

Chronic Cellulitis in the Unhoused: Case Study and Treatment Considerations

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Abstract

This report seeks to discuss sequelae of chronic cellulitis that is commonly treated in the ambulatory setting, as exacerbated by the conditions of living outside. Further we hope to identify etiologic factors that contribute to complication development. Additionally, this article will touch on unique treatment plan considerations for unhoused patients with the intention to educate providers and reduce mortality and morbidity relating to pedal skin and soft tissue infections in this population. This piece examines the case of a 52-year-old man with a history of chronic diseases, substance use disorder, and recurrent cellulitis. We highlight systemic issues in healthcare delivery for unhoused patients, including inadequate discharge planning, limited access to medication, and challenges in shelter placement. The discussion section emphasizes the importance of accurate diagnosis and tailored treatment plans for cellulitis in houseless individuals, the importance of a multidisciplinary approach incorporating social work services, and addressing chronic illnesses, substance use disorder, and housing issues. The report advocates for heightened awareness of bilateral cellulitis in unhoused populations, emphasizing the need for comprehensive, individualized treatment plans.

Keywords

cellulitis, ill-housed persons, environmental exposure, chronic disease, substance-related disorders

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Introduction

A 2018 study revealed that over half a million people in the United States are houseless, facing a mortality rate 10 times higher than the national average due to persistent health barriers.^{1,2} In addition to increased mortality risk, those who are unhoused are also found to have an overall increase in Vulnerability Index, indicating increased hazardous exposures.^{3,4} In the unhoused population, podiatric medical needs are more common than the general population, with up to two-thirds reporting active foot concerns such as wounds or infections.⁵ Without adequate attention, such conditions can result in amputation and even death.

Cellulitis is a deep tissue bacterial infection that has over 14 million reported cases in the United States annually.⁶ Skin and soft tissue infections, including cellulitis, are linked to trauma, diabetes, atherosclerotic disease, and hypertension, with diabetes and cardiovascular issues causing vascular insufficiency and increased infection risk.^{6–8} Additionally, alcohol use, although not directly tied to acute cellulitis, contributes to chronic infections through its immunosuppressive effects.⁹ Exposure and extended

immersion of the feet in water has also been associated with cellulitis. As such, recent history of trench foot and unstable housing status should indicate a possible diagnosis of bilateral lower limb cellulitis.^{9–11} Being unsheltered has also been found to independently increase the risk of severe frostbite and related consequences such as amputation and infection.¹² Similarly, being unhoused is an independent risk factor for diabetes sequelae and decreases the likelihood of obtaining revascularization procedures.¹³

Deep tissue infections are often recurrent and prior incidents of cellulitis increase the chance of development and duration of future episodes. Housing status and age are also risk factors for pedal skin and soft tissue infections and disease recurrence.^{14,15} Cellulitis may present with unilateral lower limb edema, erythema, and pain, distinguishable from

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Image 1. Dorsal aspect bilateral lower extremities 1 year after initial assessment. Notice the extensive tissue maceration, erythema, edema, and onychomycosis of both feet and proximal changes consistent with lipodermatosclerosis due to chronic venous insufficiency.

erysipelas by its deeper dermal and subcutaneous fat infection and indistinct borders. Standard treatment includes antibiotics such as beta-lactams, clindamycin, or trimethoprim/sulfamethoxazole with coverage for the most common pathogens streptococci and staphylococci. Sequelae of such infections are often devastating, resulting in amputation or death. Amputation not only increases patients' morbidity, disability, and suffering but also impacts clinicians by adding burden to the healthcare system.¹⁶

Case Description

The patient is a 52-year-old man with a history of poorly controlled diabetes, hypertension, frostbite, and lower extremity abscesses that was complicated by chronic unsheltered houselessness and alcohol use disorder. In March 2021, he initially presented to the emergency department complaining of worsening left foot pain that had been ongoing for several months (Image 1). Based on chart review, he subsequently had at least 10 emergency department presentations from March 2021 to August 2022 at 6 separate facilities with similar symptoms. His presenting complaints were consistently "bilateral foot pain" and "swelling." Throughout these presentations he was diagnosed with lower extremity edema, cellulitis, trench foot, frostbite, peripheral neuropathy, venous insufficiency, venous stasis ulcer, and gas gangrene. During these admissions he received a range of antibiotics, including vancomycin, trimethoprim/sulfamethoxazole, piperacillin/tazobactam, cefepime, and cefuroxime, for empiric cellulitis treatment. Additionally, he received hydralazine for hypertension and gabapentin for neuropathy. Throughout these various encounters, the patient

repeatedly received discharge instructions that did not account for appropriate shelter, medication refill, or follow-up. Notable hospital encounters are summarized below.

