypertension presents differently in those who are unsheltered:

- When a homeless patient appears with signs of hypotension or hypertension, a high suspicion of possible cardiac causes, disease-related causes, and drug-related causes should be considered.
- Because of the lack of clean water faced by the homeless, dehydration and recurrent dehydration should also be examined as possible causes for blood pressure abnormalities.




## BASELINE BLOOD PRESSURE IN THE HOMELESS IS ABOUT THE SAME AS THAT IN THE HOUSED

• A 2020 study found, "The study cohort included 40,626 individuals, 8492 of whom were homeless and 32,134 were housed, with matched sex and age structures between the two groups. ... Homeless individuals had lower BMI, blood pressure, and total cholesterol, but higher rates of previous/current smoking and excess/binge drinking."[1]

## LOW BLOOD PRESSURE MAY BE A RED FLAG FOR DEHYDRATION

• A 2014 clinical care review warned, "Even mild cases of dehydration can cause low blood pressure. Dehydration can result from prolonged nausea, vomiting, or severe diarrhea. In situations like this, a large amount of water is lost and blood shunts away from the organs to the muscles. Patients with mild dehydration may experience only thirst and dry mouth. Moderate dehydration may cause orthostatic hypotension, and severe dehydration (hypovolemia) can lead to shock, kidney failure, confusion, acidosis, coma, and even death."[2]

## AND HIGH BLOOD PRESSURE MAY BE A RED FLAG FOR RECURRENT DEHYDRATION

• A 2016 murine study described a possible mechanism, "Recurrent dehydration associated with irregular water intake and occupational heat stress has been linked to an epidemic of CKD in hot coastal communities of Central America. Some evidence also exists that low urine flow favours the development of hypertension; a major risk factor for the development and progression of CKD. ... The key findings of this study were that daily cycles of dehydration and replenishment induced by periodic water restriction exacerbated hypertension, decreased renal function, and increased NGAL [Urinary neutrophil gelatinase-associated lipocalin] excretion, renal inflammation and fibrosis ...."[3]

1 Nanjo, Atsunori, Hannah Evans, Kenan Direk, Andrew C Hayward, Alistair Story, and Amitava Banerjee. "Prevalence, Incidence, and Outcomes across Cardiovascular Diseases in Homeless Individuals Using National Linked Electronic Health Records." European Heart Journal 41, no. 41 (November 1, 2020): 4011–20. https://doi.org/10.1093/eurheartj/ehaa795.

2 California, Manouchehr Saljoughian, PharmD, PhD Department of Pharmacy Alta Bates Summit Medical Center Berkeley. "Hypotension: A Clinical Care Review." Accessed July 4, 2022. https://www.uspharmacist.com/article/hypotension-a-clinical-care-review.

3 Hilliard, Lucinda M., Katrina M. Mirabito Colafella, Louise L. Bulmer, Victor G. Puelles, Reetu R. Singh, Connie P. C. Ow, Tracey Gaspari, et al. "Chronic Recurrent Dehydration Associated with Periodic Water Intake Exacerbates Hypertension and Promotes Renal Damage in Male Spontaneously Hypertensive Rats." Scientific Reports 6, no. 1 (September 22, 2016): 33855. https://doi.org/10.1038/srep33855.

## Fluid-related Hypotension & Hypertension

This is how hypotension and hypertension can be assessed in those living on the streets:

- A detailed patient history is vital to understanding your homeless patient's condition.
- The history should cover any and all possible cardiac causes, disease-related causes, and drug-related causes of their hypotention or hypertension.
- In addition, the history should examine factors that could cause dehydration including: how far they walked that day, how heavy are the things they are carrying, how long have they been outside in the heat, how much fluid have they had, how much food -- and what kind of food -- have they consumed, have they had a fever, have they had diarrhea, etc.?
- This patient history is vital as the classic signs used to determine dehydration (altered skin turgor, dry oral mucous membranes, sunken eyes, an inability to spit and the sensation of thirst) are unreliable.

## THE 'CLASSIC' SIGNS AND SYMPTOMS USED TO ASSESS DEHYDRATION DO NOT WORK WELL IN THE FIELD

• A 2010 study concluded, "Sensitivity, specificity, positive predictive values and negative predictive values for all variables [altered skin turgor, dry oral mucous membranes, sunken eyes, an inability to spit and the sensation of thirst] were poor. Reduced skin turgor was the sign with the strongest correlation with percentage weight loss, but of those who exhibited this sign only 51% would actually have dehydration, only narrowly outperforming a coin toss."[1]

## THIS MAKES THE TAKING OF A DETAILED PATIENT HISTORY EXCEPTIONALLY IMPORTANT

• The importance of a detailed patient history was described in a 2022 article: "Hypovolemic patients can present with a wide assortment of symptoms and physical exam findings. Some of the most common presenting symptoms of dehydration include but are not limited to fatigue, thirst, dry skin and lips, dark urine or decreased urine output, headaches, muscle cramps, lightheadedness, dizziness, syncope, orthostatic hypotension, and palpitations. The patient's history may elicit factors that could cause dehydration, such as exercise, heat exposure, medications, illness, impaired access to water, fever, or fluid loss."[2]

## CONSIDER ORAL REHYDRATION THERAPY (ORT)

• Numerous clinical studies have found ORT to be faster and safer than IV therapy in correcting both dehydration and acidosis. In addition, studies have found ORT "... can be used to treat fluid losses caused by any factor, including diarrhea, vomiting, heat, and exercise. It can be used to treat hyponatremic and hypernatremic patients."[3]

So, why isn't ORT used more often? According to a 2018 study, "ORT use in high-income countries is disappointingly low, due possibly to greater remuneration for intra- venous therapy than when ORT is used in hospital or home ... . A shortage of intravenous saline has resulted in a renewed US interest in ORT. Looking to the future, ORT would be expected to be increasingly used to treat conditions besides acute watery diarrhoeal diseases. ORT can prevent and treat dehydration among older people, common especially in summer, and is credited with reducing global deaths from dehydration-induced kidney diseases."[4]

1 McGarvey, J., J. Thompson, C. Hanna, T. D. Noakes, J. Stewart, and D. Speedy. "Sensitivity and Specificity of Clinical Signs for Assessment of Dehydration in Endurance Athletes." British Journal of Sports Medicine 44, no. 10 (August 1, 2010): 716–19. https://doi.org/10.1136/bjsm.2008.053249.

2 Taylor, Kory, and Elizabeth B. Jones. "Adult Dehydration." In StatPearls. Treasure Island (FL): StatPearls Publishing, 2022. http://www.ncbi.nlm.nih.gov/books/NBK555956/.

3 Trotto, Nancy E. "Keeping Dehydrated Patients out of the Hospital." Patient Care 33, no. 3 (February 15, 1999): 81–82.

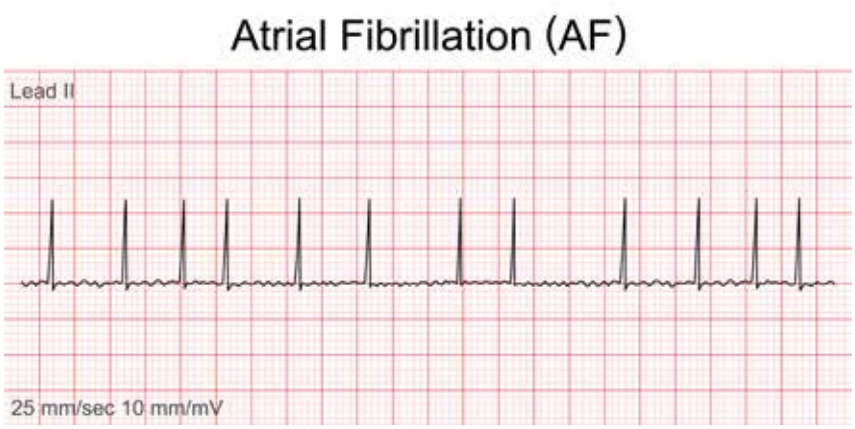
4 Nalin, David R, and Richard A Cash. "50 Years of Oral Rehydration Therapy: The Solution Is Still Simple." The Lancet 392, no. 10147 (August 2018): 536–38. https://doi.org/10.1016/S0140-6736(18)31488-0.

## Atrial fibrillation

This is how atrial fibrillation presents differently in those who are unsheltered:

- Constantly faced with water insecurity, those on the streets tend to be chronically dehydrated.
- Dehydration is a known trigger for atrial fibrillation.
- Many of the prescription medications taken by the homeless may cause thermoregulation issues and electrolyte imbalances.
- Many of the street medications taken by the homeless (e.g. meth, spice) may also cause thermoregulation issues and electrolyte imbalances.
- Because of this, atrial fibrillation in your homeless patient may be multi-factorial and may require a multi-disciplinary approach.






### WATER INSECURITY + EXTREME HEAT + CONSTANT EXERCISE PUTS THE HOMELESS AT HIGH RISK FOR ATRIAL FIBRILLATION

• Due to the extreme physical efforts it takes to transport an array of heavy belongings long distances in hot weather, the homeless face many of the same issues as endurance athletes. According to a 2004 study, this includes the risk of atrial fibrillation: "Long and intense periods of training could generate substantial shifts in body fluids due to changes in volume regulation, and changes in potassium and sodium levels. ... Inappropriate fluid intake can lead to dehydration triggering atrial arrhythmias. In addition, long-lasting training schedules can induce a significant loss in magnesium and without proper supplementation, chronic hypomagnesemia can induce arrhythmias."[1]

### EXTREME HEAT + MANY MEDS MAY CAUSE ELECTROLYTE IMBALANCES

• A 2019 study looked at the possible causes of electrolytre imbalances in the homeless. According to the study, "Extreme weather affected the physical health of 17.9 per cent of [homeless] clients. The interviews revealed that physical impacts often manifested because the weather, especially extreme heat, affected people's responses to medication. As two homeless service providers commented:

'A lot of [clients] are on heat-sensitive medications and so these medications become deactivated when it gets too hot so you have to keep them at a certain temperature. So anybody [is at risk] that's taking medications that interfere with sweating (tricyclic antidepressants, antihistamines, beta blockers for cardiac conditions) ... they're not going to be able to thermo regulate the way the rest of us will. Other interference is a lot of our antipsychotic medications .... People with substance abuse are going to be affected even more by extreme heat. People who take thyroxine for hypothyroidism. Medications that can affect your perception of thirst (ACE [angiotensin-converting-enzyme] inhibitors for heart conditions, haloperidol and droperidol for mental illness) ... they may not be rehydrating themselves. People who are on diuretics and people who are on fluid restrictions need to be monitored to make sure that they're adequately rehydrating without having electrolyte imbalances.'"[2]

1 Hoogsteen, Jan, Goof Schep, Norbert M. van Hemel, and Ernst E. van der Wall. "Paroxysmal Atrial Fibrillation in Male Endurance Athletes. A 9-Year Follow Up." EP Europace 6, no. 3 (January 1, 2004): 222–28. https://doi.org/10.1016/j.eupc.2004.01.004.

2 Every, Danielle, John Richardson, and Elizabeth Osborn. "There's Nowhere to Go: Counting the Costs of Extreme Weather to the Homeless Community." Disasters 43, no. 4 (2019): 799–817. https://doi.org/10.1111/disa.12400.

## Atrial fibrillation

This is how atrial fibrillation can be assessed in those living on the streets:

- Smartphone-based ECGs, like the low-cost Kardia Mobile Device, are a valuable aid in screening for atrial fibrillation in the field.
- The Kardia Mobile Device and the even smaller Kardia Card (the size of a credit card) auto-interprets for atrial fibrillation, bradycardia, and tachycardia and, with an additional membership, also auto-detects sinus rhythm with PVCs, sinus rhythm with SVE, and sinus rhythm with wide QRS.
- A mobile ECG assessment takes less than a minute and the ECG strip can be immediately emailed for further interpretation.
- In your patient history, make sure to include likely aFib triggers. Common triggers include alcohol, caffeine, exercise, and lack of sleep.
- In your patient history, also document any history of methamphetamine or other drug use including how it is being used (e.g. smoking, injection), and how much is being used (e.g. amount and how many times per day).

## CONSIDER THE USE OF A PORTABLE ECG LIKE THE KARDIA MOBILE DEVICE

• A 2010 study concluded, "The AliveCor Kardia ECG monitor (ACK) offers a smartphone-based one-lead ECG recording for the detection of atrial fibrillation. We compared ACK lead I recordings with the 12-lead ECG and introduce a novel parasternal lead (NPL). ... The AliveCor Kardia ECG monitor allows a highly accurate detection of atrial fibrillation by an interpreting electrophysiologist both in the standard lead I and a novel parasternal lead. The diagnostic algorithm offered by the system may be useful in screening recordings for further review. Diagnostic challenges present in atrial flutter and ventricular pacemaker stimulation."[1]

## HOMELESS PATIENTS FREQUENTLY EXPERIENCE THE TOP 5 TRIGGERS FOR AFIB

• A 2019 study looked at the most common patient-reported triggers for atrial fibrillation and found that the top five were 1) Alcohol, 2) Caffeine, 3) Exercise, 4) Lack of sleep, and 5) Dehydration.[2]

## HOMELESS METH USERS ARE AT HIGH RISK OF DEHYDRATION, HYPERTHERMIA, AND ARRHYTHMIAS

• A 2019 review article described the issues involved for methamphetamine users, "Sympathomimetic drug overdose usually results in hypertensive crises, cardiac arrhythmias, rhabdomyolysis, seizures, and metabolic derangements such as hyperglycemia, acidosis, and electrolyte anomalies. Methamphetamine has fast become an increasing problem in the US with an exponential increase in drug-related hospital admissions and an average yearly 29% increase in deaths per year. ... Methamphetamine is responsible for an approximate 94,000 ED admissions and 6800 deaths each year, with hyperthermia being the predominant presenting symptom in the majority of cases presenting to the ED. At higher doses, methamphetamine causes a dose-dependent increase in core body temperature by promoting heat generation and preventing heat dissipation, by its effects on increasing body metabolism and causing vasoconstriction, respectively. The ... pathophysiological cause of death in hyperthermia is ... presumed to be multifactorial, with autopsy findings of tissue damage in the heart, central nervous system (CNS), kidney, liver, and skeletal muscle."[3]



1 Wegner, Felix K., Simon Kochhäuser, Christian Ellermann, Philipp S. Lange, Gerrit Frommeyer, Patrick Leitz, Lars Eckardt, and Dirk G. Dechering. "Prospective Blinded Evaluation of the Smartphone-Based AliveCor Kardia ECG Monitor for Atrial Fibrillation Detection: The PEAK-AF Study." European Journal of Internal Medicine 73 (March 2020): 72–75. https://doi.org/10.1016/j.ejim.2019.11.018.

2 "Patient-Reported Triggers of Paroxysmal Atrial Fibrillation - ClinicalKey," n.d. https://www-clinicalkey-com.ezproxy2.library.arizona.edu/#!/content/playContent/1-s2.0-S1547527119300992?returnurl=null&referrer=null.

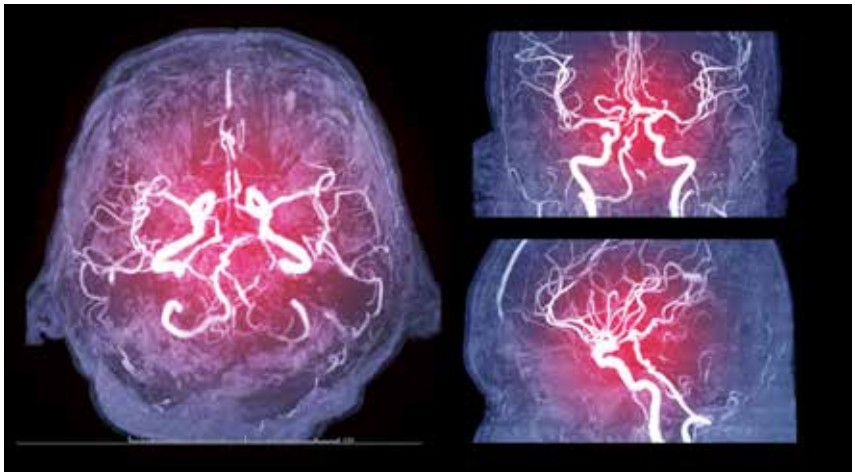
3 Pillai, Saran, Benjamin Cesarz, Chad Boulware, and Adnan Khan. "Hypotension, Severe Hyperthermia (42°C), Rhabdomyolysis, and Disseminated Intravascular Coagulation Induced by Lethal Dose of Methamphetamine." Cureus 11, no. 7 (July 26, 2019). https://doi.org/10.7759/cureus.5245.

# Stroke

This is how stroke presents differently in those who are unsheltered:

- Lack of access to clean water makes it much more difficult for the homeless to stay cool and hydrated.
- Overheating and dehydration put the homeless at a much higher risk of stroke.
- The extreme violence on the streets leads many homeless to self-treat using substances like methamphetamine.
- Meth use also puts the homeless user at a much higher risk of stroke.
- The homeless stroke patient is likely to be younger than expected and the signs of a stroke may be ignored due to their age.





## CHRONIC DEHYDRATION PUTS THE HOMELESS AT A MUCH HIGHER RISK OF STROKES

• A 2011 study looked at the relationship between dehydration and strokes. According to the study, "Of 2591 [stroke] patients registered, 1606 (62%) were dehydrated at some point during their admission. Independent risk factors for dehydration included older age, female gender, total anterior circulation syndrome, and prescribed diuretics (all P<0.001). Patients with dehydration were significantly more likely be dead or dependent at hospital discharge than those without."[1]

## LACK OF WATER PUTS THE HOMELESS AT A HIGHER RISK OF HEAT STROKE

• A 2017 review article listed the top risk factors for heat stroke many of which are common among the homeless: "Several intrinsic factors that increase risk for EHS (exertional heat stroke) include the following: Lack of heat acclimatization, Current febrile illness, Skin disorders: anhidrosis, sunburn, psoriasis, etc., Dehydration, Medications/supplements ..., Sleep deprivation, Recent alcohol use ...."[2]

## HOMELESS METH USERS - EVEN YOUNGER USERS - HAVE A HIGHER RISK OF HYPERTHERMIA AND STROKE

• A 2019 review article found, "Methamphetamine is responsible for an approximate 94,000 ED admissions and 6800 deaths each year, with hyperthermia being the predominant presenting symptom in the majority of cases ...."[3]

• A 2017 study found, "There is a preponderance of haemorrhagic strokes associated with methamphetamine use in young people, and methamphetamine-related stroke is associated with poor clinical outcomes. Mechanisms of methamphetamine-associated stroke include hypertension, vasculitis, direct vascular toxicity and vasospasm."[4]

1 Rowat, Anne, Catriona Graham, and Martin Dennis. "Dehydration in Hospital-Admitted Stroke Patients." Stroke 43, no. 3 (March 2012): 857–59. https://doi.org/10.1161/STROKEAHA.111.640821.

2 Navarro, Chelsea S., Douglas J. Casa, Luke N. Belval, and Nathaniel S. Nye. "Exertional Heat Stroke:" Current Sports Medicine Reports 16, no. 5 (2017): 304–5. https://doi.org/10.1249/JSR.0000000000000403.

3 Pillai, Saran, Benjamin Cesarz, Chad Boulware, and Adnan Khan. "Hypotension, Severe Hyperthermia (42°C), Rhabdomyolysis, and Disseminated Intravascular Coagulation Induced by Lethal Dose of Methamphetamine." Cureus 11, no. 7 (July 26, 2019). https://doi.org/10.7759/cureus.5245.

4 Lappin, Julia M., Shane Darke, and Michael Farrell. "Stroke and Methamphetamine Use in Young Adults: A Review." Journal of Neurology, Neurosurgery & Psychiatry 88, no. 12 (December 1, 2017): 1079–91. https://doi.org/10.1136/jnnp-2017-316071.

## Stroke

This is how stroke can be assessed in those living on the streets:

- The homeless patient – and those around them – may mistake the signs of stroke for alcohol or other drug intoxication.
- This makes it imperative to carefully explain your findings to your patient and to those around them so they don't ignore your assessment of stroke.
- This is especially vital in the case of a younger homeless stroke patient. They may refuse to believe that someone their age can have a stroke.
- They may also refuse EMS so arranging other transportation to the nearest ED may be necessary.
- Understand that in-hospital treatment of a homeless stroke patient is likely to be suboptimal.
- For this reason, sending the patient in with a detailed written history and clear written findings is exceptionally important.

## THE SIGNS AND SYMPTOMS OF A STROKE MAY BE MISTAKEN FOR ALCOHOL INTOXICATION

• A 2019 review article described the danger: "The signs and symptoms of acute alcohol intoxication resemble those of vertebrobasilar stroke. Due to their shared symptoms including double vision, nystagmus, dysarthria, and ataxia, the differential diagnosis of alcohol intoxication and vertebrobasilar stroke may pose a challenge. Moreover, if alcohol intoxication and stroke occur simultaneously, the signs and symptoms of stroke may be attributed to the effects of alcohol, leading to delayed stroke diagnosis and failure to perform reperfusion therapy."[1]

## YOUR HOMELESS STROKE PATIENT IS LIKELY TO BE YOUNGER THAN EXPECTED

• A 2022 study examined younger homeless stroke patients and concluded, "Epidemiological studies consistently report increasing trends of stroke among young patients, with almost 1 in 10 strokes occurring in young adults. In a recent study, hospitalization rates among young adults increased between 2002 and 2017 at an average annual rate of 2%. … We observed that stroke hospitalization rates have increased among homeless and non-homeless young adults during the last 2 decades in the US. However, contrasting trends of in-hospital mortality existed between both study groups. In-hospital mortality has decreased in non-homeless adults, while it has increased in homeless adults accompanied by poor clinical and psychiatric comorbidity profiles. Finally, disparities in treatment and discharge disposition were evident."[2]

## IN THE HOSPITAL, A HOMELESS STROKE PATIENT IS LESS LIKELY TO RECEIVE APPROPRIATE CARE AND MORE LIKELY TO DIE THAN A HOUSED PATIENT

• A 2020 study examined disparities in care among homeless patients hospitalized with cardiovascular conditions. At baseline, 22.8% of these patients presented with fluid and electrolyte disorders. The study found that among hospitalized stroke patients, the homeless were less likely than those who were housed to undergo cerebral angiography (2.9% vs 9.5%). In addition, homeless stroke patients had a significantly higher risk-standardized in-hospital mortality than housed patients.[3]



1 Arokszallasi, Tamas, Eszter Balogh, Laszlo Csiba, Istvan Fekete, Klara Fekete, and Laszlo Olah. "Acute Alcohol Intoxication May Cause Delay in Stroke Treatment – Case Reports." BMC Neurology 19, no. 1 (January 29, 2019): 14. https://doi.org/10.1186/s12883-019-1241-6.

2 Khan, Safi, Siva Yedlapati, Muhammad Khan, Salim Virani, Michael Blaha, Garima Sharma, John Jordan, et al. "Clinical and Economic Profile of Homeless Young Adults with Stroke in the United States, 2002 – 2017." Current Problems in Cardiology, March 1, 2022, 101190. https://doi.org/10.1016/j.cpcardiol.2022.101190.

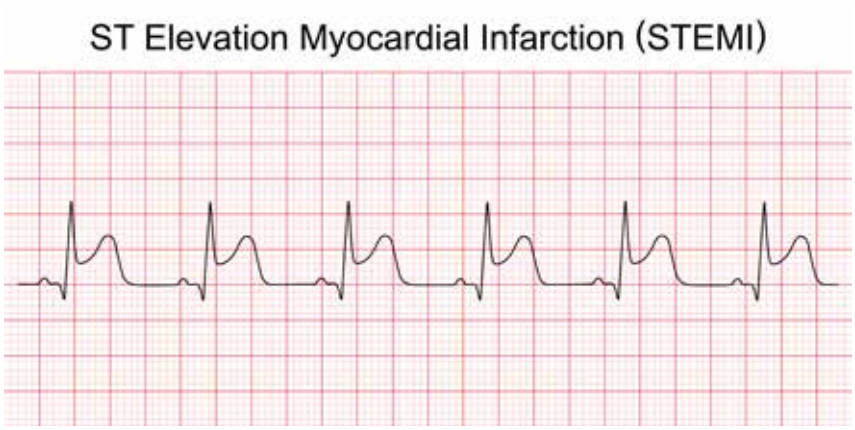
3 Wadhera, Rishi K., Sameed Ahmed M. Khatana, Eunhee Choi, Ginger Jiang, Changyu Shen, Robert W. Yeh, and Karen E. Joynt Maddox. "Disparities in Care and Mortality Among Homeless Adults Hospitalized for Cardiovascular Conditions." JAMA Internal Medicine 180, no. 3 (March 2020): 357–66. https://doi.org/10.1001/jamainternmed.2019.6010.

# Myocardial infarction

This is how myocardial infarction presents differently in those who are unsheltered:

- Lack of access to clean water makes it much more difficult for the homeless to stay cool and hydrated.
- Chronic dehydration puts the homeless at a much higher risk of an MI.
- Heat-related illness – especially heat stroke – puts the homeless at a much higher risk of an MI.
- The risk of electrolyte issues that may lead to a heart attack is especially elevated in the homeless.
- These electrolyte issues are especially deadly for homeless diabetics.






## FATAL CORONARY HEART DISEASE IS ASSOCIATED WITH A LOWER INTAKE OF WATER

• The Adventist long-term study found the risk is dose dependent: lower daily water intake is associated with a higher risk of fatal heart disease. Per the study, "The clearest and most consistent association with fatal coronary heart disease was found with water intake. Among men, univariate analysis showed a dose-response relation ($p < 0.001$). Compared with those drinking two or fewer glasses of water daily (low), subjects drinking from three to four glasses (medium) and five or more glasses (high) had relative risks of 0.65 (95 percent confidence interval (CI): 0.40, 1.05) and 0.46 (95 percent CI: 0.28, 0.75), respectively."[1]

## HOMELESS DIABETICS ARE AT A HIGH RISK FOR ELECTROLYTE ISSUES THAT MAY CAUSE AN MI

• Per a 2021 study, "AMI [acute myocardial infarction] patients with DM [diabetes mellitus] had increased Glucose, UA, Calcium and Potassium levels, and lower Magnesium, Albumin, and Sodium levels compared with non-DM patients. Furthermore, these patients had increased risk for significant hyperglycemia, hyperuricemia, hypercalcemia, hypomagnesemia, hyperkalemia, and hyponatremia throughout their admission."[2]

## HEAT STROKE PATIENTS ARE AT A HIGHER RISK OF AN MI

• Per a 2020 study, "This large cohort study of 3372 patients found that acute myocardial infarction occurred in 7% of patients hospitalized for heat stroke. We identified that obesity and chronic kidney disease were independently associated with increased risk of in-hospital acute myocardial infarction, while age <20 years, male sex, and hypothyroidism were independently associated with decreased risk. ... Heat stroke patients with acute myocardial infarction were five times more likely to die in hospital than patients without it."[3]

1 Chan, Jacqueline, Synnove F. Knutsen, Glen G. Blix, Jerry W. Lee, and Gary E. Fraser. "Water, Other Fluids, and Fatal Coronary Heart Disease: The Adventist Health Study." American Journal of Epidemiology 155, no. 9 (May 1, 2002): 827–33. https://doi.org/10.1093/aje/155.9.827.

2 Shiyovich, Arthur, Harel Gilutz, and Ygal Plakht. "Serum Electrolyte/Metabolite Abnormalities among Patients with Acute Myocardial Infarction: Comparison between Patients with and without Diabetes Mellitus." Postgraduate Medicine 133, no. 4 (May 19, 2021): 395–403. https://doi.org/10.1080/00325481.2020.1860393.

3 Bathini, Tarun, Charat Thongprayoon, Api Chewcharat, Tananchai Petnak, Wisit Cheungpasitporn, Boonphiphop Boonpheng, Narut Prasitlumkum, Ronpichai Chokesuwattanaskul, Saraschandra Vallabhajosyula, and Wisit Kaewput. "Acute Myocardial Infarction among Hospitalizations for Heat Stroke in the United States." Journal of Clinical Medicine 9, no. 5 (May 2020): 1357. https://doi.org/10.3390/jcm9051357.

## Myocardial infarction

This is how myocardial infarction can be assessed in those living on the streets:

- The homeless patient – and those around them – may mistake the signs of heart attack for another condition (e.g. food poisoning, rhinovirus infection, etc.)
- This makes it imperative to carefully explain your findings to your patient and to those around them so they don't ignore your assessment of a heart attack.
- Your homeless patient may also refuse EMS so arranging other transportation to the nearest ED may be necessary.
- Understand that in-hospital treatment of a homeless heart attack patient is likely to be suboptimal.
- For this reason, sending the patient in with a detailed written history and clear written findings is exceptionally important.

### NAUSEA, VOMITING, AND BACK PAIN ARE COMMON PRESENTING SYMPTOMS OF AN MI IN WOMEN AND THE ELDERLY

• A 2020 study cautioned, "Women present more often with only non-chest-pain discomfort, showing symptoms as 'neck-, back- and jaw pain' which was considerably less known, or with 'nausea or vomiting' which we found to be insufficiently known. Similarly, the observation is relevant for elderly people who also experience more atypical symptoms. This lack of knowledge of atypical symptoms might be one factor for the higher patient delay and mortality among women and the elderly."[1]

### THESE SIGNS AND SYMPTOMS OF A HEART ATTACK MAY BE MISTAKEN FOR 'DUMPSTER DIARRHEA' AND OTHER COMMON CONDITIONS IN THE HOMELESS

• While dramatically understudied, homeless use of dumpsters as a food source and as a source of food poisoning are well-known on the streets. One 1991 study that looked at the issue concluded, "The homeless mentally ill are more likely to obtain food from garbage cans, as are others who do not obtain food from shelters, soup kitchens, and food pantries. Homeless adults who obtain food from trash, or who lack institutional food sources, may be at especially high risk of food poisoning and dietary inadequacy.."[2]

• Food poisoning is not the only source of symptoms that mimic an MI. A 2022 study looked at rhinovirus infection in homeless shelters and found that 26.7% of those positive for rhinovirus – generally considered to be a respiratory pathogen – reported nausea or vomiting and 10.9% reported diarrhea."[3]

### IN THE HOSPITAL, A HOMELESS MI PATIENT IS LESS LIKELY TO RECEIVE APPROPRIATE CARE AND MORE LIKELY TO DIE THAN A HOUSED PATIENT

• A 2020 study examined disparities in care among homeless patients hospitalized with cardiovascular conditions. At baseline, 22.8% of these patients presented with fluid and electrolyte disorders. The study found, "Homeless adults with AMI [acute myocardial infarction] ... underwent coronary angiography at approximately half the rate of similar nonhomeless adults. ... More important, among the subgroup of patients with STEMI, a condition for which urgent revascularization is indicated, homeless individuals were less likely to undergo coronary angiography (55.8% vs 85.9%) or PCI (55.4% vs 75.9%) than nonhomeless persons. These differences may explain the high in-hospital mortality rates among homeless patients hospitalized for STEMI."[4]



1 Birnbach, Benedikt, Jens Höpner, and Rafael Mikolajczyk. "Cardiac Symptom Attribution and Knowledge of the Symptoms of Acute Myocardial Infarction: A Systematic Review." BMC Cardiovascular Disorders 20, no. 1 (October 14, 2020): 445. https://doi.org/10.1186/s12872-020-01714-8.

2 Wiecha, J L, J T Dwyer, and M Dunn-Strohecker. "Nutrition and Health Services Needs among the Homeless." Public Health Reports 106, no. 4 (1991): 364–74.

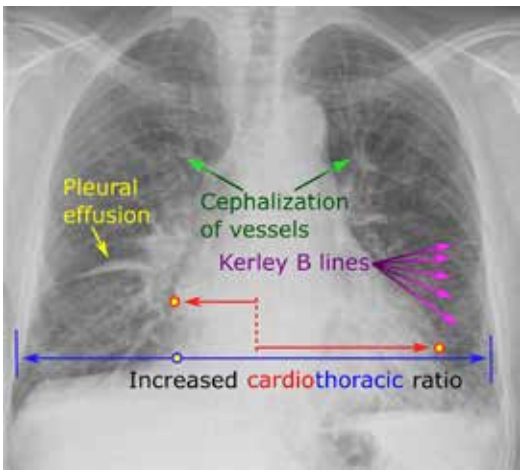
3 Chow, Eric J., Amanda M. Casto, Pavitra Roychoudhury, Peter D. Han, Hong Xie, Brian Pfau, Tien V. Nguyen, et al. "The Clinical and Genomic Epidemiology of Rhinovirus in Homeless Shelters—King County, Washington." The Journal of Infectious Diseases. Accessed July 8, 2022. https://doi.org/10.1093/infdis/jiac239.

4 Wadhera, Rishi K., Sameed Ahmed M. Khatana, Eunhee Choi, Ginger Jiang, Changyu Shen, Robert W. Yeh, and Karen E. Joynt Maddox. "Disparities in Care and Mortality Among Homeless Adults Hospitalized for Cardiovascular Conditions." JAMA Internal Medicine 180, no. 3 (March 2020): 357–66. https://doi.org/10.1001/jamainternmed.2019.6010.

# Heart failure

This is how heart failure (HF) presents differently in those who are unsheltered:

- The homeless have a higher rate of cardiovascular disease – including heart failure.
- But, due to their lack of stable housing, the homeless are much less likely to successfully self-manage their HF.
- The homeless are also less likely to receive optimal care of their HF because of stigmatization by providers.
- Lack of access to clean water makes it much more difficult for the homeless to stay cool and hydrated. This is especially deadly for homeless heart failure patients.
- Because of this, homeless HF patients are likely to present in much worse shape than housed HF patients.




## THE HOMELESS HAVE A HIGHER PREVALENCE OF CARDIOVASCULAR DISEASE INCLUDING HEART FAILURE

• A 2020 study concluded, "This first large-scale population-based study of CVDs in the homeless population has four major findings. First, homeless people have increased burden of comorbidities, particularly smoking, alcohol, diabetes, and hypertension, compared with housed individuals. Second, they are around 1.8 times more likely to have CVDs at baseline, compared with their housed counterparts. Third, homeless people are around 1.8 times more likely to develop new CVD, with important differences by age, sex, and arterial territory. Fourth, homeless individuals are around 1.6 times more likely to die within 1 year of diagnosis, compared with housed individuals."[1]

## HOMELESS HEART FAILURE PATIENTS ARE MUCH LESS LIKELY TO BE OPTIMALLY TREATED

• A 2020 study found, "In this qualitative study examining HF SM [heart failure self-management] in the context of homelessness, we found three recurrent themes: difficulty executing successful HF SM behaviors and routines arising from lack of stability; frequent tradeoffs when attempting to prioritize HF SM and basic needs; and stigmatization by providers impacting HF care."[2]

## HEART FAILURE PATIENTS HAVE AN IMPAIRED ABILITY TO RESPOND TO ENVIRONMENTAL HEAT

• Per a 2017 study, "Impaired thermoregulatory responses should be considered in patients with HF because they may contribute to heat-related illness and therefore adversely affect health outcomes during everyday activities, particularly during bouts of hot weather. Individuals should be made aware of their potential susceptibility to temperature extremes, and education should be provided to address simple strategies to avoid overheating."[3]

1 Nanjo, Atsunori, Hannah Evans, Kenan Direk, Andrew C Hayward, Alistair Story, and Amitava Banerjee. "Prevalence, Incidence, and Outcomes across Cardiovascular Diseases in Homeless Individuals Using National Linked Electronic Health Records." European Heart Journal 41, no. 41 (November 1, 2020): 4011–20. https://doi.org/10.1093/eurheartj/ehaa795.

2 Pendyal, Akshay, Marjorie S. Rosenthal, Erica S. Spatz, Alison Cunningham, Dawn Bliesener, and Danya E. Keene. "'When You're Homeless, They Look down on You': A Qualitative, Community-Based Study of Homeless Individuals with Heart Failure." Heart & Lung 50, no. 1 (January 2021): 80–85. https://doi.org/10.1016/j.hrtlng.2020.08.001.

3 Balmain, Bryce N., Surendran Sabapathy, Ollie Jay, Julie Adsett, Glenn M. Stewart, Rohan Jayasinghe, and Norman R. Morris. "Heart Failure and Thermoregulatory Control: Can Patients With Heart Failure Handle the Heat?" Journal of Cardiac Failure 23, no. 8 (August 1, 2017): 621–27. https://doi.org/10.1016/j.cardfail.2017.04.003.

## Heart failure

This is how heart failure (HF) can be assessed in those living on the streets:

- Assessing HF in a homeless patient on the streets is difficult using standard clinical assessment protocols (e.g. rales, edema, orthopnea, jugular venous pressure, hepatojugular reflux).
- A newer tool, Point of Care Ultrasound (POCUS) is both easy to use and significantly more accurate.
- Some POCUS devices, like the Butterfly IQ+ and the GE Vscan Air connect to your personal smartphone or tablet making them exceptionally portable.
- Because of this, POCUS is a valuable tool when assessing heart failure in a resource-poor setting.

## THE PROBLEM: HF IS DIFFICULT TO ASSESS IN LOW-RESOURCE SETTINGS

• A 2019 study examined diagnosis and management of acute HF in a low-resource setting and found, "The diagnosis of heart failure proves challenging in many acute care settings in SSA [Sub-Saharan Africa]. First, most patients with AHF [acute heart failure] will present with undifferentiated dyspnea or other symptoms that can mimic common and more high-profile diseases, such as tuberculosis or pneumonia. Most rural health institutions in SSA are staffed by non-physician health workers who may not have adequate training and experience in the diagnosis and management of AHF. Providers trained in these settings may lack a high index of suspicion for heart failure particularly given it was not historically emphasized as an important cause of dyspnea."[1]

## A POSSIBLE SOLUTION: POINT OF CARE ULTRASOUND (POCUS) CAN BE USED TO ASSESS HEART FAILURE IN THE FIELD

• The same 2019 study concluded, "Point-of-care ultrasound (POCUS) has been shown to help distinguish AHF from other causes of dyspnea and can guide effective treatment of those patients in resource-limited settings. POCUS can reliably show signs of pulmonary edema, venous congestion, presence of pericardial effusion, and/or reduced ejection fraction, profoundly aiding in disease diagnosis. The use of a combined lung and cardiac ultrasound (LuCUS) protocol has been shown to increase diagnostic accuracy of AHF in the emergency setting, and POCUS evaluation of the inferior vena cava (IVC) may help determine a patient's volume status. Moreover, POCUS can guide ongoing AHF management dynamically, as sonographic B-lines suggestive of pulmonary edema have been shown to rapidly decrease after diuresis in the emergent setting. In addition to the evidence showing its clinical efficacy, there is evidence showing POCUS can be successfully implemented in clinical settings in SSA. Brief training interventions have proven effective in teaching these point-of-care ultrasound skills to generalist physicians and mid-level providers in SSA."[2]

## POCUS HAS BEEN USED SUCCESSFULLY WITH THE HOMELESS ON THE STREETS

• A leader in the use of POCUS with the homeless on the streets is the Contra Costa County California Health Care for the Homeless program. Here is a link to their Powerpoint presentation designed to convince practitioners to add POCUS to their skillset: Click here for PDF.[3]

1 Bukhman, Alice Kidder, Vizir Jean Paul Nsengimana, Mindy C. Lipsitz, Patricia C. Henwood, Endale Tefera, Shada A. Rouhani, Damas Dukundane, and Gene Y. Bukhman. "Diagnosis and Management of Acute Heart Failure in Sub-Saharan Africa." Current Cardiology Reports 21, no. 10 (August 31, 2019): 120. https://doi.org/10.1007/s11886-019-1200-2.

2 Bukhman, Alice Kidder, Vizir Jean Paul Nsengimana, Mindy C. Lipsitz, Patricia C. Henwood, Endale Tefera, Shada A. Rouhani, Damas Dukundane, and Gene Y. Bukhman. "Diagnosis and Management of Acute Heart Failure in Sub-Saharan Africa." Current Cardiology Reports 21, no. 10 (August 31, 2019): 120. https://doi.org/10.1007/s11886-019-1200-2.

