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Daniel Nissi, LIA  508-259-9480  daniel.nissi@hubinternational.com
INTRODUCTION
Recent research confirms that health-related social needs (HRSN) – like housing instability and food insecurity – increased in the United States in July 2020, upon expiration of initial federal pandemic unemployment compensation. These kinds of HRSN were entrenched in the Ocean State before COVID-19 arrived, with disparate impacts on Black, Indigenous and People of Color (BIPOC) communities. Transformation efforts that better account for people’s social needs are underway in Rhode Island in both public health contexts (such as Health Equity Zones) and healthcare contexts (such as Care Transformation Collaborative of Rhode Island / PCMH (Patient-Centered Medical Home) Kids, or CTC-RI, initiatives). In fact, a 2019 CTC-RI quality improvement pilot with MLPB (formerly known as Medical-Legal Partnership | Boston) – involving complex care-based Community Health Teams (CHTs) who are dedicated to holistically meeting people’s medical, behavioral and social health goals – suggests that if care teams’ knowledge is expanded to include legal rights education, teams will be more effective social care partners with people at this time of material hardship resurgence.

An illustrative, de-identified example from the pilot follows:

During a High-Risk Case Review meeting, a CHT member asked MLPB how they could support a patient with a behavioral health condition who was at risk for eviction. Due to their diagnosis, the patient had difficulty keeping their apartment orderly, and the landlord had threatened to initiate eviction proceedings if the unit was not cleaned up in a week. The CHT member was concerned that the patient could not meet this deadline and might become homeless.

MLPB’s law and policy consultant oriented the CHT to a common dynamic in landlord-tenant relationships: a landlord’s lack of understanding that behavioral health conditions can impact how tenants engage with tenancy responsibilities, and an inaccurate perception that the tenant is being willfully non-compliant. The consultant also oriented the CHT to the basics of people’s fair housing rights, including an important legal protection for people living with disabilities: the right to reasonable accommodation in housing. Finally, MLPB helped the CHT understand the key elements of a valid request for reasonable accommodation.

This education enabled the CHT to identify a reasonable accommodation request as a potential next step in social care planning with this patient. The CHT member conveyed this basic legal information to the patient, confidently partnered with the patient to prepare a reasonable accommodation request letter, which was approved by the landlord and gave the patient more time to organize the unit. The patient was spared being served with eviction papers that week, and the CHT now is equipped to harvest this learning in future partnerships with other patients.

For Effective Social Care, We’re Going to Need a Bigger Toolbox
In December 2018, CTC-RI launched a seven-month quality improvement pilot with MLPB, an organization that provides legal education and problem-solving insight to care teams so they can more effectively partner with people around HRSN and social determinants/structural drivers of health (SDOH). CTC-RI wanted to equip Community Health Teams with additional tools to help patients navigate complex HRSNs, which exist in larger structural contexts, including racism in America and laws and policies that control access to resources. MLPB pioneered the evidence-based team-facing, legal partnering approach that constructs a community of practice equipped to surface legal rights, risks and remedies that can and should impact social care delivery. During the pilot, a law and policy consultant from MLPB trained statewide CHT staff on the connections between HRSN, people’s legal rights, risks and remedies, and scope-of-practice-aligned problem-solving strategies, and embedded with the CHT at Thundermist Health Center to support their social care planning and delivery. Notably, this MLPB colleague was not deployed to provide direct legal representation to patients, which most often is a downstream intervention. The pilot involved:

- Workforce training for the entire CHT workforce;
- Participating once a month in two “High Risk Case Reviews” (six total at the West Warwick site, six total at the Woonsocket site) to offer the teams continuous education on potentially relevant legal rights, risks and remedies;
• Responding to consults [questions about potential relevant legal rights, risks and remedies and scope-of-practice-aligned problem-solving options] initiated by CHT members outside of Case Review meetings;
• Identifying situations where the CHT might consider offering the patient a referral to an external legal specialist for direct legal representation; and
• Noting opportunities for CHT and clinic system adjustments that may enable more responsive social care across populations.

During the pilot, MLPB delivered six trainings to CHT workforce members. Of the 19 CHT learners who attended MLPB’s January 2019 “Immigration 101” training, 9 staff completed both a pre-and post-training survey. These learners reported increased proficiency in discussing, screening for, and understanding links between immigration status and health and making appropriate referrals, reflected in Figure 1.

As indicated in Figure 2, housing instability-related concerns represented the highest volume of CHT consults with MLPB.