During 1 encounter the patient was discharged with hydralazine 25 mg every 8 as needed for systolic blood pressure greater than 160 mm Hg. Regrettably, he was not provided with a mechanism to monitor his home blood pressures. In a separate instance, his medications were sent to a pharmacy 21 min away by car, and over 3 h away on foot, despite the presence of a pharmacy within the hospital and known transportation barriers. Moreover, hospital case managers had previously documented limited access to his medication being a driver of his recurrent presentations.

On 2 separate visits to the emergency department, he was discharged with recommendations to "home or self-care" follow-up with primary care physician in 1 week without confirmation that the patient had a primary care physician or steps to establish one. During multiple hospitalizations social workers provided the patient with a shelter list. The patient expressed reluctance to use a shelter and a preference to find housing, due to unsuccessful previous interactions with a local shelter placement group. Nonetheless, the case managers recommended that the patient call this same shelter placement group, without offering options for permanent supportive housing. On one such occurrence, a social worker noted that he must have a shelter to accept him prior to discharge due to unsafe current weather conditions. Despite this, he was discharged to an unknown shelter without medication or follow-up.

During his treatment course, the patient had intermittent follow-up with a local volunteer street medicine team on at least 10 separate occasions. During these visits, interventions included dressing changes and disease monitoring, trimethoprim/sulfamethoxazole prescriptions, and education regarding leg elevation and foot hygiene (Image 2). Throughout this time the patient spent his days and nights sitting on an uncovered bench in a bustling neighborhood enduring heavy rain and severe snowstorms. He continued to wear shoes with the laces and tongue removed to accommodate for his pain and the swelling of his feet. Much of the time, he remained close to the bench he resided on, due to his inability to walk significant distances due to foot pain and his access to resources through local groups and friends that knew to find him there. The street medicine team connected him with a housing specialist and after several months he was able to secure a permanent apartment, after which his presentations to the ED sharply declined and foot wounds healed. He remains housed and continues to receive care coordinated through the street medicine team.

Discussion

Within this case report there are 3 main objectives that merit discussion. We will discuss the identification and proper



Image 2. Plantar aspect of bilateral feet in August 2021 during a street medicine follow up. Notice the improved tissue breakdown, rupture bullae, and desquamation.

diagnosis of bilateral cellulitis and essential elements in creating a treatment plan for houseless individuals with this condition.

Proper Identification, Diagnosis, and Treatment of Bilateral Cellulitis

Accurate diagnosis is crucial for developing appropriate treatment plans but can be challenging when multiple pathologies have similar symptom profiles. In this case, considering the patient's history and response to antibiotics, bilateral cellulitis should be included as a differential diagnosis for his bilateral edema, erythema, and pain. Other more concerning causes of lower extremity edema, such as venous thromboembolism, systolic heart failure, nephrotic syndrome, lymphedema, or myxedema were less likely. The patient's risk factors for infection, venous insufficiency, peripheral vascular disease, along with his social risk factors including his unhoused status, chronic alcohol use, poorly controlled hypertension and diabetes, persistent environmental exposure, and recurrent foot infections increase the likelihood of bilateral cellulitis, despite typically presenting with only 1 site of infection. Therefore, when encountering bilateral inflammatory edema and pain that improves with antibiotics, particularly in patients at high risk, once an appropriate workup has been completed and alternative

etiology excluded, bilateral lower limb cellulitis should be considered as a putative diagnosis. Treatment should target the most common infectious agent based on symptom profile. In the absence of systemic symptoms, oral antibiotics covering methicillin-sensitive *Staphylococcus aureus* and streptococcal species is appropriate. However, for patients with systemic symptoms, those who have systemic immune response syndrome or quick Sepsis Related Organ Failure Assessment criteria and are at risk for sepsis, have failed outpatient treatment, or have an unmitigated exposure, the decision to admit and treat with intravenous antibiotics should be strongly considered.

Living unhoused with unmanaged chronic conditions and alcohol dependence confounded with a poor diet, limited hygiene, and fragmented support overtime contributed to reduced immune functions and exacerbated his chronic illness. Also, living exposed to the weather, he spent prolonged periods of time in freezing temperatures and wet conditions, leaving his skin vulnerable to breakdown and infection. With limited health literacy, transportation, and wound care support our patient struggled to manage the different podiatric diagnoses. Though limited treatments were administered in the hospital, he quickly returned to his bench to sit outdoors, resulting in continual exposure to the elements and his sedentary lifestyle promoting venous pooling, progressing until he

was unable to comfortably walk, further exacerbating his risk for disease progression. In turn, he developed persistent cellulitis.