3 "Point-of-Care-Ultrasound.Pdf." Accessed July 8, 2022. http://councilbackup.flywheelsites.com/wp-content/uploads/2018/05/point-of-care-ultrasound.pdf.

# Acute Kidney Injury

This is how acute kidney injury presents differently in those who are unsheltered:

- The homeless have a higher rate of dehydration-linked acute kidney injury (AKI).
- Because of the elevated prevalence of heat stroke in the unhoused, rhabdomyolysis and associated AKI is a particularly deadly threat.
- Climate change and associated global warming is likely to make AKI in the homeless even worse.
- Because of their chronic lack of access to clean water, homeless patients are likely to present in an advanced stage of AKI.
- The advanced symptoms of AKI (e.g. confusion, drowsiness) may be mistaken for various forms of intoxication.




## LACK OF WATER IS LINKED TO LIFE-THREATENING KIDNEY DISEASE IN THE HOMELESS

• A 2019 study warned, "This is especially problematic for those experiencing homelessness and who are therefore not reliably connected to a building structure. While access to water for hydration and hygiene is required to uphold basic human life and dignity, health concerns are further created and exacerbated by a lack of water access, including life-threatening kidney disease. The economic costs of these health impacts are staggering. In 2004, almost $5.5 billion of hospital charges in the United States resulted from dehydration admissions alone. Access to water becomes more critical in the face of global environmental change, with associated increases in temperatures and aridity that will require more water intake for basic hydration and health."[1]

## CLIMATE CHANGE MEANS KIDNEY DISEASE IN THE HOMELESS IS LIKELY TO GET WORSE

• A 2021 study concluded, "Future extreme heat events are projected to be more intense, longer lasting, and more frequent. People who do not have an SSN [social security number], such as non-immigrant visa holders, homeless populations, newborns, and undocumented immigrants may be more likely to face social and economic disparities, which can exacerbate the effects of extreme heat on health. With SSN data, we found higher risks with increasing temperatures of hospitalizations for cardiovascular disease, ED visits for renal disease and dehydration (for working age individuals) among those without an SSN compared to those with an SSN."[2]

## HEAT STROKE PATIENTS HAVE AN EXTREMELY HIGH RISK OF ACUTE KIDNEY INJURY

• Per a 2021 study, "In the 3 months comprising June to August 2018, ambient temperature oscillated between 33 to 46°C, with a mean of 40.6°C, and a mean humidity of 21%. 28 patients were admitted with the diagnosis of heat stroke .... Of these patients, 13 (46%) developed rhabdomyolysis .... From these 13 patients with rhabdomyolysis, 12 developed AKI [acute kidney injury]."[3]

1 Hale, Marcia Rosalie. "Fountains for Environmental Justice: Public Water, Homelessness, and Migration in the Face of Global Environmental Change." Environmental Justice 12, no. 2 (April 2019): 33–40. https://doi.org/10.1089/env.2018.0031.

2 Jung, Jihoon, Christopher K. Uejio, Temilayo E. Adeyeye, Kristina W. Kintziger, Chris Duclos, Keshia Reid, Melissa Jordan, June T. Spector, and Tabassum Z. Insaf. "Using Social Security Number to Identify Sub-Populations Vulnerable to the Health Impacts from Extreme Heat in Florida, U.S." Environmental Research 202 (November 1, 2021): 111738. https://doi.org/10.1016/j.envres.2021.111738.

3 Hernandez, Jeremy Javier, Fátima María Martínez González, Katya Lorena Wilhelmy Ledesma, Córdova Erberk, and Paola Alejandra Sterling Carrillo. "Acute Kidney Injury and Mortality in Patients with Rhabdomyolysis Due to Heat Stroke," (August 2021), 4.

## Acute Kidney Injury

This is how acute kidney injury can be assessed in those living on the streets:

- Assessing AKI in a homeless patient on the streets is only moderately successful using standard clinical assessment protocols (e.g. elevated respiratory rate, elevated heart rate, foot temperature, big toe temperature, subjectively cold, skin mottling, etc.)
- A newer tool, Point of Care Ultrasound (POCUS) is both easy to use and significantly more accurate.
- Some POCUS devices, like the Butterfly IQ+ and the GE Vscan Air connect to your personal smartphone or tablet making them exceptionally portable.

## ONE POSSIBLE SOLUTION: POINT OF CARE ULTRASOUND (POCUS) CAN BE USED TO ASSESS AKI IN THE FIELD

• A 2022 study concluded, "Overall, the current literature regarding the use of POCUS in AKI is overwhelmingly positive. POCUS has been shown to be accurate in detecting hydronephrosis and adequate skills can be obtained with relatively short training periods. The literature supports the conclusion that internists can reliably use POCUS alongside their history and physical exam to aid in diagnosis and act as a means to identify those patients who will benefit most from more formal imaging, thus preserving healthcare resources and cost. Overall, the use of POCUS is an accurate, timely, feasible, and realistic method for internists to incorporate into their assessment of patients with an AKI in an effort to expedite treatment, improve patient care, and reduce the number of unnecessary formal imaging tests."[1]

## ANOTHER POSSIBLE SOLUTION TO AKI FIELD ASSESSMENT: POC CREATININE AND URINE DIPSTICK TEST

• A 2021 study examined patients in Cochabamba, Bolivia; Dharan, Nepal; and Blantyre, Malawi utilizing point-of-care (POC) serum creatinine and urine dipstick testing to identify patients at moderate to high AKI risk. The study concluded, "In … low-resource settings, acute kidney dysfunction is seldom recognized, due to inaccessibility of diagnostic tools, limited access to healthcare, and a lack of awareness of the impact of kidney disfunction on patient outcomes. Delays in recognizing AKI are common and have been associated with a 30% higher risk of mortality in hospitalized patients. … We applied a symptom-based risk score for AKI to identify a high-risk population for the POC creatinine test and identified kidney abnormalities in over 66% of the patients at initial presentation. The POC test and urinary dipstick results at enrollment showed that more than half of the patients had decreased eGFR and/or proteinuria, and only a small fraction had prior evidence of CKD."[2]

## POCUS HAS BEEN USED SUCCESSFULLY WITH THE HOMELESS ON THE STREETS

• A leader in the use of POCUS with the homeless on the streets is the Contra Costa County California Health Care for the Homeless program. Here is a link to their Powerpoint presentation designed to convince practitioners to add POCUS to their skillset: Click here for PDF.[3]



1 Sheehan, Kristin N., and Christopher T. Kelly. "The Use of Point-of-Care Ultrasound in Acute Kidney Injuries." Open Journal of Internal Medicine 12, no. 1 (January 25, 2022): 1–12. https://doi.org/10.4236/ojim.2022.121001.

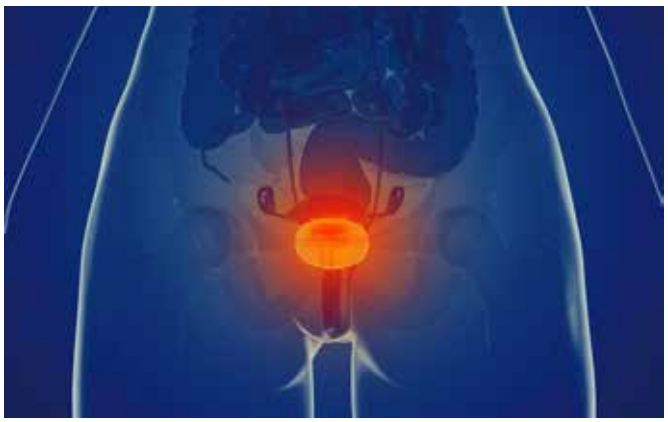
2 Macedo, Etienne, Ulla Hemmila, Sanjib Kumar Sharma, Rolando Claure-Del Granado, Henry Mzinganjira, Emmanuel A. Burdmann, Jorge Cerdá, et al. "Recognition and Management of Community-Acquired Acute Kidney Injury in Low-Resource Settings in the ISN 0by25 Trial: A Multi-Country Feasibility Study." PLOS Medicine 18, no. 1 (January 14, 2021): e1003408. https://doi.org/10.1371/journal.pmed.1003408.

3 "Point-of-Care-Ultrasound.Pdf." Accessed July 8, 2022. http://councilbackup.flywheelsites.com/wp-content/uploads/2018/05/point-of-care-ultrasound.pdf.

# Urinary tract infections

This is how urinary tract infections (UTIs) present differently in those who are unsheltered:

- Chronic dehydration puts the homeless at a higher risk of developing UTIs.
- Risk factors like frequent sexual intercourse (e.g. sex workers and those homeless who trade sex for food and/or shelter) and incontinence puts the homeless at a higher risk of developing more severe UTIs including acute pyelonephritis.
- Lack of access to clean water increases the risk of UTIs in homeless menstruators.
- Lack of access to clean water and adequate nutrition increases the risk of UTIs.
- Because of this, your homeless patient is at a higher risk of developing UTIs more often and those UTIs are more likely to be severe.



## DEHYDRATION INCREASES THE RISK OF URINARY TRACT INFECTIONS. ADEQUATE WATER INTAKE REDUCES THAT RISK

• A 2019 study examining UTIs in nursing home residents achieved remarkable results in lowering the incidence of UTIs by simply making sure their residents had access to regular water. The study found, "Residents of care homes are at high risk of dehydration which increases the risk of UTIs and other problems. ... The principal intervention was the introduction of seven structured drink rounds every day accompanied by staff training and raising awareness. UTIs requiring antibiotics reduced by 58% and UTIs requiring hospital admissions reduced by 36%, when averaged across the four care homes."[1]

## LACK OF ACCESS TO CLEAN WATER INCREASES THE RISK OF UTIS IN HOMELESS MENSTRUATORS

• A 2020 study observed, ""Access to clean water and a safe space to dispose of menstrual hygiene products are necessary to manage menstruation. Without these resources, [homeless] menstruators are at a greater risk of developing urinary tract infections (UTIs) or reproductive tract infections. Additionally, considering the taboo around menstruation, if menstruators are unable to access these things they could be ostracized by peers and experience high levels of stress."[2]

## POOR NUTRITION INCREASES THE RISK OF UTIS

• A 2014 study looked at the nutrition status of elderly patients and noted a direct link between poor nutrition and urinary tract infections.[3]

• A 2016 study looked at the nutritional status of the homeless and found, "Nutrition is a daily challenge for the estimated 2·3 to 3·5 million individuals who are homeless each year in America. The prevalence of food insufficiency is sixfold greater in the US homeless population than in the general population."[4]

1 Lean, Katie, Rasanat Fatima Nawaz, Sundus Jawad, and Charles Vincent. "Reducing Urinary Tract Infections in Care Homes by Improving Hydration." BMJ Open Quality 8, no. 3 (July 2019): e000563. https://doi.org/10.1136/bmjoq-2018-000563.

2 Earle, Courtney. "Menstrual Equity within the Homeless Community: The Good, the Bad, and the Bloody," (2020), 51.

3 Cangelosi, Michael J., Angie Mae Rodday, Tully Saunders, and Joshua T. Cohen. "Evaluation of the Economic Burden of Diseases Associated With Poor Nutrition Status." Journal of Parenteral and Enteral Nutrition 38, no. 2S (2014): 35S-41S. https://doi.org/10.1177/0148607113514612.

4 Koh, Katherine A, Monica Bharel, and David C Henderson. "Nutrition for Homeless Populations: Shelters and Soup Kitchens as Opportunities for Intervention." Public Health Nutrition 19, no. 7 (May 2016): 1312–14. https://doi.org/10.1017/S1368980015002682.

## Urinary tract infections

This is how urinary tract infections (UTIs) can be assessed in those living on the streets:

- Frequent sexual intercourse and incontinence are risks factors for developing acute pyelonephritis. This puts homeless sex workers at a high risk for this potentially deadly ascending UTI.
- For this reason, any suspicion of a UTI warrants a referral for further assessment and/or treatment.
- With sepsis rates at over 10% in acute pyelonephritis, back or flank pain OR fever in your patient should be seen as a red flag for possible acute pyelonephritis.
- In addition, be aware that your homeless patient with diabetes and acute pyelonephritis is LESS likely to present with back or flank pain but is more likeley to die from the condition.

### SEX WORKERS ARE AT HIGHER RISK OF ACUTE PYELONEPHRITIS

• A 2005 study found, "Factors associated with pyelonephritis risk were frequency of sexual intercourse in the previous 30 days (odds ratio, 5.6 [95% CI, 2.8 to 11.0] for ≥3 times per week), recent urinary tract infection (UTI) (odds ratio, 4.4 [CI, 2.8 to 7.1]), diabetes (odds ratio, 4.1 [CI, 1.6 to 10.9]), recent incontinence (odds ratio, 3.9 [CI. 2.6 to 5.9]) .... As with cystitis in reproductive-age women, sexual behaviors and patient and family history of UTI are associated with increased pyelonephritis risk. Diabetes and incontinence also seem to independently increase the risk for pyelonephritis."[1]

### MAINTAIN A HIGH SUSPICION OF PYELONEPHRITIS IN HOMELESS UTI PATIENTS WITH BACK OR FLANK PAIN AND/ OR FEVER

• A 2005 study found, "The 2 most frequently reported symptoms among case-patients [women with acute pyelonephritis] within 2 weeks of their index infection were severe back or flank pain (86%) and fever (77%); 95% of case-patients reported 1 or both of these symptoms. Many case-patients also reported cystitis symptoms (83% reported dysuria, frequency, or urgency)."[2]

• A 2009 study found that the occurrence of sepsis in acute pyelonephritis patients was over 10%.[3]

### BE AWARE THAT HOMELESS ACUTE PYELONEPHRITIS PATIENTS WITH DIABETES HAVE A HIGHER RISK OF SEVERE DISEASE BUT A LOWER RISK OF PRESENTING WITH FLANK PAIN AND/ OR COSTOVERTEBRAL ANGLE TENDERNESS

• A 2014 study looked at diabetic patients with acute pyelonephritis and found, "Of a total of 775 patients, 246 (31.7%) were diabetic and 529 (68.3%) non-diabetic. Fewer of the diabetic patients had flank pain (27.6% vs. 37.2% P = 0.009), symptoms of lower urinary tract infection (57.3% vs. 69.6% P = 0.001) and costovertebral angle tenderness (54.9% vs. 72.2% P < 0.001). ... CA-APN patients with diabetes have more severe disease manifestations and require longer hospitalization than non-diabetic patients although their clinical findings are less clear than those of non-diabetic patients."[4]



1 Scholes, Delia et al. "Risk factors associated with acute pyelonephritis in healthy women." Annals of internal medicine vol. 142,1 (2005): 20-7. doi:10.7326/0003-4819-142-1-200501040-00008

2 Scholes, Delia, Thomas M. Hooton, Pacita L. Roberts, Kalpana Gupta, Ann E. Stapleton, and Walter E. Stamm. "Risk Factors Associated with Acute Pyelonephritis in Healthy Women." Annals of Internal Medicine 142, no. 1 (January 4, 2005): 20–27.

3 Lee, Dong-Gi, Seung Hyun Jeon, Choong-Hyun Lee, Sun-Ju Lee, Jin Il Kim, and Sung-Goo Chang. "Acute Pyelonephritis: Clinical Characteristics and the Role of the Surgical Treatment." Journal of Korean Medical Science 24, no. 2 (April 20, 2009): 296–301. https://doi.org/10.3346/jkms.2009.24.2.296.

4 Kim, Yeonjae, Seong-Heon Wie, U-Im Chang, Jieun Kim, Moran Ki, Young Kyun Cho, Seung-Kwan Lim, et al. "Comparison of the Clinical Characteristics of Diabetic and Non-Diabetic Women with Community-Acquired Acute Pyelonephritis: A Multicenter Study." Journal of Infection 69, no. 3 (September 1, 2014): 244–51. https://doi.org/10.1016/j.jinf.2014.05.002.

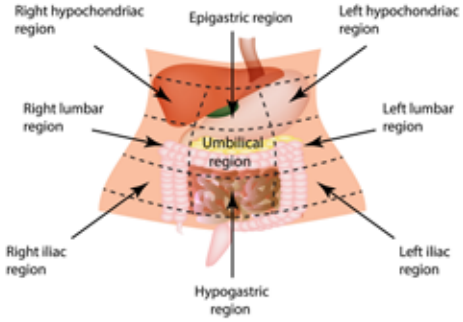
# Acute abdominal pain

This is how acute abdominal pain presents differently in those who are unsheltered:

- Because of their lack of access to clean water, the homeless are more likely to devlelop a number of painful abdominal conditions including UTIs, kidney stones, and acute pyelonephritis.
- Given this, chronic abdominal pain is very common in the unhoused.
- This chronic pain may mask acute abdominal pain that arises with a new condition.
- Your homeless patient is highly likely to "just tough it out" in the hopes that the pain – as it has in the past - will subside.
- Because of this delay, a homeless patient is likely to present in significantly worse condition.
- When they do present for treatment, they are also likely to know of someone on the streets who died from an abdominal condition.
- This is likely to make your homeless patient extremely anxious and worried about their acute abdominal pain.



REGIONS OF THE ABDOMEN




## THE HOMELESS REPORT HIGHER RATES OF CHRONIC PAIN WITH ABDOMINAL PAIN BEING THE SECOND MOST COMMON SITE

• A 2013 study found, "Pain is a substantial problem in homeless shelter users: 71.3% reported acute pain, and 59.3% fulfilled the criteria for chronic pain, the mean duration of which exceeded 6 years. The prevalence of chronic pain in our participants is substantially higher than that reported in several large population studies. ... The lower limbs were the most common site of pain, with 51.4% of participants reporting pain in this area. Further areas affected were: abdomen, pelvis or back (36.9%); chest, arms and shoulders (25.2%); and head or neck (15.3%). Thirty-one participants (27.9%) reported more than one affected area ...."[1]

## ACUTE ABDOMINAL PAIN AND LOW BACK PAIN ARE COMMON PRESENTING DIAGNOSES FOR THE HOMELESS AT EDS

• A 2021 study looking at homeless veterans who sought acute care at EDs determined that acute abdominal pain (3.0%) and acute low back pain (3.8%) were among the top presenting diagnoses.[2]

## DIGESTIVE DISEASE IS TIED WITH CANCER AS THE SECOND LEADING CAUSE OF DEATH IN THE HOMELESS

• Acute abdominal pain may indicate a deadly condition in your homeless patient. A 2019 study in England looked at the causes of death in the homeless: "We collected data on 3,882 individual homeless hospital admissions that were linked to 600 deaths. The median age of death was 51.6 years ... . The top three underlying causes of death by ICD-10 chapter in the [homeless] group were external causes of death (21.7%; 130/600), cancer (19.0%; 114/600) and digestive disease (19.0%; 114/600)."[3]

1 Fisher, Rebecca, Judith Ewing, Alice Garrett, E Katherine Harrison, Kimberly KT Lwin, and Daniel W Wheeler. "The Nature and Prevalence of Chronic Pain in Homeless Persons: An Observational Study." F1000Research 2 (July 30, 2013): 164. https://doi.org/10.12688/f1000research.2-164.v1.

2 Tsai, Jack, Dorota Szymkowiak, and Stefan G. Kertesz. "Top 10 Presenting Diagnoses of Homeless Veterans Seeking Care at Emergency Departments." The American Journal of Emergency Medicine 45 (July 1, 2021): 17–22. https://doi.org/10.1016/j.ajem.2021.02.038.

3 Aldridge, Robert W, Dee Menezes, Dan Lewer, Michelle Cornes, Hannah Evans, Ruth M Blackburn, Richard Byng, et al. "Causes of Death among Homeless People: A Population-Based Cross-Sectional Study of Linked Hospitalisation and Mortality Data in England." Wellcome Open Research 4 (March 11, 2019): 49. https://doi.org/10.12688/wellcomeopenres.15151.1.

## Acute abdominal pain

This is how acute abdominal pain can be assessed in those living on the streets:

- Because of the myriad causes of acute abdominal pain, field assessment of homeless patients requires a high degree of suspicion.
- The use of POCUS (point of care ultrasound) has been shown to improve the overall diagnosis and treatment of patients.
- However, please be aware that your elderly homeless patient with acute abdominal pain is half as likely to be triaged as high acuity but more likely to require surgical management.
- Because of this, follow-up is extremely important as homeless patients who feel they are being "slighted" are much more likely to leave the hospital before being treated.

### ELDERLY HOMELESS PATIENTS WITH ABDOMINAL PAIN ARE HALF AS LIKELY TO BE CONSIDERED 'EMERGENT'

• A 2022 study found, "Patients over 65 years old were half as likely to be triaged as high acuity compared with non-abdominal pain patients, yet were more likely to be surgically managed. Nearly one in six ED patients over 65 years old with a chief complaint of abdominal pain received only an X-ray for radiologic evaluation. A minority (39%) of older patients with abdominal pain received an EKG."[1]

### POCUS HAS BEEN PROVEN TO BE A VALUABLE TOOL WHEN ASSESSING ACUTE ABDOMINAL PAIN

• A 2019 study concluded, "Regarding the wide range of causes providing multiple differential diagnosis, as well as the limited time of the health team in the emergency department for diagnostic and therapeutic measures, particularly in time-sensitive clinical conditions, ultrasound offered by emergency medicine specialists as a diagnostic aid is considered to improve the overall diagnosis and treatment of patients, thereby reducing complications." [see chart below][2]

| Target of ultrasound | | Sensitivity | Specificity |
|---|---|---|---|
| Testicular torsion | | 94.0% | 96.0% |
| Ectopic pregnancy | | 99.3% | 38.0–74.0% |
| Appendicitis | | 100% | 80.0–90.0% |
| Pelvic fracture | | 26.0% | 96.0% |
| Abdominal aortic aneurysm | | 96.3–99.0% | 98.0–100% |
| Deep vein thrombosis | | 32.0–46.0% | 97.0–100% |
| Vascular dissection[1] | | 98.0% | NA |
| FAST[2] | Blunt abdominal trauma | 50.0–95.4% | 78.4–99.0% |
| | Penetrating trauma (Stable patients) | 43.0% | 100% |
| | Pelvic fracture | 26.0–96.0% | 96.0% |
| E-FAST[3] | Pneumothorax | 42.7–77.0% | 99.2–99.8% |
| | Hemothorax | 92.0% | 100% |
| RUSH[4] | Hypovolemic | 100% | 72.7–96.2% |
| | Cardiogenic | 60.0–90.0% | 98.0–100% |
| | Obstructive | 90.9% | 98.2% |
| | Distributive | 72.7–75.0% | 100% |
| | Mixed | 63.6% | 98.2% |

1 Friedman, Ari B., Angela T. Chen, Rachel Wu, Norma B. Coe, Scott D. Halpern, Ula Hwang, Rachel R. Kelz, and Anne R. Cappola. "Evaluation and Disposition of Older Adults Presenting to the Emergency Department with Abdominal Pain." Journal of the American Geriatrics Society 70, no. 2 (2022): 501–11. https://doi.org/10.1111/jgs.17503.

2 Abdolrazaghnejad, Ali, Ali Rajabpour-Sanati, Hojjat Rastegari-Najafabadi, Maryam Ziaei, and Abdolghader Pakniyat. "The Role of Ultrasonography in Patients Referring to the Emergency Department with Acute Abdominal Pain." Advanced Journal of Emergency Medicine 3, no. 4 (May 16, 2019): e43. https://doi.org/10.22114/ajem.v0i0.152.


SoCal
ELITE COLLEGE

## CHAPTER 3



# POOR NUTRITION LEADS TO 'MEDIEVAL' DISEASES

How many days have you gone without food? How many weeks have you only had a single meal a day? How many times have you skipped a meal in order to feed your child?

These are not questions generally asked of housed patients, but they are important issues for any patient who is or has been unsheltered.

Here are your bullet points:

## LACK OF ACCESS TO FOOD

• Food insecurity is the daily reality for the vast majority of the homeless. This includes such critical elements of a healthy diet as adequate protein.[1]

• It's even worse for homeless youth. Over 70% of homeless youth are estimated to have inadequate intakes of vitamins A, C, D3 and E, as well as calcium and magnesium.[2]

• Homeless individuals and homeless families are frequently stuck in "food desserts" (an area located at least 10 miles from a grocery store) because shelters and other temporary housing are located as far away as possible from the housed.[3]

**Quick take**

**Lack of access to food is deadly for the homeless and especially deadly for homeless youth.**

## RISE OF MEDIEVAL ILLNESS

• Here's just a sampling of recent headlines warning about the problem:

**Forbes:**

*"Are L.A.'s Medieval Diseases Coming To Your City?"*

**Scientific American:**

*"'Medieval' Diseases Flare as Unsanitary Living Conditions Proliferate"*

**The Atlantic:**

*"Medieval Diseases Are Infecting California's Homeless"*

• The reality is that these nutrition-linked conditions have been affecting the very poor for millennia. The current scare is based on the fact that the "medieval" illnesses afflicting the homeless have spread into the housed population.[4]

**Quick take**

**Lack of basic nutrition gives rise to a host of diseases, many of which physicians do not recognize.**

1 Walker, Sam, Kevin Fitzpatrick, and Jamie Baum. "Barriers to Consuming Dietary Protein and Cardiometabolic Risk Factors Among Low-Income and Homeless Adults (P04-089-19)." Current Developments in Nutrition 3, no. Supplement_1 (June 1, 2019): nzz051.P04-089-19. https://doi.org/10.1093/cdn/nzz051.P04-089-19.

2 Hatsu, Irene, Carolyn Gunther, Erinn Hade, Stephanie Vandergriff, Natasha Slesnick, Rachel Williams, Richard S. Bruno, and Julie Kennel. "Unaccompanied Homeless Youth Have Extremely Poor Diet Quality and Nutritional Status." International Journal of Adolescence and Youth 24, no. 3 (July 3, 2019): 319–32. https://doi.org/10.1080/02673843.2018.1538885.

3 Brown, Rory, BA, Avik Chatterjee, MD, and MPH. "Dietary Inadequacies Among US Homeless Families: An Enduring Problem." Journal of Health Care for the Poor and Underserved 29, no. 4 (November 2018): 1188–1208. https://doi.org/10.1353/hpu.2018.0090.

4 News, Anna Gorman, Kaiser Health. "Medieval Diseases Are Infecting California's Homeless." The Atlantic, March 8, 2019. https://www.theatlantic.com/health/archive/2019/03/typhus-tuberculosis-medieval-diseases-spreading-homeless/584380/.

# The View from The Streets:

Even though the United Nations asserts that available, adequate, and accessible food is a fundamental human right, that right is not available to far too many people on the streets:[1]

**1) Homeles shelters are located "too damn far" from traditional supermarkets and grocery stores. Why? "Because they don't want us anywhere near them (the housed)."**[2]

**2) "Just when I get to a feeding project, it's either closed or out of food."**[3]

**3) "How am I supposed to eat fruits and vegetables? First, feeding projects don't have them**[4] **and, second, I can't chew goddamn apples with my rotten teeth."**[5]

**4) "Sure I'm grateful, but food out here is the same. Same, same, same. Sometimes I don't eat just because I'm sick of the monotony."**[6]

**5) "I have nothing to eat but I look fat. Who's going to give food to a fat guy?"**[7]

1 "FactSheet34en.Pdf." Accessed July 11, 2022. https://www.ohchr.org/sites/default/files/Documents/Publications/FactSheet34en.pdf.

2 Brown, Rory, BA, Avik Chatterjee, MD, and MPH. "Dietary Inadequacies Among US Homeless Families: An Enduring Problem." Journal of Health Care for the Poor and Underserved 29, no. 4 (November 2018): 1188–1208. https://doi.org/10.1353/hpu.2018.0090.

3 Bowen, Elizabeth A., and Andrew Irish. "'Hello, You're Not Supposed to Be Here': Homeless Emerging Adults' Experiences Negotiating Food Access." Public Health Nutrition 21, no. 10 (July 2018): 1943–51. https://doi.org/10.1017/S1368980018000356.

4 Brown, Rory, BA, Avik Chatterjee, MD, and MPH. "Dietary Inadequacies Among US Homeless Families: An Enduring Problem." Journal of Health Care for the Poor and Underserved 29, no. 4 (November 2018): 1188–1208. https://doi.org/10.1353/hpu.2018.0090.

5 Daly, Blánaid, Tim Newton, Paul Batchelor, and Kate Jones. "Oral Health Care Needs and Oral Health-Related Quality of Life (OHIP-14) in Homeless People." Community Dentistry and Oral Epidemiology 38, no. 2 (2010): 136–44. https://doi.org/10.1111/j.1600-0528.2009.00516.x.

6 Booth, Sue, Andrea Begley, Bruce Mackintosh, Deborah Anne Kerr, Jonine Jancey, Martin Caraher, Jill Whelan, and Christina Mary Pollard. "Gratitude, Resignation and the Desire for Dignity: Lived Experience of Food Charity Recipients and Their Recommendations for Improvement, Perth, Western Australia." Public Health Nutrition 21, no. 15 (October 2018): 2831–41. https://doi.org/10.1017/S1368980018001428

7 Koh, Katherine A., Jessica S. Hoy, James J. O'Connell, and Paul Montgomery. "The Hunger–Obesity Paradox: Obesity in the Homeless." Journal of Urban Health : Bulletin of the New York Academy of Medicine 89, no. 6 (December 2012): 952–64. https://doi.org/10.1007/s11524-012-9708-4.

*Brandon asked, "Who's going to give food to a fat guy?"*


1 Kleinman, L C, H Freeman, J Perlman, and L Gelberg. "Homing in on the Homeless: Assessing the Physical Health of Homeless Adults in Los Angeles County Using an Original Method to Obtain Physical Examination Data in a Survey." Health Services Research 31, no. 5 (December 1996): 533–49.

# Root cause:
## Poor nutrition causes "medieval" diseases in the homeless

**The top conditions that present differently because of this root cause (using their medieval names):**

1. Scurvy
2. Beriberi and Wet brain
3. Dropsy
4. Moonblink
5. The Bloody Flux
6. Pellagra
7. Green-sickness
8. Gaol fever
9. Consumption
10. The Pissing Evil

*Morgan describes what it's like living with what was known in medieval times as "The Pissing Evil."*

**See her story at: https://youtu.be/x11Bcyu9d3o**

# Scurvy

This is how Vitamin C deficiency presents differently in those who are unsheltered:

- Homeless patients with low Vitamin C levels may first present with fatigue, a feeling of being "unwell," may complain of depression, and may demonstrate wide swings in emotion.
- While any or all of the above are the sentinel signs of scurvy, recommendations for patients presenting with those signs do not include Vitamin C testing.
- Instead, clinicians who understand scurvy is a modern, not medieval disease, look for signs like bleeding gums.
- However, bleeding gums do not occur in scurvy patients without teeth.
- Because homeless patients without teeth are highly unlikely to eat citrus (one of the few sources of Vitamin C at feeding projects) edentulous homeless patients are among the most likely to develop scurvy.
- Other high risk groups include smokers and those with alcohol use disorder.




## SCURVY IS CAUSED BY LACK OF ADEQUATE VITAMIN C

• According to the NHS, "Scurvy is caused by not having enough vitamin C in your diet for at least 3 months. Vitamin C is mainly found in fruit and vegetables. Even people who do not eat very healthily all the time are not usually considered at risk of scurvy."[1]

## 95% OF HOMELESS ADULTS ARE VITAMIN C DEFICIENT

• A 2002 study looking at the diets of homeless adults in France found, "[R]eal deficiencies were mainly observed for vitamin C (95% of the subjects were deficient). Only 9.3% of the general French population between 40 and 50 y old are deficient in vitamin C."[2]

## OVER 70% OF HOMELESS YOUTH DON'T GET ENOUGH VITAMIN C

• A 2019 study determined that over 70% of homeless youth are estimated to have inadequate intakes of vitamin C as well as lacking in adequate Vitamin A, D3 and E, as well as calcium and magnesium.[3]

## SMOKING AND ALCOHOL CONSUMPTION INTERFERE WITH THE BODY'S UPTAKE OF VITAMIN C

• A 2016 study found, "Similar to alcoholism, smoking can also make an impact on the nutritional needs of the individual as evidenced by the increased vitamin C requirements in smokers. This effect may, in part, explain the recurrent demonstration of low vitamin C levels in the homeless given the high rates of smoking in this population. However, the persistence of reduced vitamin C levels following adjustment for the effects of smoking indicates that such behaviour is not the only reason for the low Vitamin C reported in this group."[4]

1 nhs.uk. "Scurvy," October 25, 2017. https://www.nhs.uk/conditions/scurvy/.

2 Malmauret, L, JCh Leblanc, I Cuvelier, and Philippe Verger. "Dietary Intakes and Vitamin Status of a Sample of Homeless People in Paris." European Journal of Clinical Nutrition 56 (May 1, 2002): 313–20. https://doi.org/10.1038/sj.ejcn.1601312.

3 Hatsu, Irene, Carolyn Gunther, Erinn Hade, Stephanie Vandergriff, Natasha Slesnick, Rachel Williams, Richard S. Bruno, and Julie Kennel. "Unaccompanied Homeless Youth Have Extremely Poor Diet Quality and Nutritional Status." International Journal of Adolescence and Youth 24, no. 3 (July 3, 2019): 319–32. https://doi.org/10.1080/02673843.2018.1538885.

4 Seale, J. V., R. Fallaize, and J. A. Lovegrove. "Nutrition and the Homeless: The Underestimated Challenge." Nutrition Research Reviews 29, no. 2 (December 2016): 143–51. https://doi.org/10.1017/S0954422416000068.

## Scurvy

This is how Vitamin C deficiency can be assessed in those living on the streets:

- The sentinel signs for hypovitaminosis C are neuropsychiatric.
- These include fatigue, weakness, irritability, and psychomotor issues.
- The physical signs of scurvy usually present later and are easy to miss.
- These include follicular hyperkeratosis, perifollicular hemorrhages, and xerosis.
- Bleeding from the gums and poor wound healing are usually late signs of scurvy.
- Since 95% of your homeless patients may have a Vitamin C deficiency (as opposed to 9% of the housed), a high suspicion of scurvy is warranted in a homeless patient who presents with any of the above symptoms.

### THE SENTINEL FINDINGS OF SCURVY ARE NEUROPSYCHIATRIC SYMPTOMS

• A 2015 study cautioned, "For centuries, the sentinel findings in scurvy have been neuropsychiatric. Today, the World Health Organization recognizes an early or 'latent' form of scurvy characterized in part by 'lassitude, weakness, and irritability.' Apathy, irritability, and psychomotor retardation have been recognized for centuries as heralding the onset of scurvy. ... The management of neuropsychiatric scurvy firstly involves its recognition, followed by adequate treatment and follow-up care. The clinician should be emboldened to consider the possibility of hypovitaminosis C, partly because this condition is not rare. Perhaps the most difficult barrier for the clinician to scale is the idea—indeed the misconception—that scurvy occurs only where there is nutritional catastrophe, such as a war or famine may impose."[1]

### BLEEDING GUMS ARE A LATE SIGN OF SCURVY. FATIGUE AND PERIFOLLICULAR HEMORRHAGES MAY BE EARLIER SIGNS

• According to a 1999 review article, "The earliest symptom of scurvy, occurring only after many weeks of deficient intake, is fatigue. The most common cutaneous findings are follicular hyperkeratosis, perifollicular hemorrhages, ecchymoses, xerosis, leg edema, poor wound healing, and bent or coiled body hairs." [See image of perifollicular hemorrhages from study on previous page][2]

### SCORBUTIC GUM MANIFESTATIONS HAPPEN ONLY IF YOUR PATIENT HAS TEETH

• According to a 1999 review article, "Gum abnormalities, which occur only in patients with teeth, include gingival swelling, purplish discoloration, and hemorrhages."[3]

### SCURVY IS A FREQUENTLY MISSED DIAGNOSIS, EVEN AMONG HEMATOLOGISTS

• A 2019 described why the diagnosis of scurvy is so often missed. Per the study, "Unexplained bruising and bleeding are common reasons for referral to a hematologist. Recommendations for evaluation of such presentations typically do not include vitamin C testing. There are no known published guidelines or good quality studies that address the work-up or the management of vitamin C deficiency. The optimal vitamin C replacement regimen is also unclear and not evidence-based."[4]

1 Brown, Thomas M. "Neuropsychiatric Scurvy." Psychosomatics 56, no. 1 (January 1, 2015): 12–20. https://doi.org/10.1016/j.psym.2014.05.010.

2 Hirschmann, J. V., and Gregory J. Raugi. "Adult Scurvy." Journal of the American Academy of Dermatology 41, no. 6 (December 1, 1999): 895–910. https://doi.org/10.1016/S0190-9622(99)70244-6.

3 Hirschmann, J. V., and Gregory J. Raugi. "Adult Scurvy." Journal of the American Academy of Dermatology 41, no. 6 (December 1, 1999): 895–910. https://doi.org/10.1016/S0190-9622(99)70244-6.

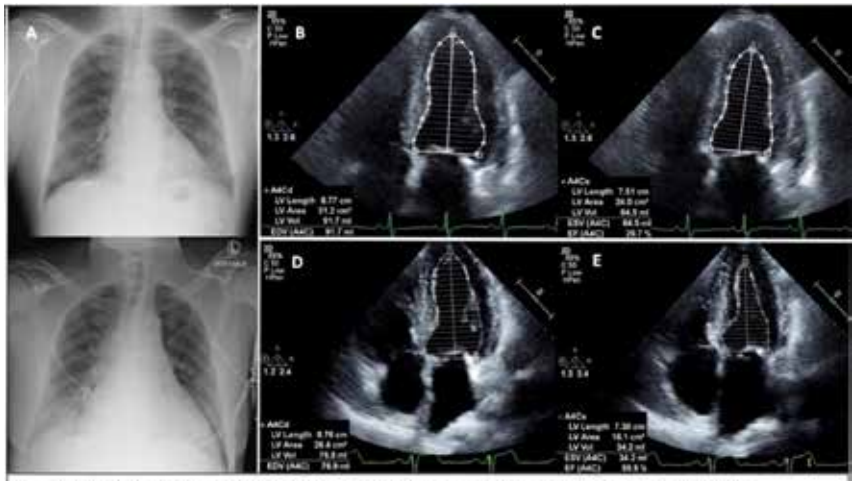
4 Khalife, Roy, Anthony Grieco, Karima Khamisa, Alan Tinmouh, Chris McCudden, and Elianna Saidenberg. "Scurvy, an Old Story in a New Time: The Hematologist's Experience." Blood Cells, Molecules, and Diseases 76 (May 1, 2019): 40–44. https://doi.org/10.1016/j.bcmd.2019.01.004.

# Beriberi and Wet brain

This is how Vitamin B1 (Thiamine) deficiency presents differently in those who are unsheltered:

- Homeless patients with low nutritional intake may appear obese (the "hunger-obesity paradox"). Thus, a homeless patient literally starved for nutrients may be seen as "over-nourished" by clinicians.
- A homeless patient who does not have alcohol use disorder is unlikely to be assessed for thiamine deficiency.
- Because of this, a homeless patient presenting with signs of heart failure and/or peripheral neuropathies due to thiamine deficiency is very likely to be misdiagnosed.
- This is exceptionally unfortunate as thiamine deficiency caused cardiomyopathy ("wet beriberi" or "Shoshin beriberi") is a reversible condition with administration of thiamine, and deadly if not diagnosed and treated promptly.






Figures. A: Baseline CXR (top) and on presentation showing cardiomegaly and pulmonary congestion (bottom). B-C: Transthoracic echocardiogram (TTE) on presentation showing reduced left systolic function. D-E: TTE showing recovery of left ventricular systolic function after thiamine repletion.