The most prevalent specific housing concerns were rental conditions and eviction risk, reflected in Figure 3.

Figure 1. MLPB Immigration 101 Training for CHTs, Outcomes (Jan. 2019)

Figure 2. Health-related Social Needs Discussed During CHT-MLPB Consults. (N=67) Dec. 2018–June 2019

<table>
<thead>
<tr>
<th>Housing &amp; Utilities sub-topics</th>
<th># of Consults w/sub-topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rental conditions</td>
<td>9</td>
</tr>
<tr>
<td>Eviction</td>
<td>5</td>
</tr>
<tr>
<td>Access to stable housing</td>
<td>4</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Foreclosure</td>
<td>3</td>
</tr>
<tr>
<td>Search resources</td>
<td>1</td>
</tr>
<tr>
<td>Security deposit return</td>
<td>1</td>
</tr>
<tr>
<td>Reasonable accommodation</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
</tr>
</tbody>
</table>

During reflective debriefs, CHTs shared with CTC-RI and MLPB that:
• Historically, tackling health-related social needs borne by complex care patients had often felt overwhelming to the team and sometimes had a “numbing” effect on team members;
• Thundermist’s High-Risk complex care team initially was skeptical that this pilot could meaningfully support HRSN problem-solving;
• Integration of a law and policy consultant colleague generated new confidence, capacity and enthusiasm on the team, because staff were better equipped to “meet patients where they are” and therefore could better build – and sustain – therapeutic alliances with patients.

In the wake of this pilot’s learning, CTC-RI has continued to prioritize integration of MLPB training and technical assistance within its CHT network.

CONCLUSION

Caring for people classified by insurers and health organizations as high-risk presents unique challenges for care teams, and complex care practice will only become more demanding as pandemic-worsened trends in employment, income, and access to basic needs like food and housing evolve. To advance quality and impact, organizations and systems should break down silos of knowledge and problem-solving pathways. Welcoming legal education and problem-solving insight within the community health workforce is an important first step.
References

Acknowledgment
The pilot described in this Commentary was funded by Community Health Team support provided by the RI Executive Office of Health and Human Services (EOHHS) and RI Department of Behavioral Healthcare Developmental Disabilities and Hospitals (BHDDH) to the Care Transformation Collaborative of Rhode Island/PCMH Kids.

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'Elvis is here! Elvis is here!'  
A wagging Social Determinant of Health

MARY KORR  
RIMJ MANAGING EDITOR

This month’s focus theme on Social Determinants of Health (SDoH) brought back memories of my late Portuguese Water Dog, Elvis, and our visits to Rhode Island senior citizens living in nursing homes, a Veteran’s home, and assisted living and rehab facilities.

Elvis was a certified therapy dog, a process that required him to be enrolled in a 10-week American Kennel Club (AKC) Canine Good Citizen’s training class, and passing a series of tests. His final therapy certification exam took place in a hallway and in the lobby at Rhode Island Hospital. The toughest challenge came during the reaction-response portion, when the evaluator rolled quickly up to us in a wheelchair, as we sat in the lobby, waiting for the results. Elvis jumped up, startled. So did I. Elvis had to retake the test on another day to pass.

Shortly afterwards, when he received his certificate, we began to visit an East Side nursing home. Our first encounter was with a woman with dementia. When I told her Elvis’ name, she grinned. “Elvis is here! Elvis is here!” she shouted out. It became her habit when she saw him as we exited the elevator near the lounge. She would advance her wheelchair, pat him on the head, lift one of his ears and whisper words that sometimes sounded like babble.

When a columnist I worked with, who was in his 80s, fell at home, he wound up there for several months. Yehuda was a dog owner, and the sight of Elvis erased his intent frown as he scanned the pile of newspapers on his attached bed tray. At times, I would prod him to tell me about his post-wartime experiences, when he led displaced Holocaust survivors in refugee camps in Germany, by foot, along an ‘underground’ route to Mediterranean ports and on to Palestine. “Elvis doesn’t want to hear about that again!” he would say. “But he wants to hear about how you dodged the British blockade,” I would answer.

We always visited Yehuda last, and as we left his room and walked towards the elevator, one resident would frequently navigate his walker to greet us. When he heard Elvis was a water dog, he told us about Ollie, his boyhood Labrador Retriever, who loved to swim. I showed him Elvis’ webbed paws. “Labs have webbed paws, too,” he said. Once he introduced us to his son, visiting from Chicago. “This must be Elvis. Dad has been telling me what a good boy you are.” He looked at me and said, “Thank you for talking to dad when you visit. I don’t get back East as often as I would like to.”