Navigating Treatment Plans for Individuals With Comorbidities, Housing Instability, and Substance Use

Tailoring treatment plans for houseless patients involves addressing unique challenges such as limited resources, unpredictable environments, and increased podiatric issues due to exposure to cold, damp conditions, and unsanitary environments. Limited health literacy contributes to higher acute care utilization and hospital readmissions, making education on foot hygiene crucial.¹⁷⁻¹⁹

For patients like ours, who repeatedly sought emergency care for infectious podiatric symptoms, it is evident that previous treatments did not resolve his issues. It seems that he was treated based on presenting symptoms, rather than based on his entire medical story. Analysis of his records reveals chronic exposure, infectious skin diagnoses, uncontrolled diabetes, hypertension, peripheral vascular disease risk, alcohol use, and recurrent symptoms with suboptimal antibiotic therapy duration. Recognizing these patterns suggests the need for additional treatment plans addressing chronic illnesses, alcohol use, and housing.

Addressing uncontrolled chronic illnesses in emergency settings requires understanding the underlying issues. Successful management involves physical and financial access to follow-up care, medications, and social support. Adjunct social work services in the emergency department can assist with post-discharge resource access.²⁰ Additionally, education about chronic disease and individualized suggestions for those who have been struggling to manage their illnesses, may benefit patients.^{19,21}

Physicians should also consider potential substance use disorder and its impact on medication adherence, appropriate prescriptions, discharge plans, and patient education. In severe cases of alcohol dependence, hospital admission for intravenous antibiotics may be necessary for non-self-limiting infections. In other cases, physicians can consider discharging a houseless patient with substance use disorder to a subacute rehabilitation or respite program to simultaneously address risks associated with alcohol use and environmental exposure. Establishment of more permanent housing has been shown to improve psychiatric health and substance abstinence in previously unhoused individuals.²²

Addressing Houselessness as a Means of Improving Health Outcomes

Street medicine encompasses a field of care dedicated to addressing the comprehensive medical and social needs of

those experiencing housing instability or homelessness. Multidisciplinary teams often composed of volunteer medical personnel, medical students, pharmacists, and case managers, serve as a bulwark aimed at addressing the otherwise unmet health needs of the unsheltered community. In doing so, they aim to disrupt cycles of suboptimal care complicated by limited access and stigmatization, and to reduce healthcare disparities. Moreover, when viewed from a harm reduction vantage, street medicine promotes patient autonomy and individualism, fosters a trusting physician-patient partnership, and positive impact through the lens of incremental change.²³ Therefore, identifying patients who may benefit from street medicine services, especially those who may be at risk for unmitigated exposure, health system overuse, or poor follow up, as was the case with our patient, may serve as a mechanism to reduce systemic care burden. Importantly for our patient, he had been identified at high risk of progression to amputation. Due to the increased risk of mortality in homeless patients after amputations, a street medicine group rapidly established a therapeutic relationship with him while hospitalized and planned for follow-up reevaluation after discharge. During these encounters antibiotic adherence was reviewed, wound care and dressing changes were performed, and the patient was monitored for signs of disease recurrence or decompensation. Due to the potentially life-threatening disease, he was also prioritized with a housing care coordinator to help facilitate prevention of sentinel events, reducing mortality risk.

In a recent review the authors describe the differences in the sequelae of unsheltered and sheltered homelessness. In contrast to sheltered homeless populations, those without regular residential access were found to be at increased risk of chronic disease, have higher rates of mental health illness including substance or alcohol use, injury, chronic homelessness, and all-cause mortality.²⁴ Those experiencing unsheltered homelessness, were also linked to increased risk of concurrent condition disorders of physical health, mental health, and substance use, that is, trimorbidity, however no statistically significant difference was observed between rates of use for emergency and hospital-related healthcare services.²⁴ Interestingly, being insured and having a primary care provider was lower in those unsheltered, nonetheless they had a greater likelihood of seeking follow up care relative to their sheltered peers.²⁴ Surprisingly, when coupled with a rapid rehousing agency, patients enrolled in housing first programs model, were shown to have excess rates of mortality when compared with both the general populations and unhoused individuals due to both chronic disease as well as violent causes such as suicide or overdose.^{25,26}

As such, considering discharge location and supporting a patient in establishing appropriate shelter is essential to improve patient outcome and reduce readmission.^{18,19,27} For example, the California Hospital Association models the