## BERIBERI IS CAUSED BY LACK OF ADEQUATE VITAMIN B1

• A 2013 review article provides an overview on beriberi: "Thiamine (vitamin B1) is a water-soluble vitamin present in most animal and plant tissues. Neuropathy due to thiamine deficiency, known as beriberi, was the first clinically described deficiency syndrome in humans. Beriberi may manifest with heart failure (wet beriberi) or without heart failure (dry beriberi). Thiamine deficiency is also responsible for Wernicke's encephalopathy and Korsakoff's syndrome [Wet Brain]."[1]

## 96% OF HOMELESS ADULTS HAVE LOW VITAMINE B1 INTAKE

• A 2001 study found the mean thiamine intake of homeless men was significantly lower than the general population.[2] A 2002 study also looked at thiamine intake and found that over 96% of homeless men and women had thiamine intakes below the levels of the general population."[3]

## EXCESSIVE ALCOHOL CONSUMPTION IS A WELL KNOWN CAUSE OF THIAMINE DEFICIENCY. OTHER CAUSES MAY BE MISSED

• A 2021 study warned, "The excessive chronic consumption of alcohol is a well-known cause of thiamine deficiency and the consequent Wernicke encephalopathy (due to impaired intestinal absorption and utilization of thiamine); thus, when facing a patient with a history of alcoholism, clinicians tend to look for symptoms of thiamine deficiency. However, in the absence of a medical history of alcoholism, the variable symptoms of thiamine deficiency (which affects multiple organ systems) may be attributed to other conditions and can be easily misdiagnosed."

• Other causes of thiamine deficiency, per the same study, include, "disease-related malnutrition, bariatric surgery, chronic use of diuretics, repeated vomiting, … food insecurity, and reliance on monotonous or restrictive diets.[4]

1 Hammond, Nancy, Yunxia Wang, Mazen Dimachkie, and Richard Barohn. "Nutritional Neuropathies." Neurologic Clinics 31, no. 2 (May 2013): 477–89. https://doi.org/10.1016/j.ncl.2013.02.002.

2 Darmon, Nicole, J Coupel, M Deheeger, and André Briend. "Dietary Inadequacies Observed in Homeless Men Visiting an Emergency Night Shelter in Paris." Public Health Nutrition 4 (May 1, 2001): 155–61. https://doi.org/10.1079/PHN200053.

3 Malmauret, L, JCh Leblanc, I Cuvelier, and Philippe Verger. "Dietary Intakes and Vitamin Status of a Sample of Homeless People in Paris." European Journal of Clinical Nutrition 56 (May 1, 2002): 313–20. https://doi.org/10.1038/sj.ejcn.1601312.

4 Gomes, Filomena, Gilles Bergeron, Megan W. Bourassa, and Philip R. Fischer. "Thiamine Deficiency Unrelated to Alcohol Consumption in High-Income Countries: A Literature Review." Annals of the New York Academy of Sciences 1498, no. 1 (2021): 46–56. https://doi.org/10.1111/nyas.14569.

## Beriberi and Wet brain

This is how Vitamin B1 (Thiamine) deficiency can be assessed in those living on the streets:

- The sentinel signs of beriberi affecting the heart are indistinguishable from other dilated cardiomyopathies.
- The clinical features of neuropathic beriberi are nearly identical to other causes of peripheral neuropathies.
- Polyneuropathies caused by beriberi are easily mistaken for those in the much better known Guillain-Barré syndrome.
- Because of this, homeless patients presenting with any of the signs and symptoms mentioned above should be assessed for thiamine deficiency.

### THE SENTINEL FINDINGS OF THIAMINE DEFICIENCY MAY BE MISTAKEN FOR OTHER CAUSES OF CARDIOMYOPATHY

• A 2019 study cautioned, "Classically, patients with cardiac beriberi have been described as having heart failure with significant lower-extremity edema but upper-body cachexia. However, patients with calorie-rich but nutritionally poor diets, or those with recent changes in their diets, may not appear emaciated. Echocardiography may reveal reduced ejection fraction that is indistinguishable from other dilated cardiomyopathies."[1]

• A 2018 case study describes how this presented in a homeless patient: "No clear etiology for cardiomyopathy [in a 68-year-old homeless man] was identified. Patient was treated medically and discharged. He was readmitted 5 times over 3 months with recurrent HFrEF from medication non-adherence. On the 5th admission, he was also noted to have bilateral 6th cranial nerve palsy. Given this, along with HFrEF and history of alcoholism, severe thiamine deficiency was suspected. Thiamine level was indeed very low at 12nmol/L. Sixteen days from thiamine treatment initiation, he became hypotensive and all cardiac medications were stopped. Repeat TTE showed fully recovered LVEF at 55%." [see image from study on previous page][2]

### THE SENTINEL FINDINGS OF THIAMINE DEFICIENCY MAY ALSO BE MISTAKEN FOR OTHER CAUSES OF PERIPHERAL NEUROPATHY

• A 2013 review article described the diagnostic issue, "Clinical features of thiamine deficiency begin with distal sensory loss, burning pain, paraesthesias or muscle weakness in the toes and feet. There is often associated aching and cramping in the lower legs."[3]

### WERNICKE-KORSAKOFF SYNDROME FROM THIAMINE DEFICIENCY (WET BRAIN) IS VERY LIKELY TO BE MISSED

• A 2021 study warned, "Healthcare professionals are relatively unaware of thiamine deficiency as a possible cause of polyneuropathy, particularly in patients without Wernicke encephalopathy or heart failure in the initial phase, and some of the thiamine deficiency cases we identified were initially diagnosed as Guillain–Barré syndrome. Even in patients with Wernicke encephalopathy, it is estimated that 80% of the cases do not receive a diagnosis, with some cases only being diagnosed postmortem."[4]

1 Helali, Jonathan, Sandy Park, Boback Ziaeian, Janet K. Han, and Azadeh Lankarani-Fard. "Thiamine and Heart Failure: Challenging Cases of Modern-Day Cardiac Beriberi." Mayo Clinic Proceedings: Innovations, Quality & Outcomes 3, no. 2 (June 1, 2019): 221–25. https://doi.org/10.1016/j.mayocpiqo.2019.03.003.

2 Park, Sandy, Azadeh Lankarani-Fard, Jonathan Helali, and Janet Han. "TAKE YOUR VITAMINS: A CASE OF BERIBERI HEART DISEASE." Journal of the American College of Cardiology 71, no. 11, Supplement (March 10, 2018): A2151. https://doi.org/10.1016/S0735-1097(18)32692-5.

3 Hammond, Nancy, Yunxia Wang, Mazen Dimachkie, and Richard Barohn. "Nutritional Neuropathies." Neurologic Clinics 31, no. 2 (May 2013): 477–89. https://doi.org/10.1016/j.ncl.2013.02.002.

4 Gomes, Filomena, Gilles Bergeron, Megan W. Bourassa, and Philip R. Fischer. "Thiamine Deficiency Unrelated to Alcohol Consumption in High-Income Countries: A Literature Review." Annals of the New York Academy of Sciences 1498, no. 1 (2021): 46–56. https://doi.org/10.1111/nyas.14569.

# Dropsy

This is how edema presents differently in those who are unsheltered:

- Edema (Dropsy) in homeless patients may rise from the same causes seen in the housed population: e.g. peripheral artery disease, heart disease, kidney disease, liver disease, lymphatic disease, etc.
- However, the homeless also face edema caused by a range of nutritional issues.
- These include vitamin and other nutritional deficiencies.
- Physicians may not immediately think of nutritional deficiencies as a cause of edema because nearly two-thirds of homeless patients are either overweight or obese.
- This is known as the "Hunger-Obesity Paradox" and it has been found even in mildly food insecure patients.
- Because of this, your homeless patient is likely to present with chronic edema that has remained suboptimally assessed and treated.

## DROPSY (EDEMA) IN THE HOMELESS MAY BE A SIGN OF BERIBERI

• A 2019 study cautioned, "Classically, patients with cardiac beriberi have been described as having heart failure with significant lower-extremity edema but upper-body cachexia. However, patients with calorie-rich but nutritionally poor diets, or those with recent changes in their diets, may not appear emaciated. Echocardiography may reveal reduced ejection fraction that is indistinguishable from other dilated cardiomyopathies."[1]

## EDEMA MAY ALSO BE A SIGN OF SCURVY

• A 2019 review article described how scurvy ("the eternal masquerader") was mistaken for reactive arthritis in a homelss man with edema in his ankles.[2]

## IN ADDITION, EDEMA MAY BE CAUSED BY LOW LEVELS OF PROTEIN IN THE HOMELESS

• A Harvard Health article describes the issue in plain English: "Low protein levels in the blood caused by malnutrition, kidney and liver disease can cause edema. The proteins help to hold salt and water inside the blood vessels so fluid does not leak out into the tissues. If a blood protein, called albumin, gets too low, fluid is retained and edema occurs, especially in the feet, ankles and lower legs."[3]

• A 2019 study determined that over 70% of the low-income and homeless subjects studied had encountered at least one barrier to accessing dietary protein and that one-third reported a significant lack of protein in their diet.[4]

1 Helali, Jonathan, Sandy Park, Boback Ziaeian, Janet K. Han, and Azadeh Lankarani-Fard. "Thiamine and Heart Failure: Challenging Cases of Modern-Day Cardiac Beriberi." Mayo Clinic Proceedings: Innovations, Quality & Outcomes 3, no. 2 (June 1, 2019): 221–25. https://doi.org/10.1016/j.mayocpiqo.2019.03.003.

2 Christopher, Karen L., Kelly K. Menachof, and Ramin Fathi. "Scurvy masquerading as reactive arthritis." Cutis 103.3 (2019): E21-E23.

3 Harvard Health. "Edema," December 18, 2018. https://www.health.harvard.edu/a_to_z/edema-a-to-z.

4 Walker, Sam, Kevin Fitzpatrick, and Jamie Baum. "Barriers to Consuming Dietary Protein and Cardiometabolic Risk Factors Among Low-Income and Homeless Adults (P04-089-19)." Current Developments in Nutrition 3, no. Supplement_1 (June 1, 2019): nzz051.P04-089-19. https://doi.org/10.1093/cdn/nzz051.P04-089-19.

## Dropsy

This is how edema can be assessed in those living on the streets:

- Assessing the nutritional causes of edema begins with a careful and detailed patient nutritional history.
- Begin with asking what your patient has eaten that day. Gently ask them to be as detailed as possible.
- Then, gently ask them to detail what they have eaten over the past week.
- Was it a good week for food? A bad week? A normal week?
- How many days in the past week did they go without food? How many days in the past month did they go without food?
- What food do they believe is missing in their diet?

## DON'T CONFUSE OBESITY WITH BEING 'WELL-FED.' A HOMELESS PATIENT'S OBESITY MAY ACTUALLY BE CAUSED BY FOOD INSECURITY

• A 2012 study examined the "Hunger-Obesity Paradox" in the homeless and found, "By weight category, 1.6 % of homeless individuals were underweight, 32.6 % were normal weight, 65.7 % were overweight, and 32.3 % were obese. ... The recently described hunger–obesity paradox, which describes the co-existence of hunger and obesity in the same person, may help explain our findings."[1]

• This "Hunger-Obesity Paradox" was originally described in a 2001 study which found, "Food insecurity remained a significant predictor of overweight status, after adjustment for potentially confounding demographic and lifestyle variables ($P < 0.01$). In a logistic regression analysis, mildly [food] insecure women were 30% more likely to be overweight than those who were food secure. Thus, food insecurity had an unexpected and paradoxical association with overweight status among women with a higher prevalence of overweight among the food insecure, and a resulting potential for increased incidence of obesity-related chronic diseases."[2]

## EDEMA IN THE HANDS AND/OR FEET. HEART FAILURE? MAYBE. LIVER OR KIDNEY DISEASE? POSSIBLY. BUT DON'T OVERLOOK 'PUFFY HAND SYNDROME'

• A 2022 review article described a form of non-pittting edema relatively common in homeless intravenous drug users: "Puffy hand syndrome can present during or after bouts of intravenous drug abuse with intermittent non-pitting edema. These clinical symptoms are typically found on the dorsum of the hands. After several months of evolution, the edema does not decrease, even with postural changes. Foot involvement is less common yet remains possible if injections are frequently administered in the surrounding area. In addition, infectious complications such as cellulitis regularly support the diagnosis. Unfortunately, these clinical findings are commonly misdiagnosed and persist for years before a correct diagnosis is made. Some implicated risk factors for puffy hand syndrome include female gender, repeated injections in the hands and feet, and the absence of tourniquet use." [see image from study above and left][3]



1 Koh, Katherine A., Jessica S. Hoy, James J. O'Connell, and Paul Montgomery. "The Hunger–Obesity Paradox: Obesity in the Homeless." Journal of Urban Health : Bulletin of the New York Academy of Medicine 89, no. 6 (December 2012): 952–64. https://doi.org/10.1007/s11524-012-9708-4.

2 Townsend, Marilyn S., Janet Peerson, Bradley Love, Cheryl Achterberg, and Suzanne P. Murphy. "Food Insecurity Is Positively Related to Overweight in Women." The Journal of Nutrition 131, no. 6 (June 1, 2001): 1738–45. https://doi.org/10.1093/jn/131.6.1738.

3 Janardan, Abhishek, Malek Ayoub, Husna Khan, Pinky Jha, and Mohan S. Dhariwal. "Mysteriously Puffy Extremities: An Unintended Consequence of Intravenous Drug Abuse." Cureus 14, no. 5 (May 29, 2022). https://doi.org/10.7759/cureus.25453.

# Moonblink

This is how Vitamin A deficiency presents differently in those who are unsheltered:

- Night blindness (Moonblink) may appear as the first sign of Vitamin A deficiency.
- Homeless children are a particular concern for Vitamin A deficiency. Even mild, subclinical Vitamin A deficiency may increase a child's risk for respiratory and intestinal infections, decrease growth rates, slow bone development and decrease the likelihood of survival from illness.
- Over 4 out of 10 of your homeless patients are likely to be deficient in Vitamin A.
- That figure climbs to 79% for homeless male youths and 64% of homeless female youths.
- 80% of patients with any degree of cirrhosis may be Vitamin A deficient.
- 100% of patients with Child Pugh class C cirrhosis are likely to be Vitamin A deficient.




## NIGHT BLINDNESS (MOONBLINK) IS ONE OF THE FIRST SIGNS OF VITAMIN A DEFICIENCY

• The WHO Nutrition Landscape Information System described the extent of the problem: "Night blindness is one of the first signs of vitamin A deficiency. In its more severe forms, vitamin A deficiency contributes to blindness by making the cornea very dry, thus damaging the retina and cornea. An estimated 250,000–500,000 children who are vitamin A-deficient become blind every year, and half of them die within 12 months of losing their sight. Deficiency of vitamin A is associated with significant morbidity and mortality from common childhood infections, and is the world's leading preventable cause of childhood blindness. Vitamin A deficiency also contributes to maternal mortality and other poor outcomes of pregnancy and lactation. It also diminishes the ability to fight infections. Even mild, subclinical deficiency can be a problem, because it may increase children's risk for respiratory and diarrhoeal infections, decrease growth rates, slow bone development and decrease the likelihood of survival from serious illness."[1]

## OVER 40% OF HOMELESS ADULTS AND 50% OF HOMELESS YOUTH MAY BE VITAMIN A DEFICIENT

• A 2002 study found that 43.6% of homeless adults studied had blood levels deficient in Vitamin A.[2]

• A 2005 study of homeless youth found that 79% of homeless males and 64% of homeless females had inadequate intakes of Vitamin A.[3]

## EXPECT LOW LEVELS OF VITAMIN A IN HOMELESS PATIENTS WITH CIRRHOSIS

• A 2013 study found, "Malnutrition is commonly encountered in patients with end stage liver disease (ESLD) being reported in up to 80% of all patients with cirrhosis and in up to 25% of patients with Child Pugh class A cirrhosis. … [In this study] All patients with Child Pugh class C cirrhosis were deficient in vitamin A."[4]

1 "Vitamin A Deficiency." Accessed July 15, 2022. https://www.who.int/data/nutrition/nlis/info/vitamin-a-deficiency.

2 Malmauret, L, JCh Leblanc, I Cuvelier, and Philippe Verger. "Dietary Intakes and Vitamin Status of a Sample of Homeless People in Paris." European Journal of Clinical Nutrition 56 (May 1, 2002): 313–20. https://doi.org/10.1038/sj.ejcn.1601312.

3 Tarasuk, Valerie, Naomi Dachner, and Jinguang Li. "Homeless Youth in Toronto Are Nutritionally Vulnerable." The Journal of Nutrition 135, no. 8 (August 1, 2005): 1926–33. https://doi.org/10.1093/jn/135.8.1926.

4 Venu, Mukund, Eric Martin, Kia Saeian, and Epi Samer Gawrieh. "High Prevalence of Vitamin A and D Deficiency in Patients Evaluated for Liver Transplantation." Liver Transplantation : Official Publication of the American Association for the Study of Liver Diseases and the International Liver Transplantation Society 19, no. 6 (June 2013): 627–33. https://doi.org/10.1002/lt.23646.

## Moonblink

This is how Vitamin A deficiency can be assessed in those living on the streets:

- Homeless adults in the first stages of Vitamin A deficiency may report a reduced ability to taste.
- This may lead to a reduced desire to eat food which may be coupled with an impaired ability to absorb and digest.
- This combination may lead to compromise of the immune system and a disturbance of the intestinal microbiome.
- Any or all of the above may lead to the development of ocular symptoms including night blindness.
- Other signs (like Bitot's spots, Conjunctival xerosis, Corneal xerosis, and Corneal ulceration) are more prevalent in Vitamin A deficient patients younger than 6 years of age.

## DON'T CONFUSE OBESITY WITH BEING 'WELL-FED.' A HOMELESS PATIENT'S OBESITY MAY ACTUALLY BE CAUSED BY FOOD INSECURITY

- A 2012 study examined the "Hunger-Obesity Paradox" in the homeless and found, "By weight category, 1.6 % of homeless individuals were underweight, 32.6 % were normal weight, 65.7 % were overweight, and 32.3 % were obese. ... The recently described hunger–obesity paradox, which describes the co-existence of hunger and obesity in the same person, may help explain our findings."[1]
- This "Hunger-Obesity Paradox" was originally described in a 2001 study which found, "Food insecurity remained a significant predictor of overweight status, after adjustment for potentially confounding demographic and lifestyle variables ($P < 0.01$). In a logistic regression analysis, mildly [food] insecure women were 30% more likely to be overweight than those who were food secure. Thus, food insecurity had an unexpected and paradoxical association with overweight status among women with a higher prevalence of overweight among the food insecure, and a resulting potential for increased incidence of obesity-related chronic diseases."[2]

## VITAMIN A DEFICIENCY SETS OFF A VICIOUS NUTRITIONAL CYCLE WITH MOONBLINK AND DISTURBED VISION SEEN AS LATER SIGNS OF ILLNESS

- A 2017 study described the vicious cycle that is created by Vitamin A deficiency. Per the study, "Typically, the cycle of VAD [Vitamin A deficiency] begins with reduced taste ability, which leads to decreased food intake. This, along with impairment in absorption and digestion, may lead to malnutrition and may increase the risk for inflammation, which is exacerbated during VAD state. At the same time, VAD can reduce immune system's ability to protect the body through direct interaction with immune components/gene expression, or through the microbiome, that consequently damaged growth, bone development, and reproduction. As the VAD deepens, disturbed vision is witnessed. All mentioned above sets the stage for increased morbidity and mortality due to VAD, with the involvement of epigenetic mechanisms, among others."[3]
- Other than night blindness and disturbed vision, ocular signs of VAD occur more prevalently in young children.[4]

1 Koh, Katherine A., Jessica S. Hoy, James J. O'Connell, and Paul Montgomery. "The Hunger–Obesity Paradox: Obesity in the Homeless." Journal of Urban Health : Bulletin of the New York Academy of Medicine 89, no. 6 (December 2012): 952–64. https://doi.org/10.1007/s11524-012-9708-4.

2 Townsend, Marilyn S., Janet Peerson, Bradley Love, Cheryl Achterberg, and Suzanne P. Murphy. "Food Insecurity Is Positively Related to Overweight in Women." The Journal of Nutrition 131, no. 6 (June 1, 2001): 1738–45. https://doi.org/10.1093/jn/131.6.1738.

3 Wiseman, Elina Manusevich, Shimrit Bar-El Dadon, and Ram Reifen. "The Vicious Cycle of Vitamin a Deficiency: A Review." Critical Reviews in Food Science and Nutrition 57, no. 17 (November 22, 2017): 3703–14. https://doi.org/10.1080/10408398.2016.1160362.

4 Gilbert, Clare. "The Eye Signs of Vitamin A Deficiency." Community Eye Health 26, no. 84 (2013): 66–67.

## The Bloody Flux

This is how dysentery (infectious diarrhea) presents differently in those who are unsheltered:

- Shigellosis (one form of The Bloody Flux) is a common cause of bacterial gastroenteritis.
- Shigellosis is highly infectious and has been linked to outbreaks in the homeless.
- Amebiasis (also known as amebic dysentery and, previously, The Bloody Flux) is a common cause of amebic gastroenteritis.
- Amebiasis is also highly contagious and is a particular risk to those who face inadequate sanitation and insufficient hygiene.
- Because inadequate nutrition weakens the immune system, the homeless are at risk of developing severe shigellosis and/or amebiasis.
- But, because the homeless frequently suffer from diarrhea from other causes, they may underestimate the severity of both shigellosis and amebiasis.



### THE SYMPTOMS OF THE BLOODY FLUX PRESENT TODAY AS THEY DID CENTURIES AGO

• Here's how the bloody flux was described in 1850: "The symptoms of flux are—a frequent irresistible desire to evacuate the bowels, and sometimes without the corresponding ability, accompanied with violent pains and cramps in the abdomen, which immediately precede every discharge, and in consequence of the severity of which, the patient cries aloud, and rolls upon the bed, in a paroxysm of agony. The dejections are, at first, composed of the natural fecal matter, broken down and reduced to a liquid form, but ultimately assume a sanguineous, or muco—sanguineous character, and are voided very frequently, but in small quantities. In some instances, pure blood alone is discharged ... ."[1]

### SHIGELLOSIS, CAUSED BY SHIGELLA BACTERIA, IS A RISK FOR THE HOMELESS

• A 2016 studied described an outbreak of shigellosis among the homeless: "Shigella is the third most common cause of bacterial gastroenteritis in the United States, resulting in approximately 500,000 infections, 100,000 hospitalizations, and 500 deaths annually; S. sonnei is most commonly reported. Shigella is transmitted by the fecal-oral route and is highly infectious, highlighting the importance of hygiene in outbreak control. ... During July 1, 2015–June 30, 2016, a total of 103 Shigella infections ... were reported in Oregon. All cases occurred in adults aged ≥18 years; 77 (75%) were men, 38 (49%) of whom self-identified as MSM [men who have sex with men]. Homelessness was self-reported by three (8%) MSM and 41 (63%) of 65 persons who did not self-identify as MSM."[2]

### AMEBIASIS, CAUSED BY A PARASITE, IS ALSO A RISK FOR THE HOMELESS

• A 2019 review article described the issue for the poor, "The significance of amebiasis is a global problem, with prevalence that may reach as high as 40% in some areas of the world. Disease can be severe and fatal in some, but there are no accurate disease prevalence estimates to help define the true burden. Transmission is fecal–oral and so cannot easily be prevented when there is poverty, inadequate sanitation, and insufficient hygiene."[3]

1 Draughon, Robert J. "ART. IX.--Remarks upon Malignant Dysentery, or" Bloody Flux," with cases illustrative of the Pathology, and treatment of the Disease." The Ohio Medical and Surgical Journal (1848-1878) 3.1 (1850): 33.

2 Hines, Jonas Z. "Notes from the Field: Shigellosis Outbreak Among Men Who Have Sex with Men and Homeless Persons — Oregon, 2015–2016." MMWR. Morbidity and Mortality Weekly Report 65 (2016). https://doi.org/10.15585/mmwr.mm6531a5.

3 Shirley, Debbie-Ann T., Koji Watanabe, and Shannon Moonah. "Significance of Amebiasis: 10 Reasons Why Neglecting Amebiasis Might Come Back to Bite Us in the Gut." PLoS Neglected Tropical Diseases 13, no. 11 (November 14, 2019): e0007744. https://doi.org/10.1371/journal.pntd.0007744.

## The Bloody Flux

This is how dysentery (infectious diarrhea) can be assessed in those living on the streets:

- You are unlikely to meet a homeless patient who has not recently had some form of diarrheal illness.
- Diarrheal illness puts the homeless at a high risk of dehydration.
- Lack of access to bathrooms and hygiene, ensures that illnesses transmitted by the fecal-oral route spread rapidly on the streets.
- Any diarrheal illness marked by fever and/or blood in your homeless patient should be treated as an emergent issue.
- In addition, due to the elevated possibility of fecal-oral contagion, steps should be immediately taken to locate and assess any person who may have had contact with the patient.

## SHIGELLOSIS IN YOUR HOMELESS PATIENT MAY BE RESISTANT TO A RANGE OF ANTIBIOTICS

• A 2015 study reported, "SFDPH [San Francisco Department of Public Health] identified 95 ciprofloxacin-resistant S. sonnei infections in residents of or travelers to San Francisco during November 1, 2014–January 15, 2015. … Sixty-seven patients (53% of those with such information) were hospitalized. Seventy-four cases (47% of those with such information) occurred among persons who were homeless or living in single-room occupancy hotels."[1]

• A 2021 book detailing foodborne infections warned, "Although shigellosis can be a self-limiting disease, appropriate antibiotic therapy can shorten the duration of symptoms and decrease fecal shedding. The rise of antibiotic-resistant Shigella infections has limited empiric treatment options and, subsequently, complicated prevention efforts. Over the last several decades, Shigella strains in the United States have developed high rates of resistance to multiple antimicrobials including ampicillin, tetracycline, and cotrimoxazole. More recently, resistance to ciprofloxacin, a fluoroquinolone currently recommended as a first-line treatment for shigellosis, has emerged and is rapidly increasing worldwide."[2]

## DIARRHEA MAY RUN RAMPANT IN HOMELESS SHELTERS

• A fact sheet from the Boston Healthcare for the Homeless provides the details, "Diarrhea can be a persistent problem in any crowded setting, especially with diapered children, communal bathrooms, and shared eating facilities. Shelters are particularly prone to outbreaks of diarrhea because food management may involve many different people with varying degrees of training in safe food handling. … Dozens of infectious agents can cause diarrhea, including: • viruses (Norwalk, Norwalk-like, and rotovirus); • bacteria (Campylobacter, Salmonella, Shigella, Staphylococcus, Yersinia and E.coli); • parasites (Giardia, Cryptosporidium). Furthermore, any child or adult recovering from infectious diarrhea may have damaged the lining of the intestine to such a degree that chronic diarrhea results."[3]

## FORCED OPEN DEFECATION BY THE HOMELESS ENSURES THE RAPID SPREAD OF FECAL-ORAL DISEASES

• A 2019 review article described the problem: "Open defecation (OD) by people experiencing homelessness is common in many U.S. cities. Without sanitation when and where it is needed, the human right to sanitation for people experiencing homelessness has not been realized and concerns about the risks of infectious disease transmission are valid."[4]



1 Bowen, Anna, Jacqueline Hurd, Cora Hoover, Yvette Khachadourian, Elizabeth Traphagen, Emily Harvey, Tanya Libby, et al. "Importation and Domestic Transmission of Shigella Sonnei Resistant to Ciprofloxacin — United States, May 2014–February 2015." Morbidity and Mortality Weekly Report 64, no. 12 (April 3, 2015): 318–20.

2 Garcia-Williams, Amanda G., Naeemah Logan, and Zachary A. Marsh. "Chapter 12 - Shigella." In Foodborne Infections and Intoxications (Fifth Edition), edited by J. Glenn Morris and Duc J. Vugia, 221–36. Academic Press, 2021. https://doi.org/10.1016/B978-0-12-819519-2.00032-3.

3 "Diarrhea.Pdf." Accessed July 15, 2022. https://www.bhchp.org/sites/default/files/BHCHPManual/pdf_files/Part1_PDF/Diarrhea.pdf.

4 Frye, Elizabeth A., Drew Capone, and Dabney P. Evans. "Open Defecation in the United States: Perspectives from the Streets." Environmental Justice 12, no. 5 (October 2019): 226–30. https://doi.org/10.1089/env.2018.0030.

# Pellagra

This is how pellagra (Niacin deficiency) presents differently in those who are unsheltered:

- A homeless patient presents with any combination of: irritability, poor concentration, memory problems, anxiety, fatigue, restlessness, apathy, sleep disturbances, depression and dementia.
- Their neuropsychiatric symtpoms may even include psychosis.
- In fact, those neuropsychiatric symptoms coupled with psychosis may make it diffiult for your patient to reliably find food.
- This psychiatric-nutritional cycle is unlikely to be recognized as being caused by niacin deficiency.
- Because of this, your homeless patient is likely to present with a more advanced case of niacin deficiency.



Figure 1. The Patient Before Admission With (A) Casal Collar or Necklace Plus Dermatitis of the (B) Hands and (C) Feet and (D) After Discharge With No Signs of Facial and Neck Erythematous Pigmented Skin Rash


## DIARRHEA CAN BE A SYMPTOM OF PELLAGRA AND A CAUSE OF PELLAGRA

• A 2018 case report of a homeless patient details the triad of Pellagra: dermatitis, diarrhea, and dementia. Per the report, "Pellagra is a nutritional disorder that is caused by niacin (nicotinic acid, vitamin B3) deficiency, which leads to systemic disease with clinical manifestations in the skin, gastrointestinal tract, and nervous system. ... Recently, there seems to have been a reemergence of pellagra, .... Niacin deficiency, in particular, should be suspected in the following conditions: malnutrition (homelessness, anorexia nervosa, or severe comorbid conditions, such as end-stage malignancy or HIV); malabsorption (e.g., Crohn's or Hartnup disease); chronic alcoholism; hemodialysis or peritoneal dialysis; administration of drugs like isoniazid, ethionamide, 6-mercaptopurine, and estrogens; and carcinoid syndrome ... . The classic triad of pellagra is dermatitis, diarrhea, and dementia. The symptoms do not have to appear in this order, and the most common clinical presentation is with incomplete symptoms rather than the complete triad. Untreated pellagra results in death from multiorgan failure."[1]

## PSYCHOSIS CAN BE A SYMPTOM OF PELLAGRA AND A CAUSE OF PELLAGRA

• A 2022 case report described pellagra marked by psychosis in a homeless man: "A 52-year-old man, living as a homeless for 2 decades, was admitted at the psychiatry emergency department for Capgras syndrome. He had a firmly held belief that his family members were killed and substituted by hermaphrodite alien doubles ... In his clinical records, we found 5 psychiatric admissions over the last couple of years. .... The patient had previously been on different antipsychotics and benzodiazepines. He stayed at therapeutic communities for drug rehabilitation, but full recovery was never achieved. Because of Casal necklace plus limb extremity skin lesions (see patient image above), we suspected a diagnosis of secondary psychotic syndrome, with delusions (ICD-11 WHO 6E61.1) in dementia due to pellagra (ICD-11 WHO 6D85.8) and started treatment with oral niacin 20 mg/night ... .He was discharged to a housing first program, with referral to dermatology and hepatology clinics. After 24 months of follow-up at the psychiatry outpatient clinic, full remission was achieved."[2]

1 Oliveira Alves, Andreia de, Thaissa Bortolato, and Fred Bernardes Filho. "Pellagra." The Journal of Emergency Medicine 54, no. 2 (February 1, 2018): 238–40. https://doi.org/10.1016/j.jemermed.2017.10.010.

2 Marques, João Gama. "Pellagra With Casal Necklace Causing Secondary Schizophrenia With Capgras Syndrome in a Homeless Man." The Primary Care Companion for CNS Disorders 24, no. 2 (March 10, 2022): 40040. https://doi.org/10.4088/PCC.21cr03014.

## Pellagra

This is how pellagra (Niacin deficiency) can be assessed in those living on the streets:

- While niacin deficiency in the homeless is uncommon, it is not a zebra diagnosis.
- Our lack of knowledge regarding the prevalence of niacin deficiency in the homeless population – or in any adult population – is simply due to the paucity of studies on the subject.
- However, many case studies exist that specifically cite homeless patients with misdiagnosed pellagra.
- Because of this, a high suspicion of pellagra is appropriate for any patient with dermatitis, diarrhea, and any neuropsychiatric symptoms.
- In addition, a homeless patient treated with antidepressants should be evaluated for possible niacin deficiency.

### PELLAGRA PATIENTS WITH DEPRESSION MAY BE GIVEN DRUGS WHICH FURTHER DEPLETE NIACIN

• A 2015 study warned that subclinical pellagra patients with neuropsychiatric symptoms may be given antidepressants which further deplete niacin. Per the study, "Despite the serious consequences of niacin and NAD depletion, these substances are hardly ever measured in the clinic. Niacin deficiency is usually assumed by the appearance of symptoms of pellagra and, occasionally, by the determination of metabolites of niacin excreted in the urine. Pellagra is characterised by photosensitivity, diarrhoea, dermatitis and dementia. However, it is important to note that even in the absence of a diagnosis of pellagra, niacin deficiency may have effects on neuropsychiatric functioning. Symptoms such as irritability, poor concentration, memory problems, anxiety, fatigue, restlessness, apathy, sleep disturbances, depression and dementia may result from niacin deficiency without it being recognised as such. The possibility of undiagnosed niacin deficiency underlying neuropsychiatric symptoms or disorders such as dementia is perhaps more pertinent in patients with poor dietary intake of amino acids and vitamins and in conditions with malabsorption. ... The hypothesis is put forward that patients with poor dietary intake, who are treated with antidepressants, are at risk of developing niacin/NAD deficiency with possible development of the associated neuropsychiatric symptoms."[1]

### 'SUNBURN,' DELIRIUM AND CHRONIC DIARRHEA MAY POINT TO A MISSED CASE OF PELLAGRA

• A 2020 case study detailed how a man with pellagra was misdiagnosed for over a year: "An 81-year-old Caucasian male presented with a 1-year history of chronic diarrhea, 2–3 weeks of an itchy skin rash, 2 weeks of truncal and bilateral hand coarse tremors, and 1–2 days of delirium confusion. The patient lived alone. For the past 1 year, the patient had chronic diarrhea consisting of 6–7 loose stools daily of unknown etiology and poor oral intake, and he had experienced weight loss of 11.7 kg. The patient had a history of social alcohol use but quit 2 years prior to admission. On exam, the patient appeared cachectic, confused, and somnolent. ... Stool Clostridium difficile (C. diff) antigen and toxin were negative. Laboratory tests ruled out celiac disease and C. diff infection. The collective presentation of sunburn-like hyperpigmentation dermatitis in sun exposure areas, chronic diarrhea, and delirium was suggestive of pellagra. ... The correction of the clinical 3D features with niacin replacement further supported the diagnosis of pellagra."[2]



1 Viljoen, Margaretha, Annie Swanepoel, and Priyesh Bipath. "Antidepressants May Lead to a Decrease in Niacin and NAD in Patients with Poor Dietary Intake." Medical Hypotheses 84, no. 3 (March 1, 2015): 178–82. https://doi.org/10.1016/j.mehy.2014.12.017.

2 Cao, Shanjin, Xiaodan Wang, and Kristen Cestodio. "Pellagra, an Almost-Forgotten Differential Diagnosis of Chronic Diarrhea: More Prevalent Than We Think." Nutrition in Clinical Practice 35, no. 5 (2020): 860–63. https://doi.org/10.1002/ncp.10418.

## Green-sickness

This is how anemia presents differently in those who are unsheltered:

- Green-sickness was a term used to describe a range of anemias, especially iron-deficiency anemia in women.
- Patients suffering from green-sickness were frequently very pale with the lack of color making their skin seem to appear green.
- Homeless patients with anemia may also be pale but their symptoms are more likely to include fatigue, weakness, and headache.
- In addition, they may show the neuropsychiatric signs and symptoms of vitamin B12 and folate deficiencies.
- These include – but are certainly not limited to – numbness, gait problems, symmetric paresthesias, depression, mood impairment, insomnia, psychosis, and visual disturbances.

## THE SYMPTOMS OF GREEN-SICKNESS IN THE 18TH CENTURY

• A 1996 study described the malady historically known as green-sickness: "[T]he typical sufferer was … expected to be young and female. The list of eleven symptoms given by Sydenham in the mid-seventeenth century would have been recognised throughout the history of chlorosis; in a mid-eighteenth century translation this reads as follows: 'This indisposition is attended with (1.) a bad colour of the face, and whole body; (2.) a swelling of the face, eyelids and ankles; (3.) heaviness of the whole body; (4.) a tension and lassitude of the legs and feet; (5.) difficult respiration; (6.) palpitation of the heart; (7.) pain in the head; (8.) feverish pulse; (9.) drowsiness; (10.) an unnatural longing for such things as are noxious, and unfit for food; and (11.) a suppression of the menstrual discharge.'"[1]

## THE SYMPTOMS OF ANEMIA IN THE 21ST CENTURY

• A 2021 review article lists the signs and symptoms of iron-deficieny anemia (IDA) as follows: "Mild-to-moderate IDA can be asymptomatic. When symptoms are present, they commonly include fatigue, weakness, and shortness of breath. Other symptoms may include headache, pica, hair loss, brittle nails, cold insensitivity, and restless leg syndrome."[2]

• A 2022 review article lists the signs and symptoms of vitamin B12 and folate deficiencies as follows: "Neuropsychiatric manifestations may be present in both vitamin B12 and folate deficiencies. Although these findings are most commonly ascribed to vitamin B12 deficiency, neurocognitive and other changes have been reported with folate deficiency as well. … The most common neurologic findings in vitamin B12 deficiency are symmetric paresthesias or numbness and gait problems. Other findings may include one or more of the following: Depression or mood impairment, Irritability, Insomnia, Cognitive slowing, Forgetfulness, Dementia, Psychosis, Visual disturbances …, Peripheral sensory deficits, Weakness, which may progress to paraplegia and incontinence …, Ataxia …, Extrapyramidal signs (eg, dystonia, dysarthria, rigidity), Restless legs syndrome"[3]

1 King, Helen. "Green Sickness: Hippocrates, Galen and the Origins of the 'Disease of Virgins.'" International Journal of the Classical Tradition 2, no. 3 (1996): 372–87.

2 Mansour, Diana, Axel Hofmann, and Kristina Gemzell-Danielsson. "A Review of Clinical Guidelines on the Management of Iron Deficiency and Iron-Deficiency Anemia in Women with Heavy Menstrual Bleeding." Advances in Therapy 38, no. 1 (January 1, 2021): 201–25. https://doi.org/10.1007/s12325-020-01564-y.

3 "Clinical Manifestations and Diagnosis of Vitamin B12 and Folate Deficiency." Accessed July 16, 2022. https://medilib.ir/uptodate/show/7155.

## Green-sickness

This is how anemia can be assessed in those living on the streets:

- Our lack of knowledge on the prevalence of various anemias in the homeless population is simply due to the paucity of studies on the subject.
- However, nutritional studies and case studies consisitently to point to a much higher level of anemia in the homeless population than expected.
- Since WHO estimates anemia in women worldwide to be 29.6% (2019), you can expect that at least one-third of your homeless female patients may have anemia.
- Given the high rate of anemia, any homeless female patient with any of the signs of iron-deficiency anemia or B12 and folate deficiency anemias should be referred for testing.