We usually ran into the same custodial engineer as we left the building, and he would pause and pet Elvis, a cao de agua like the ones he remembered in his native Algarve region in southern Portugal. He spoke to Elvis in Portuguese and Elvis always offered his paw.

When we visited the Rhode Island Veterans Home in Bristol, Elvis wore his red, white and blue flag neckerchief. He liked going here – he did not have to ride in an elevator like the one at the East Side nursing home, which made him nervous. We would visit vets in their rooms and one time when we entered one, there was a woman with a parrot at the bedside. “Hell-O!” the bird chirped. “Hell-O!” And, he spoke in phrases: “I’m a GOOD BOY!” We all laughed.

When the COVID pandemic is over, therapy pets will return, to bring smiles and solace to residents and patients, who may welcome them with a shout-out: “Elvis is here! Elvis is here!” Therapy and visitation animals, whether canine, avian or other species, can break the social isolation, bring smiles, and sometimes spark memories of days gone by – truly positive Social Determinants of Health in the broadest use of the term.
With Gratitude for Health Care Providers Across Rhode Island

Neighborhood Health Plan of Rhode Island sincerely thanks Rhode Island providers for keeping our community healthy, and risking their lives to save ours, especially this past year during the pandemic.

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As a geriatrician, I have the privilege of caring for older individuals, whose health has been impacted by a combination of genetic influences, environmental factors, and social determinants. While broad conditions, such as social determinants, are out of the control of myself or my patients, I have a responsibility to assess, intervene and improve function whenever possible – including on people’s social needs. Preserved function and resilience are critical to overcoming the increasing burden of disease and mortality with age. As individuals age, they are less able to respond to the stress of the social determinants. The combination of the aging process and social determinants can result in negative outcomes such as premature mortality, additional comorbidity, social isolation, and suffering.

Social frailty
The intent of the compilation in this issue of the Rhode Island Medical Journal is to further define the concepts that will empower additional research by examining the intersection of social determinants and aging. One example of this is social frailty, presented in “The Intersection of Physical and Social Frailty in Older Adults,” by Quach, et al. In its most basic definition, frailty is a decreased resilience to stressors. The past two decades have built a literature and the supporting science around physical frailty – the decreased ability to return to physical function after stress such as acute illness, cognitive decline, or death of a caregiver. Our clinical experience is that physical frailty is exacerbated by social frailty. For instance, the location of hospital discharge is often dictated by the availability of social supports.

Dementia/homelessness
Dementia is an example of a medical condition where social need is heightened, as examined in “Incidence of Homelessness among Veterans Newly Diagnosed with Alzheimer’s Disease and Related Dementias,” by Jutkowitz, et al. Cognitive decline limits the ability to complete tasks that are essential to self-care and navigating daily life. Caregivers of individuals experiencing dementia are likely to report more depression, anxiety, poor health maintenance, reduced quality of life, and burnout. When a caregiver becomes overwhelmed by the needs of the individual, the outcome is often placement in a facility. However, in cases of limited social support (social frailty), the disease can further disintegrate and disenfranchise tenuous bonds resulting in outcomes such as housing instability and homelessness for the person who is cognitively impaired.

Food insecurity
Food insecurity, or the inability to obtain adequate food, is particularly dangerous for older adults who may be taking medications or have health conditions that require specific nutritional intake. For older adults with physical or cognitive impairments, particularly those lacking social support, it can be an insurmountable challenge to overcome the transportation, planning, and preparation required to meet nutritional needs. This inability often results in a worsening of health outcomes. While community programs such as Meals on Wheels exist, accessibility is location dependent, coverage in rural areas is sparse, providers must possess awareness of these resources, and the referral process must be completed. “An Exploratory Framework to Interpret County-Level Indicators of Food Insecurity,” by Tucher, et al combines multiple data sources to index food insecurity.

Home-based primary care
Similar to the food insecurity framework, the area deprivation index (ADI) provides important insights into who is being served through home-based services within the VA. The ADI is a relatively new tool to identify neighborhood income, which can then be used to examine components of healthcare within that region. By comparing service delivery, health systems can examine how the biases of income may influence access to care. For example, in the presented analysis, “Association of Home-Based Primary Care Enrollment with Social Determinants of Health for Older Veterans,” by Montano, et al shows that individuals experiencing homelessness were less likely to get home-based primary care, but the program does not enroll individuals without a home. However, those with housing instability were five times more likely to receive home-based services. This finding suggests that housing is a logistical challenge, but the system is adapting to the needs of those with marginal stability.