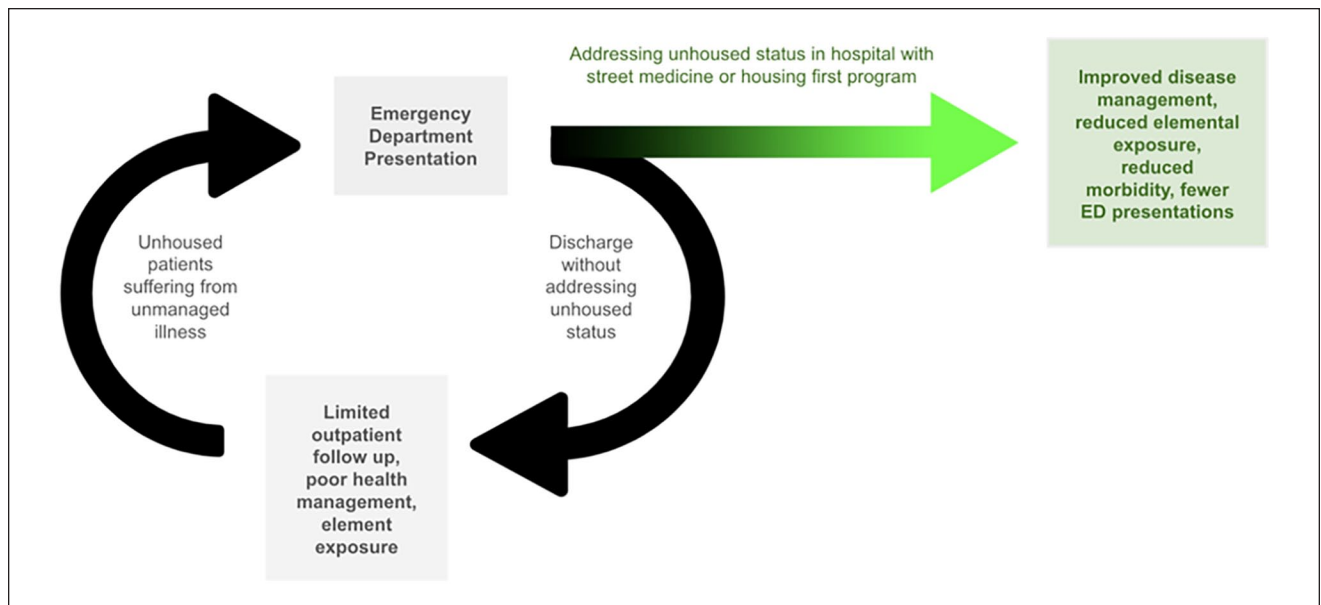


Figure 1. The proposed mechanism of alleviating undue suffering of unhoused individuals secondary to poor health management and environmental exposure through establishing connections with street medicine and housing first programs prior to hospital discharge.

use of discharge plan checklists that address follow-up care, access to food and clothing, and discharge destination. Another group, Community Resources for Emergency Department Overuse, uses a multidisciplinary team approach to offer personalized care suggestions, which has been shown to reduce recurrence, decrease costs, and enhance individual care.²⁸ Ultimately, patients with recurrent presentations to the emergency department may require a greater level of planning in management and discharge in order to reduce further complications and repeated presentations (Figure 1). A similar approach would have likely benefited our patient by addressing his health needs, risk factors, and chronic conditions that ultimately primed him for a chronic tissue infection and recurrent emergency department presentation. Implementing hospital-based housing assistance teams, offering referral to housing coordination groups, or establishing a connection with a street medicine before discharge may benefit patients such as ours, reduce podiatric morbidity, suffering, and even mortality.

Conclusion

While cellulitis typically presents unilaterally, we should maintain a high index of suspicion of bilateral cellulitis when confronted with patients demonstrating bilateral erythema, edema, and pain along with other appropriate risk factors. These risk factors include immunosuppression, vascular damage, recurrent infection, and chronic exposure.

Those who have sequelae including amputation, have much higher mortality rates and as such we maintain the goal of early recognition and action towards removal of the highest risk patients out of the cycle of homelessness and prevention of sentinel events, to reduce mortality risk. Additionally, in working with patient populations that experience homelessness, extra considerations must be taken in creating a treatment plan. Specifically, addressing the patient's housing status as a means to improve their medical status should be considered. Moving forward, policy change and advocacy for people experiencing homelessness will drastically decrease the prevalence of undue suffering and podiatric disease in this population.

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