### THE HOMELESS CONSUME LESS THAN 50% OF THE RDA OF IRON AND HAVE IRON-DEFICIENCY ANEMIA AT MUCH HIGHER THAN EXPECTED LEVELS

• A 1992 study found, "Data were collected on the nutrient intake and nutritional status of 96 single mothers and their 192 dependent children who had been displaced from their homes. ... [A] nutrient analysis found that the study subjects in all age groups were consuming less than 50 percent of the 1989 Recommended Dietary Allowances (RDA) for iron, magnesium, zinc, and folic acid. ... A high prevalence of nutritional risk factors, identified by nutrient consumption, biochemical indexes, and anthropometric measurements, is apparent in the group studied. Iron deficiency anemia, overweight and obesity, and hypercholesterolemia were found to be present at much higher than expected levels."[1]

• A 2022 study looked at the homeless in Glasgow, Scotalnd – a country with comprehensive healthcare for the homeless – and found, "Data from 122 PEH [people experiencing homelessness] registered with Glasgow's specialist Homelessness Health Service, showed 41 (33.6%) were anaemic, of whom 21 had additional blood tests to investigate the anaemia and the following were found to be deficient in eight participants: iron (n = 1), vitamin B12 (n = 1), and folate (n = 6)."[2]

### IRON-DEFICIENCY ANEMIA CAN BE CAUSED BY DENTAL PROBLEMS AND DENTAL PROBLEMS CAN BE CAUSED BY IRON-DEFICIENCY ANEMIA

• A 2022 study found, "Concerning the association between DPs [dental problems] and iron-deficiency anaemia, a recent meta-analysis showed that individuals with chronic periodontitis have lower levels of hemoglobin, erythrocytes and hematocrit biomarkers, suggesting that the inflammatory response in chronic DPs might leading to anemia."[3]

### FOLATE-DEFICIENCY ANEMIA AND VITAMIN B12 ANEMIA ARE ALSO SUSPECTED TO BE COMMON IN THE HOMELESS

• A 2022 study found, ""Of 1368 patients tested, 76 (5.5%) met criteria for folate deficiency. Overall, 86.8% of these patients were anemic, and 17.1% had macrocytic anemia; 42% were diagnosed with malnutrition. Common social determinants in folate-deficient patients included birth outside of the United States, homelessness, and alcohol use disorder."[4]



1 Drake, M A. "The Nutritional Status and Dietary Adequacy of Single Homeless Women and Their Children in Shelters." Public Health Reports 107, no. 3 (1992): 312–19.

2 Huang, C., H. Foster, V. Paudyal, M. Ward, and R. Lowrie. "A Systematic Review of the Nutritional Status of Adults Experiencing Homelessness." Public Health 208 (July 1, 2022): 59–67. https://doi.org/10.1016/j.puhe.2022.04.013.

3 Mejia-Lancheros, Cilia, James Lachaud, Rosane Nisenbaum, Andrea Wang, Vicky Stergiopoulos, Stephen W. Hwang, and Patricia O'Campo. "Dental Problems and Chronic Diseases in Mentally Ill Homeless Adults: A Cross-Sectional Study." BMC Public Health 20, no. 1 (March 30, 2020): 419. https://doi.org/10.1186/s12889-020-08499-7.

4 Hildebrand, Lindsey A., Brett Dumas, Charles J. Milrod, and James C. Hudspeth. "Folate Deficiency in an Urban Safety Net Population." The American Journal of Medicine 134, no. 10 (October 1, 2021): 1265–69. https://doi.org/10.1016/j.amjmed.2021.04.028.

# Gaol fever

This is how murine typhus presents differently in those who are unsheltered:

- The term Gaol fever (Jail fever) was used to describe various forms of typhus that were commonly found in the malnourished and crowded conditions of English prisons.
- Those enabling conditions – malnourishment and crowding – still exist in people who undergo forced displacements and in the homeless worldwide.
- Murine typhus, an endemic form of typhus spread by fleas, is rapidly becoming more common in the homeless population.
- Antibody testing among the homeless in Texas shows that approximately 10% of the homeless population has been exposed to murine typhus.
- While murine typhus has a low fatality rate, it may be fatal in up to 5% of cases left untreated or where treatment is delayed.
- Expect your homeless patient with murine typhus to exhibit respiratory symptoms that do not respond to a standard course of non-doxycycline antibiotics.

## GAOL FEVER MAY OR MAY NOT BE RESURGENT AMONG THE HOMELESS IN CALIFORNIA

• In 2019, the spectre of a particular medieval disease – typhus aka Gaol Fever - made the headlines. Here's how *The Atlantic* described the situation, "Infectious diseases—some that ravaged populations in the Middle Ages—are resurging in California and around the country, and are hitting homeless populations especially hard. Los Angeles recently experienced an outbreak of typhus—a disease spread by infected fleas on rats and other animals—in downtown streets. Officials briefly closed part of City Hall after reporting that rodents had invaded the building."[1]

• While the focus of the news articles were on the homeless and rats from homeless camps as a suspected path of infection, a 2009 study found that fleas from cats (Rickettsia felis) were the dominant fleas in an area of California endemic for murine typhus.[2]

• In addition, less than half of the cases of murine typhus described in the articles occurred in the homeless."[3]

## BUT GAOL FEVER IS PRESENT IN TEXAS AND ABOUT 10% OF THE HOMELESS MAY HAVE BEEN EXPOSED

• A 2017 study gave an overview of the issue in Texas: "Flea-borne typhus, also known as endemic or murine typhus, is a rickettsial zoonosis caused by Rickettsia typhi that occurs predominantly in warm, coastal areas of the world, including certain parts of the United States. ... The majority of U.S. cases occur in Texas, which reported 3,048 confirmed or probable cases of flea-borne typhus during 1985–2015 (Texas Department of State Health Services, unpublished data). Flea-borne typhus is often described as a relatively mild and self-limiting rickettsiosis; nonetheless, a spectrum of severe manifestations is also recognized, and the disease may be fatal in as many as 5% of patients for whom appropriate antibiotic therapy is delayed or not provided."[4]

• A 2008 study found, "We tested sera from 176 homeless people in Houston for antibodies against typhus group rickettsiae (TGR). Sera from 19 homeless people were reactive to TGR antigens."[5]

1 News, Anna Gorman, Kaiser Health. "Medieval Diseases Are Infecting California's Homeless." The Atlantic, March 8, 2019. https://www.theatlantic.com/health/archive/2019/03/typhus-tuberculosis-medieval-diseases-spreading-homeless/584380/.

2 Karpathy, S. E., E. K. Hayes, A. M. Williams, R. Hu, L. Krueger, S. Bennett, A. Tilzer, et al. "Detection of Rickettsia Felis and Rickettsia Typhi in an Area of California Endemic for Murine Typhus." Clinical Microbiology and Infection 15 (December 1, 2009): 218–19. https://doi.org/10.1111/j.1469-0691.2008.02140.x.

3 Stuart, Gwynedd. "How the Homeless Ended Up Being Blamed for Typhus." Los Angeles Magazine (blog), February 13, 2019. https://www.lamag.com/citythinkblog/typhus-los-angeles-homeless/.

4 Pieracci, Emily G., Nicole Evert, Naomi A. Drexler, Bonny Mayes, Inger Vilcins, Philip Huang, Jill Campbell, Casey Barton Behravesh, and Christopher D. Paddock. "Fatal Flea-Borne Typhus in Texas: A Retrospective Case Series, 1985–2015." The American Journal of Tropical Medicine and Hygiene 96, no. 5 (May 3, 2017): 1088–93. https://doi.org/10.4269/ajtmh.16-0465.

5 Reeves, Will, Kristy Murray, Tamra Meyer, Lara Bull, Rhia Pascua, Kelly Holmes, and Amanda Loftis. "Serological Evidence of Typhus Group Rickettsia in a Homeless Population in Houston, Texas." Journal of Vector Ecology : Journal of the Society for Vector Ecology 33 (July 1, 2008): 205–7. https://doi.org/10.3376/1081-1710(2008)33[205:SEOTGR]2.0.CO;2.

## Gaol fever

This is how murine typhus can be assessed in those living on the streets:

- Murine typhus in a homeless patient is not a zebra condition. Antibody testing among the homeless in Texas shows that approximately 10% of the homeless population has been exposed to murine typhus.
- In France, approximately one-third of the homeless population in Marseilles has been exposed to murine typhus.
- Any homeless patient with fever and respiratory systems and/or rash should be assessed for exposure to fleas.
- Specifically, the patient should be asked if they have seen any rats, cats, or possums in their camp or living space.
- Any direct or indirect exposure to rats, cats, or possums should create a high suspicion of possible murine typhus in your symptomatic patient.

### MURINE TYPHUS HAS A FATALITY RATE IN UNTREATED OR TREATMENT-DELAYED PATIENTS OF UP TO 5%

• A 2017 study examining fatal murine typhus cases in Texas found, "Flea-borne typhus is often described as a relatively mild and self-limiting rickettsiosis; nonetheless, a spectrum of severe manifestations is also recognized, and the disease may be fatal in as many as 5% of patients for whom appropriate antibiotic therapy is delayed or not provided. ... All patients [in this study of fatal cases of flea-borne typhus] were hospitalized. At hospital presentation, fever was reported for 11 (100%) patients. The median temperature was 101.9°F (range, 99–104.6°F). Thrombocytopenia (82%) and elevated hepatic transaminase levels (64%) were the most frequently reported laboratory abnormalities. Six (55%) patients reported one or more respiratory-related symptom (i.e., cough), or diagnosis (i.e., pneumonia, pulmonary edema, or acute respiratory distress syndrome). Rash was reported in 55% of patients, and was described as macular and maculopapular (50%) or petechial (50%), and was distributed across the palms and soles (33%), arms and legs (33%), and trunk (67%). Rash was frequently reported as a late finding, occurring > 7 days after initial illness onset."[1]

### A STUDY FROM FRANCE SUGGESTS MURINE TYPHUS IN THE HOMELESS IS AN UNDER-RECOGNIZED AND FAST-GROWING PROBLEM

• A 2012 study examining the homeless in Marseille found, "We used reference serological diagnostic methods and detected a high seroprevalence (22%) of antibodies to R. typhi in two sheltered homeless populations in Marseille during a two-year survey (2010 and 2011). Furthermore, the seroprevalence rate has significantly increased from 2010 to 2011 (13% vs. 31%, $p < 0.001$), indicating that this population is increasingly affected by this disease. The murine typhus seroprevalence rate we found in the current study was significantly higher than those previously reported in the same population in a survey performed from 2000 to 2003. ... In summary, our study indicates that murine typhus is probably a re-emerging but unrecognized disease in the homeless in Marseille due to a combination of factors including an accumulation of rodents due to increased waste resulting from construction sites and sanitation industry strike, poor living conditions of homeless people, the mild and non-specific characteristics of this disease and the poor access of this vulnerable population to health care systems."[2]

1 Pieracci, Emily G., Nicole Evert, Naomi A. Drexler, Bonny Mayes, Inger Vilcins, Philip Huang, Jill Campbell, Casey Barton Behravesh, and Christopher D. Paddock. "Fatal Flea-Borne Typhus in Texas: A Retrospective Case Series, 1985–2015." The American Journal of Tropical Medicine and Hygiene 96, no. 5 (May 3, 2017): 1088–93. https://doi.org/10.4269/ajtmh.16-0465.

2 Badiaga, Sékéné, et al. "Murine typhus in the homeless." Comparative immunology, microbiology and infectious diseases 35.1 (2012): 39-43.

# Consumption

This is how tuberculosis (TB) presents differently in those who are unsheltered:

- Tuberculosis was known as phthisis and consumption from the time of Hippocrates up until the 18th century.
- It is not a medieval disease. It is the world's most infectious killer and latent TB is pervasive among the homeless in the United States.
- One reason for the high incidence of TB and latent TB among the homeless is malnutrition.
- This, coupled with delayed diagnosis, places your homeless patient at risk of presenting with advanced disease.
- In addition, your homeless patient is at a higher risk of presenting with multidrug-resistant TB.



## THE HOMELESS HAVE A 10-FOLD INCREASE IN TB INCIDENCE. ONE REASON FOR THEIR EXTREME RISK: MALNUTRITION

• According to a 2020 study, "Tuberculosis (TB) is caused by Mycobacterium tuberculosis bacteria and is associated with poverty and homelessness. In the United States (US), as compared to the general population, homeless persons have a 10-fold increase in TB incidence. In Los Angeles County, approximately 7.6% of TB cases occur among those experiencing homelessness. Prior to a TB diagnosis, over 5% of individuals report being homeless within the last year. As compared to the general population, homeless populations are at higher risk for recent TB transmission due to lack of TB treatment completion, malnutrition, and substance abuse (e.g., alcohol use). Additional risk factors include residing in a homeless shelter with persons with active TB disease [7] and length of stay in shelters."[1]

## TUBERCULOSIS IN THE HOMELESS MAY BE MORE SEVERE DUE TO DELAYED DIAGNOSIS AND TREATMENT

• A 2013 study cautioned, "As the overall number of TB cases continues to decline nationally, the case rate in homeless individuals remains unacceptably high. Available data did not allow us to ascertain the timeliness of TB diagnosis among persons experiencing homelessness. However, the odds of having acid-fast bacilli smear-positive or cavitary TB disease were higher among homeless persons, suggesting more infectious disease, possibly due to delayed diagnosis and treatment."[2]

## HOMELESSNESS MAY ALSO BE A RISK FACTOR FOR DEVELOPING MULTIDRUG-RESISTANT TUBERCULOSIS

• A 2018 global systematic review and meta-analysis found, "Our study corroborated the results of prior meta-analyses showing that previous TB disease and treatment were essential risk factors of MDR-TB [multidrug-resistant tuberculosis], while alcohol abuse and low education were not. Moreover, meta-analyses in China pointed out pulmonary cavity and living in rural area as risk factors of MDR-TB, while studies in Europe showed that male gender, homelessness and urban domicile to be risk factors of MDR-TB."[3]

1 Salem, Benissa E., Erin Klansek, Donald E. Morisky, Sanghyuk S. Shin, Kartik Yadav, Alicia H. Chang, and Adeline M. Nyamathi. "Acceptability and Feasibility of a Nurse-Led, Community Health Worker Partnered Latent Tuberculosis Medication Adherence Model for Homeless Adults." International Journal of Environmental Research and Public Health 17, no. 22 (November 11, 2020): 8342. https://doi.org/10.3390/ijerph17228342.

2 Bamrah, S., R. S. Yelk Woodruff, K. Powell, S. Ghosh, J. S. Kammerer, and M. B. Haddad. "Tuberculosis among the Homeless, United States, 1994–2010." The International Journal of Tuberculosis and Lung Disease : The Official Journal of the International Union against Tuberculosis and Lung Disease 17, no. 11 (November 2013): 1414–19. https://doi.org/10.5588/ijtld.13.0270.

3 Pradipta, Ivan Surya, Lina Davies Forsman, Judith Bruchfeld, Eelko Hak, and Jan-Willem Alffenaar. "Risk Factors of Multidrug-Resistant Tuberculosis: A Global Systematic Review and Meta-Analysis." Journal of Infection 77, no. 6 (December 1, 2018): 469–78. https://doi.org/10.1016/j.jinf.2018.10.004.

## Consumption

This is how tuberculosis (TB) can be assessed in those living on the streets:

- Tuberculosis in the homeless is not a zebra condition.
- According to WHO, 10 million people fall ill with tuberculosis every year
- Despite being a preventable and curable disease, 1.5 million people die from TB each year – making it the world's top infectious killer.
- In the US, the homeless have a 10-fold higher incidence of TB than the housed population.
- In addition, studies show the incidence of latent tuberculosis in the homeless may range from 23% to 31%.
- The latest CDC guidelines call for the treatment of homeless shelter residents with a TST reaction of 10 or more millimeters.

## LATENT TUBERCULOSIS IN THE HOMELESS MAY BE AS HIGH AS 31%

• A 2009 study looking at the homeless in New York City found, "We conducted a retrospective study to examine trends in latent tuberculosis infection (LTBI) and TB disease rates among homeless persons in shelters in New York, NY, 1992–2006. Although TB case rates fell from 1,502/100,000 population to 0, a 31% LTBI rate in 2006 shows the value of identifying and treating TB in the homeless."[1]

• This high rate of latent tuberculosis infection is not found just in large cities. A 2020 study examining the homeless population in Minneapolis found, "During the 2016 shelter contact investigation, in which 180 contacts of smear-positive case-patients were identified, HCPH [Hennepin County Public Health] found a positivity rate of 23%. Given a preliminary positivity rate of 26% in our investigation, including 1 new case of disease, transmission exceeding the expected rate was evident … ."[2]

## THE CDC INCLUDES THE HOMELESS AS A TARGETED GROUP TO RECEIVE TREATMENT FOR LATENT TUBERCULOSIS

• According to the latest published guidelines from the CDC, "People with latent TB infection do not have symptoms, and they cannot spread TB bacteria to others. However, if latent TB bacteria become active in the body and multiply, the person will go from having latent TB infection to being sick with TB disease. For this reason, people with latent TB infection should be treated to prevent them from developing TB disease. Treatment of latent TB infection is essential to controlling TB in the United States because it substantially reduces the risk that latent TB infection will progress to TB disease. In the United States, up to 13 million people may have latent TB infection. Without treatment, on average 1 in 10 people with latent TB infection will get sick with TB disease in the future. The risk is higher for people with HIV, diabetes, or other conditions that affect the immune system. More than 80% of people who get sick with TB disease in the United States each year get sick from untreated latent TB infection. Treatment of latent TB infection should start after excluding the possibility of TB disease. Groups Who Should be Given High Priority for Latent TB Infection Treatment include … People with a TST reaction of 10 or more millimeters who are … Residents and employees of high-risk congregate settings (e.g., correctional facilities, nursing homes, homeless shelters hospitals, and other health care facilities)."[3]

1 McAdam, John M., Scott J. Bucher, Philip W. Brickner, Richard L. Vincent, and Steven Lascher. "Latent Tuberculosis and Active Tuberculosis Disease Rates among the Homeless, New York, New York, USA, 1992–2006." Emerging Infectious Diseases 15, no. 7 (July 2009): 1109–11. https://doi.org/10.3201/eid1507.080410.

2 Tibbetts, Kelzee K., Randy A. Ottoson, and Dean T. Tsukayama. "Public Health Response to Tuberculosis Outbreak among Persons Experiencing Homelessness, Minneapolis, Minnesota, USA, 2017–2018." Emerging Infectious Diseases 26, no. 3 (March 2020): 420–26. https://doi.org/10.3201/eid2603.190643.

3 CDCTB. "Tuberculosis (TB) - Deciding When to Treat Latent TB Infection." Centers for Disease Control and Prevention, September 24, 2020. https://www.cdc.gov/tb/topic/treatment/decideltbi.htm.

## The Pissing Evil

This is how diabetes presents differently in those who are unsheltered:

- The Pissing Evil is a medieval term for diabetes.
- The homeless have a diabetes prevalence of approximately 8%.
- The homeless have a pre-diabetes prevalence of approximately 9%.
- Because the homeless lack access to basic hygiene, foot issues in the homeless – including difficulty walking, and loss of sensitivity – are far too common.
- This creates a perfect storm for the development of foot ulcers which your patient may not even know they have.
- Because physicians rarely examine the feet of the homeless, these ulcers are frequently missed.



## THE HOMELESS HAVE A REPORTED INCIDENCE OF DIABETES OF 8%

• A 2015 systematic review and meta-analysis found, "We estimated hypertension and diabetes prevalence among US homeless adults compared with the general population, and investigated prevalence trends. We systematically searched 5 databases for published studies (1980–2014) that included hypertension or diabetes prevalence for US homeless adults, pooled disease prevalence, and explored heterogeneity sources. We used the National Health Interview Survey for comparison. We included data from 97 366 homeless adults. The pooled prevalence of self-reported hypertension was 27.0% (95% confidence interval = 23.8%, 29.9%; n = 43 studies) and of diabetes was 8.0% (95% confidence interval = 6.8%, 9.2%; n = 39 studies)."[1]

## MALNUTRITION IS A KEY CONTRIBUTOR TO DIABETES

• A 2012 study found, "As with nearly all biochemical processes, glucose metabolism and insulin signaling require cofactors and vitamins that are essential in the diet. Deficiencies in any of these micronutrients have potential to impair glucose metabolism and cause insulin resistance. Clinical evidence supporting this hypothesis regarding the metabolic effects of specific deficiencies including vitamin D, chromium, biotin, thiamine and vita- min C is mounting. Unlike vitamin E, which has little to no proven clinical effect when given as a supplement, these vita- mins are known to be deficient at relatively high rates in obese individuals and in diabetic patients. Clinicians should consider addressing possible deficiencies of these micronutrients when advising obese patients who are at risk for the development of type 2 diabetes."[2]

## HOMELESS DIETS ARE THE OPPOSITE OF A DIET DESIGNED TO PREVENT DIABETES

• A 2019 Consensus Report described the eating patterns that should be used to help prevent Type 2 diabetes. Per the report, "Until the evidence surrounding comparative benefits of different eating patterns in specific individuals strengthens, health care providers should focus on the key factors that are common among the patterns: Emphasize nonstarchy vegetables, Minimize added sugars and refined grains., Choose whole foods over highly processed foods …."[3]

1 Bernstein, Rebecca S., Linda N. Meurer, Ellen J. Plumb, and Jeffrey L. Jackson. "Diabetes and Hypertension Prevalence in Homeless Adults in the United States: A Systematic Review and Meta-Analysis." American Journal of Public Health 105, no. 2 (February 2015): e46–60. https://doi.org/10.2105/AJPH.2014.302330.

2 Via, Michael. "The Malnutrition of Obesity: Micronutrient Deficiencies That Promote Diabetes." ISRN Endocrinology 2012 (March 15, 2012): 1–8. https://doi.org/10.5402/2012/103472.

3 Evert, Alison B., Michelle Dennison, Christopher D. Gardner, W. Timothy Garvey, Ka Hei Karen Lau, Janice MacLeod, Joanna Mitri, et al. "Nutrition Therapy for Adults With Diabetes or Prediabetes: A

## EXPECT FOOT PROBLEMS IN YOUR HOMELESS PATIENTS WITH DIABETES

• A 2016 systematic review examining foot problems in the homeless found, "Foot pathologies related to diabetes were found in several studies. Prevalence of diabetes ranged from 6.2–23%. Arnaud et al. screened 488 homeless shelter residents for diabetes which identified 35 previously diagnosed and 2 newly diagnosed individuals with diabetes. They found that 41% of homeless individuals with diabetes had difficulty walking, 42% had a loss of foot sensitivity, 43% had permanently reduced mobility, and 17% had experienced lower limb amputation. One in three homeless persons with diabetes had a high or very high podiatric risk as defined by international classification, warranting regular foot care."[1]

## EXPECT FOOT PROBLEMS IN YOUR HOMELESS PATIENTS WITH PRE-DIABETES

• A 2021 systematic review found that pre-diabetics are at high risk for developing peripheral neuropathy. Per the review, "The majority of studies (21 of 29, 72%) in this systematic review reported a ≥10% prevalence of peripheral neuropathy in pre-diabetes, although with figures varying widely between 2% and 77%, in part due to diagnostic methodology. This is higher than the background prevalence of peripheral neuropathy reported in the general population of 1%–3% (increasing to 7% in the elderly)."[2]

• A 2013 study found a high incidence of pre-diabetes in the homeless. According to the study, "We screened 252 members of the homeless population, 156 men (62%) mean age (±standard deviation) 47.2 ± 14.6 years and 96 women (38%) mean age 39.1 ± 13.5 years. Type 2 diabetes was present in 8% (n = 20), IFG [impaired fasting glucose] in 5% (n = 13) and IGT [impaired glucose tolerance] in 4% (n = 11), giving a total prevalence of 9% (n = 24) for pre-diabetes."[3]

• Peripheral neuropathy is a huge risk factor for developing a foot ulcer that leads to a foot amputation. According to a 2021 study, "The diabetic foot ulcer is the most important reason for non-traumatic limb amputation. Based on recent data, it has been estimated that up to 34% of type 2 diabetes patients may develop diabetic foot ulcers once in their lifetime. Risk factors for developing foot ulcers are distal sensorimotor peripheral neuropathy, peripheral arterial disease, previous ulcers, and/or amputations."[4]

## The Pissing Evil

This is how diabetes can be assessed in those living on the streets:

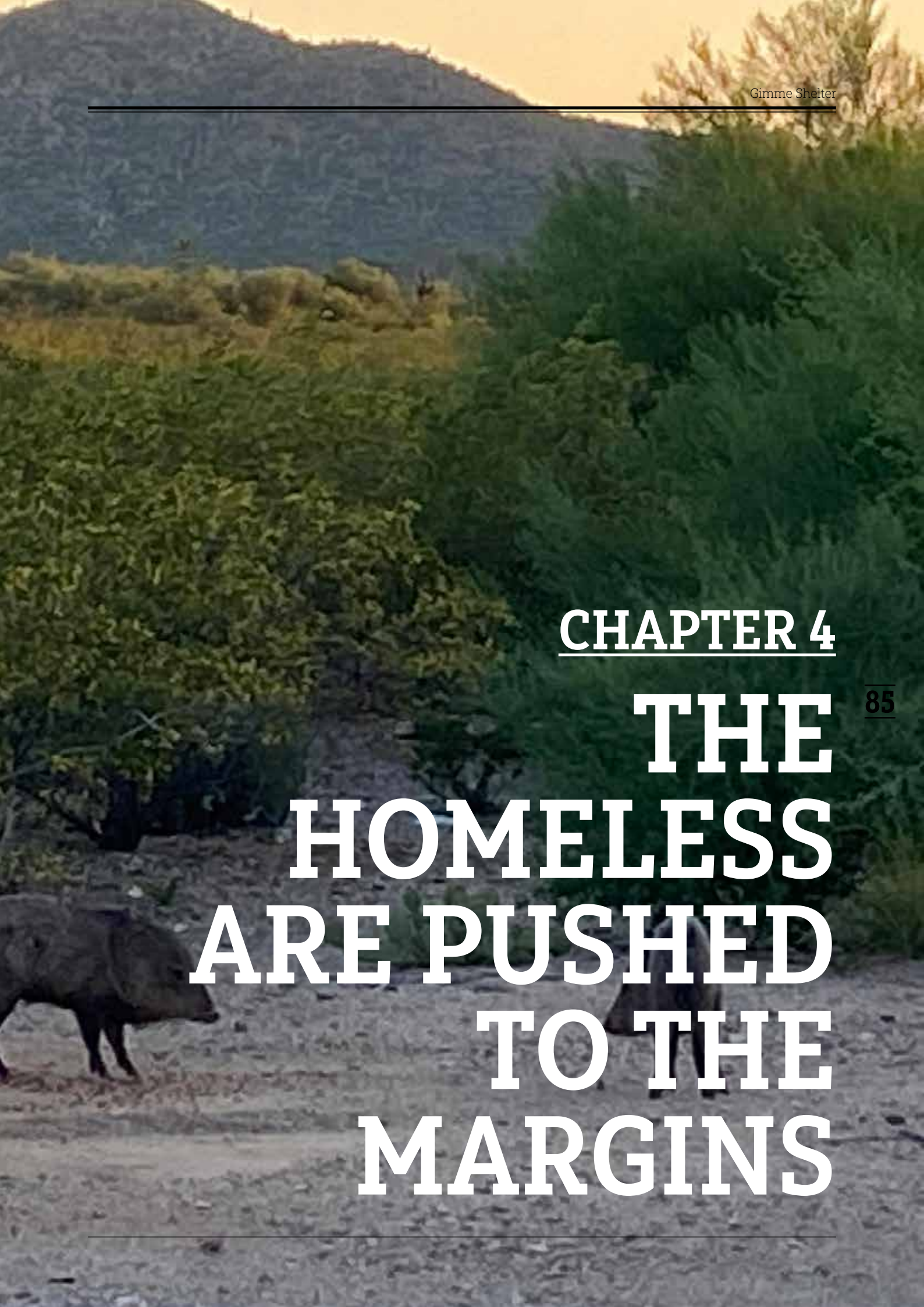
- Take your homeless patient's shoes off.
- Take your homeless patient's shoes off.
- Take your homeless patient's shoes off.

1 To, Matthew J., Thomas D. Brothers, and Colin Van Zoost. "Foot Conditions among Homeless Persons: A Systematic Review." PLOS ONE 11, no. 12 (December 9, 2016): e0167463. https://doi.org/10.1371/journal.pone.0167463.

2 Kirthi, Varo, Anugraha Perumbalath, Emily Brown, Sarah Nevitt, Ioannis N Petropoulos, Jamie Burgess, Rebecca Roylance, et al. "Prevalence of Peripheral Neuropathy in Pre-Diabetes: A Systematic Review." BMJ Open Diabetes Research & Care 9, no. 1 (May 2021): e002040. https://doi.org/10.1136/bmjdrc-2020-002040.

3 Scott, J., J. Gavin, A.M. Egan, G. Avalos, M.C. Dennedy, M. Bell, and F. Dunne. "The Prevalence of Diabetes, Pre-Diabetes and the Metabolic Syndrome in an Irish Regional Homeless Population." QJM: An International Journal of Medicine 106, no. 6 (June 1, 2013): 547–53. https://doi.org/10.1093/qjmed/hct063.

4 Miranda, Cesare, Roberto Da Ros, and Raffaele Marfella. "Update on Prevention of Diabetic Foot Ulcer." Archives of Medical Sciences. Atherosclerotic Diseases 6 (June 30, 2021): e123–31. https://doi.org/10.5114/amsad.2021.107817.



## CHAPTER 4



# THE HOMELESS ARE PUSHED TO THE MARGINS

How many people avert their gaze when they pass you? How many celebrities call for you to be shot on one of the world's most popular podcasts?

These are not questions generally asked of housed patients, but they are important issues for any patient who is or has been unsheltered.

Here are your bullet points:

## SHUNNED AND DENIGRATED

• Denigration of the homeless is endemic. So much so that a popular podcaster felt comfortable calling for the murder of the homeless on his podcast:

**Joe Rogan, July 14, 2022**

**Tom Segura:** *When you see stuff like that on the streets, at least in Los Angeles or California, that's protected property. Like by law. That's that's person's property by law.*

**Joe Rogan:** *Oh, a homeless person's property is protected?*

**Segura:** *Absolutely. If you were to try to move that or take that—*

**Rogan:** *You'd get arrested. Hilarious. But they wouldn't arrest you if you shot somebody. Maybe you should just go shoot the homeless people.*

**Segura:** *I like your ideas.*[1]

**Quick take**

**In a world of marginalized populations, the homeless are one of the most denigrated groups.**

## PUSHED TO THE MARGINS

• Even in "liberal" cities, leaders are increasingly demanding that the homeless be forcibly moved and are calling for harsher measures to be put in place to keep the unhoused out of specific areas. For example, the Los Angeles City Council used new laws to ban camping in 54 locations [2]

• Spearheaded by such conservative groups as the Cicero Institute, anti-homeless laws and camping bans are being introduced in state legislatures across the United States. One model bill pushed by the Cicero Institute would make sleeping on public property a Class C misdemeanor punishable by a fine of up to $5,000 and a month in jail.[3]

**Quick take**

**It's not just individuals. Cities and states are also increasingly pushing the homeless to the margins.**

1 "Joe Rogan Faces Criticism for Saying 'Shoot the Homeless People' - Variety," n.d. https://variety.com/2022/digital/news/joe-rogan-homeless-controversy-1235318314/.

2 "Liberal U.S. Cities Change Course, Now Clearing Homeless Camps." Los Angeles Times, March 13, 2022. https://www.latimes.com/world-nation/story/2022-03-12/liberal-us-cities-change-course-now-clearing-homeless-camps.

3 "Homeless Camping Bans Are Spreading. This Group Shaped the Bills." Accessed July 20, 2022. https://pew.org/3DNUXva.

## The View from The Streets:

Perceived discrimination for being homeless is reported at a higher level among ethnically diverse homeless adults than perceived discrimination for race, ethnicity, or skin color. In short, the stigma of being homeless is so pervasive and so strong it effects every aspect of the life of the unhoused – including their physical and mental health.[1]

**1) "Do you know what it's like to feel invisible? I used to be part of society. Now, I'm just so ashamed."**[2]

**2) "The hardest part is being constantly moved by the cops. Like last night. I found a dark corner next to a wall and then I wake up with the cops yelling at me telling me it's illegal to camp there. I wasn't camping ... I was just trying to sleep."**[3]

**3) "I can't move from here. This is where I pick up Mars the best."**[4]

**4) "You want me to take my meds, right? How am I supposed to do that when the purple people [security guards in downtown Tucson] take all my stuff whenever I go to find something to eat? It's f***ing impossible, you know."**[5]

**5) "I just can't keep doing this. The only way I can make money to cover a motel is to work Fourth Avenue. This is going to kil me."**[6]

1 Skosireva, Anna, Patricia O'Campo, Suzanne Zerger, Catharine Chambers, Susan Gapka, and Vicky Stergiopoulos. "Different Faces of Discrimination: Perceived Discrimination among Homeless Adults with Mental Illness in Healthcare Settings." BMC Health Services Research 14, no. 1 (September 7, 2014): 376. https://doi.org/10.1186/1472-6963-14-376.

2 Sanders, Ben, and Brianna Brown. "I was all on my own': experiences of loneliness and isolation amongst homeless people." Crisis (2015): 1-9.

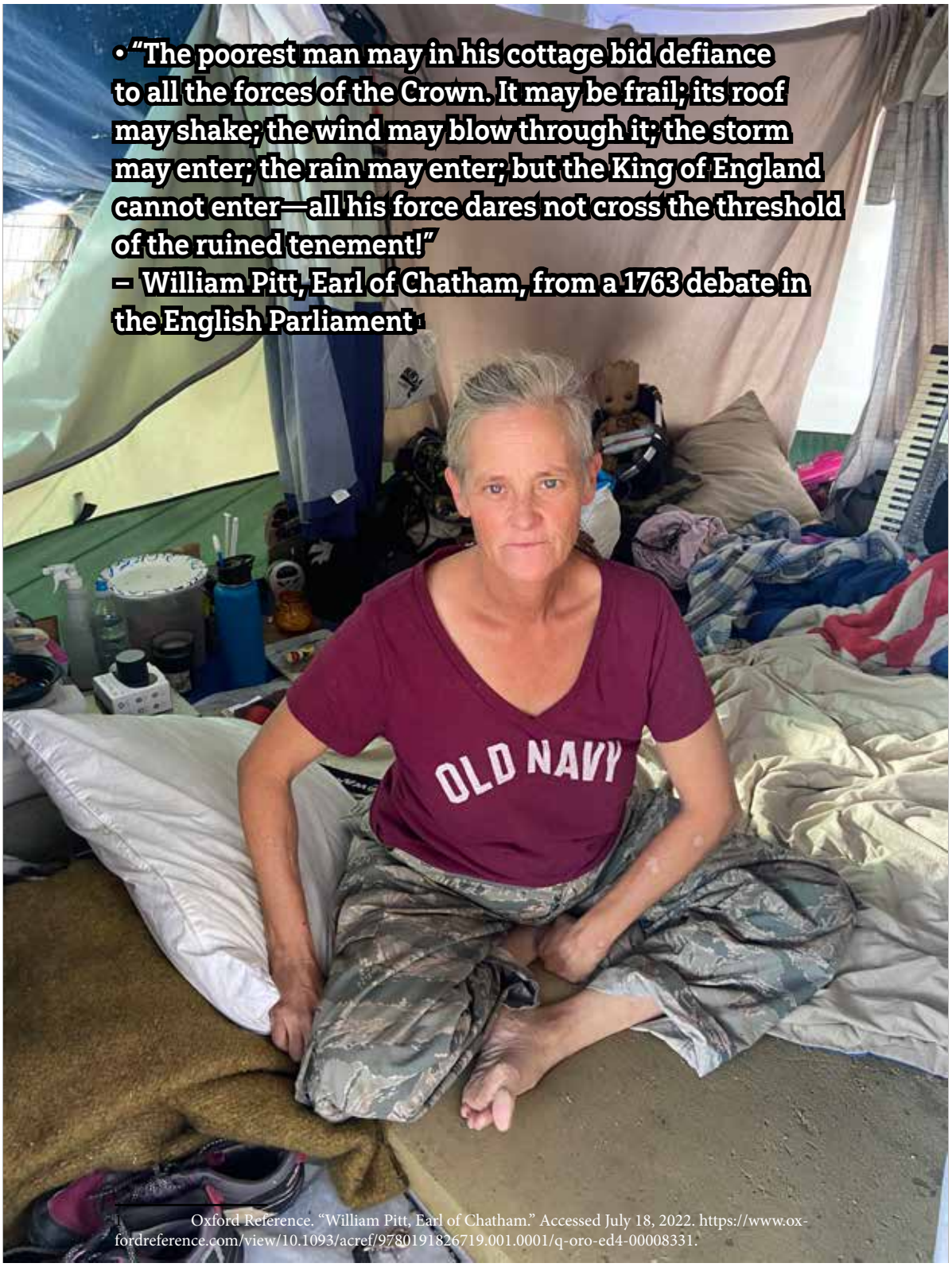
3 Kieschnick, Hannah. "A cruel and unusual way to regulate the homeless: Extending the status crimes doctrine to anti-homeless ordinances." Stan. L. Rev. 70 (2018): 1569.

4 Robinson, Tony. "No Right to Rest: Police Enforcement Patterns and Quality of Life Consequences of the Criminalization of Homelessness." Urban Affairs Review 55, no. 1 (January 1, 2019): 41–73. https://doi.org/10.1177/1078087417690833.

5 "HOMELESS CAMP PROTOCOL," City of Tucson (2021), 1.

6 Duff, Putu, Kathleen Deering, Kate Gibson, Mark Tyndall, and Kate Shannon. "Homelessness among a Cohort of Women in Street-Based Sex Work: The Need for Safer Environment Interventions." BMC Public Health 11, no. 1 (August 12, 2011): 643. https://doi.org/10.1186/1471-2458-11-643.

*Pockets regularly broke the law by openly camping in an alley in downtown Tucson. Forced to move much farther into the desert, Pockets was unable to reach medical help and died in his camp from a suspected case of pneumonia.*




1 Oxford Reference. "William Pitt, Earl of Chatham." Accessed July 18, 2022. https://www.oxfordreference.com/view/10.1093/acref/9780191826719.001.0001/q-oro-ed4-00008331.

# Root cause:

## The homeless are pushed to the margins creating a life of constant ostracism and stress

**The top responses that present differently in the homeless because of this root cause:**

1. Failure to "recover" after a forced location change
2. Failure to treat traumatic medical issues
3. Failure to make medical appointments
4. Failure to take prescribed medication
5. Development of and failure to treat hepatitis C
6. Development of and failure to treat HIV
7. Development of and failure to treat cirrhosis
8. Development of and failure to treat mental illness
9. Development of and failure to treat STIs
10. Development of and failure to treat COVID-19




*Joe Rogan takes ostracism to a whole new level by saying on his podcast, "Maybe you should just go shoot the homeless people."*
**Read the** *Variety* **story and see the video by clicking here.**

# Forced location changes

This is how the effects of forced location changes present differently in those who are unsheltered:

- Studies have shown that moving from one area to another can be damaging to the mental health of the housed.
- This damage is increased if the move is forced through an eviction or other outside means.
- For the homeless, forced location changes are exceptionally common events.
- Because Oppositional Defiant Disorder (ODD) is common in homeless adults, forced location changes are frequently met with extreme defiance.
- This further stresses the mental and physical health of the homeless ODD patient and of those around them.
- That stress can be deadly as homeless heroin users – when faced with an unfamiliar and stressful location – are much more likely to overdose due to the known and predictable effects of Pavlovian conditioning.


## THE HOMELESS ARE FREQUENTLY FORCED TO CHANGE LOCATION

• The homeless are frequently forced by local authorities to move their camp or location. As the National Law Center on Homelessness and Poverty put it in 2014: "Imagine a world where it is illegal to sit down. Could you survive if there were no place you were allowed to fall asleep, to store your belongings, or to stand still? For most of us, these scenarios seem unrealistic to the point of being ludicrous. But, for homeless people across America, these circumstances are an ordinary part of daily life."[1]

## ADULT OPPOSITIONAL DEFIANT DISORDER (ODD) IS COMMON IN THE HOMELESS

• A 2008 study found that, of the 127 [adult homeless] participants in the study, "On the ODD, alcohol and drug abuse scales, nearly 1 in 4 participants met the criteria for further evaluation of the disorders ...."[2]

• ODD most commonly affects children and teenagers, but it can also affect adults.[3] The DSM-5 diagnostic symptom criteria for ODD includes: "Often argue with authority figures or, for children and adolescents, with adults ... Often actively refuse or defy to comply with requests from authority figures or with rules."[4]

## FORCED LOCATION CHANGES ARE DEEPLY DESTABILIZING EVEN IF YOU'RE HOUSED AND DON'T HAVE ODD

• A 2018 study looked at the effects of evictions on low-income households and found, "... evictions cause a large and persistent increase in risk of homelessness. Evictions also increase emergency room use and raise the risk of mental health hospitalizations, particularly for cases on the margin."[5]

## FORCED LOCATION CHANGES ARE ALSO A RISK FACTOR FOR HEROIN OVERDOSE

• A 2009 study described how a forced change of location contributes to an overdose: "When a drug user takes drugs in locations other than those previously associated with drug use, the risk of overdose increases."[6]

1 Bauman, Tristia, et al. "No safe place: the criminalization of homelessness in US cities." National Law Center on Homelessness & Poverty (2014).