Measures such as the area deprivation index provide important information when providing care for older adults, but additional factors also need to be considered. The impact...
of social frailty on health outcomes for older adults in relation to race and ethnicity is beyond the scope of this paper and is a critical area for future research.

The complexities of social determinants are unique to each individual. One measurement system, one social need, or one survey will not present a comprehensive picture of all social determinants. As clinicians our responsibility is to mitigate disease, improve function, and reduce suffering while trying to understand the factors that influence the well-being of our patients beyond the walls of the clinic.

Guest editor
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The Intersection of Physical and Social Frailty in Older Adults

LIEN T. QUACH, PhD, MD; JENNIFER PRIMACK, PhD; MELANIE BOZZAY, PhD; CAROLINE MADRIGAL, PhD, RN; SEBHAT ERQOU, MD, PhD; JAMES L. RUDOLPH, MD, SM

ABSTRACT
Frailty, a vulnerability to stressors, has been increasingly woven into the clinical understanding of older people who are unable to respond to the impact of diseases, disability, and age-related decline. While the literature has focused on physical frailty, social frailty has been conceptualized within the domains of social needs (social and emotional support, loneliness), resources (income, food, housing, medical care, etc), social fulfillment (engagement in work and activities), and self-management (cognitive function, mental health, advance planning). This review outlines the assessment of the four domains of social frailty within the structure of clinical visits, particularly annual wellness and advance care planning. Increasing connectivity with the community, health system, and government support is the primary recommended intervention. On a policy level, expanding opportunities to connect socially frail people with resources may help mitigate the vulnerability of physical frailty.

KEYWORDS: frailty, physical frailty, social frailty

INTRODUCTION
Frailty decreases resiliency and reserves, which renders people vulnerable to the stress of disease, disability, or social change. Physical frailty has dominated medical literature for the past 20 years. With prevalence estimates of up to 45% among adults 85 years or older, physical frailty increases the risk of low functional status, hospitalization, and mortality. Despite its high prevalence, physical frailty is not a normal process of aging, and many have postulated that frailty can be prevented or treated.

Over the past two decades, physical frailty measurements have emerged: 1) the clinically favorable frailty phenotype and 2) the data-focused frailty index (accumulation of deficits). The phenotype of frailty by Fried et al. (2001) includes five criteria: weight loss, reduced activities, grip strength, gait speed, and exhaustion. Clinically, the objective measurement of the frailty phenotype is possible within the context of an office visit and is billable, starting in 2021, with the R54 ICD-10 code. In contrast, the frailty index presents a model of deficit accumulation. With the breadth of comorbidities, disabilities, and age-related decline, each additional deficit results in the patient being less able to rebound from stressors. For example, a patient with many comorbidities, including dementia, is going to be less able to rebound from the stress of acute hospitalization. Frailty indexes incorporate clinical information, such as that from an assessment of function, cognition, depression, physical ability, and comorbidities. For clinicians with access to electronic medical record data, the frailty index can be calculated with fields completed in the course of clinical care.

The social frailty gap
In examining the fundamental definition of frailty – a decrease in resiliency and reserves, clinicians invariably recognize that numerous social factors beyond those contributing to the phenotype of frailty index definitions play a substantial role in patient function. For example, if a person lacks financial resources for food (a socially-anchored process), solely capturing strength loss in the physical frailty phenotype does not account for social factors that may be largely responsible for frailty in nonphysical domain. Thus, there is a gap in the narrow definitions of physical frailty that does not include the broader perspective of social frailty – a gap that has clear ramifications for improving patient care, and even potentially mitigating negative outcomes. Therefore, social frailty should be considered in concert with broader frailty definition. Social frailty has been defined as a progressive loss of resources, activities, or the ability to participate in social activities to fulfill basic social needs.

Social frailty often manifests with clinical stressors such as the response to a new diagnosis or acute hospitalization, when the system supporting the patient may get overwhelmed or break down. Other symptoms of social frailty include limited social support, a smaller social network, poor living conditions, fewer socially-oriented leisure activities, and risk of losing resources. Other features may include unhealthy social behaviors [lack of physical exercise, poor diet, alcohol use, and smoking], social isolation, and loneliness. Social frailty is a broad but highly medically relevant construct. Yet, clinical tools for identifying social frailty remain elusive.