2 Van Rooy, Pamela J. "Homeless Not Hopeless: The Frequency of Characteristics of Attention Deficit Disorder. Alcohol, Drug Abuse and Oppositional Defiant Disorder in the Adult Homeless Population." Ph.D., Cardinal Stritch University. Accessed July 18, 2022. https://www.proquest.com/docview/304817058/abstract/B81B3DE87C6841ACPQ/1.

3 Cleveland Clinic. "Oppositional Defiant Disorder (ODD): Symptoms & Treatment." Accessed July 18, 2022. https://my.clevelandclinic.org/health/diseases/9905-oppositional-defiant-disorder.

4 Aggarwal, Arpit, and Raman Marwaha. "Oppositional Defiant Disorder." In StatPearls. Treasure Island (FL): StatPearls Publishing, 2022. http://www.ncbi.nlm.nih.gov/books/NBK557443/.

5 Collinson, Robert, and Davin Reed. "The effects of evictions on low-income households." Unpublished Manuscript.[Google Scholar] (2018): 1-82.

6 Siegel, Shepard. "Pavlovian Conditioning and Drug Overdose: When Tolerance Fails." Addiction Research & Theory 9 (July 11, 2009): 503–13. https://doi.org/10.3109/16066350109141767.

## Forced location changes

This is how the effects of forced location changes can be assessed in those living on the streets:

- When homeless heroin users are forcibly moved, they are at a much higher risk of an overdose. It is absolutely vital you discuss this risk with your homeless patient who is about to be or has been forcibly moved.
- You should expect that your homeless patient will lose their medications during a forced location change. Every effort should be made to contact their providers to make them aware of the situation.
- You should also expect that your patient has lost their identification in the move. This will make their ability to find shelter even more difficult.
- In addition, your patient is likely to have lost all of their hygiene supplies. Providing them with a toothbrush, toothpaste, soap, washcloth, and similar hygiene supplies may reduce their risk of infection.

## FORCED LOCATION CHANGE? ASSESS YOUR HOMELESS PATIENT FOR THE RISK OF OVERDOSE

• A forced location change for a homeless heroin user can be fatal. The mechanism of that danger was described in a 2005 analysis of a heroin fatality: "The fatal consequence of the heroin injection may have been caused by the failure in the action of conditioned tolerance. ... When the drug is taken in a strange environment the conditioned tolerance does not operate since the organism is not 'expecting' the drug. The end result is that the otherwise accustomed dose leads to an overdose and thereby to death."[1]

• A 1994 study looked at a series of 76 consecutive non-fatal heroin overdoses and found a strong correlation with an unexpected change of location. Per the study, "In the overdose group, drug administration occurred in an unusual place in 52% of cases. In the non-overdose group, drug administration did not occur in an unusual place. This shows the clinical relevance of the factor 'place and form of self-administration' in heroin overdose."[2]

## ASSESS YOUR PATIENT FOR THE LOSS OF THEIR MEDICATION

• When the homeless are forcibly relocated it is common for many of their possessions to be thrown away – including their medications. As the Denver Post reported in 2014 after one such forced removal, "Homeless people camping along the South Platte River and Cherry Creek who left their possessions at the sites were likely to find them gone Thursday after the city mounted a major cleanup. Advocates for the homeless expressed concern about the move to clear the homeless out of the areas. ... It is not uncommon during sweeps of the homeless for people to lose possessions, including medication, identification and other necessities when the area is cleared."[3]

## ASSESS YOUR PATIENT FOR THE LOSS OF ID AND THE ABILITY TO OBTAIN SHELTER

• The loss of a photo ID can be life threatening as the vast majority of homeless shelters require photo identification. According to a 2004 study of the homeless in New York City, "... fifty-four percent of the homeless were denied housing or shelter services due to lack of identification."[4]

## ASSESS YOUR PATIENT FOR THE THE LOSS OF HYGIENE SUPPLIES AND RISK OF INFECTION

• A 2017 study found that reduced hygiene in the homeless can lead to MRSA outbreaks."[5]

1 Gerevich, József, Erika Bácskai, Lajos Farkas, and Zoltán Danics. "A Case Report: Pavlovian Conditioning as a Risk Factor of Heroin 'overdose' Death." Harm Reduction Journal 2, no. 1 (July 25, 2005): 11. https://doi.org/10.1186/1477-7517-2-11.

2 Gutiérrez-Cebollada, Juan, Rafael de la Torre, Jorge Ortuño, JoséM. Garcés, and Jordi Camí. "Psychotropic Drug Consumption and Other Factors Associated with Heroin Overdose." Drug and Alcohol Dependence 35, no. 2 (April 1, 1994): 169–74. https://doi.org/10.1016/0376-8716(94)90124-4.

3 "Denver Moves Homeless from South Platte, Cherry Creek Encampments – The Denver Post," September 11, 2014 https://www.denverpost.com/2014/09/11/denver-moves-homeless-from-south-platte-cherry-creek-encampments/.

4 Kim, Joy H. "The Case Against Criminalizing Homelessness: Functional Barriers To Shelters And Homeless Individuals' Lack Of Choice." New York University Law Review 95 (2020): 42.

5 Leibler, Jessica, Daniel Nguyen, Casey León, Jessie Gaeta, and Debora Perez. "Personal Hygiene Practices among Urban Homeless Persons in Boston, MA." International Journal of Environmental Research and Public Health 14, no. 8 (August 18, 2017): 928. https://doi.org/10.3390/ijerph14080928.

## Failure to: Treat traumatic medical issues

This is why the unsheltered may fail to treat a traumatic medical issue:

- The vast majority of the homeless have been repeat victims of trauma.
- Partly because of this repeated trauma, the rate of PTSD in the homeless is "remarkably high."
- You can expect a homeless patient with PTSD to avoid places that remind them of previous events. For many of the homeless, this includes hospitals and clinics.
- You can also expect your homeless trauma patient to be angry and irritable and to avoid thoughts or feelings related to past traumatic events.
- Because a shocking majority of the homeless do not trust physicians and/or hospitals, they are likely to be angry and irritable and to refuse to seek care.
- This results in homeless patients presenting with their traumatic injuries days or weeks later than expected.
- This also results in the homeless trauma patient presenting in far worse condition than expected.



### THE PREVALENCE OF PTSD AMONG THE HOMELESS IS 'REMARKABLY HIGH'

• According to a 2020 systematic review and meta-analysis, "19 studies with 20,364 participants across seven countries were included in the final analysis. Our meta-analysis revealed that the pooled prevalence of PTSD among homeless people was 27.38% (95% CI; 21.95–33.57). In our subgroup analysis, we found that the prevalence of PTSD was considerably high as measured by the screening instrument (35.93%) than the diagnostic instrument (23.57% %). ... This review showed that the pooled prevalence estimate of PTSD among homeless peoples was remarkably high."[1]

### THE DEFINING SYMPTOMS OF PTSD INCLUDE: IRRITABILITY AND AVOIDANCE

• According to a review article published by the National Institute of Mental Health, some of the defining symptoms of PTSD include:

"Avoidance symptoms

• Staying away from places, events, or objects that are reminders of the experience

• Avoiding thoughts or feelings related to the traumatic event ...

Arousal and reactivity symptoms

• Being easily startled

• Feeling tense, on guard, or "on edge" ...

• Feeling irritable and having angry or aggressive outbursts"[2]

### THE HOMELESS HAVE LITTLE TRUST OF PHYSICIANS AND ARE AFRAID OF HOSPITALS

• A 2020 study found, "One of the nurse participants highlighted how previous trauma could cause people experiencing homelessness to become distrustful of the hospital system. 'I think for a lot of patients that are homeless, they've gone through some sort of trauma. . .a lot of the patients don't trust the hospital because they've been let down so many times.'"[3]

• A 2015 study asked homeless veterans to rate a series of reasons for why they may have delayed seeking care. Three of the top 10 reasons included trust: "I don't trust the VA" (84.9%), "I don't trust the doctors" (75.8%), and "I'm afraid" (72.6%).[4]

1 Ayano, Getinet, Melat Solomon, Light Tsegay, Kalkidan Yohannes, and Mebratu Abraha. "A Systematic Review and Meta-Analysis of the Prevalence of Post-Traumatic Stress Disorder among Homeless People." Psychiatric Quarterly 91, no. 4 (December 1, 2020): 949–63. https://doi.org/10.1007/s11126-020-09746-1.

2 National Institute of Mental Health (NIMH). "Post-Traumatic Stress Disorder." Accessed July 21, 2022. https://www.nimh.nih.gov/health/publications/post-traumatic-stress-disorder-ptsd.

3 Grech, Elizabeth, and Toby Raeburn. "Perceptions of Hospital-Based Registered Nurses of Care and Discharge Planning for People Who Are Homeless: A Qualitative Study." Collegian 28 (July 1, 2020). https://doi.org/10.1016/j.colegn.2020.02.004.

4 O'Toole, Thomas P., Erin E. Johnson, Stephan Redihan, Matthew Borgia, and Jennifer Rose. "Needing Primary Care But Not Getting It: The Role of Trust, Stigma and Organizational Obstacles Reported by Homeless Veterans." Journal of Health Care for the Poor and Underserved 26, no. 3 (August 2015): 1019–31.

## Failure to: Treat traumatic medical issues

This is how you can encourage those living on the streets to treat a traumatic medical condition:

- Those who regularly provide direct services to the homeless are likely to have heightened levels of secondary traumatic stress.
- In addition, groups of people who directly serve the homeless are likely to have little enthusiasm for programmed interventions like trauma-informed care.
- This unfortunate combination means an individual physician directly serving the homeless is likely to be suffering from secondary traumatic stress and burnout and is less likely to be backed up effectively by their team.
- Understanding the difficulty of the following: We've found a three-step solution to the problem is to always show your homeless trauma patient respect, respect, and respect.

## REALITY CHECK: YOU AND YOUR STAFF ARE LIKELY TO BE EXPERIENCING SECONDARY TRAUMATIC STRESS

• A 2022 study looked at practitioners who worked with the homeless and concluded, "Our findings of heightened risk levels of STS [secondary traumatic stress] in frontline staff, and its significant association with BO [burnout], align with previous studies in the homeless and other similar vulnerable people sectors … . Nearly two-thirds of staff in our sample indicated potentially problematic STS levels, and there was further evidence that this was affecting staff's mental health (i.e. 10 of 13 people who reported high levels of STS also indicated previous time-off due to work-related stress)."[1]

## YOU AND YOUR STAFF ARE ALSO LIKELY TO HAVE A LARGE 'ENTHUSIASM GAP' FOR IMPLEMENTING TRAUMA-INFORMED CARE FOR THE HOMELESS

• A 2022 study found that, while bosses may hold positive opinions about trauma-informed care, the people who actually provide it evidence little enthusiam. Per the study, "Preliminary analysis revealed staff who indicated previous experience of PIE [psychologically informed environments], TIC [trauma-informed care] or related training (e.g. while working for a previous provider) did not significantly differ in their attitudes towards trauma-informed practice … from those who had no previous experience. … We found, however, significant differences between staff groups with regard to their attitudes towards trauma-informed practice … . Posthoc examinations yielded significantly more positive attitudes in senior management … than other staff groups (support staff …, team leaders …, area heads ….)."[2]

## RESPECT. RESPECT. RESPECT. A PLAN OF ACTION FROM THE AMA CODE OF ETHICS

• A 2017 article in the *AMA Journal of Ethics* put it directly: "Opinion 1.2.2 [AMA Code of Medical Ethics], 'Disruptive Behavior by Patients,' describes the need for and how to show respect as follows:

"Disrespectful or derogatory language or conduct on the part of either physicians or patients can undermine trust and compromise the integrity of the patient-physician relationship. It can make members of targeted groups reluctant to seek care, and create an environment that strains relationships among patients, physicians, and the health care team.

"Trust can be established and maintained only when there is mutual respect. Therefore, in their interactions with patients, physicians should: (a) Recognize that derogatory or disrespectful language or conduct can cause psychological harm to those they target.

"(b) Always treat their patients with compassion and respect."[3]

1 Schneider, Christel, Christopher W. Hobson, and Katherine H. Shelton. "'Grounding a PIE in the Sky': Laying Empirical Foundations for a Psychologically Informed Environment (PIE) to Enhance Well-Being and Practice in a Homeless Organisation." Health & Social Care in the Community 30, no. 3 (2022): e657–67. https://doi.org/10.1111/hsc.13435.

2 Schneider, Christel, Christopher W. Hobson, and Katherine H. Shelton. "'Grounding a PIE in the Sky': Laying Empirical Foundations for a Psychologically Informed Environment (PIE) to Enhance Well-Being and Practice in a Homeless Organisation." Health & Social Care in the Community 30, no. 3 (2022): e657–67. https://doi.org/10.1111/hsc.13435.

3 "AMA Code of Medical Ethics' Opinions Related to Moral Psychology and 'Difficult' Clinician-Patient Relationships." AMA Journal of Ethics 19, no. 4 (April 1, 2017): 347–48. https://doi.org/10.1001/journalofethics.2017.19.4.coet1-1704.

# Failure to: Make medical appointments

This is why the unsheltered may fail to treat make their medical appointments:

Q. Do most homeless patients receive free bus passes?
A. Not usually.

Q. How does the average homeless patient make the money they need for transportation?
A. Many don't make any money at all, so they walk.

Q. Without a bus pass, how far does the average homeless patient walk each day just to find food?
A. Don't think blocks, think miles … and more miles. And then back again.

Q. How many homeless patients have a working cellphone?
A. Most. But more than half keep their current phone and current number for fewer than 90 days.

Q. How do the homeless keep their phones charged?
A. When was the last time you saw an outlet with the sign "Free Electricty"? Exactly. The homeless are generally forced to illegally plug in their phones wherever they can. For this reason and myriad others, your homeless patient may have a phone they simply cannot use.



## THE PROBLEM? IT'S NOT MAKING THE APPOINTMENT … IT'S GETTING TO IT

• A 2020 study found, "The lack of access to transportation appears to promote stereotypical perceptions of this population. Making and keeping appointments can become a challenge, without appropriate means of getting to service locations, when attempting to help-seek and improve one's situation. Nickasch and Marnocha (2009) examined homeless individuals and experiences of health care and cited several factors that affect the quality of care and lifestyle including lack of transportation. In other words, getting health-care appointments was often not as significant an issue as being able to travel there."[1]

## FREE BUS PASSES? IN SOME AREAS, BUT NOT EVEN IN A MAJOR CITY LIKE TORONTO

• A 2017 study from Toronto described the costs involved for the homeless: "Although transit cost is only one aspect of the transportation equity equation, it is an obvious hindrance to mobility options for homeless individuals in Toronto. Notably, at the time of the study, … users of the Toronto Transit Commission paid a fare of $3.00 for one-time travel from an origin to a destination within the transit network … These prices give a clear picture of how travel cost can play a pivotal role in limiting homeless people's movement patterns."[2]

## WALKING DISTANCE TO FOOD AND HYGIENE? EXPECT TO SPEND A LOT OF TIME ON YOUR FEET

• A 2020 study looked at the transportation requirements for the homeless in Los Angeles and found, "only about 20% of sheltered and unsheltered homeless people are potentially being served within a 1,000 m [.621 miles] walking distance of food services … Only 8% of the homeless population is within a 1,000 m walking distance of hygiene services."[3]

## CELLPHONE? SURE, BUT EXPECT IT TO GET LOST AND THE NUMBER TO CHANGE

• A 2017 study of cellphone use in the homeless found, "The vast majority [of homeless adults in this study] (94%) currently owned a cell phone, although there was considerable past 3-month turnover in phones (56%) and phone numbers (55%).[4]

1 Scott, Hannah, Toba Bryant, and Scott Aquanno. "The Role of Transportation in Sustaining and Reintegrating Formerly Homeless Clients." Journal of Poverty 24, no. 7 (November 9, 2020): 591–609. https://doi.org/10.1080/10875549.2020.1740375.

2 Hui, Vivian, and Khandker Nurul Habib. "Homelessness Vis-à-Vis Transportation-Induced Social Exclusion: An Econometric Investigation of Travel Behavior of Homeless Individuals in Toronto, Canada." Transportation Research Record 2665, no. 1 (January 1, 2017): 60–68. https://doi.org/10.3141/2665-07.

3 Wu, Jerome. "Assessing Homeless Accessibility to Community Resources in the City of Los Angeles," (2020), 81.

4 Rhoades, Harmony, Suzanne Wenzel, Eric Rice, Hailey Winetrobe, and Benjamin Henwood. "No Digital Divide? Technology Use among Homeless Adults." Journal of Social Distress and the Homeless 26, no. 1 (2017): 73–77. https://doi.org/10.1080/10530789.2017.1305140.

## Failure to: Make medical appointments

This is how you can help those living on the streets make their next medical appointment:

- At the start of their visit with you, encourage your homeless patient to plug their cellphone into a directly visible outlet. Let them know it can charge during their appointment, but they'll have to take it as soon as they leave.
- Be mindful that memory issues are common in the homeless.
- Ask your homeless patient if they are OK receiving reminder texts. If so, schedule a text reminder (or a series of reminders) for their appointment.
- Provide your homeless patient with a free pocket calendar and then mark their next appointment on that calendar. Make sure to mark today's date and add the clinic's phone number if they have further questions.
- At the end of your visit, go over the details of the next appointment again and then remind them to unplug their phone. Remind them also that you will be texting their phone about the upcoming appointment.

## IT IS EASY TO LOSE TRACK OF DATE AND TIME ON THE STREETS

• A 2017 study found, "The [homeless] women were hesitant to seek various forms of professional help. Among individuals who did want help, securing appointments and transportation to travel to those appointments was a challenge. Many individuals did not follow set schedules and lost track of time, causing them to miss appointments."[1]

## AND IT'S DIFFICULT TO FIND TRANSPORTATION

• The same 2017 study found, "Many of the participants indicated they did not have personal transportation, and to access services or go to medical appointments or job interviews, they had to figure out a means of transportation. Renee listed all the places she needed to access and said, 'government offices, DMV, Social Security.' She did not see how to get everywhere she needed to go and said, 'how am I going to get there, transportation, you know that's huge. And like where [the shelter] is at there's no buses.' She was trapped by geography and unable to easily travel to where she needed to be. Cindy agreed and said, "what would be a big help if some city bus would come up here, but they won't."[2]

## UNDERSTAND THAT MEMORY ISSUES IN THE HOMELESS ARE COMMON

• A 2015 systematic review concluded, "Memory deficits were common among the samples of homeless persons studied. ... In general, the studies reviewed reported impairment in general or overall memory and in verbal memory with conflicting findings regarding visual memory problems among homeless persons. In the majority of studies that examined verbal and overall or general memory impairment significant impairment was observed."[3]

## SO TEXT REMINDERS CAN BE HELPFUL

• A 2016 study investigated homeless persons' perceptions about using cell phone alerts to help manage health care appointments found, "A total of 290 participants completed the survey; 89% had a cell phone. Seventy-seven percent were interested in appointment reminders, whereas 66%, 60% and 54% were interested in refill reminders, medication taking reminders and medication information messages respectively."[4]

1 Spicer, Rebecca Keeler. "Barriers to Mental Health Treatment Among Chronically Homeless Women: A Phenomenological Inquiry." Clinical Psychology, (2017), 170.
2 Spicer, Rebecca Keeler. "Barriers to Mental Health Treatment Among Chronically Homeless Women: A Phenomenological Inquiry." Clinical Psychology, (2017), 170.
3 Ennis, Naomi, Sylvain Roy, and Jane Topolovec-Vranic. "Memory Impairment among People Who Are Homeless: A Systematic Review." Memory 23, no. 5 (July 4, 2015): 695–713. https://doi.org/10.1080/09658211.2014.921714.
4 Moczygemba, Leticia R, Lauren S Cox, Samantha A Marks, Margaret A Robinson, Jean-Venable R Goode, and Nellie Jafari. "Homeless Patients' Perceptions about Using Cell Phones to Manage Medications and Attend Appointments." The International Journal of Pharmacy Practice 25, no. 3 (November 29, 2016): 220–30. https://doi.org/10.1111/ijpp.12321.

## Failure to: Take medications

This is why the unsheltered may fail to take their medications:

- The World Health Organization has estimated that long-term adherence to chronic medications in all populations is as low as 50%.
- In other words, plan for half of your homeless patients to have problems adhering to their medications.
- Adherence is made especially difficult when the homeless are ostracized and forced to the margins.
- For this and other reasons, believe your homeless patient when they tell you they lost their medications due to a forced relocation, or the authorities disposed of their backpack, or their medication was stolen from them. These are very common events for the unsheltered.



### MEDICATIONS ARE LOST DURING FORCED RELOCATIONS

• When the homeless are forcibly relocated it is common for many of their possessions to be thrown away – including their medications. As the Denver Post reported in 2014 after one such forced removal, "Homeless people camping along the South Platte River and Cherry Creek who left their possessions at the sites were likely to find them gone Thursday after the city mounted a major cleanup. Advocates for the homeless expressed concern about the move to clear the homeless out of the areas. ... It is not uncommon during sweeps of the homeless for people to lose possessions, including medication, identification and other necessities when the area is cleared."[1]

### POLICE AND PRIVATE SECURITY GUARDS DISPOSE OF 'SUSPICIOUS' BACKPACKS

• Due to concerns about terrorism, "abandoned" backpacks are frequently invesigated by the police and then disposed of. Here's how one such case transpired according to KOLD-TV News: "The bomb unit for Tucson Police Department responded to the area of Oracle and Wetmore Road just after 5:00 p.m. Sunday. Sgt. Pete Dugan with TPD said a backpack left next to a power pole in the area is what prompted the response. Officers blocked off the area as a precaution, according to Dugan. He said the bomb unit examined the backpack. They deemed it safe and cleared the area before 5:45 p.m.."[2]

### THEFT OF BACKPACKS AND PERSONAL ITEMS IS RAMPANT ON THE STREETS

• CTV News in Vancouver reported, "For someone living on the streets, a backpack can be much more than just a bag. 'The few possessions they have managed to hold onto – their photographs, their clothing, their documents – it's your whole life,' said Jeremy Hunka of the Union Gospel Mission, a group offering services to Vancouver's homeless and at-risk population. But carrying around your life on your back also comes with the constant worry of theft. 'This is a vulnerable population and they are targeted,' said Hunka. ... 750 homeless people in the Vancouver-area will receive specially-made 'street-proof' backpacks this week designed to keep out the rain – and prevent theft."[3]

1 "Denver Moves Homeless from South Platte, Cherry Creek Encampments – The Denver Post," September 11, 2014 https://www.denverpost.com/2014/09/11/denver-moves-homeless-from-south-platte-cherry-creek-encampments/.

2 https://www.kold.com. "UPDATE: Police Give All Clear to Suspicious Backpack in Tucson." Accessed July 22, 2022. https://www.kold.com/story/33756387/bomb-unit-responds-to-suspicious-backpack-in-tucson.

3 Matheson, Darcy. "Not Just a Bag: 'Street-Proof' Backpacks Give Safety to Homeless." British Columbia, November 21, 2016. https://bc.ctvnews.ca/not-just-a-bag-street-proof-backpacks-give-safety-to-homeless-1.3170870.

## Failure to: Take medications

This is how you can help those living on the streets adhere to their medications:

- Be very aware that, due to pervasive ostracism, there are few if any public toilet facilities available to the homeless.
- For this reason, be mindful when you prescribe any medication that may make your homeless patient increase their urination.
- This includes a wide range of prescriptions like diuretics, tricyclic antidepressants, antihistamines, calcium channel blockers, mood stabilizers, antipsychotics, some medications for type 2 diabetes, and alpha blockers.
- Urinating in public is a crime. In some areas, it is treated as a sexual offense and those caught urinating in public have to register as sexual offenders.
- In addition, due to the lack of toilet facilities, your homeless patient is likely to stop taking any medication that makes them vomit. This includes a wide range of common medications when taken with alcohol.
- If your homeless cardiac patient is presribed anticoagulants, be aware they may stop taking their meds due to a fear of bleeding from trauma.

### BE MINDFUL OF MEDICATIONS THAT INTERACT WITH ALCOHOL

• Prescription medications that interact badly with alcohol are legion. For example, alcohol taken with the common antibiotics Metronidazole (Flagyl) and Azithromycin (Zithromax) may cause "Fast heartbeat, sudden changes in blood pressure; stomach pain, upset stomach, vomiting, headache, or flushing or redness of the face." And a common diabetes drug like Metformin taken with alcohol may result in, "Abnormally low blood sugar levels, flushing reaction (nausea, vomiting, headache, rapid heartbeat, sudden changes in blood pressure); symptoms of nausea and weakness."[1]

### BE MINDFUL OF YOUR HOMELESS CARDIAC PATIENT'S FEAR OF BLEEDING DUE TO TRAUMA

• The book *Medical Care for Homeless Persons* (2021) describes why many homeless patients are wary of taking anticoagulants: "Risks of bleeding from antiplatelet therapy (aspirin and clopidogrel) and/or oral anticoagulation therapy (warfarin, apixaban, dabigatran, and rivaroxaban) may be markedly elevated in homeless person who are at high risk for injury/trauma. This may be mitigated through patient education and arranging for respite care or other placement following acute hospitalization."[2]

### BE MINDFUL OF DRUGS THAT ACT AS DIURETICS. THERE ARE VERY FEW PUBLIC RESTROOMS AVAILABLE TO THE HOMELESS

• If you give a homeless patient any medication with a diuretic affect (diuretics, tricyclic antidepressants, antihistamines, calcium channel blockers, mood stabilizers, antipsychotics, some medications for type 2 diabetes, alpha blockers[3]), be mindful it increases their risk of arrest. Here's how pew.org described the issue in 2020: "According to Eisinger [executive director of the Seattle/King County Coalition on Homelessness], some homeless people in the city have resorted to wearing adult diapers or using 5-gallon buckets filled with kitty litter. She pointed to the city's recent hepatitis A outbreak — as well as the fact that COVID-19 can live in feces — as evidence that the city's restroom shortage is a public health failure. … 'You're criminalizing having a bladder,' said Taunya Lovell Banks, a professor at the University of Maryland School of Law who recently authored a law review article about the lack of public toilets. 'If you're caught by the police and ticketed, you have to register as a sex offender. It's beyond the pale.'"[4]

1 "Harmful Interactions | National Institute on Alcohol Abuse and Alcoholism (NIAAA)." Accessed July 22, 2022. https://www.niaaa.nih.gov/publications/brochures-and-fact-sheets/harmful-interactions-mixing-alcohol-with-medicines.

2 Hernandez, Caridad A., and Adam G. Golden. "Medical Care for Homeless Persons." In Clinical Management of the Homeless Patient: Social, Psychiatric, and Medical Issues, edited by Elspeth Cameron Ritchie and Maria D. Llorente, 25–40. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-70135-2_3.

3 EverydayHealth.com. "10 Medications That May Cause Increased Urination." Accessed July 22, 2022. https://www.everydayhealth.com/urinary-conditions/urine/10-medications-that-may-cause-increased-urination/.

4 "The Pandemic Has Closed Public Restrooms, and Many Have Nowhere to Go." Accessed July 22, 2022. https://pew.org/2D0EBUp.

# Development of and failure to treat: Hepatitis C

This is why the unsheltered may develop and fail to treat HCV:

- Homelessness increases the risk of being infected with HCV.
- The use of alcohol due to stress and other factors increases the risk of dying from the complications of HCV.
- The stigmatization of the homeless and of people with HCV combine to make it far more difficult to receive treatment for HCV on the streets.
- In addition, word on the street may be that the HCV medication "costs $1,000 a pill" and your homeless patient may believe they have to pay that amount to receive treatment.

## HOMELESSNESS INCREASES THE RISK OF BEING INFECTED WITH HEPATITIS C (HCV)

• A 2020 study warned, "Hepatitis C virus (HCV) prevalence is underestimated in underserved populations, including people experiencing homelessness who are at increased risk of HCV infection. According to a recent systematic review of infectious disease prevalence studies, the prevalence of HCV among homeless adults ranges from 9.8% to 52.5%. Among people experiencing homelessness, substance use and mental health disorders are common, and are risk factors for HCV infection."[1]

## STRESS AND OSTRACISM-LINKED STRESS INCREASE THE RISK OF ALCOHOL USE DISORDER (AUD)

• A 2019 study detailed how stress increases the risk of alcohol use disorder, especially in women: "Rates of alcohol use disorder (AUD) have increased in women by 84% over the past ten years relative to a 35% increase in men. This substantive increase in female drinking is alarming given that women experience greater alcohol-related health consequences compared to men. Stress is strongly associated with all phases of alcohol addiction, including drinking initiation, maintenance, and relapse for both women and men, but plays an especially critical role for women."[2]

## THE USE OF ALCOHOL INCREASES THE RISK OF COMPLICATIONS FROM HCV INFECTION

• According to recent guidance from the AASLD-IDSA, "Upon diagnosis of active HCV infection, patients require counseling and certain clinical interventions prior to initiation of antiviral therapy. Prevention of further liver damage is crucial. To that end, counseling patients to abstain from alcohol takes priority because of associations between excess alcohol use and incident or progressive fibrosis and the development of HCC. There is no known safe level of alcohol use for patients with chronic hepatitis C. All patients with chronic hepatitis C, especially those with advanced fibrosis or cirrhosis, should be advised to abstain from alcohol use. Persons suffering from alcohol use disorder require treatment for this condition; consider referring these individuals to an addiction specialist. Ongoing alcohol use, however, is not a contraindication to antiviral therapy. "[3]

1 Fokuo, J. Konadu, Carmen L. Masson, August Anderson, Jesse Powell, Dylan Bush, Margaret Ricco, Barry Zevin, Claudia Ayala, and Mandana Khalili. "Recommendations for Implementing Hepatitis C Virus Care in Homeless Shelters: The Stakeholder Perspective." Hepatology Communications 4, no. 5 (2020): 646–56. https://doi.org/10.1002/hep4.1492.

2 Peltier, MacKenzie R., Terril L. Verplaetse, Yann S. Mineur, Ismene L. Petrakis, Kelly P. Cosgrove, Marina R. Picciotto, and Sherry A. McKee. "Sex Differences in Stress-Related Alcohol Use." Neurobiology of Stress 10 (February 1, 2019): 100149. https://doi.org/10.1016/j.ynstr.2019.100149.

3 Ghany, Marc G., Timothy R. Morgan, and AASLD-IDSA Hepatitis C. Guidance Panel. "Hepatitis C Guidance 2019 Update: American Association for the Study of Liver Diseases–Infectious Diseases Society of America Recommendations for Testing, Managing, and Treating Hepatitis C Virus Infection." Hepatology 71, no. 2 (2020): 686–721. https://doi.org/10.1002/hep.31060.

## Development of and failure to treat: Hepatitis C

This is how you can help those living on the streets treat their HCV infection:

• Let your homeless HCV patient know that current treatments for HCV infection are far better and far easier to take. Counsel them that no injections are required – it is an oral medication - and the side effects are nothing like the ones previously seen in interferon treatment for HCV.
• Be exceptionally aware of the stigma they are facing both for being homeless and for having HCV.
• Commend them for their courage for coming to see you and let them know you will be there for them every step along the way.
• In short, the kind of emotional support that Stanley (the homeless HCV patient in the photo above and to the left) received is far more important than any list of facts and figures you can provide.

### DUE TO THE STIGMATIZATION OF HCV, MANY HOMELESS PATIENT'S DO NOT BELIEVE THEY 'DESERVE' TO BE TREATED

• A 2021 thematic synthesis of qualitative research described the issue: "Addressing stigma is a key step towards reaching national and global targets to eliminate viral hepatitis as a major public health threat (A National Strategy for the Elimination of Hepatitis B & C, 2017; Commonwealth of Australia, 2018; World Health Organization, 2016). A well-established body of literature traces stigma and its adverse effects as a common feature of the lived experience of viral hepatitis, primarily arising from misconceptions of infection and transmission. Additionally, many individuals with viral hepatitis belong to marginalised populations, such as people who are experiencing homlessness or who use drugs, or engage in practices which are subject to various forms of stigma, such as injecting drugs (World Health Organization, 2017). Stigma is also reproduced in healthcare practices and settings, resulting in fragile trust in experts and services, especially amongst those most vulnerable with least access to care. Consequently, experiences of stigma can preclude access to care and deter help-seeking, even in the face of need."[1]

### MANY HOMELESS PATIENTS BELIEVE THE TREATMENT FOR HEPATITIS C IS PAINFUL AND DANGEROUS

• A 2019 study surveyed HIV-uninfected PWID (people who inject drugs) through community-based organizations and found, "Some participants who were generally aware of HCV treatment were concerned about side effects or had misconceptions about the new treatment. These individuals had heard from peers who had undergone months of older interferon treatment with side effects that were described as worse than the HCV infection symptoms. Concerns about side effects were particularly important in light of the frequency with which participants were already experiencing drug withdrawal symptoms and other illnesses. As this 35-year-old woman from Boston explained, 'I hear it makes you really sick. I get sick on my own easily. I have a really weak immune system, so, um, anything that's going to make me sick, I do not-I am not really looking forward to doing.'"[2]



1 Harris, Magdalena, Danielle Guy, Camila A Picchio, Trenton M White, Tim Rhodes, and Jeffrey V Lazarus. "Conceptualising Hepatitis C Stigma: A Thematic Synthesis of Qualitative Research." International Journal of Drug Policy, Progress and remaining challenges to address hepatitis C, other infectious diseases, and drug-related harms to improve the health of people who use drugs, 96 (October 1, 2021): 103320. https://doi.org/10.1016/j.drugpo.2021.103320.

2 Childs, Ellen, Sabrina A. Assoumou, Katie B. Biello, Dea L. Biancarelli, Mari-Lynn Drainoni, Alberto Edeza, Peter Salhaney, Matthew J. Mimiaga, and Angela R. Bazzi. "Evidence-Based and Guideline-Concurrent Responses to Narratives Deferring HCV Treatment among People Who Inject Drugs." Harm Reduction Journal 16, no. 1 (February 11, 2019): 14. https://doi.org/10.1186/s12954-019-0286-6.

# Development of and failure to treat: HIV

This is why the unsheltered may develop and fail to treat HIV:

- Homelessness increases the risk of being infected with HIV.
- Stress and depression are associated with adverse sequelae in those with HIV including poorer treatment adherence and more rapid disease progression.
- The stigmatization of the homeless and of people with HIV combine to make it far more difficult to receive treatment for HIV on the streets.
- Because of these factors, your homeless patient with HIV is likely to present in a more advanced stage of infection.
- In addition, your homeless patient's HIV infection is also likely to progress more rapidly.
- Unless steps are taken to reduce health-care related stigma, your homeless HIV patient is less likely to make their medical appointments and adhere to their medication.



## HOMELESSNESS INCREASES THE RISK OF BEING INFECTED WITH HIV

• A 2021 systematic review and meta-analysis looked at the prevalence of HIV among the homeless and found "strong evidence of an increased risk of HIV and HCV acquisition among PWID [people who inject drugs] who are exposed to recent homelessness or unstable housing compared with PWID who are not homeless or are stably housed. Across all included studies, recent homelessness or unstable housing was associated with a 1·55 times greater risk of HIV acquisition and a 1·65 times greater risk of HCV acquisition."[1]

## STRESS AND OSTRACISM-LINKED STRESS ARE ASSOCIATED WITH ADVERSE SEQUELAE IN THOSE WITH HIV

• A 2018 study examined the role of stress in HIV infection found, "Despite significant treatment advances, HIV remains a stressful chronic illness for many and is associated with elevated levels of depression. Stress and depression in HIV are of concern not only because of the deleterious effects on quality of life, but because they are associated with adverse sequelae, including poorer treatment adherence, increased risk behaviors for HIV transmission, and potentially more rapid disease progression."[2]

## THE COMBINED STIGMA OF HOMELESSNESS AND HIV MAY ADVERSELY IMPACT THE TREATMENT OF A HOMELESS HIV PATIENT

• A 2018 study warned, "Studies have shown that stigma from health care providers experienced by HIV-positive individuals is associated with longer gaps between medical appointments, and people with greater anticipated stigma are less likely to access care. This effect on health care utilization has also been shown to be the case with stigma related to mental illness and substance abuse. The multidimensionality of stigma may have a more significant impact on those who are marginalized and vulnerable, and these individuals frequently contend with more than 1 stigmatizing attribute, which may further exacerbate their problems."[3]

1 Arum, Chiedozie, Hannah Fraser, Andreea Adelina Artenie, Sandra Bivegete, Adam Trickey, Michel Alary, Jacquie Astemborski, et al. "Homelessness, Unstable Housing, and Risk of HIV and Hepatitis C Virus Acquisition among People Who Inject Drugs: A Systematic Review and Meta-Analysis." The Lancet Public Health 6, no. 5 (May 1, 2021): e309–23. https://doi.org/10.1016/S2468-2667(21)00013-X.

2 Hecht, Frederick M., Judith T. Moskowitz, Patricia Moran, Elissa S. Epel, Peter Bacchetti, Michael Acree, Margaret E. Kemeny, et al. "A Randomized, Controlled Trial of Mindfulness-Based Stress Reduction in HIV Infection." Brain, Behavior, and Immunity 73 (October 2018): 331–39. https://doi.org/10.1016/j.bbi.2018.05.017.

3 Maskay, Manisha Harisingh, Howard J. Cabral, Jessica A. Davila, Jo Ann Whitlock Davich, Ruthanne Marcus, Emily K. Quinn, and Serena Rajabiun. "Longitudinal Stigma Reduction in People Living with HIV Experiencing Homelessness or Unstable Housing Diagnosed With Mental Health or Substance Use Disorders: An Intervention Study." American Journal of Public Health 108, no. S7 (December 2018): S546–51. https://doi.org/10.2105/AJPH.2018.304774.

# Development of and failure to treat: HIV

This is how you can help those living on the streets treat their HIV infection:

- Advocate for point of care (POC) testing at sites where the homeless congregate (e.g. feeding projects, food box distribution locations, etc.)
- Do not make your homeless patient wait days or have to travel to know their HIV status.
- POC testing for HIV is an important part of a strategy to improve trust with your homeless HIV patient.
- Gaining trust is vital in helping to achieve viral suppression and improve overall health outcomes.
- As your homeless HIV patient's disease is likely to progress more rapidly, make sure they are aware of the signs and symptoms of AIDS. As many are non-specific, let your patient know it is imperative to reach out for help if they develop any of those signs and symptoms.

## ADVOCATE FOR POC TESTING FOR HIV

• A 2022 study in England confirmed the feasability and scalability of POC (point of care) testing for HIV in a homeless population. According to the study, ' This qualitative study found that HIV POCT is acceptable to both [homeless] service users and health care providers in Gloucestershire. Facilitators to service implementation and uptake included understanding the test and the processes, ease and convenience of testing and perceived effectiveness of the test. Two barriers were identified: stigma and anxiety. These findings support feasibility and scalability of HIV POCT for high-risk, priority population groups, such as people who inject drugs or are homeless."[1]

## REDUCED STIGMA RESULTS IN IMPROVED CARE FOR YOUR HOMELESS HIV PATIENT

• A 2018 study looked at homeless HIV patients and found that interventions that increased trust and reduced barriers improved care. Per the stuy, ""In this study, we developed interventions with key components of trust building, addressing unmet needs, reducing barriers to accessing and engaging in care, and accounting for geographic and cultural differences. ... There was a substantive decrease in the percentage of respondents who reported HIV stigma from the baseline to 6-month interview ... ... Decreasing perceived external stigma is essential to helping PLWH engage and stay in care and achieve viral suppression as well as improved health outcomes overall.."[2]

## MAKE SURE YOUR HOMELESS HIV PATIENT IS AWARE OF THE SIGNS AND SYMPTOMS OF AIDS

• A clear description for patients of the symptoms of AIDS is presented by HIV.gov: "If you have HIV and you are not on HIV treatment, eventually the virus will weaken your body's immune system and you will progress to AIDS (acquired immunodeficiency syndrome). This is the late stage of HIV infection. Symptoms of AIDS can include:

- Rapid weight loss
- Recurring fever or profuse night sweats
- Extreme and unexplained tiredness
- Prolonged swelling of the lymph glands in the armpits, groin, or neck
- Diarrhea that lasts for more than a week
- Sores of the mouth, anus, or genitals
- Pneumonia
- Red, brown, pink, or purplish blotches on or under the skin or inside the mouth, nose, or eyelids
- Memory loss, depression, and other neurologic disorders."[3]

1 Corker, Elizabeth, Fabiana Lorencatto, Niall Anderson, Maya Gobin, Sarah Scott, Susan Michie, and Georgina Angel. "Acceptability and Facilitators of and Barriers to Point-of-Care HIV Testing in a Homeless-Focused Service in Gloucestershire: A Qualitative Evaluation." HIV Medicine 23, no. 3 (2022): 237–48. https://doi.org/10.1111/hiv.13187.

2 Maskay, Manisha Harisingh, Howard J. Cabral, Jessica A. Davila, Jo Ann Whitlock Davich, Ruthanne Marcus, Emily K. Quinn, and Serena Rajabiun. "Longitudinal Stigma Reduction in People Living with HIV Experiencing Homelessness or Unstable Housing Diagnosed With Mental Health or Substance Use Disorders: An Intervention Study." American Journal of Public Health 108, no. S7 (December 2018): S546–51. https://doi.org/10.2105/AJPH.2018.304774.

3 "Symptoms of HIV." HIV.gov, June 15, 2022. https://www.hiv.gov/hiv-basics/overview/about-hiv-and-aids/symptoms-of-hiv.

# Development of and failure to treat: Cirrhosis

This is why the unsheltered may develop and fail to treat cirrhosis of the liver:

- Ostracism-linked stress due to homelessness increases the risk of developing alcohol use disorder.
- Alcohol use disorder is a primary risk factor for developing cirrhosis.
- For this and other reasons, 1 out of 6 of the homeless may have cirrhosis.
- Homeless patients with cirrhosis are more likely to be repeatedlty admitted to the hospital.
- Homeless patients are also more likely to die from cirrhosis.
- Homeless patients with cirrhosis are also more likely to suffer from nutrition-linked cognitive deficits.
- Because of this, your homeless patient is not as likely to understand the risks of cirrhosis and are, consequently, less likely to try and mitigate those risks.
- Hence, your homeless patient is more likely to present with untreated and uncontrolled cirrhosis.



## OSTRACISM-LINKED STRESS INCREASES THE RISK OF ALCOHOL USE DISORDER (AUD)

• A 2019 study detailed how stress increases the risk of alcohol use disorder, especially in women: "Stress is strongly associated with all phases of alcohol addiction, including drinking initiation, maintenance, and relapse for both women and men, but plays an especially critical role for women."[1]

## AUD IS A TOP RISK FACTOR FOR CIRRHOSIS

• According to the American College of Gastroenterology, "There are several known risk factors for developing cirrhosis. The most common risk factors are: Excess alcohol use – regular consumption of more than 1-2 alcoholic beverage a day for women or 2-3 alcoholic beverages a day for men over a long period of time can lead to liver cirrhosis. Patients with other risk factors for liver disease may develop cirrhosis with even less regular alcohol use."[2]

## CIRRHOSIS IS COMMON IN THE HOMELESS

• A 2022 found that 17% of the homeless patients in their study population had cirrhosis.[3]

## HOMELESSNESS INCREASES THE SEVERITY OF CIRRHOSIS

• A 2019 study found, "The presence of multiple comorbidities predicted readmission in our main cirrhosis cohort [including] discharge of patients AMA [against medical advice] .... Patients discharged AMA often having multiple medical comorbidities, are more likely to be homeless and have higher mortality rates."[4]

## HOMELESSNESS AND CIRRHOSIS INCREASE THE RISK OF COGNITIVE IMPAIRMENT

• A 2021 study concluded, "In this study on AUD [alcohol use disorder] patients ... only half of the patients had a normal AA [ascorbic acid/vitamin C] level. ... This prevalence of AAD was higher in men, patients living on the street and those suffering from compensated cirrhosis. ... A low level of AA was associated with cognitive impairment."[5]

1 Peltier, MacKenzie R., Terril L. Verplaetse, Yann S. Mineur, Ismene L. Petrakis, Kelly P. Cosgrove, Marina R. Picciotto, and Sherry A. McKee. "Sex Differences in Stress-Related Alcohol Use." Neurobiology of Stress 10 (February 1, 2019): 100149. https://doi.org/10.1016/j.ynstr.2019.100149.

2 American College of Gastroenterology. "Liver Cirrhosis." Accessed July 23, 2022. https://server1.gi.org/topics/liver-cirrhosis/.

3 Hashim, Ahmed., Stephen Bremner, Jane I. Grove, Stuart Astbury, Manuela Mengozzi, Margaret O'Sullivan, Lucia Macken, et al. "Chronic Liver Disease in Homeless Individuals and Performance of Non-Invasive Liver Fibrosis and Injury Markers: VALID Study." Liver International 42, no. 3 (2022): 628–39. https://doi.org/10.1111/liv.15122.

4 Shaheen, Abdel-Aziz, Henry Nguyen, Stephen Congly, Gilaad Kaplan, and Mark Swain. "Nationwide Estimates and Risk Factors of Hospital Readmission in Patients with Cirrhosis in the United States." Liver International 39 (January 28, 2019). https://doi.org/10.1111/liv.14054.

5 Clergue-Duval, Virgile, Julien Azuar, Julien Fonsart, Clément Delage, Dorian Rollet, Jihed Amami, Alexia Frapsauce, et al. "Ascorbic Acid Deficiency Prevalence and Associated Cognitive Impairment in Alcohol Detoxification Inpatients: A Pilot Study." Antioxidants 10, no. 12 (December 2021): 1892. https://doi.org/10.3390/antiox10121892.

## Development of and failure to treat: Cirrhosis

This is how you can help those living on the streets treat their cirrhosis of the liver:

- Cognitive impairment in any cirrhosis patient – especially a homeless one – is not a zebra condition.
- Begin by understanding your homeless patient with cirrhosis is likely to have significant memory impairments.
- Your homeless cirrhosis patient is also likely to have an extreme reduction in their ability to pay attention.
- These deficits are seen across the range of cirrhosis stages beginning with the least severe levels of the disease.
- Because of this, your homeless patient with cirrhosis is unlikely to fully understand your comments and instructions.
- Consequently, caring and supportive communication is the key to help your patient deal with cirrhosis.

## HOMELESS PATIENTS WITH CIRRHOSIS HAVE A 72% REDUCTION IN COMPLEX MEMORY FUNCTION

• A 2005 study examined memory impairment in patients with cirrhosis and reported, "We detected a 36% decrement in personal and actual information, 40% decrement in orientation, 36% decrement in concentration, 48% decrement in logical memory, 68% decrement in attention, 92% decrement in visual memory, 40% decrement in verbal intellect memory, 68% decrement in short-term verbal memory, 44% decrement in long-term verbal memory, and 72% decrement in complex memory process in cirrhotic patients without HE [hepatic encephalopathy] as compared to healthy subjects. ... There was no statistical significant difference in cirrhotic patients with Child-Pugh A, B and C. In addition, all psychometric tests were similar in cirrhotic patients with and without a history of HE."[1]

## HERE ARE TIPS FOR WORKING WITH A COGNITIVELY IMPAIRED PATIENT

• As developed by the National Institute on Aging, here are 15 tips for effectively working with and communicating with cognitively impaired patients.

"1) Try to address the patient directly, even if his or her cognitive capacity is diminished. 2) Gain the person's attention. Sit in front of and at the same level as him or her and maintain eye contact. 3) Speak distinctly and at a natural rate of speed. Resist the temptation to speak loudly. 4) Help orient the patient. Explain (or re-explain) who you are and what you will be doing. 5) If possible, meet in surroundings familiar to the patient. Consider having a family member or other familiar person present at first. 6) Support and reassure the patient. Acknowledge when responses are correct. 7) If the patient gropes for a word, gently provide assistance. 8) Make it clear that the encounter is not a "test" but rather a search for information to help the patient. 9) Use simple, direct wording. Present one question, instruction, or statement at a time. 10) If the patient hears you but does not understand you, rephrase your statement. 11) Although open-ended questions are advisable in most interview situations, patients with cognitive impairments often have difficulty coping with them. Consider using a yes-or-no or multiple-choice format. 12) Remember that many older people have hearing or vision problems, which can add to their confusion. 13) Consider having someone call the patient to follow up on instructions after outpatient visits. 14) If the patient can read, provide written instructions and other background information about the problem and options for solutions. 15) Address potential issues of driving, getting lost, and home safety each time you see the patient. And, encourage regular physical activity, social activity, hobbies, and intellectual stimulation, as well as a healthy diet. Some studies link these approaches to the maintenance of cognitive function."[2]



1 Bahceci, Funda, Bulent Yildirim, Melih Karincaoglu, Ibrahim Dogan, and Birsen Sipahi. "Memory Impairment in Patients with Cirrhosis." Journal of the National Medical Association 97, no. 2 (February 2005): 213–16.

2 National Institute on Aging. "Tips for Communicating with a Confused Patient." Accessed July 23, 2022. https://www.nia.nih.gov/health/tips-communicating-confused-patient.

# Development of and failure to treat: Mental illness

This is why the unsheltered may develop and fail to treat their mental illness:

- Over 75% of the homeless have a current mental disorder.
- According to a recent and exceptionally large study from Denmark, the diagnosis of a single mental disorder dramatically increases the risk of developing another mental disorder.
- For example, the study found, "the rate of receiving a diagnosis of neurotic disorders was almost 80 times higher in the first 6 months after receiving a diagnosis of mood disorders, compared with those without a diagnosis of mood disorders."
- While the risk diminishes over time, the study found "even after 15 years, affected individuals had a higher rate of receiving a diagnosis of incident neurotic disorders compared with those who had not received a diagnosis of mood disorders."
- In short, your homeless patient is highly likely to develop at least one other mental disorder while they are attempting to deal with their index disorder.



## OVER 3 OF 4 OF YOUR HOMELESS PATIENTS HAVE A CURRENT MENTAL DISORDER

• A 2021 systematic review and meta-regression analysis investigated mental illness among the homeless and found, "The mean prevalence of any current mental disorder was estimated at 76.2% (95% CI 64.0% to 86.6%). The most common diagnostic categories were alcohol use disorders, at 36.7% (95% CI 27.7% to 46.2%), and drug use disorders, at 21.7% (95% CI 13.1% to 31.7%), followed by schizophrenia spectrum disorders (12.4% [95% CI 9.5% to 15.7%]) and major depression (12.6% [95% CI 8.0% to 18.2%])."[1]

## ONCE A HOMELESS PERSON HAS ONE MENTAL DISORDER, THEIR CHANCE OF DEVELOPING ANOTHER DISORDER IS SHOCKINGLY HIGH

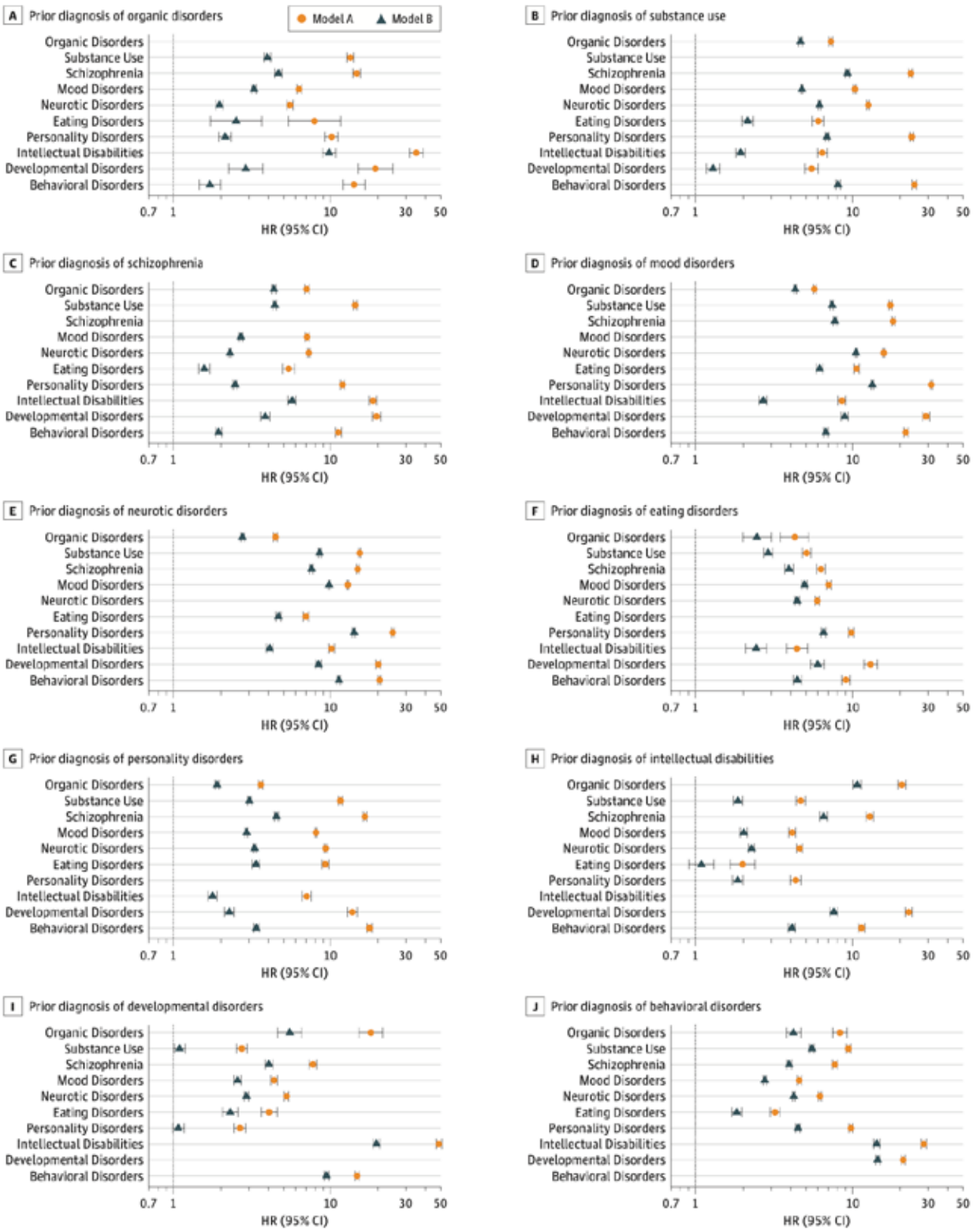
• According to a 2019 study from Denmark, "A total of 5,940,778 persons were included in this study (2,958,293 men and 2,982,485 women; mean [SD] age at beginning of follow-up, 32.1 [25.4] years). They were followed up for 83.9 million person-years. All mental disorders were associated with an increased risk of all other mental disorders when adjusting for sex, age, and calendar time (hazard ratios ranging from 2.0 [95% CI, 1.7-2.4] for prior intellectual disabilities and later eating disorders to 48.6 [95% CI, 46.6-50.7] for prior developmental disorders and later intellectual disabilities). The hazard ratios were temporally patterned, with higher estimates during the first year after the onset of the first disorder, but with persistently elevated rates during the entire observation period. Some disorders were associated with substantial absolute risks of developing specific later disorders (eg, 30.6% [95% CI, 29.3%-32.0%] of men and 38.4% [95% CI, 37.5%-39.4%] of women with a diagnosis of mood disorders before age 20 years developed neurotic disorders within the following 5 years).... For example, the rate of receiving a diagnosis of neurotic disorders was almost 80 times higher in the first 6 months after receiving a diagnosis of mood disorders, compared with those without a diagnosis of mood disorders."[2]

**Because of the importance of this information, the risk chart from the study is printed on the next page for your review. Understanding the risks – which are multi-directional – is a physician's first step in helping your mentally ill patient deal with their condition on the streets.**

1 Gutwinski, Stefan, Stefanie Schreiter, Karl Deutscher, and Seena Fazel. "The Prevalence of Mental Disorders among Homeless People in High-Income Countries: An Updated Systematic Review and Meta-Regression Analysis." PLOS Medicine 18, no. 8 (August 23, 2021): e1003750. https://doi.org/10.1371/journal.pmed.1003750.

2 Plana-Ripoll, Oleguer, Carsten Bøcker Pedersen, Yan Holtz, Michael E. Benros, Søren Dalsgaard, Peter de Jonge, Chun Chieh Fan, et al. "Exploring Comorbidity Within Mental Disorders Among a Danish National Population." JAMA Psychiatry 76, no. 3 (March 1, 2019): 259. https://doi.org/10.1001/jamapsychiatry.2018.3658.

**Figure 1. Risk of Persons With and Without a Diagnosis of a Prior Disorder Receiving a Diagnosis of Another Disorder**




Each panel shows the pairwise comorbidity between prior disorders and later disorders. Some 95% CIs are obscured by the effect size symbol used to display the hazard ratio (HR). Estimates were obtained via Cox proportional hazards regression models with age as the underlying time scale, adjusting for sex and calendar time (model A) and further adjustment for other mental disorders that had onset before the prior disorder (model B). The line of unity is shown as a dotted line in each panel.

# Development of and failure to treat: STIs

This is why the unsheltered may develop and fail to treat their sexually transmitted illnesses:

• The biggest risk factors for sexually transmitted illness in a homeless woman are: 1) Intimate partner violence (IPV), 2) History of abuse, 3) History of assault, 4) History of substance abuse, 5) Any past or current mental illness.
• The biggest risk factors for sexually transmitted illness in a homeless youth include exposure to violence and using sex for survival.
• Homeless patients who have been exposed to violence may fear for their lives – or the lives of their children. Because of this, they may be reluctant to seek treatment for a sexually transmitted illness, an act which may anger their abuser.
• Homeless sex workers may also be reluctant to seek treatment for a STI, an act which may anger their pimp.
• And homeless women and men may be reluctant to admit the existence of an STI, an act which may anger the person they trade sex with for their survival.



## HOMELESS WOMEN WITH A HISTORY OF INTIMATE PARTNER VIOLENCE HAVE THE HIGHEST RATES OF STIS

• A 2018 systematic literature review reported, "This review of literature focused on homeless adults, sought to describe associations between STIs and risk factors. Homeless women who experience IPV [intimate partner violence] had the highest prevalence of one or more STI diagnoses, and STIs were also associated with any histories of abuse and assault. With regard to substance use, all but one study measured and reported substance use as a contributing factor to homelessness or STI prevalence. For women, IPV histories increased the likelihood of having a substance use history, and both IPV and substance use histories were associated with STI prevalence. For men with HCV, substance use history seems to be a primary risk for STIs. Mental health symptoms or disorders are also associated with STI risk and outcomes for women, but the indicators were not reported for men. Four studies reported incarceration as a risk factor for STI rates or STI history among women, and predictive of HCV for homeless men."[1]

## TWO WORDS HEIGHTEN THE RISK OF STIS: 'SURVIVAL SEX'

• A 2017 narrative review found, "All studies in the review identified behavioral risk factors associated with STD prevalence. Homeless youth who experienced longer periods of homelessness were more likely to engage in high-risk sexual behaviors, such as alcohol and drug use, multiple sex partners, inconsistent use of condoms, violence, and survival sex."[2]

## THE HOMELESS HAVE HIGHER RATES OF MOST STIS INCLUDING 14 TIMES THE RATE OF SYPHILIS

• According to a 2022 study, "PEH [people experiencing homelessness] patients were more likely to have ED visits (94.80% vs 33.04%) and ≥ 20 outpatient clinic visits (60.29% vs 16.16%) than non-PEH patients in 2019. Higher diagnoses were observed for syphilis 1.57% vs 0.11%, HIV 3.93% vs 0.41%, chlamydia 1.94% vs 0.85% and gonorrhea 1.26% vs. 0.33% among PEH compared to non-PEH. Among PEH, higher STI/HIV diagnoses rates indicate an increase in STI burden and suboptimal STI testing indicates an underutilization of STI services despite having a higher percentage of health care visits compared to non-PEH patients. Focused STI/HIV interventions are needed to address health care needs of PEH patients."[3]

1 Williams, Samantha P., and Kenneth L. Bryant. "Sexually Transmitted Infection Prevalence among Homeless Adults in the United States: A Systematic Literature Review." Sexually Transmitted Diseases 45, no. 7 (July 2018): 494–504. https://doi.org/10.1097/OLQ.0000000000000780.
2 Caccamo, Alexandra, Rachel Kachur, and Samantha P. Williams. "Narrative Review: Sexually Transmitted Diseases and Homeless Youth—What Do We Know About Sexually Transmitted Disease Prevalence and Risk?" Sexually Transmitted Diseases 44, no. 8 (August 2017): 466–76. https://doi.org/10.1097/OLQ.0000000000000633.
3 Patel, Chirag G., Samantha P. Williams, and Guoyu Tao. "Access to Healthcare and the Utilization of Sexually Transmitted Infections Among Homeless Medicaid Patients 15 to 44 Years of Age." Journal of Community Health, July 10, 2022. https://doi.org/10.1007/s10900-022-01119-y.

## Development of and failure to treat: STIs

This is how you can help those living on the streets treat their sexually transmitted illnesses:

- For homeless women, intimate partner violence is frequently the cause of an STI and the barrier to treating that STI.
- Because of this, to truly treat the sexually transmitted illness, steps must be taken to remove the patient from violence.
- Once the patient is safe, steps must then be taken to help the victimized patient "re-establish a sense of safety and empowerment to regain control of their lives in the context of a safe, therapeutic relationship."
- This approach should go without question when dealing with a housed patient.
- This approach should also go without question when dealing with a homeless patient.

### UNDERSTAND HOW INCREDIBLY DIFFICULT IT IS FOR A VICTIM OF INTIMATE PARTNER VIOLENCE TO SEEK HELP FOR AN STI

• A 2009 study detailed the issues involved: "Many women who experience IPV often find it difficult to seek help or leave an abusive relationship. Often these women live with intense shame and fear that prevents them from taking action to protect themselves. They fear for their lives as well as their children's in addition to worrying about retaliation if they go outside of the relationship for support. As noted earlier, women exposed to IPV experience more life threats and fears of bodily injury than men and are exposed to frequent and long lasting violence. A significant proportion (47%–72%) of these women do not report their abuse experiences to the police. In addition to fear, many of these women suffer from psychiatric disorders as a consequence of their exposure to violence (e.g., depression, PTSD, substance abuse), which may make it even harder to mobilize their psychological and social resources and take action."[1]

### UNDERSTAND HOW INCREDIBLY DIFFICULT IT IS FOR A HOMELESS VICTIM OF IPV TO RECEIVE TREATMENT FOR IPV

• The same 2009 study provided the extensive steps needed to successfully treat the many issues created by IPV: "Given the multifaceted nature of women's response to IPV, treatment will necessarily require a multimodal approach which targets a wide range of psychiatric symptoms. A strong emphasis is placed on helping victimized women re-establish a sense of safety and empowerment to regain control of their lives in the context of a safe, therapeutic relationship. Moreover, given the multiple levels on which women may need help, clinicians may find themselves in the position of coordinating a wide range of services for these women including social support and legal advocacy. Also of importance is increased awareness of the various legal options and responses available to each client and the necessity of protecting client's psychotherapy records during legal trials. Clinicians are encouraged to be mindful of the socio-cultural barriers to seeking or receiving help including gender and ethnic/racial proscriptions against help-seeking as well as the economic factors that prevent women from leaving an abusive relationship."[2]



1 Hien, Denise, and Lesia Ruglass. "Interpersonal Partner Violence and Women in the United States: An Overview of Prevalence Rates, Psychiatric Correlates and Consequences and Barriers to Help Seeking." International Journal of Law and Psychiatry 32, no. 1 (2009): 48–55. https://doi.org/10.1016/j.ijlp.2008.11.003.

2 Hien, Denise, and Lesia Ruglass. "Interpersonal Partner Violence and Women in the United States: An Overview of Prevalence Rates, Psychiatric Correlates and Consequences and Barriers to Help Seeking." International Journal of Law and Psychiatry 32, no. 1 (2009): 48–55. https://doi.org/10.1016/j.ijlp.2008.11.003.

# Development of and failure to treat: COVID-19

This is why the unsheltered may develop and fail to prevent and/or treat their COVID-19 infection:

- The homeless are pushed to the margins of public society and lack independent access to useful information resources.
- One of the resources they turn to is talk radio which they listen to on inexpensive portable radios.
- Talk radio is a major source of COVID-19 disinformation, but it is a source that its listeners trust.
- That's why a 74-year-old homeless man in Tucson, Arizona (pictured with COVID-19 in the photo above) had refused to be vaccinated even though he had known the street-based medical team for several years.
- That relationship, however, convinced this patient to be one of the first to receive Paxlovid in Arizona.
- Due to the risk of losing medication on the streets, a healthcare team brought this patient his pills twice each day.
- This team approach enabled Paxlovid to facilitate his remarkable recovery.



## THE HOMELESS SUFFER FROM 'INFORMATION POVERTY'

• A 2008 study described the problem: "The factors that disadvantage developing nations are also present among the homeless population in industrialized nations and affect the relationship of this population with technology; lower levels of education and literacy restrict access to information, a lack of economic independence restricts access to computers and Internet resources, and limited access to training hinders uptake of digital technology when it is made available. These factors converge, leading to a situation of economic poverty along with what has been called information poverty—a dearth of access to useful information resources."[1]

## EVEN YOUNGER PEOPLE ON THE STREETS LACK ACCESS TO THE INTERNET AND SOCIAL MEDIA

• A 2018 study found, "While experiencing homelessness, subjects [homeless youth aged 18-21] reported a 68% decreased odds in internet access frequency, 75% decreased odds in spending greater amounts of time on the internet, and an 87% decreased odds of social media use." [2]

## A POPULAR SOURCE FOR NEWS FOR THOSE ON THE STREETS IS TALK RADIO

• A 2020 post on the "HomelessOnReddit" community advised, "PSA: Homeless people absolutely love battery powered AM/FM radio's--they don't require a monthly data plan and helps the mind numbing reality of outside living! For those looking for homeless gift ideas around the holidays this is it. Bonus for built-in speaker cause a lot of headphones fail."[3]

## TALK RADIO IS A MAJOR SOURCE OF COVID-19 DISINFORMATION

• A 2021 study found, "Only one-third of [talk radio] frequent listeners (compared with 87 percent of non-listeners) said they always wear masks in public, or do so except when outside and socially distancing—with most reporting that they only wear masks 'sometimes' or never. Just 15 percent of listeners (compared with 67 percent of non-listeners) worry that they or family members might become sick. Only 3 percent of listeners (vs. 76 percent of non-listeners) agree that the government's highest priority should be containing the spread of the virus ... ."[4]

1 Le Dantec, Christopher A., and W. Keith Edwards. "Designs on Dignity: Perceptions of Technology among the Homeless." In Proceeding of the Twenty-Sixth Annual CHI Conference on Human Factors in Computing Systems - CHI '08, 627. Florence, Italy: ACM Press, 2008. https://doi.org/10.1145/1357054.1357155.

2 VonHoltz, Lauren A Houdek, Rosemary Frasso, Jesse M Golinkoff, Alicia J Lozano, Alexandra Hanlon, and Nadia Dowshen. "Internet and Social Media Access Among Youth Experiencing Homelessness: Mixed-Methods Study." Journal of Medical Internet Research 20, no. 5 (May 22, 2018): e184. https://doi.org/10.2196/jmir.9306.

3 HomelessOnReddit. "PSA: Homeless People Absolutely Love Battery Powered AM/FM Radio's--They Dont Require a Monthly Data Plan and Helps the Mind Numbing Reality of Outside Living! For Those Looking for Homeless Gift Ideas around the Holidays This Is It. Bonus for Built-in Speaker Cause a Lot of Headphones Fail." Reddit Post. R/Homeless, November 21, 2020. www.reddit.com/r/homeless/comments/jygask/psa_homeless_people_absolutely_love_battery/.

4 Hamilton, Lawrence, and Thomas Safford. "Conservative Media Consumers Less Likely to Wear Masks and Less Worried About COVID-19," 2020. https://doi.org/10.34051/p/2021.6.

# Development of and failure to treat: COVID-19

This is how you can help those living on the streets prevent and/or treat their COVID-19 infection:

• Only 15% of homeless patients trust their physician as a reliable source for their medical information about COVID-19.

• Over 70% of the homeless, on the other hand, trust their "news source" for COVID-19 information.

• Having a trusting relationship with a physician is associated with a much higher use of COVID-19 treatments like Paxlovid.

• Not having a trusting relationship with a physician creates an extreme barrier to the diagnosis and consequent treatment of COVID-19.

• Because of this, the prevention and treatment of your homeless patient's COVID-19 infection begins BEFORE they become infected.

• Working to establish trust with your homeless patient is the single most important step to treating this – or any – disease.

## OVER 30% OF THE HOMELESS ARE NOT PLANNING ON RECEIVING A COVID-19 VACCINATION

• A 2022 surveyed homeless residenst and staff at a homeless shelter and found, "33 (31.1%) clients and five (13.9%) staff were not planning on receiving a vaccine, and 12 (11.3%) clients and four (11.1%) staff remained unsure. ... Among those who were unsure about or not planning to receive a vaccine, the most commonly reported reasons for their decision was concern over systemic side effects such as fever or body aches (29 clients [64.4%] and 7 staff [77.8%]), concern over unknown long-term health effects (26 clients [57.8%] and 6 staff [66.7%]), and concern about the vaccines being new (21 clients [46.7%] and 4 staff [44.4%]).Twenty-four (53.3%) clients also specified 'Other' reasons why they were not planning on receiving the vaccine, which included fear of dying from the vaccine ... ."[1]

## ONLY 15% OF THE HOMELESS TRUST THEIR PHYSICIAN FOR COVID-19 INFORMATION WHILE OVER 70% TRUST THEIR 'NEWS SOURCE'

• The same 2022 study found, "Participants who did not want to receive a COVID-19 vaccine or were uncertain about receiving a vaccine were asked an open-ended question if anything would help them feel more comfortable receiving a vaccine (data not shown). Most clients (29; 64.4%) did not offer a recommendation. Some clients (6; 13.3%) expressed that they would feel more comfortable if their family or friends received it or if a doctor or nurse recommended it. Among everyone surveyed, the most common and most trusted sources of information about COVID-19 vaccines were news sources (75 clients [70.8%] and 30 staff [83.3%]). A total of 16 (15.1%) clients shared that they trust primary care providers the most."[2]

## LACK OF A TRUSTING RELATIONSHIP WITH A PHYSICIAN CREATES A HUGE BARRIER TO ANTIVIRALS LIKE PAXLOVID

• The New York Times discussed this problem in a recent (April 2022) article: "Not having a regular relationship with a medical provider ... leaves these high-risk people open to confusion and misinformation, especially in the current political environment. People without insurance lagged in being vaccinated at all and will face more obstacles in getting antivirals."[3]



1 Meehan, Ashley A., Michael Yeh, Annette Gardner, Tiera L. DeFoe, Alberto Garcia, Patrick Vander Kelen, Martha P. Montgomery, et al. "COVID-19 Vaccine Acceptability Among Clients and Staff of Homeless Shelters in Detroit, Michigan, February 2021." Health Promotion Practice 23, no. 1 (January 2022): 35–41. https://doi.org/10.1177/15248399211049202.

2 Meehan, Ashley A., Michael Yeh, Annette Gardner, Tiera L. DeFoe, Alberto Garcia, Patrick Vander Kelen, Martha P. Montgomery, et al. "COVID-19 Vaccine Acceptability Among Clients and Staff of Homeless Shelters in Detroit, Michigan, February 2021." Health Promotion Practice 23, no. 1 (January 2022): 35–41. https://doi.org/10.1177/15248399211049202.

3 Tufekci, Zeynep. "Opinion | Covid Drugs Save Lives, but Americans Can't Get Them." The New York Times, April 22, 2022, sec. Opinion. https://www.nytimes.com/2022/04/22/opinion/covid-pandemic-drugs-treatment.html.

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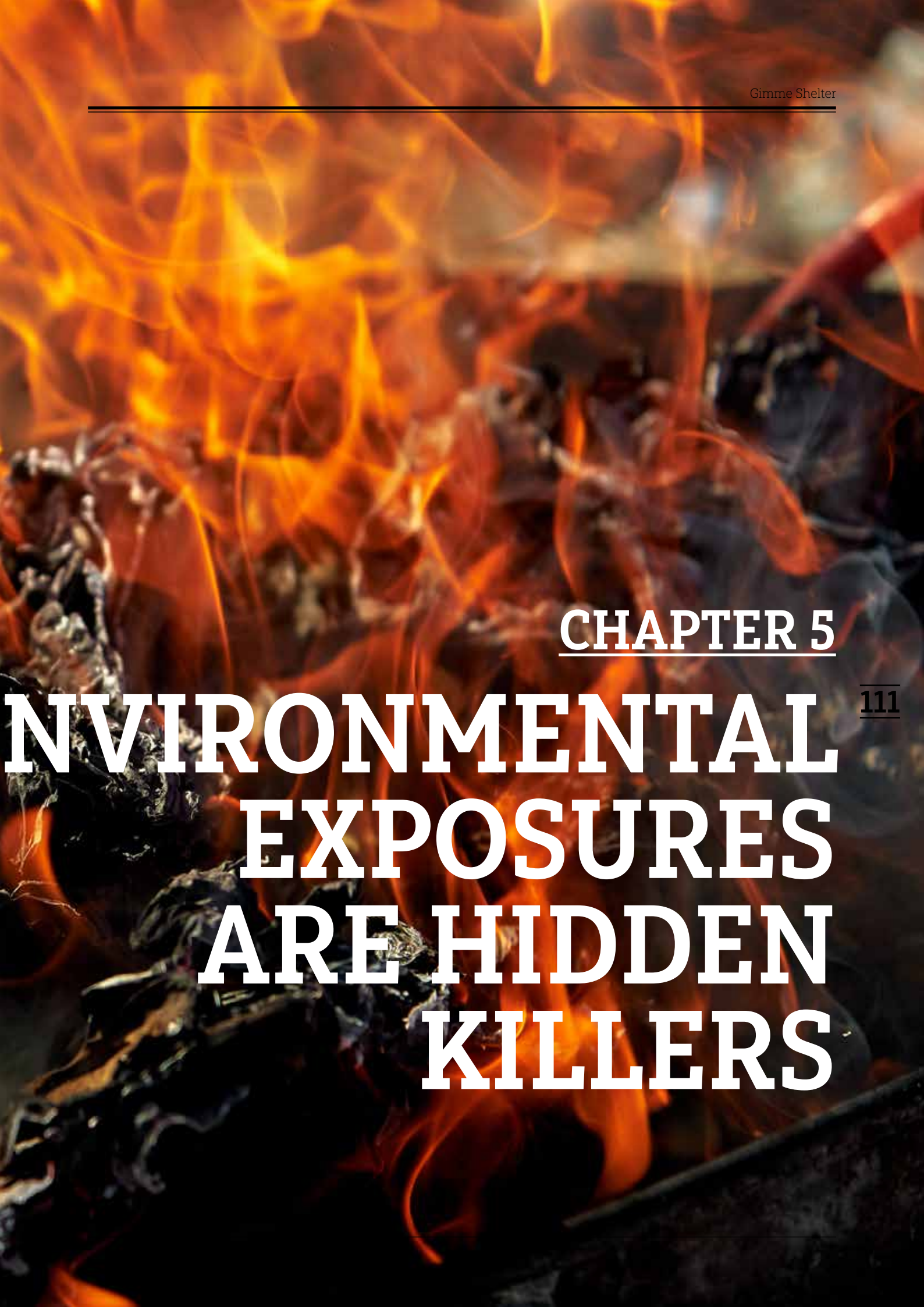


## CHAPTER 5

# NVIRONMENTAL EXPOSURES ARE HIDDEN KILLERS

What is the level of lead in your blood? How many times have you been sickened by carbon monoxide? When was the last time you received a human bite to your hand?

These are not questions generally asked of housed patients, but they are important issues for any patient who is or has been unsheltered.

Here are your bullet points:

## THERE IS NO SAFE PLACE

• Due to environmental pollution, blood levels of heavy metals like cadmium are up to 2.5 times higher in the homeless.[1]

• Also due to environmental exposures, skin infections are prevalent in the homeless.[2]

• Among those skin infections, the homeless are up to 80 times more likely to have an infection caused by invasive group A streptococcus.[3]

**Quick take**

**Environmental dangers lurk everywhere for the homeless.**

## EVEN BREATHING IS NOT SAFE

• 89% of the homeless have sought medical care for conditions related to air pollution.[4]

• Carbon monoxide poisoning – and even cyanide gas poisoning – are risks that the homeless face due to living in tents, tunnels, cars, and places hidden by tarps and plastic sheeting.[5]

• Homeless youth have a 31 times higher rate of hospitalization for asthma.[6]

**Quick take**

**Due to pollutants, not even the air is safe for the homeless to breathe.**



1 Hrnčířová, Dana, Andrea Batáriová, Milena Černá, Bohumír Procházka, Pavel Dlouhý, and Michal Anděl. "Exposure of Prague's Homeless Population to Lead and Cadmium, Compared to Prague's General Population." International Journal of Hygiene and Environmental Health 211, no. 5–6 (October 2008): 580–86. https://doi.org/10.1016/j.ijheh.2007.09.006.

2 Raoult, D., C. Foucault, and P. Brouqui. "Infections in the Homeless." The Lancet. Infectious Diseases 1, no. 2 (September 2001): 77–84. https://doi.org/10.1016/S1473-3099(01)00062-7.

3 Valenciano, Sandra J, Jennifer Onukwube, Michael W Spiller, Ann Thomas, Kathryn Como-Sabetti, William Schaffner, Monica Farley, et al. "Invasive Group A Streptococcal Infections Among People Who Inject Drugs and People Experiencing Homelessness in the United States, 2010–2017." Clinical Infectious Diseases 73, no. 11 (December 1, 2021): e3718–26. https://doi.org/10.1093/cid/ciaa787.

4 DeMarco, Angelina L., Rebecca Hardenbrook, Jeff Rose, and Daniel L. Mendoza. "Air Pollution-Related Health Impacts on Individuals Experiencing Homelessness: Environmental Justice and Health Vulnerability in Salt Lake County, Utah." International Journal of Environmental Research and Public Health 17, no. 22 (November 13, 2020): 8413. https://doi.org/10.3390/ijerph17228413.

5 Turrina, Stefania, Carla Neri, and Domenico De Leo. "Effect of Combined Exposure to Carbon Monoxide and Cyanides in Selected Forensic Cases." Journal of Clinical Forensic Medicine 11, no. 5 (October 1, 2004): 264–67. https://doi.org/10.1016/j.jcfm.2004.01.006.

6 "Asthma Hospitalizations Among Homeless Children in New York State | Pediatrics | American Academy of Pediatrics," (2019) https://publications.aap.org/pediatrics/article/144/2/e20182769/76887/Asthma-Hospitalizations-Among-Homeless-Children-in.

## The View from The Streets:

No one cares about the ridiculously filthy and unsafe world lived in by the homeless. In fact, city and county authorities devise plans to keep the homeless in areas where there are multiple pollutants and other environmental factors that are known to be deadly.