The purpose of this article is to describe the intersection of physical frailty and social frailty and utilize existing social frailty literature to describe a framework for building a clinical checklist of social frailty.
The social frailty framework: measurement and integration into care and treatment

Figure 1 highlights the intersection of physical and social frailty. This intersection is influenced by biological, psychological, social, and environmental factors. Prior systematic reviews of social frailty have developed a framework of four social frailty domains including 1) social needs; 2) general resources; 3) social fulfillment; and 4) self-management to provide a more comprehensive view of the system supporting people living with frailty. Social needs encompass social and emotional support. General resources include life essentials such as housing, food, water, air, and income. Social fulfillment describes a person’s ability to interact and engage in activities that allow survival and thriving. Self-management is the autonomous component of social frailty that includes self-determination and motivation necessary to achieve equilibrium among the other social frailty domains and potentially avoid physical frailty.

This conceptual framework of social frailty is based on a combination of different theories including: 1) Loneliness Theory, which refers to an individuals’ social network and relationships being less satisfactory than expected; 2) The convoy theory of social relations, which refers to individuals receiving social support throughout their life by members of their cohort; 3) Self Determination Theory, which refers to the status of motivation or autonomy and control, and 4) Social Production Functions Theory, which refers to individuals who maximize their psychological and environmental factors or resources for physical and social well-being.

Table 1 describes the relationship between social frailty domains and physical frailty. An analysis conducted by Woo et al. in 2005 found that increasing social support was associated with lower frailty. Weight loss from physical frailty phenotype, has been associated with the resource domain of social frailty (occupation, race, gender, and educational level, neighborhood deprivation, and individual socioeconomic status). The social fulfillment domain highlights that components of frailty such as exhaustion can be associated with depression and slow gait speed leading to reduced social engagement. Similarly, the self-management domain has a strong relationship with cognitive function and can be associated with weakness, resulting from reduced exercise and poor disease management among people with cognitive impairment.

Clinical recommendations for integrating frailty and social frailty into treatment

Incorporation of yet another assessment into an already busy clinical practice has potential to benefit patients with physical frailty, but should be accomplished with an eye toward minimizing additional clinical burden. There are components of social frailty that could be built into pre-visit assessments, annual wellness visits, advance care planning, or pre-procedure shared decision making. The purpose would be to facilitate clinical responses when stressors affect the social infrastructure of a patient, rather than simply rote completion of assessment fields. This approach emphasizes that medicine is within the control of the provider.

Table 2 presents a framework for a social frailty checklist with example measures based on a multi-component model of social frailty that includes social isolation, loneliness (social needs), social exercise and participation (social fulfillment), housing, food (resources), behavior, and motivation (self-management). The checklist identifies key elements of social frailty (but is not comprehensive), assessments of the element, and clinical opportunities to complete the assessment. This checklist may assist providers and multidisciplinary teams in coordinating evaluation at the early stages of frailty or addressing frailty in older adults.
Conclusions

Social frailty contributes to reduced resiliency and ability to maintain independence. Using a literature-based conceptual model of social frailty, this manuscript identifies potential opportunities to assess social frailty. Because there is clear overlap between physical and social frailty, integrating a broader and socially-sensitive view of frailty into medical practice may be useful to identify factors that could impact frailty (both physical and social) and maybe amenable to interventions to improve patient outcomes.

Clinical research directions

While the physical frailty phenotype has dominated the medical literature, the study of social frailty is less developed. The demonstrated association of physical frailty and adverse health outcomes with biological underpinnings strongly suggests that the conceptualizations of physical frailty are appropriate. However, the lack of incorporation of social domains suggests that the overall concept of frailty needs reconsideration. Recent research has systematically examined the association of physical frailty with elements of social frailty domains. Additional work is needed to target interventions in social frailty domains using existing infrastructure [e.g., meals on wheels, home, and community-based services, etc.] to determine if modifying social frailty can impact physical frailty. While pharmaceuticals may address biological deficits, larger-scale interventions are necessary to influence social determinants. Fortunately, social support programs could permit or encourage such interventions [e.g., Meals on Wheels, Program of All-Inclusive Care of the Elderly, VA Homeless Programs, State Medicaid home, and community-based services, etc.] to determine if modifying social frailty can impact physical frailty. While pharmaceuticals may address biological deficits, larger-scale interventions are necessary to influence social determinants. Fortunately, social support programs could permit or encourage such interventions [e.g., Meals on Wheels, Program of All-Inclusive Care of the Elderly, VA Homeless Programs, State Medicaid home, and community-based services, etc.] to determine if modifying social frailty can impact physical frailty. While pharmaceuticals may address biological deficits, larger-scale interventions are necessary to influence social determinants. Fortunately, social support programs could permit or encourage such interventions [e.g., Meals on Wheels, Program of All-Inclusive Care of the Elderly, VA Homeless Programs, State Medicaid home, and community-based services, etc.] to determine if modifying social frailty can impact physical frailty. While pharmaceuticals may address biological deficits, larger-scale interventions are necessary to influence social determinants. Fortunately, social support programs could permit or encourage such interventions [e.g., Meals on Wheels, Program of All-Inclusive Care of the Elderly, VA Homeless Programs, State Medicaid home, and community-based services, etc.] to determine if modifying social frailty can impact physical frailty. While pharmaceuticals may address biological deficits, larger-scale interventions are necessary to influence social determinants. Fortunately, social support programs could permit or encourage such interventions [e.g., Meals on Wheels, Program of All-Inclusive Care of the Elderly, VA Homeless Programs, State Medicaid home, and community-based services, etc.] to determine if modifying social frailty can impact physical frailty.