**1) "Do you smell that? That's from the plastic and the old mattress burning in our fire. It's all we can find to burn. How fucked up is that? You know it's gotta be killing us."**[1]

**2) "My feet look like this because my camp got flooded in the rain ... they haven't been dry for nearly a week. Do you have a pair of dry socks? How about shoes? I'm not picky, I'm pretty much considering cutting the damn things off at this point."**[2]

**3) "Yes, I'm goddamn sure it's a spider bite. You think I'm a druggie? I'm not like the others out here. I've been clean for a week."**[3]

**4) "All I need is some supplies to clean my abscess. I live out in the shit and I just need alcohol wipes and gauze to wipe all the dirt away."**[4]

**5) "I'll tell you if you promise not to tell anyone. I don't want to lose my dog. She bit my hand when I went to separate her from another dog that was trying to kill her."**[5]

1 Turrina, Stefania, Carla Neri, and Domenico De Leo. "Effect of Combined Exposure to Carbon Monoxide and Cyanides in Selected Forensic Cases." Journal of Clinical Forensic Medicine 11, no. 5 (October 1, 2004): 264–67. https://doi.org/10.1016/j.jcfm.2004.01.006.

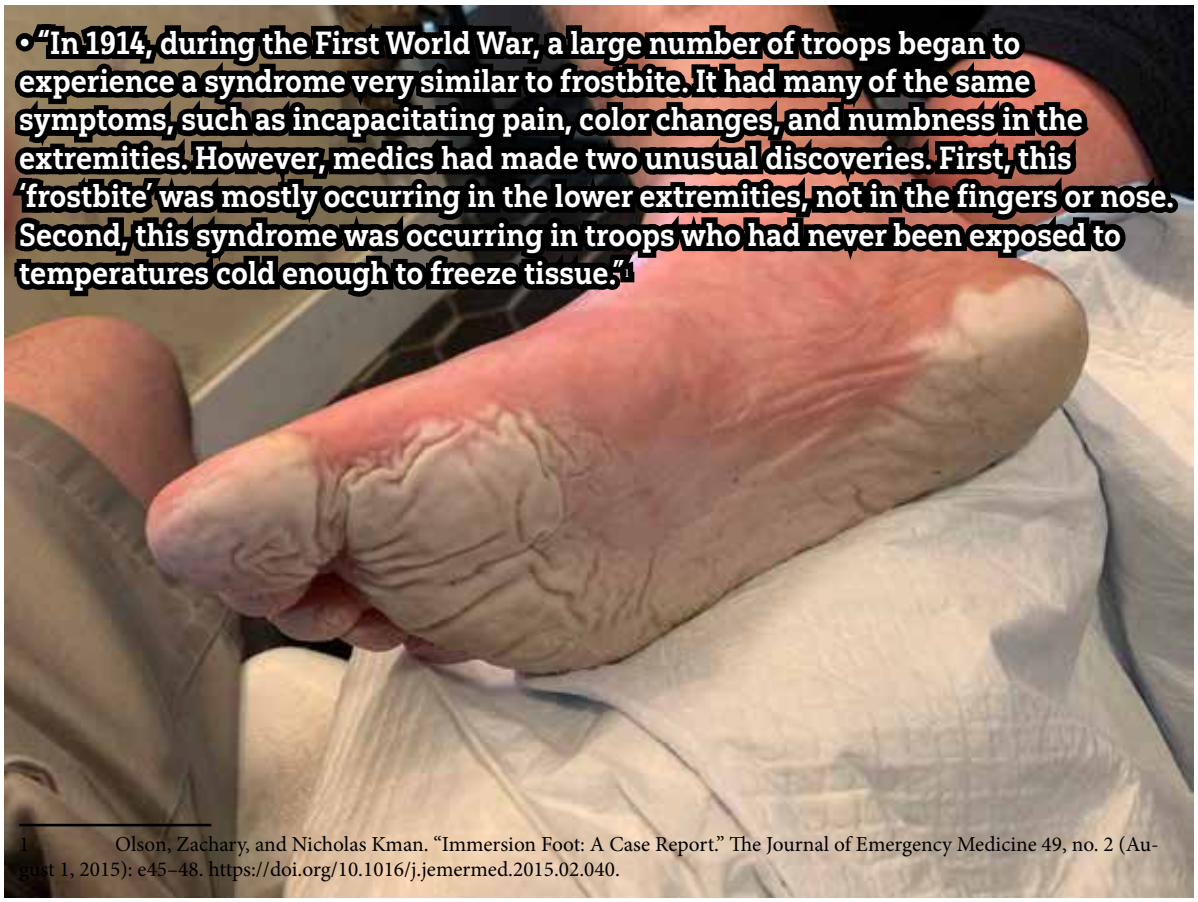
2 Olson, Zachary, and Nicholas Kman. "Immersion Foot: A Case Report." The Journal of Emergency Medicine 49, no. 2 (August 1, 2015): e45–48. https://doi.org/10.1016/j.jemermed.2015.02.040.

3 Suchard, Jeffrey Ross. "'Spider Bite' Lesions Are Usually Diagnosed as Skin and Soft-Tissue Infections." The Journal of Emergency Medicine 41, no. 5 (November 2011): 473–81. https://doi.org/10.1016/j.jemermed.2009.09.014.

4 Monteiro, Jordanna, Kristina T. Phillips, Debra S. Herman, Catherine Stewart, Julia Keosaian, Bradley J. Anderson, and Michael D. Stein. "Self-Treatment of Skin Infections by People Who Inject Drugs." Drug and Alcohol Dependence 206 (January 1, 2020): 107695. https://doi.org/10.1016/j.drugalcdep.2019.107695.

5 Henwood, Benjamin, Eldin Dzubur, Harmony Rhoades, Patricia St. Clair, and Robynn Cox. "Pet Ownership in the Unsheltered Homeless Population in Los Angeles." Journal of Social Distress and Homelessness 30, no. 2 (July 3, 2021): 191–94. https://doi.org/10.1080/10530789.2020.1795791.

*Mama Stacey takes her chihuaha Pancho with her wherever she goes. Pancho is in a carrier hidden among her supplies to prevent anyone from taking him.*




1 Olson, Zachary, and Nicholas Kman. "Immersion Foot: A Case Report." The Journal of Emergency Medicine 49, no. 2 (August 1, 2015): e45–48. https://doi.org/10.1016/j.jemermed.2015.02.040.

# Root cause:

**The camps and the streets of the homeless are filled with hidden environmental dangers.**

## The top responses that present differently in the homeless because of this root cause:

1. Carbon monoxide poisoning
2. Exposure to pollutants and heavy metals
3. Pneumonia
4. Asthma and COPD
5. Skin abscesses
6. Necrotizing fasciitis
7. Spider bites
8. Animal bites
9. Human bites
10. Frostbite and Immersion foot




*Carbon monoxide poisoning happens far too often among the homeless.*
*This story describes how a homeless family of four died from carbon monoxide poisoning.*
**See the video by clicking here.**

# Carbon monoxide poisoning

This is how carbon monoxide poisoning presents differently in the unhoused:

- The homeless who have cars may idle them at night for warmth. As they seek hidden locations, the surrounding shrubbery may hold in the car's exhaust.
- The homeless who camp may try to hide their locations by covering their campsites with tarps and plastic sheeting.
- This keeps them hidden and protected from rain, but it also holds in the smoke from their campfires and camp stoves.
- These campfires burn whatever material is available including plastics and other synthetic materials.
- This creates the enabling conditions for both acute and chronic carbon monoxide poisoning.
- The burning of plastics and synthetics also puts the homelss at risk for cyanide poisoining.



## THE TOP SOURCES OF CARBON MONOXIDE FOR THE HOMELESS: CAR EXHAUST, CAMPFIRES, AND CAMP STOVES

• According to the CDC, "CO is found in fumes produced any time you burn fuel in cars or trucks, small engines, stoves, lanterns, grills, fireplaces, gas ranges, or furnaces."[1]

## THE HIDDEN RISKS OF CHRONIC CARBON MONOXIDE POISONING

• A 2021 case report detailed the dangers of chronic carbon monoxide poisoning: "Chronic CO poisoning" is a condition in which there is repeated exposure to relatively low concentrations of CO. Each time a patient is exposed to CO, if the concentration and duration of exposure are high enough, they will repeatedly develop symptoms associated with exposure to the poison. However, because chronic CO poisoning often presents nonspecific symptoms, it is difficult to recognize and frequently mistaken for a flu-like disease. Symptoms of chronic CO poisoning include chronic fatigue, memory problems, work difficulties, sleep disorders, dizziness, neurological disorders, paresthesia, recurrent infections, abdominal pain, and diarrhea. … These symptoms … can be delayed up to several months or 2–3 years."[2]

## BURNING PLASTICS AND SYNTHETIC MATERIALS MAY RELEASE CARBON MONOXIDE AND HYDROGEN CYANIDE

• Per a 1991 study, "In addition to carbon monoxide, hydrogen cyanide is a major source of concern. The thermal decomposition of various nitrogen-containing materials, either natural (such as wool and silk) or synthetic (such as polyurethane and polyacrylonitrile), can produce toxic levels of hydrogen cyanide."[3]

• A 2004 case study investigated the death of a homeless man and found that the burning of plastics and synthetic material had released both carbon monoxide and cyanide. Per the study, "when the homeless person was found his blood cyanide concentration would be about double (4 mg/l) of that measured when the toxicological test was carried out after the autopsy. … Consequently, this might support a synergistic action between carbon monoxide and cyanide, both important in causing death."[4]

1 Health, National Center for Environmental. "Frequently Asked Questions | CDC," July 1, 2021. https://www.cdc.gov/co/faqs.htm.

2 Tetsuka, Syuichi, Tomohiro Suzuki, Tomoko Ogawa, Ritsuo Hashimoto, and Hiroyuki Kato. "Repeated Unconsciousness Due to Chronic Carbon Monoxide Poisoning in an Older Patient: A Case Report." Journal of Rural Medicine 16, no. 4 (2021): 289–92. https://doi.org/10.2185/jrm.2021-033.

3 Baud, Frédéric J., Patrick Barriot, Véronique Toffis, Bruno Riou, Eric Vicaut, Yves Lecarpentier, Raymond Bourdon, Alain Astier, and Chantal Bismuth. "Elevated Blood Cyanide Concentrations in Victims of Smoke Inhalation." New England Journal of Medicine 325, no. 25 (December 19, 1991): 1761–66. https://doi.org/10.1056/NEJM199112193252502.

4 Turrina, Stefania, Carla Neri, and Domenico De Leo. "Effect of Combined Exposure to Carbon Monoxide and Cyanides in Selected Forensic Cases." Journal of Clinical Forensic Medicine 11, no. 5 (October 1, 2004): 264–67. https://doi.org/10.1016/j.jcfm.2004.01.006.

## Carbon monoxide poisoning

This is how you can assess carbon monoxide poisoning on the streets:

- First, be mindful that both acute and chronic carbon monoxide poisoning are not zebra conditions.
- Assessment of both acute and chronic carbon monoxide poisoning begins with a detailed patient history. For chronic carbon monoxide poisoning, this history should go back 2 to 3 years.
- The symptoms of chronic carbon monoxide poisoning include: chronic fatigue, memory problems, work difficulties, sleep disorders, dizziness, neurological disorders, paresthesia, recurrent infections, abdominal pain, and diarrhea.
- The symptoms of acute cyanide poisoning – which is a zebra condition – include: Patient unresponsive (78%), hypotension (54%), respiratory failure (73%), cardiac arrest (20%), seizures (20%), and cyanosis (15%).

## CHERRY RED SKIN? NOT LIKELY. INSTEAD, A DETAILED PATIENT HISTORY MAY POINT TO SOURCES OF CARBON MONOXIDE EXPOSURE

• A 2019 journal article warned, "Diagnosis of CO poisoning requires a thorough history taking to link any clinical symptoms to environment and exposure to CO. Cardiovascular examination with electrocardiogram may reveal a sinus tachycardia, however CO poisoning has also been associated with angina and cardiac ischaemia. Neurological examination may reveal non-specific symptoms, such as a broad spectrum of sensory changes, inattention, memory change, confusion, ataxia, and in severe cases seizure and reduced consciousness. Carboxyhaemoglobin is brighter in hue than oxyhaemoglobin, which is the cause of the red conjunctival injection in the case in this article. Textbooks often report elevated carboxyhaemoglobin levels that lead to a 'cherry red' skin tone, however this appears to be unfounded and exceptionally rare. Signs on clinical examination of CO poisoning have a poor predictive value, making the key to diagnosis the connection of onset/worsening of symptoms to CO exposure."[1]

• Cherry red skin is also NOT likely in acute cyanide poisoning. Per a 2018 systematic review, "Contrary to general reviews published on cyanide toxicity, reports of cherry red skin and bitter almond odor were rare among published cyanide cases. Consistent with other studies, metabolic acidosis with significant lactic acidosis were the laboratory values consistently associated with cyanide toxicity."[2]

## PHYSICIANS MAY MISS THE SIGNS OF CHRONIC CARBON MONOXIDE POISONING FOR YEARS

• The same 2019 journal article described how physicians missed the diagnosis of chronic CO poisoning ine one housed patient for years: "Sue Westwood-Ruttledge, a patient author for this article, was poisoned by carbon monoxide over three years caused by a disconnected appliance duct in her newly built house. Sue says 'After moving to a new house I had many episodes of feeling generally unwell with lethargy, headaches, dizziness, and nausea. I also struggled to concentrate. I put my symptoms down to being run down due to working long hours. Several times when I had been away on holiday and the windows had all been closed I would come home, go to bed, and be violently sick all night long. My son who was 6 years old when we moved into the house suffered from frequent stomach pains and headaches. After taking him to the GP, each time I was told he was fine and it was suggested my son was trying to get out of going to school." Sue's diagnosis came with difficulty. She underwent a range of neurological examinations, blood investigations, and imaging studies including computed tomography and echocardiography. One of the leading differentials for Sue's case was cocaine abuse, which was distressing for her and left her feeling abandoned."[3]

1 Ashcroft, James, Emma Fraser, Sanjay Krishnamoorthy, and Sue Westwood-Ruttledge. "Carbon Monoxide Poisoning." BMJ, June 13, 2019, l2299. https://doi.org/10.1136/bmj.l2299.

2 Parker-Cote, J. L., et al. "Challenges in the diagnosis of acute cyanide poisoning." Clinical toxicology 56.7 (2018): 609-617.

3 Ashcroft, James, Emma Fraser, Sanjay Krishnamoorthy, and Sue Westwood-Ruttledge. "Carbon Monoxide Poisoning." BMJ, June 13, 2019, l2299. https://doi.org/10.1136/bmj.l2299.

# Exposure to pollutants and heavy metals

This is how the effects of pollutants and heavy metal toxicity presents differently in the unhoused:

- Because so many of the homeless literally live "on the streets," their exposure to car exhaust and other air pollutants is extreme.
- Many of the areas they exist on are roads (or near roads) that have been dusted with lead and other heavy metals for decades.
- In part due to elevated exposure to lead and other pollutants, your pregnant homeless patient is more likely to experience a stillbirth, a preterm birth, or to deliver a low birth weight baby.
- Also because of their exposure to these pollutants, nearly 9 out of 10 homeless patients seek medical care for conditions associated with poor air quality.
- Chief among these are respiratory complaints.
- In short, your homeless patient is likely to present with worsening asthma, COPD, and/or pneumonia simply because of where they live and sleep.



## LEAD AND OTHER POLLUTANTS AFFECT PREGNANT HOMELESS WOMEN AND THEIR FETUSES

• According to a 2022 study, ". The myriad of stressors associated with homelessness include, but are not limited to, inadequate nutrition, lack of sleep and limited access to medical care. These stressors may have important effects on mothers and children. Exposure to air pollution and poor nutrition increase the likelihood of preterm birth and low birth weight. The presence of lead in the home, rodent and pest infestations, crowding, temperature concerns and bed-sharing have also been found to be associated with poor birth outcomes. ... Our study also highlights the very high-risk maternity histories for women experiencing homelessness during pregnancy. 4% experienced a still birth, 24% had a prior preterm delivery, and 18% had a prior low birth weight baby. These high-risk maternity histories are higher than the national averages reported by the CDC in 2017."[1]

## THOSE 'ON THE STREETS' ARE EXPOSED TO DAMAGING AMOUNTS OF AIR POLLUTION

• A 2022 research letter detailed the extreme exposure to air poluttion faced by the homeless: "Participants [all homeless] identified a total of 166 locations where they spent the night during the 2019 calendar year and a further 117 'safe' day locations. ... When analyzed by proximity buffer, 32.5% of night locations and 52.1% of day locations were within 300 m of a major roadway. Mobile emissions modeling for the 2019 calendar year estimated total road traffic-related emissions of PM2:5 at 93.9 tons/y, with a further 190.5 tons/y of road traffic-related PM10 emissions. Total roadway-associated nitrogen dioxide (NO2) emissions were estimated at 186.3 tons/y, with 1541.9 tons/y of TOG emission and 24.5 tons/y of SO2 emissions."[2]

1 Ervin, Emma, Barbara Poppe, Amanda Onwuka, Hannah Keedy, Stephen Metraux, Leslie Jones, Megan Sandel, and Kelly Kelleher. "Characteristics Associated with Homeless Pregnant Women in Columbus, Ohio." Maternal and Child Health Journal 26, no. 2 (February 1, 2022): 351–57. https://doi.org/10.1007/s10995-021-03227-y.

2 MacMurdo, Maeve G., Karen B. Mulloy, Charles W. Felix, Andrew J. Curtis, Jayakrishnan Ajayakumar, and Jacqueline Curtis. "Ambient Air Pollution Exposure among Individuals Experiencing Unsheltered Homelessness." Environmental Health Perspectives 130, no. 2 (2022): 027701. https://doi.org/10.1289/EHP10414.

## Exposure to pollutants and heavy metals

This is how you can assess the effects of pollutants and heavy metal toxicity on the streets:

- First, be mindful that the effects of exposure to pollutants and heavy metals are not zebra conditions in the homeless population.
- In point of fact, 61% of the homeless have reported an adverse physical reaction to air pollution and 9 out of 10 homeless patients have sought medical care for conditions associated with poor air quality.
- Blood testing of the homeless has also revealed starkly higher levels of such heavy metals as lead and cadmium.
- Because of this, you should be aware of the key health effects caused by lead exposure including peripheral neuropathy, seizures, and chronic nephropathy with proximal tubular damage.
- In addition, safe housing should be considered as a primary treatment for homeless patients with worsening respiratory complaints.

## CONSTANT EXPOSURE TO AIR POLLUTION EFFECTS THE HEALTH OF THE HOMELESS

• A 2020 study looking at the effects of air pollution on the homeless population in Salt Lake City found, "Exposure to air pollution worsens individuals' health by increasing cardiovascular and pulmonary events, exacerbations of asthma, and mortality. Fine particulate matter (PM2.5) and ozone, even low levels of exposure, have resulting in increased rates of mortality … Nearly 90% of the [homeless] sample indicated that they notice air pollution, with the most common way of noticing it being through sight (46.3%), followed by smell (12.3%). Further, 61% of [the homeless] reported having a physical reaction to air pollution and 37% of the sample reported air pollution-related emotional stress. Additionally, more than 89% of interviewees sought medical attention because of a condition associated with poor air quality. Of these participants who reported health-related pollution impacts, the majority of the concerns centered around chest complaints (49.6%), followed by exhaustion (18.7%) and ear, nose, throat, and headache complaints (17.9%)."[1]

## BLOOD LEAD AND CADMIUM LEVELS ARE HIGHER IN THE HOMELESS

• A 2008 study looked at the blood levels of the homeless population in Prague and deterimined, "B-Pb [blood lead] levels in homeless women (34.8 mg/l) were significantly higher than those in women in the GP [general population] (25.8 mg/l). … B-Cd [blood cadmium] levels in the HP [homeless population] were more than 2.5 times higher than in the GP."[2]

## THE EFFECTS OF LEAD EXPOSURE IN ADULTS MAY BE EXTENSIVE

• According to the State of New York Department of Health, "Lead exposure occurs when lead dust or fumes are inhaled, or when lead is ingested via contaminated hands, food, water, cigarettes or clothing. Lead entering the respiratory and digestive systems is released to the blood and distributed throughout the body. More than 90% of the total body burden of lead is accumulated in the bones, where it is stored. Lead in bones may be released into the blood, re-exposing organ systems long after the original exposure. … [K]ey lead-induced health effects [include] Neurological Effects: Peripheral neuropathy, Fatigue/Irritability, Impaired concentration, Hearing loss, Wrist/ Foot drop, Seizures, Encephalopathy. Gastrointestinal Effects: Nausea, Dyspepsia, Constipation, Colic, Lead line on gingival tissue. Reproductive Effects: Miscarriages/Stillbirths, Reduced sperm count & motility, Abnormal sperm. Heme Synthesis: Anemia, Erythrocyte protoporphyrin elevation. Renal Effects: Chronic nephropathy with proximal tubular damage, Hypertension. Other: Arthralgia, Myalgia."[3]

1 DeMarco, Angelina L., Rebecca Hardenbrook, Jeff Rose, and Daniel L. Mendoza. "Air Pollution-Related Health Impacts on Individuals Experiencing Homelessness: Environmental Justice and Health Vulnerability in Salt Lake County, Utah." International Journal of Environmental Research and Public Health 17, no. 22 (November 13, 2020): 8413. https://doi.org/10.3390/ijerph17228413.

2 Hrnčířová, Dana, Andrea Batáriová, Milena Černá, Bohumír Procházka, Pavel Dlouhý, and Michal Anděl. "Exposure of Prague's Homeless Population to Lead and Cadmium, Compared to Prague's General Population." International Journal of Hygiene and Environmental Health 211, no. 5–6 (October 2008): 580–86. https://doi.org/10.1016/j.ijheh.2007.09.006.

3 "Lead Exposure in Adults: A Guide for Health Care Providers" State of New York Department of Health (2008) 12.

# Pneumonia

This is how pneumonia presents differently in the unhoused:

- In part due to environmental exposures, the homeless have 94 times the risk of developing invasive pneumococcal disease.
- Unlike the housed, the homeless who develop invasive pneumococcal disease are generally under 65 years of age (96.6%).
- The homeless may also present with "atypical pneumonia" that is no longer so atypical.
- Chief among these is mycoplasma pneumoniae pneumonia.
- Because of this, your homeless pneumonia patient may present with a cascade of bewildering signs and symptoms including dermatoligic findings (i.e. Stevens-Johnson syndrome), cardiovascular issues (i.e. cardiac thrombi), and central nervous system findings (e.g. encephalitis, aseptic meningitis).
- Due to dehydration, your homeless patient may present without the rales and rhonchi that typify pneumonia in the general population.
- In addition, because the homeless are forced away from population centers, they may be unable to reach medical care when they develop pneumonia. This was the case for Pockets (pictured above) who died in his camp too sick to walk to medical care.



## THE HOMELESS HAVE 94 TIMES THE RISK OF DEVELOPING INVASIVE PNEUMOCOCCAL DISEASE

• A 2019 study found, "Of the 1729 cases, 321 cases (18.8%) occurred in homeless persons. Compared with the estimated prevalence of homelessness in the adult population (0.2%), homelessness was over-represented in IPD [invasive pneumococcal disease] cases by a factor of 94 times. The mean age in homeless persons was 45.0 years (median [range], 45.0 [18.6–72.9] years), compared with a mean age of 57.9 years (median [range], 60.6 [18.5–101.3] years) in nonhomeless persons (P < .001). In addition, 310 IPD cases (96.6%) in homeless persons occurred in persons under 65 years of age, compared with 896 IPD cases (64.6%) in nonhomeless persons occurring in persons under 65 years. … [The] homeless persons were more commonly male, and the majority presented with a primary diagnosis of pneumonia and empyema."[1]

## 'ATYPICAL' PNEUMONIA IS NO LONGER SO ATYPICAL DUE TO THE RISE OF MYCOPLASMA PNEUMONIAE AND CHLAMYDOPHILIA PNEUMONIAE

• On the streets in Tucson, Arizona CCHS medical teams have noted a growing incidence of "atypical" pneumonias. This trend was also noted in a 2016 study: "In recent years, faced with aging society, increasing damaging factors to the immune system, changing nature of pathogens and rising antibiotic resistance, the treatment of CAP [Community-acquired pneumonia] now encounters many new problems. Some scholars believe that atypical respiratory pathogens like the Mycoplasma Pneumoniae (M. Pneumoniae) and Chlamydophila pneumoniae (C. Pneumoniae) will replace Streptococcus pneumoniae as the most common pathogens for CAP."[2]

• The potential severity of mycoplasma pneumoniae infection is also underrecognized. Per a 2016 study, "Apart from its atypical symptoms, M pneumoniae presentations can vary dramatically ranging from the mild upper respiratory symptoms to pneumonia and other extrapulmonary manifestations in absence of pneumonia, including dermatologic [Erythema Nodosum, Cutaneous Leukocytoclastic Vasculitis, Stevens-Johnson Syndrome], cardiovascular [Cardiac thrombi, Kawasaki disease], and central nervous system findings [Encephalitis, aseptic meningitis]."[3]

1 Lemay, Julie-Anne, Leah J Ricketson, Lauren Zwicker, and James D Kellner. "Homelessness in Adults With Invasive Pneumococcal Disease in Calgary, Canada." Open Forum Infectious Diseases 6, no. 10 (October 1, 2019): ofz362. https://doi.org/10.1093/ofid/ofz362.

2 Yu, Yun, and Aihua Fei. "Atypical Pathogen Infection in Community-Acquired Pneumonia." BioScience Trends., (2016), 7.

3 Sharma, Lokesh, Ashley Losier, Thomas Tolbert, Charles S. Dela Cruz, and Chad R. Marion. "Pneumonia Updates on Legionella, Chlamydophila, and Mycoplasma Pneumonia." Clinics in Chest Medicine 38, no. 1 (March 2017): 45–58. https://doi.org/10.1016/j.ccm.2016.11.011.

## Pneumonia

This is how pneumonia can be assessed on the streets:

- First, be mindful that the ABSENCE of rales and rhonchi in your homeless pneumonia patient is not a zebra finding.
- Due to the high rate of atypical pneumonia, like mycoplasma pneumoniae pneumonia, some breath sounds in your homeless patient may be absent or diminshed.
- In addition, due to the likely dehydration in your homeless pneumonia patient, some breath sounds may also be absent or diminished.
- Because of this, and because of the poor accuracy of symptoms and physical signs in assessing pneumonia in your homeless patient, point of care ultrasound (POCUS) may be a good choice for use on the streets.

## HOMELESS ATYPICAL PNEUMONIA PATIENTS FREQUENTLY HAVE AN ABSENCE OF RALES AND RHONCHIS

• A 2011 study looked at the treatment of community-acquired pneumonia and found, "Community-acquired pneumonia is diagnosed in 3 to 4 million persons annually and continues to be a leading cause of death in the United States. One study estimated that more than 900,000 cases of community-acquired pneumonia occur each year in persons aged more than 65 years.1 Approximately 80% of patients with pneumonia are treated as outpatients. Common risk factors for community-acquired pneumonia include age greater than 65 years, smoking, alcohol consumption, chronic lung diseases, mechanical obstruction of airways, aspiration of oropharyngeal or gastric contents, pulmonary edema, uremia, and malnutrition. ... Systemic physical findings in pneumonia are nonspecific and include fever/chills, fatigue, myalgias, or headaches. Pulmonary findings in pneumonia are typically localized to a specific lung zone and may include rales, rhonchi, bronchial breath sounds, dullness, increased fremitus, and egophony. Atypical pneumonia may have absent or diffuse findings on lung examination. ... The cornerstone of diagnosis is the chest X-ray, which usually reveals an infiltrate at presentation. However, this finding may be absent in dehydrated or neutropenic patients."[1]

## HOMELESS PNEUMONIA PATIENTS ALSO MAY HAVE AN ABSENCE OF RALES AND RHONCHI DUE TO DEHYDRATION

• A 2010 study detailed the mechanism involved: "Healthy mucus contains 3% solids, with the consistency of egg white. However, mucin hypersecretion or dysregulation of surface liquid volume may increase the concentration of solids up to 15%, resulting in viscous and elastic mucus that is not easily cleared. In addition, dehydrated mucus adheres more readily to the airway wall."[2]

## POCUS ON THE STREETS MAY HELP IN IDENTIFYING PNEUMONIA

• According to a 2020 study, "Given the poor accuracy of symptoms and physical signs, a radiological confirmation is generally recommended to differentiate pneumonia from exacerbated COPD or bronchitis. When integrated in clinical context, lung US outperforms chest X-ray in the identification of pneumonia."[3]



1 Butt, Saira, and Edwin Swiatlo. "Treatment of Community-Acquired Pneumonia in an Ambulatory Setting." The American Journal of Medicine 124, no. 4 (April 1, 2011): 297–300. https://doi.org/10.1016/j.amjmed.2010.06.027.

2 Fahy, John V., and Burton F. Dickey. "Airway Mucus Function and Dysfunction." The New England Journal of Medicine 363, no. 23 (December 2, 2010): 2233–47. https://doi.org/10.1056/NEJMra0910061.

3 Leidi, Antonio, Frédéric Rouyer, Christophe Marti, Jean-Luc Reny, and Olivier Grosgurin. "Point of Care Ultrasonography from the Emergency Department to the Internal Medicine Ward: Current Trends and Perspectives." Internal and Emergency Medicine 15, no. 3 (April 2020): 395–408. https://doi.org/10.1007/s11739-020-02284-5.

# Asthma and COPD

This is how asthma and COPD present differently in the unhoused:

- In part due to environmental exposures, homeless youth have a 31 times higher rate of hospitalization for asthma.
- Homeless youth are also more likely to develop more severe asthma, more likely to discontinue preventive medications, and more likely to seek treatment for their asthma at an ED.
- Homeless adults face the same unfortuante environmental exposures.
- Due also in part to those exposures, homeless adults are 46% more likely to have asthma and 40% more likely to have COPD.
- Due to forced evictions and theft, your homeless adult patient is also likely to have lost their medication for their asthma and/or COPD.
- This issue is also a huge problem for homeless children taking medication for their asthma.
- Because of this, expect your homeless patient with asthma or COPD to present with more severe symptoms and less-controlled disease.



## HOMELESS YOUTH HAVE 31 TIMES THE RATE OF HOSPITALIZATION FOR ASTHMA

• A 2019 study found, "Asthma is the most common chronic health condition faced by children1 and was the primary reason for hospital admission after emergency department (ED) visits among children <18 years of age in 2011. Racial and socioeconomic differences in asthma prevalence have been reported, with highest prevalence among those living below the federal poverty level and among minorities. Additionally, children from disadvantaged households are more likely to be diagnosed with more severe forms of asthma, are more likely to discontinue preventive medication, and are more likely to seek treatment of asthma at the ED. ... We demonstrated a 31 times higher rate of asthma hospitalization among homeless youth compared with nonhomeless youth."[1]

## ENVIRONMENTAL FACTORS ARE A HUGE PART OF THE RISK FOR ASTHMA IN HOMELESS CHILDREN

• Per the same 2019 study, ""[E]nvironmental factors could contribute to asthma hospitalizations. Shelter environments are generally poor and often expose homeless youth to second-hand and third-hand tobacco smoke. In fact, smoking is estimated to be 4 times more prevalent in homeless adults than in the general US population. Disadvantaged communities are exposed to a wide array of interpersonal and environmental risk factors, contributing to high asthma prevalence and poor health outcomes. Such exposures could contribute to high hospitalization rates, as reported in our study."[2]

## ASTHMA (AND COPD) RATES ARE ALSO HIGHER IN HOMELESS ADULTS

• A 2021 study found, "Homeless individuals were 46% more likely to have asthma (OR 1.46, 95% CI 1.16–1.84) and 40% more likely to have COPD (OR 1.40, 95% CI 1.14–1.73) after adjustment for age, gender, race/ethnicity, BMI, and tobacco use status."[3]

1 "Asthma Hospitalizations Among Homeless Children in New York State | Pediatrics | American Academy of Pediatrics," (2019) https://publications.aap.org/pediatrics/article/144/2/e20182769/76887/Asthma-Hospitalizations-Among-Homeless-Children-in.

2 "Asthma Hospitalizations Among Homeless Children in New York State | Pediatrics | American Academy of Pediatrics," (2019) https://publications.aap.org/pediatrics/article/144/2/e20182769/76887/Asthma-Hospitalizations-Among-Homeless-Children-in.

3 Tannis, Candace, and Sritha Rajupet. "Differences in Disease Prevalence among Homeless and Non-Homeless Veterans at an Urban VA Hospital." Chronic Illness, June 23, 2021, 17423953211023960. https://doi.org/10.1177/17423953211023959.

## Asthma and COPD

This is how asthma and COPD can be assessed on the streets:

- The issue is simple and direct: your homeless patient with asthma or COPD is unlikely to be able to control their disease on the streets.
- Because of this, the top medical intervention for respiratory disease in the homeless is housing.
- In the absence of housing, the next best medical intervention is careful counseling to instruct your homeless patient how to be aware of the environmental triggers that may trigger an exacerbation of their disease.
- This gentle instruction should include the patient's immediate friends and family who may be called on to recognize and treat an asthma attack or serious COPD episode.
- In addition, the patient should also be instructed where to go, who to call, and what to say to replace their medications -- especially rescue inhalers -- when they are inevitably lost or stolen.

## AIR POLLUTION, PARTICULATE MATTER, AND TEMPERATURE EXTREMES ALL INCREASE THE RESPIRATORY DISEASE BURDEN FOR THE HOMELESS

• A 2021 study looked at homelss respiratory patients and concluded, "Possible explanations for this increased respiratory disease burden include: increased exposure to temperature extremes, environmental allergies, and pests from poor quality transitional living arrangements, resulting in an increased risk of having asthma that is not well controlled. Transitional housing for homeless individuals also results in increased exposure to secondhand tobacco smoke even if individuals may be non-smokers or are trying to quit themselves to reduce their health risk. This population may also tend to spend more time outside increasing exposure to environmental air pollutants and particulate matter that is associated with COPD and other chronic lung diseases."[1]

## THE RESPIRATORY ENVIRONMENT FOR THE HOMELESS IS BAD NOW AND GETTING WORSE, MUCH WORSE

• A 2009 study concluded, "Of the major air pollutants (ground-level ozone, acid aerosols, particulate matter [PM] and carbon monoxide), ground-level ozone (O3) will be most altered by climate change. Ozone is formed in the atmosphere by the reaction of volatile organic compounds (VOCs) and nitrogen oxides (NOx) in the presence of sunlight; thus peak O3 concentrations are observed in warmer conditions. As summer temperatures rise, concentrations of ground-level ozone are already increasing across the planet. Climate change is projected to increase ground-level ozone by 2–4% for a 2°C increase and by about 5–10% for a 5°C increase. ... Air pollution has been found to disproportionately impact those suffering from cardio-respiratory conditions, those who spend more time outdoors, those with ischemic heart disease, peripheral vascular disease, COPD and asthma. he homeless are therefore particularly susceptible to illness and death from climate change related increases in air pollution due to their high levels of exposure to outdoor air pollution and their underlying respiratory and cardiovascular conditions which are often poorly controlled."[2]



1 Tannis, Candace, and Sritha Rajupet. "Differences in Disease Prevalence among Homeless and Non-Homeless Veterans at an Urban VA Hospital." Chronic Illness, June 23, 2021, 17423953211023960. https://doi.org/10.1177/17423953211023959.

2 Ramin, Brodie, and Tomislav Svoboda. "Health of the Homeless and Climate Change." Journal of Urban Health : Bulletin of the New York Academy of Medicine 86, no. 4 (July 2009): 654–64. https://doi.org/10.1007/s11524-009-9354-7.

## Skin abscesses

This is how skin abscesses present differently in the unhoused:

- In part due to environmental exposures, skin abscesses are prevalent in the homeless.
- They are especially common among people who inject drugs (PWID).
- Skin abscesses among homeless drug users are not random, however.
- Users who lack vein access and "skin pop" (subcutaneous injection vs. intravenous injection) have 11 times the risk of developing an abscess.
- Users who inject black tar heroin vs. powder heroin have 7 times the risk of developing an abscess.
- In addition, the unsanitary environment of homeless users and their lack of access to hygiene supplies puts those on the streets at an even greater risk of developing an abscess.
- Because homeless users are likely to have had multiple abscesses in the past year, expect them to seek help only when they perceive their abscess or abscesses have gotten "out of control."
- Because of all of this, your homeless patient with a skin abscess is more likely to present with a more severe infection.



### INJECTION DRUG USE IS A RECOGNIZED RISK FACTOR FOR SKIN ABSCESSES

• A 2022 study found, "When comparing routes of illicit drug administration, injection drug use (IDU) is associated with the most diverse and harmful effects. IDU is associated with bacterial infections (e.g., blood sepsis, skin and soft tissue infection [SSTI], endocarditis), viral infections such as HIV and Hepatitis C, and self-reported poor physical and mental health. Intravenous IDU is the most common injection route; however, people who inject drugs (PWID) also commonly inject subcutaneously (under the skin; aka skin popping [see image of drained subcutaneous abscess above]), often due to an inability to obtain a vein. Poor vascular structure can result from years of injection into the same vein."[1]

### INJECTIONS DON'T JUST GO INTO THE VEINS. THE TYPE OF DRUG USED AND WHERE IT IS INJECTED GREATLY DETERMINE THE RISK OF ABSCESS

• According to a 2017 study, "PWID [people who inject drugs] in Sacramento reported significantly more abscesses, more extensive vein loss, and more frequent soft tissue injection, compared to those in Boston. Boston-based PWID predominantly injected powder heroin, while those in Sacramento almost exclusively used black tar heroin. Black tar heroin use was associated with an increased rate of abscesses and injection-site vein loss compared to powder heroin: PWID who used black tar heroin had more than seven times greater odds of reporting abscesses and reported losing an average of two more injection-site veins during the past six months compared to those who use powder heroin. Those reporting consistent venous access had eleven times lower odds of soft tissue injection, while PWIDs were more likely to engage in soft tissue injection if they reported having lost more injection sites or required more time for venous injection. Those who reported soft-tissue injection were over five times more likely to report abscesses."[2]

1 "Under the Skin: The Relationship Between Subcutaneous Injection and Skin Infections Among People Who Inject Drugs." Accessed July 27, 2022. https://oce-ovid-com.ezproxy4.library.arizona.edu/article/01271255-202204000-00012/HTML.

2 Summers, Phillip J., Isabelle A. Struve, Michael S. Wilkes, and Vaughan W. Rees. "Injection-Site Vein Loss and Soft Tissue Abscesses Associated with Black Tar Heroin Injection: A Cross-Sectional Study of Two Distinct Populations in USA." International Journal of Drug Policy 39 (January 1, 2017): 21–27. https://doi.org/10.1016/j.drugpo.2016.08.006.

## Skin abscesses

This is how skin abscesses can be assessed on the streets:

- Be mindful that your homeless patient may have extensive experience treating their own abscesses.
- Because of this, involving your homeless skin abscess patient in their treatment decisions is exceedingly important. Frankly, they know what works for them – and what doesn't.
- A gentle patient history should attempt to determine the drug being injected and how it is being injected (e.g. IV vs. subcutaneous)
- Especially in the case of black tar heroin use, any hint of muscle weakness, difficulty swallowing, blurred vision, drooping eyelids, slurred speech, difficulty breathing, loss of facial expression, or descending paralysis should raise immediate suspicion for wound botulism.

### EXPECT YOUR PATIENT TO HAVE SELF-TREATED THEIR ABSCESS IF THEY'VE HAD MULTIPLE ABSCESSES IN THE PAST YEAR

• A 2020 study found, "Persons who inject drugs (PWID) experience high rates of skin and soft tissue infections (SSTI) and often access emergency or inpatient treatment. However, many PWID do not seek care and self-treat some or all of their infections. … Of study participants [61.7% homeless], 162 (64%) reported having at least one SSTI in the past year. … One-third of these participants (32.3%) reported ever self-treating SSTI in the past year. In a logistic regression model, number of past-year infections (OR = 1.81, $p < .001$) and positive outlook (OR = 2.46, $p < .001$) were associated with self-treatment of SSTI. Common methods of self-treatment included mechanically draining sores, applying heat/warm compress, and cleaning affected areas. Continued drug use and belief that infections were not serious and could be self-treated were two main reasons for not seeking professional medical care."[1]

### CONTAMINATED SOIL COUPLED WITH BLACK TAR HEROIN INCREASES THE RISK OF WOUND BOTULISM

• A 2019 study detailed an outbreak of wound botulism among PWID in San Diego, California: "[N]ine (eight confirmed and one probable) patients with wound botulism were identified, all of whom were hospitalized; one of the nine died. All nine were persons who inject drugs; seven specifically reported using black tar heroin and six practiced subcutaneous injection known as skin popping. Clinically compatible signs and symptoms included muscle weakness, difficulty swallowing, blurred vision, drooping eyelids, slurred speech, difficulty breathing, loss of facial expression, or descending paralysis. … Wound botulism is likely underrecognized because of its rarity and the overlapping signs and symptoms with opioid intoxication, overdose, and other neurologic syndromes."[2]

### DESPITE KNOWN OUTBREAKS, THE SIGNS AND SYMPTOMS OF WOUND BOTULISM ARE FREQUENTLY MISSED

• A 2016 study detailed the sobering facts: "During June–July 2016, the New Mexico Department of Health (NMDOH) investigated an outbreak of three wound botulism cases among persons who injected drugs …. Wound botulism was not considered during patient 1 and patient 3's initial emergency department evaluations and consequently wound care and BAT [heptavalent botulism antitoxin] administration were delayed. Both suffered respiratory arrest and required intubation and mechanical ventilation for weeks or months."[3]



1 Monteiro, Jordanna, Kristina T. Phillips, Debra S. Herman, Catherine Stewart, Julia Keosaian, Bradley J. Anderson, and Michael D. Stein. "Self-Treatment of Skin Infections by People Who Inject Drugs." Drug and Alcohol Dependence 206 (January 1, 2020): 107695. https://doi.org/10.1016/j.drugalcdep.2019.107695.

2 Peak, Corey M., Hilary Rosen, Amanda Kamali, Alyssa Poe, Mahtab Shahkarami, Akiko C. Kimura, Seema Jain, and Eric McDonald. "Wound Botulism Outbreak Among Persons Who Use Black Tar Heroin — San Diego County, California, 2017–2018." Morbidity and Mortality Weekly Report 67, no. 51–52 (January 4, 2019): 1415–18. https://doi.org/10.15585/mmwr.mm675152a3.

3 Middaugh, Nicole, Leslie Edwards, Kevin Chatham-Stephens, and D. Fermin Arguello. "Wound Botulism Among Persons Who Inject Black Tar Heroin in New Mexico, 2016." Frontiers in Public Health 9 (December 16, 2021): 744179. https://doi.org/10.3389/fpubh.2021.744179.

# Necrotizing fasciitis (NF)

This is how nectrotizing fasciitis presents differently in the unhoused:

- In part due to environmental exposures, skin infections are prevalent in the homeless.
- Among those skin infections, the homeless are up to 80 times more likely to have an infection caused by invasive group A streptococcus infection (iGAS).
- This extreme rate of iGAS has led to an increasing number of necrotizing fasciitis infections among the homeless.
- Since the perineum is the most commonly affected site, your homeless patient may be reluctant to seek care until the pain becomes inexorable.
- In addition, as the homeless are much less likely to undergo full-body exams during clinic visits, perineal, lower limb, and axillary infection sites are unlikely to be assessed.
- Because of these factors, your homeless patient with necrotizing fasciitis is likely to present in much worse shape than a housed patient.



## THE HOMELESS ARE UP TO 80 TIMES MORE LIKELY TO DEVELOP AN INVASIVE GROUP A STREPTOCOCCUS (IGAS) INFECTION

• A 2021 study sounded the alarm: "Reported outbreaks of invasive group A Streptococcus (iGAS) infections among people who inject drugs (PWID) and people experiencing homelessness (PEH) have increased, concurrent with rising US iGAS rates. ... We identified 12,386 iGAS cases; IDU, homelessness, or both were documented in ~13%. Skin infections and acute skin breakdown were common among iGAS patients with documented IDU or homelessness. Endocarditis was 10-fold more frequent among iGAS patients with documented IDU only versus those with neither risk factor. Average percentage yearly increase in prevalence of IDU and homelessness among iGAS patients was 17.5% and 20.0%, respectively. iGAS infection rates among people with documented IDU or homelessness were ~14-fold and 17- to 80-fold higher, respectively, than among people without those risks."[1]

## IGAS IS THE MOST COMMON CAUSE OF NECROTIZING FASCIITIS

• According to the CDC, "There are many types of bacteria that can cause the 'flesh-eating disease'"called necrotizing fasciitis. Public health experts believe group A Streptococcus (group A strep) are the most common cause of necrotizing fasciitis."[2]

## NECROTIZING FASCIITIS OUTBREAKS ARE BECOMING MORE COMMON IN THE HOMELESS POPULATION

• Recent outbreaks of invasive group A streptococcus among the homeless – including patients who developed necrotozing fasciitis – have occurred in Anchorage, Alaska[3]; London, Canada[4], Ontario, Canada[5]; Montreal, Canada[6]; and Rennes, France[7].

1 Valenciano, Sandra J, Jennifer Onukwube, Michael W Spiller, Ann Thomas, Kathryn Como-Sabetti, William Schaffner, Monica Farley, et al. "Invasive Group A Streptococcal Infections Among People Who Inject Drugs and People Experiencing Homelessness in the United States, 2010–2017." Clinical Infectious Diseases 73, no. 11 (December 1, 2021): e3718–26. https://doi.org/10.1093/cid/ciaa787.

2 CDC. "Necrotizing Fasciitis." Centers for Disease Control and Prevention, June 27, 2022. https://www.cdc.gov/groupastrep/diseases-public/necrotizing-fasciitis.html.

3 Mosites, Emily, Anna Frick, Prabhu Gounder, Louisa Castrodale, Yuan Li, Karen Rudolph, Debby Hurlburt, et al. "Outbreak of Invasive Infections From Subtype Emm26.3 Group A Streptococcus Among Homeless Adults—Anchorage, Alaska, 2016–2017." Clinical Infectious Diseases 66, no. 7 (March 19, 2018): 1068–74. https://doi.org/10.1093/cid/cix921.

4 Turner, S. "Numerous Outbreaks amongst Homeless and Injection Drug-Using Populations Raise Concerns of an Evolving Syndemic in London, Canada." Epidemiology and Infection 148 (2020): e160. https://doi.org/10.1017/S0950268820001260.

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## Necrotizing fasciitis (NF)

This is how nectrotizing fasciitis can be assessed on the streets:

- While necrotizing fasciitis is a zebra condition among the housed, it is rapidly becoming a condition of concern for the homeless.
- It is also a condition that is initially missed in over 70% of cases for three significant reasons:
  1) The classic triad of "pain, tenderness, and erythema" may only be present in approximately one-quarter of cases.
  2) Fever also may be present in less than one-half of patients.
  3) Because the most common site of infection is the perineum, the presence of infection may be hidden from plain view.
- Be mindful that the most common presenting symptoms in a large systematic review of NF were swelling (80.8%) and pain (frequently out of proportion, 79%).

## FEVER IS A LESS COMMON SYMPTOM OF NECROTIZING FASCIITIS. PAIN OUT OF PROPORTION IS A FAR MORE COMMON INDICATOR

• A 2013 systematic review found, "Across the nine studies, swelling (80·8 per cent) was the commonest presenting symptom, followed by pain (79·0 per cent) and erythema (70·7 per cent). More advanced findings were bullae (25·6 per cent), skin necrosis (24·1 per cent) and crepitus (20·3 per cent) (Fig. 2). The presence of bullae was reported in eight of nine studies, and there was moderate positive correlation with amputation (R = 0·68) and mortality (R = 0·65). At presentation, fever was present in only 40·0 per cent of the patients."[1]

• A 2017 study echoed these findings when it found, "Nearly all patients were admitted in a serious condition, with both systemic and local symptoms. The vast majority had tenderness (90.3%) and pain (77.4%) on the infected site, which in some cases was inexorable. In 46 patients, the site of infection was edematous (74.2%), and in 43 patients, the infected skin was erythematous (69.4%). However, the simultaneous presence of these 3 symptoms, pain, tenderness, and erythema, which are characterized in the literature as "the classic triad of NF," was recorded in only 16 patients (25.8%). ... As far as the systematic symptoms are concerned, tachycardia was found in 21 patients (33.9%) and 19 patients were febrile (30.7%)."[2]

## NF IS LIKELY TO BE HIDDEN AS THE PERINEUM IS THE MOST COMMON SITE OF INFECTION

• Per the previously cited 2017 study, "A total of 62 patients were included in the study. The mean age of patients was 63.7 (47 male patients). Advanced age (over 65 years) (P < 0.01) and female sex (P = 0.04) correlated significantly with mortality. Perineum was the mostly infected site (46.8%), followed by the lower limbs (35.5%), the upper limbs, and the axillary region (8.1%). Diabetes mellitus was the most common coexisting disease (40.3%), followed by hypertension (25.8%) and obesity (17.7%).[3]

## NF IS MISSED 71% OF THE TIME

• Per the previously cited 2013 systematic review, "Misdiagnosis of NF as cellulitis or abscess was common. Six of the nine studies reported the rate of misdiagnosis, which was a mean of 71·4 per cent across the reports ...."[4]



1 Goh, T, L G Goh, C H Ang, and C H Wong. "Early Diagnosis of Necrotizing Fasciitis." British Journal of Surgery 101, no. 1 (December 12, 2013): e119–25. https://doi.org/10.1002/bjs.9371.

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3 Misiakos, Evangelos P., George Bagias, Iordanis Papadopoulos, Nickolaos Danias, Paul Patapis, Nickolaos Machairas, Theodore Karatzas, et al. "Early Diagnosis and Surgical Treatment for Necrotizing Fasciitis: A Multicenter Study." Frontiers in Surgery 4 (2017). https://www.frontiersin.org/articles/10.3389/fsurg.2017.00005.

4 Goh, Terence, L.G. Goh, C.H. Ang, and Chin-Ho Wong. "Early Diagnosis of Necrotizing Fasciitis." The British Journal of Surgery 101 (January 1, 2014): e119-25. https://doi.org/10.1002/bjs.9371.

## Spider bites

This is how spider bites present differently in the unhoused:

- In part due to environmental exposures, skin infections are prevalent in the homeless.
- In some cases, those skin infections are the result of injection drug use.
- Due to the stigma attached to both homelessness and injection drug use, your homeless patient may report the cause of their infection as a "spider bite."
- In addition, because the homeless live in areas frequently inhabited by spiders, ants, and insects, they may believe their skin infection is from a spider bite.
- While this is certainly possible, a more likely cause for their skin infection is a bacterial, viral, or fungal infection.
- In the case of "multiple bites," the lesions may point to a life-threatening systemic infection.



### IS IT A SPIDER BITE? YES ... IN LESS THAN 4% OF 'SPIDER BITE' CASES

• A 2011 study found, "ED patients who reported that their condition was caused by a 'spider bite' were prospectively enrolled in an anonymous, voluntary survey regarding details of their illness and demographic information. Discharge diagnoses were also collected and categorized as: spider bite, bite from other animal (including unknown arthropod), infection, or other diagnosis. Results: There were 182 patients enrolled over 23 months. Seven patients (3.8%) were diagnosed with actual spider bites, 9 patients (4.9%) with bites from other animals, 156 patients (85.7%) with infections, and 6 patients (3.3%) were given other diagnoses."[1]

### MANY TYPES OF SPIDERS REPORTED TO CAUSE 'SPIDER BITES' IN HUMANS DON'T CAUSE SYMPTOMS IN HUMANS

• A 2011 study concluded, "The misdiagnosis of spider bites is a widespread and common problem that can have far-reaching consequences. The conventional description of a spider bite and its symptoms are often based purely on circumstantial evidence without the suspected spider being presented or envenomation being witnessed. Several medical conditions commonly misdiagnosed as spider bites include bacterial, viral, and fungal infections; vasculitis; dermatological conditions; bites and stings from other arthropods; and miscellaneous causes such as allergies or drug reactions, chemical burns, reactions to poisonous plants, or diabetic ulcers. Professionals working in toxicology and poison control clinics report spider bites or necrotic arachnidism as overdiagnosed and poorly defined and almost always without any corroborating evidence. Evidence from studies that refute the diagnosis of necrotic arachnidism is growing as researchers determine that many spiders commonly associated with humans do not cause suspected symptoms; for example, the yellow sac spider, Cheiracanthium mildei Koch; the white tailed spiders, Lampona spp.; wolf spiders (Lycosidae); the black house spiders, Badumna spp.; and the hobo spider, Tegenaria agrestis. Numerous studies describe cases in which initially reported spider bite wounds and resulting necrotic tissue lesions are found to be the result of bacterial infections."[2]

1 Suchard, Jeffrey Ross. "'Spider Bite' Lesions Are Usually Diagnosed as Skin and Soft-Tissue Infections." The Journal of Emergency Medicine 41, no. 5 (November 2011): 473–81. https://doi.org/10.1016/j.jemermed.2009.09.014.

2 "Misdiagnosis of Spider Bites: Bacterial Associates, Mechanical Pathogen Transfer, and Hemolytic Potential of Venom From the Hobo Spider, Tegenaria Agrestis (Araneae: Agelenidae)." Journal of Medical Entomology 48, no. 2 (March 1, 2011): 382–89. https://doi.org/10.1603/ME09224.

## Spider bites

This is how spider bites can be assessed on the streets:

• One of the most common spiders blamed for spider bites in the homeless is the brown recluse spider.
• Because there have been so many false reports of brown recluse bites, a team developed a mnemonic that lists the findings that are NOT associated with brown recluse envenomation.
• For example, if your homeless patient has multiple bites, they are NOT likely to be from a brown recluse.
• In the same way, if the bite occurs during November through March, it is NOT likely to be from a brown recluse.
• The complete mnemonic – which spells "NOT RECLUSE" – is shown to the right.

## THE MNEMONIC FOR 'IS THIS BITE FROM A BROWN RECLUSE?' IS: –NOT RECLUSE–

• A 2017 study gave the details on recognizing a brown recluse infection, "[W]e have developed a mnemonic device—NOT RECLUSE—that summarizes findings not typical of recluse envenomation and should help eliminate unlikely diagnoses. ...

**N - Numerous:** A typical recluse bite is a single focal lesion. Bites most often result from a defensive response when a spider is compressed or crushed. Occasionally 2 bites may occur. Contemporaneous widely separated dermonecrotic lesions are a highly unlikely result of recluse bites. Differential diagnoses: multiple lesions indicate contagious bacterial infection, herpes zoster, pyoderma gangrenosum, poison ivy or poison oak, and arthropod bites (eg, fleas, bedbugs, and various mites).

**O - Occurrence:** The most common circumstance surrounding occurrence of a recluse bite involves disturbance of a secluded recluse spider. Often it may be hiding in a box in a closet, attic or garage, or in clothing long unused or left on the floor. Alternately, the recluse may have crawled into a bed ...

**T - Timing:** Credible bites outside the April to October recluse activity season in North America are unlikely. ...

**R - Red Center:** Recluse venom causes immediate destruction of the capillary bed with resulting ischemia. Thus, the central area of a recluse bite will be pale, blue-white, or purple and only rarely, with mild bites, will be red. ...

**E - Elevated:** Recluse bites are flat or slightly sunken. A central lesion area raised more than 1 cm above the normal skin is not a recluse bite; any elevation makes a recluse bite unlikely. ...

**C - Chronic:** Only the largest recluse bites are not healed in 3 months. ...

**L - Large:** The most dynamic recluse bites typically do not exceed 10 cm.5 Although peripheral erythema may extend several times this distance from the injury, there is no credible documentation of very large areas of necrosis. Recluse venom appears to cause a deeper and more severe reaction in morbidly obese people, likely due to circulatory insufficiency in adipose tissue. D...

**U - Ulcerates Too Early:** Recluse bites do not typically ulcerate until 7 to 14 days postenvenomation. ...

**S - Swollen:** Recluse bites typically do not cause massive swelling below the neck. However, bites to the face, especially the eyelids,6 can develop significant edema. Significant swelling can also occur on the feet. ...

**E - Exudative:** Recluse bites are not initially exudative, moist, or purulent (exceptions: bites on eyelids and toes); although, at the bite site, a small blister filled with clear or reddish fluid may manifest. Pus formation indicates bacterial infection and is the first negative sign excluding a loxoscelism diagnosis. Additionally, it has been strongly argued that spiders do not vector bacteria."[1]

1 Stoecker, William V., Richard S. Vetter, and Jonathan A. Dyer. "NOT RECLUSE—A Mnemonic Device to Avoid False Diagnoses of Brown Recluse Spider Bites." JAMA Dermatology 153, no. 5 (May 1, 2017): 377–78. https://doi.org/10.1001/jamadermatol.2016.5665.

## Animal bites

This is how animal bites present differently in the unhoused:

- The homeless care for their dogs as well as housed dog owners.
- However, due to an environment which contains a large number of animals, the homeless are more predisposed to dog bites.
- When it's their own pet that has bitten them, the homeless may fear the removal of their pet if they seek care for their injury.
- When it's someone elses pet that has bitten them, the homeless may fear reprisal from the owner if they seek care for their injury,
- In addition, the vast majority of hospitals and clinics do not allow pets.
- Because the homeless frequently do not have anyone who can watch their pet for them, they put off treatment as long as possible.
- For these reasons, your homeless patient with an animal bite is likely to present with a more severe infection than a housed patient.



### DOG BITES ARE AN ENVIRONMENTAL DANGER FOR THE HOMELESS

• A 2021 systematic review reported, "Dog bites are a major public health problem in children and adults worldwide, with dogs being responsible for 76% to 94% of animal bites to people. These incidents affect the physical and psychological integrity of the victims, generate economic costs associated with medical care and reconstructive procedures and also constitute a zoonotic risk. As a result of a canine bite injury, there is a high probability of transmission of pathogenic microorganisms, mainly to immunocompromised individuals, which can contract infections by Streptococcus canis, Pasteurella spp., Prevotella spp. and Capnocytophaga canimorsus, the latter being capable of causing meningitis in immunocompromised patients. These injuries can also transmit the rabies virus. Injuries caused by dog bites can sometimes be fatal. There are predisposing factors as- sociated with human deaths that are described in case reports, for example splenectomized people whose death is related to septic shock due to Capnocytophaga canimorsus. Moreover, cognitive impairment or other mental or physical disability, alcohol or drug abuse and being homeless have been reported as predisposing factors."[1]

### THIS IS NOT BECAUSE HOMELESS DOGS ARE MISTREATED. QUITE THE CONTRARY

• A 2021 study concluded, "A convenience, cross-sectional sample of 19 homeless people, owning a total of 21 dogs were recruited, and their dogs' health and wellbeing assessed using the PDSA Petwise MOT (P-MOT). ... This study found all the dogs to be in generally good overall health as measured by the P-MOT, which broadly agrees with previous findings. This contrasts with the self-reported experiences of homeless people, who describe receiving abuse related to a perceived inability to adequately care for their pets. In particular, the dogs had high levels of exercise, especially when contrasted with recent data showing 42% of UK dogs were walked for less than 30 min per day, and 13% did not receive daily exercise. Although prevalence of being overweight (28.6%) and obese (14.3%) were relatively high, it compared favourably to that of conventionally owned pets, where reported estimates of overweight and obesity are 33.5%–65% and 5.1%–40.9%, respectively. Many of the dogs had at least some health inter- ventions, in the form of preventive procedures such as neutering, booster vaccination or treatment for health conditions. Eighteen dogs (85.7%) had been vaccinated, 19 (90.5%) dewormed and 20 (95.2%) regularly flea-treated, which compares positively with (pre-pandemic) rates in conventionally owned dogs, reported by owners as 78%, 87% and 80%, respectively. ... The main negative issue identified in the present study was behaviour problems, in particular separation-related distress."[2]

1 Barrios, Carmen Luz, Valentina Aguirre-Olea, Carlos Bustos-López, Sandra Pérez-Vergara, and Sandra Claros-Alegría. "Characterization of the Variables Related to Reports of Death Due to Canine Bites in Scientific Articles during the Years 2013–2017: A Systematic Review." Animals 11, no. 9 (September 9, 2021): 2654. https://doi.org/10.3390/ani11092654.

2 Scanlon, Louise, Pru Hobson-West, Kate Cobb, Anne McBride, and Jenny Stavisky. "Assessment of Health and Welfare in a Small Sample of Dogs Owned by People Who Are Homeless." Veterinary Record 190, no. 12 (2022): e776. https://doi.org/10.1002/vetr.776.

## Animal bites

This is how animal bites can be assessed on the streets:

- Be mindful of the fact that a homeless pet owner who has been bitten by their pet may be fearful of the authorities removing their pet from them.
- Because of this, they may hide the true extent of their injury.
- They may also blame their animal bite on another more benign cause.
- Providing a safe and supportive environment is the first step in assessing your homeless patient with an animal bite.
- Understand that the risk factors for problematic animal bites include: puncture wounds; contaminated wounds; bites to the hand, wrist, foot, or genitalia; presentation of the wound greater than 8 hours after the injury; and any scalp or face wound.
- In addition, any cat bite presents a high risk of infection (30.8% for cats vs 8.5% for dogs).

## ABOUT 10% OF THE HOMELESS OWN DOGS (WHICH MAY CAUSE THEM TO BE TURNED AWAY FROM A SHELTER OR HOSPITAL)

• A 2021 study in Los Angeles determined, "Estimates of pet ownership among unsheltered homeless adults were 12% in 2017 and 2019, and 9% in 2018. Among pet owners in 2017, 48% (n=1,362) reported being turned away from shelter because of pet policies."[1]

## DOG BITES TO THE HAND ARE A MEDICAL EMERGENCY

• A 2021 systematic review examined animal bites in humans and determined, "Animal bites represent a significant global health issue and grew to be common public health problem. They account for 5 % of the total traumatic wounds evaluated in the emergency department (ED) and approximately 1 % of all the ED visits. ... High Risk Factors [include] Moderate to severe wounds; Deep Puncture wound, large avulsion, crush injury; Cat bite; Contaminated wound; Foreign body; Hand, wrist, foot, genitalia involvement; Associated injury- bone, joints, tendon, nerve, vessel; Adjacent to prosthesis; Delayed presentation > 8 hours; Scalp, face wound in infant and young children."[2]

## NEARLY ONE-THIRD OF CAT BITES – EVEN JUST A SINGLE PUNCTURE – WILL BECOME INFECTED

• A 2021 systematic review examined animal bites in humans and determined, "Cats represent a larger portion (89.4%) of provoked attacks as compared to dogs, with additional features of Siamese breed, female gender, and domestic status increasing the risk of attack. In contrast to dogs, cat bites are largely inflicted by the owner's own cat regardless of age of the victim. Additional victim characteristics associated with increased prevalence include female gender and older age. Cat bites commonly present as a single puncture, often on the hand or arm (91%). Of hand injuries, the index finger is the most common site of injury (45%). Across all animal bites, nonpurulent wounds with lymphangitis are most associated with cats. Risk factors for subsequent hospitalization include smoking, immunocompromised state, location of bite over a joint or tendon sheath, and initial physical findings of erythema and swelling. ... Complications of cat bites include wound infection, development of rabies infection, and lymphadenopathy (cat scratch fever). Wound infection following cat bites is of greatest concern, as it is more common following bites by cats (30.8%) than by dogs (8.5%)."[3]



1 Henwood, Benjamin, Eldin Dzubur, Harmony Rhoades, Patricia St. Clair, and Robynn Cox. "Pet Ownership in the Unsheltered Homeless Population in Los Angeles." Journal of Social Distress and Homelessness 30, no. 2 (July 3, 2021): 191–94. https://doi.org/10.1080/10530789.2020.1795791.

2 Hosain, Mohammad, M Mohamed, and Aftab Siddiqui. "An Up to Date Guideline for Management and Prevention of Dog and Cat Bite - A Literature Review." Journal of Advances in Medicine and Medical Research, February 23, 2021. https://doi.org/10.9734/JAMMR/2021/v33i330818.

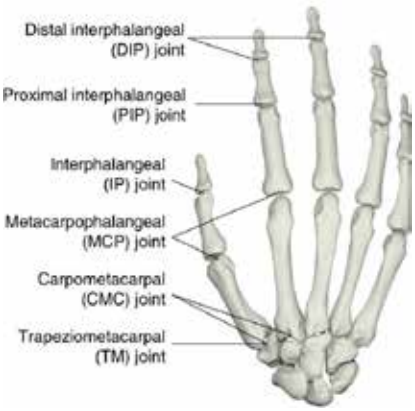
3 Savu, Andrei N., Anna R. Schoenbrunner, Rachel Politi, and Jeffrey E. Janis. "Practical Review of the Management of Animal Bites." Plastic and Reconstructive Surgery Global Open 9, no. 9 (September 9, 2021): e3778. https://doi.org/10.1097/GOX.0000000000003778.

## Human bites

This is how human bites present differently in the unhoused:

- The homeless live in a violent environment where fights are far too common.
- The majority of human bites experienced by the homeless happen as a result of physical assault.
- Assault is a crime and your patient is either the perpetrator of that crime or its victim (or both).
- Your homeless patient may also have outstanding warrants for their arrest.
- Because of this, your homeless patient may be very reluctant to seek treatment for their injury.
- In addition, their injury may appear to be mild at first.
- In the case of a "fight bite" injury to the hand, a study examining those wounds found that 95% of PCP joint injuries involved a breach and 100% of PIP injuries involved a breach.
- This study also found that 100% of cases explored later than 24 hours after the initial injury found intra-articular pus.
- Because of all of this, your homeless human bite patient is likely to present much later with a bite injury that is now far worse than it would be in a housed patient.






### 'FIGHT BITES' CAN BE DANGEROUS, ESPECIALLY THOSE INVOLVING THE PIP JOINT OF THE HAND

• A 2015 study found, "Over a 4-year period, 147 patients were treated. All injuries were sustained striking an opponent in the mouth with a clenched fist. There were 141 male and six female patients, with a mean age of 25 years (range 12–51). ... There were 130 MCP [metacarpophalangeal] and 29 PIP [proximal interphalangeal] joint injuries. Eleven patients had involvement of more than one MCP joint, ten with two, and one patient with three. The MCP joint of the middle finger was most commonly affected. A total of 93 patients presented to the hand trauma service within 24 hours of injury and 37 patients presented within 7 days. A total of 17 presented more than 7 days after the injury. In all cases the wound was formally explored. ... The joint was found to be breached in 100% of PIP joint injuries and in 95% of MCP joint injuries. Intra-articular pus was present in all cases explored later than 24 hours after the initial injury. A notch on the metacarpal head caused by the tooth was commonly seen, but no fragments of tooth were found within the joint. .... Of the 24 patients with PIP joint injuries, none were classified as having a good result .... No patient had a full range of movement by 6 months .... Eight patients had protracted wound problems, including discharge, wound breakdown and scar pain."[1]

### HUMAN BITES IN ANY LOCATION CREATE A HOST OF PROBLEMS, INCLUDING BITES TO THE PENIS

• A 2009 review article describes why human bites are so dangerous: "Human saliva is known to contain as many as 50 species of bacteria with almost 108 microbes/ml. This is one of the reasons why human bites are believed to have higher rates of infection than other injuries. Other factors associated with higher rates of infection are delayed presentation to the ER, bites on the upper limbs and hand and bites on relatively avascular structures like the ear cartilage. ... Clenched fist injuries can lead to septic arthritis of the MCP joint, which is a rapidly destructive process. Because the options for surgical reconstruction of MCP joints are limited, only 10% of the patients with septic arthritis following a human bite will regain their previous level of functioning, with amputation rates as high as 7-20% being reported. ... Exposure to saliva alone is not considered a risk factor for viral transmission, although HIV may be present in the saliva (infrequently and at low levels). Salivary inhibitors render the virus non-infective in a majority of the cases. Therefore, transmission of HIV is a risk when there is blood in the mouth of the person who bites and there is a breach in the skin of the victim. There have also been reports of necrotizing fasciitis occurring after human bites. Penile bites have been reported to transmit many serious infections such as Streptococcal toxic shock syndrome and Fournier's gangrene."[2]

1 Hnyda, D. J. Shewring, R. W. Trickett, K. N. Subramanian, R. "The Management of Clenched Fist 'Fight Bite' Injuries of the Hand - D. J. Shewring, R. W. Trickett, K. N. Subramanian, R. Hnyda, 2015." Journal of Hand Surgery (European Volume), March 14, 2015. https://journals-sagepub-com.ezproxy2.library.arizona.edu/doi/full/10.1177/1753193415576249.

2 Patil, Pradnya D, Tanmay S Panchabhai, and Sagar C Galwankar. "Managing Human Bites." Journal of Emergencies, Trauma and Shock 2, no. 3 (2009): 186–90. https://doi.org/10.4103/0974-2700.55331.

## Human bites

This is how human bites can be assessed on the streets:

- Homeless human bite patients are at a high risk of infection.
- Homeless human bite patients are also listed in clinical guidelines among those bite patients who "must be admitted" to the hospital.
- The homeless who receive bite wounds to the hand are at a 34% to 73% risk of infection by Methicillin-resistant Staphylococcus aureus (MRSA).
- However, the homeless are likely to initially perceive their human bite wound (or wounds) to be "no big deal."
- Given this, use special care when explaining the true risks faced by your homeless patient.
- If your patient refuses treatment, make sure they are aware of what worsening symptoms look like. Write those symptoms down for your homeless patient whenever possible.
- Also, let them know exactly where they can go to for help in the next 24, 48, and 72 hours.

## THE HOMELESS MAY DELAY SEEKING HELP FOR A HUMAN BITE DUE TO THE FEAR OF 'BEING REPORTED'

• A 2020 study detailed the problem: "The findings also suggest that many of those unsheltered in San Francisco had an outstanding bench warrant issued for their arrest. … Together, the threat of a move-along order, a citation, or arrest often caused those living on the streets to avoid contacting the police, even in the face of serious theft or violence."[1]

• A 1997 study detailed how that fear affects the homeless when it comes to going to the hospital for their injuries: "Vulnerable individuals [including the homeless] may be afraid to access the health care system for fear of being reported to the police or immigration authorities, especially if their condition is related to crime, violence or drugs."[2]

## THE HOMELESS ARE ON THE LIST OF HUMAN BITE PATIENTS WHO 'MUST BE ADMITTED'

• According to a 2019 review article, "[The following human bite] patients who are at a high risk of infection, … must be considered for inpatient therapy: Hand, foot or face wounds; Scalp involvement; Bone/joint involvement; Puncture wounds; Crush injuries; Delayed treatment; Patients > 50 years; Immunosuppressed patients; Chronic alcoholism; Diabetes mellitus; Vascular disease; Pre-existing edema of the affected extremity. In addition, patients with systemic manifestations of infection, such as fever, chills, elevated white blood cell count, those who fail to improve on initial outpatient therapy, those with a high likelihood of non-compliance (mentally handicapped, homeless people or alcoholics) and those with infected hand wounds, must be admitted. Any patient with an injury severe enough to require operative exploration should be observed at least overnight postoperatively."[3]

## THE HOMELESS ARE AT A HIGHER RISK OF MRSA INFECTION FROM A HUMAN BITE WOUND

• According to a 2014 journal article, "Patients with infections caused by mixed bacterial flora, often seen in human bite wounds, have the highest complications. Bacteria resistance, specifically methicillin-resistant S aureus (MRSA), is becoming more prevalent both in the hospital and community setting. The incidence of MRSA infections ranges from 34% to 73% of all hand infections. Risk factors for the development of MRSA include prolonged hospitalization, prolonged antimicrobial therapy, previous surgical procedures, chronic illnesses, intravenous drug use, and patients who have close, prolonged contact with others (military recruits, prison inmates, and homeless individuals)."[4]



1 Herring, Chris, Dilara Yarbrough, and Lisa Marie Alatorre. "Pervasive Penality: How the Criminalization of Poverty Perpetuates Homelessness." Social Problems 67, no. 1 (February 1, 2020): 131–49. https://doi.org/10.1093/socpro/spz004.

2 Rogers, Ada C. "Vulnerability, Health and Health Care." Journal of Advanced Nursing 26, no. 1 (1997): 65–72. https://doi.org/10.1046/j.1365-2648.1997.1997026065.x.

3 Patil, Pradnya D, Tanmay S Panchabhai, and Sagar C Galwankar. "Managing Human Bites." Journal of Emergencies, Trauma and Shock 2, no. 3 (2009): 186–90. https://doi.org/10.4103/0974-2700.55331.

4 Osterman, Meredith, Reid Draeger, and Peter Stern. "Acute hand infections." The Journal of Hand Surgery 39.8 (2014): 1628-1635.

# Frostbite and Immersion foot

This is how frostbite and immersion foot present differently in the unhoused:

- The homeless live in an unforgiving environment where bitter cold and pouring rain are regular occurences.
- Because of this, they are at a much higher risk of having a frostbite injury during cold weather and an immersion foot injury during non-freezing wet weather.
- Both conditions are dangerous and both create a risk of amputation and/or ongoing disability.
- Immersion foot can occur during warm weather and presents with many of the same symptoms. In that case it is known as "Warm water immersion foot" or "Tropical immersion foot."
- Because of the rarity of frostbite and immersion foot in the housed population, many physicians have little experience with these conditions.
- For these reasons, either of these conditions may be initially missed leading to an even more severe presentation in your homeless patient.



## THE HOMELESS ARE AT A RIDICULOUSLY HIGHER RISK OF FROSTBITE THAN THE HOUSED

• A 2018 study in Toronto, Canada found, "A total of 16 ED visits for cold-related injuries occurred among the homeless cohort (13 for frostbite, 1 for hypothermia, and 2 for other effects of cold). There were no visits for cold-related injuries among men or women in the matched low-income control groups. For cold-related injuries among homeless men, there were 6.7 ED visits per 1000 person-years of observation. There were 0.9 ED visits among homeless women. In the low-income matched cohort, there were 0 ED visits per 1000 person-years of observation among men and 0 visits among women."[1]

## FROSTBITE IS MORE SEVERE IN THE HOMELESS

• A 2021 study found, "The overall incidence of frostbite injury in the United States is 0.83 of 100,000 people. Of the social factors associated with frostbite injury, homelessness and the black race were independently associated with a higher likelihood of amputation at the primary admission. Diagnosis of cellulitis was a predictor of amputation. Homeless frostbite patients were more frequently discharged against medical advice and were less likely to discharge with supportive medical care, despite having a higher rate of more severe injury. Disability from amputation following frostbite injury affects at least 20% of frostbite-injured patients and disproportionally affects the homeless population."[2]

## THE HOMELESS ARE AT A HIGHER RISK OF IMMERSION FOOT

• According to a 2015 case report of a homeless patient with immersion foot, "In 1914, during the First World War, a large number of troops began to experience a syndrome very similar to frostbite. It had many of the same symptoms, such as incapacitating pain, color changes, and numbness in the extremities. However, medics had made two unusual discoveries. First, this 'frostbite' was mostly occurring in the lower extremities, not in the fingers or nose. Second, this syndrome was occurring in troops who had never been exposed to temperatures cold enough to freeze tissue. ... [Nowadays] the homeless population is by far the most reported group presenting to the ED with immersion foot. This is due to a combination of the following risk factors: the homeless experience frequent exposure to moisture in the forms of rain, mud, and sweat; their living conditions do not allow for the frequent removal of footwear; altered mental status due to the prevalence of psychiatric and substance disorders prevents awareness of developing injury; and malnutrition results in increased risk of developing the injury."[3]

1 Zhang, Paige, Kate Bassil, Stephanie Gower, Marko Katic, Alex Kiss, Evie Gogosis, and Stephen Hwang. "Cold-Related Injuries in a Cohort of Homeless Adults." Journal of Social Distress and the Homeless 28 (September 18, 2018): 1–5. https://doi.org/10.1080/10530789.2018.1523103.

2 Endorf, Frederick W, and Rachel M Nygaard. "Social Determinants of Poor Outcomes Following Frostbite Injury: A Study of the National Inpatient Sample." Journal of Burn Care & Research 42, no. 6 (November 1, 2021): 1261–65. https://doi.org/10.1093/jbcr/irab115.

3 Olson, Zachary, and Nicholas Kman. "Immersion Foot: A Case Report." The Journal of Emergency Medicine 49, no. 2 (August 1, 2015): e45–48. https://doi.org/10.1016/j.jemermed.2015.02.040.

## Frostbite and Immersion foot

This is how frostbite and immersion foot can be assessed on the streets:

- According to the CDC, the signs and symptoms of frostbite include: Redness or pain in any skin area, A white or grayish-yellow skin area, Skin that feels unusually firm or waxy, Numbness.
- Also according to the CDC, the symptoms of immersion foot may include: Reddening of the skin, Numbness, Leg cramps, Swelling, Tingling pain, Blisters or ulcers, Bleeding under the skin, Gangrene (the foot may turn dark purple, blue, or gray).
- Quick recognition of these signs and symptoms may save your patient from amputation of their foot or feet.
- In addition, your assessment of these conditions should also include the provision of appropriate footwear for your homeless patient.

## IT ALL BEGINS WITH THEIR FEET

• A 2021 study described the foot-related problems of the homeless: "Among male participants, 20 (44.44%) reported a history of foot problems, while 33 (73.33%) currently had foot problems. These figures among female participants were 5 (25.00%) and 14 (70%) respectively. Study participants reported a history of foot problems that included callus and corn formation, foot ulcers, ingrown and infected nails, bunions, hammertoes, plantar warts, frostbite and street feet. Many (55.38%) participants reported foot pain, with 12.31% reporting constant pain and 44.62% recurrent pain related to these conditions. In addition to a history of foot problems, the research team observed that participants also experienced other foot problems such as deformity, changes in nails, sensation, skin, temperature-cold and -hot, range of motion, pedal pulses, dependent rubor and erythema. These changes indicated that homeless people had complex problems that comprised chronic health conditions, such as diabetes, difficulty walking, loss of foot sensitivity, reduced mobility, numbness and tingling in feet, peripheral artery disease and deep vein thrombosis. The highest mean scores for all participants were deformity, nails, sensation, skin compared to temperature (cold and hot), range of motion, pedal pulses, dependent rubor and erythema."[1]

## AND THEN THEIR SHOES

• The 2021 book "Comprehensive Management of the Lower Extremity in the Homeless Patient" spells out the costs and benefits involved: "Shoes protect our feet from the outside environment. Unstable housing leads to the homeless to be subjected to this outside environment even in the harshest of weather conditions. The importance of proper shoe wear is essential in preventative care of many dangerous lower extremity medical conditions such as ulcerations, frostbite, and bacterial or fungal infections. Any of these conditions can lead to the need for hospitalization and often loss of limb, ultimately changing the patients' life forever. The dramatic difference in healthcare expenditures when comparing the cost of a new pair of shoes compared to hospital admission, surgical intervention, postoperative care, and prosthesis is clear."[2]

## AND, FINALLY, 5 WORDS OF PODIATRIC WISDOM FROM THE CCHS TEAM FOR EVERY SINGLE TIME YOU ASSESS A HOMELESS PATIENT

• Take off their damn shoes.[3]



1 Sheila D'Souza, Melba, Noeman A. Mirza, and Subrahmanya Nairy Karkada. "Development of a Foot Care Model to Determine the Risk of Foot Problems among Homeless Adults in Canada." Health & Social Care in the Community 29, no. 5 (2021): e214–23. https://doi.org/10.1111/hsc.13271.

2 Elmarsafi, Tammer, Jessica M. Arneson, Jonathon J. Srour, and Gregory P. Stimac. "Comprehensive Management of the Lower Extremity in the Homeless Patient." In Clinical Management of the Homeless Patient: Social, Psychiatric, and Medical Issues, edited by Elspeth Cameron Ritchie and Maria D. Llorente, 69–87. Cham: Springer International Publishing, 2021. https://doi.org/10.1007/978-3-030-70135-2_5.

3 Vance, Christopher et al. "Gimme Shelter." 135. CCHS Foundation, 2022.