Social Frailty Checklist

<table>
<thead>
<tr>
<th>Domain</th>
<th>Element</th>
<th>Assessment</th>
<th>Clinical Assessment Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Needs</td>
<td>Social Supports</td>
<td>Perceived support when needed</td>
<td>Demographic information</td>
</tr>
<tr>
<td></td>
<td>Loneliness</td>
<td>UCLA loneliness</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td>General Resources</td>
<td>Food Security</td>
<td>Not able to afford the food in household in the last 12 months</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td></td>
<td>Housing Security</td>
<td>Have any housing problems</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td></td>
<td>Elder Abuse</td>
<td>Neglect, physical abuse, psychological abuse, financial abuse</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td></td>
<td>Discrimination</td>
<td>Perceived Discrimination Scale</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td>Social Fulfillment</td>
<td>Leisure time activities</td>
<td>IADLs17</td>
<td>Introduction to Medicare visit/Annual Wellness</td>
</tr>
<tr>
<td></td>
<td>Mental Health</td>
<td>PHQ-918</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td>Self-management</td>
<td>Cognitive Function</td>
<td>See AA Cog screening</td>
<td>Annual Wellness</td>
</tr>
<tr>
<td></td>
<td>Care Planning</td>
<td>Physical exercise and Physical Activity Scale for the Elderly (PASE)20</td>
<td>Advance Care Planning</td>
</tr>
</tbody>
</table>

References


**Acknowledgments**

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Incidence of Homelessness among Veterans Newly Diagnosed with Alzheimer’s Disease and Related Dementias

ERIC JUTKOWITZ, PhD; FRANK DEVONE, MS; CHRISTOPHER HALLADAY, MS; DINA HOOSHYAR, MD, MPH; JACK TSAI, PhD; JAMES L. RUDOLPH, MD, SM

ABSTRACT

BACKGROUND: To determine the incidence of homelessness among Veterans diagnosed with Alzheimer’s disease and related dementias (ADRD).

METHODS: We used Veterans Affairs (VA) administrative records to identify Veterans with a new ADRD diagnosis anytime between 2010-2019. Among these Veterans, we calculated the incidence of homelessness, and estimated the association between demographics, comorbidities and hazard of homelessness.

RESULTS: The incidence rate of homelessness was highest for Veterans diagnosed with ADRD between 18–49 years of age (14.9 per 1,000 person-years; 95%CI: 13.6, 16.3) and lowest for Veterans diagnosed with ADRD at 90+ years (0.3 per 1,000 person-years; 95%CI: 0.2, 0.4). The adjusted hazard ratio of homelessness was higher for unmarried Veterans, and those with alcohol use disorder, substance use disorder, liver disease, depression, hypertension, lung disease, post-traumatic stress disorder and psychoses.

CONCLUSIONS: Younger age and being unmarried at the time of ADRD diagnosis are associated with a greater risk of experiencing homelessness.

KEYWORDS: housing insecurity, veterans, dementia, ADRD

INTRODUCTION

In 2019 approximately 37,085 Veterans in the US experienced homelessness, which is almost 50% less than the 73,362 Veterans who experienced homelessness in 2009. The reduction in homelessness among Veterans is credited to US Department of Veterans Affairs’ (VA) investments in outreach, supportive housing, and specialized clinical services. Although the VA has made substantial progress in reducing homelessness, Veterans remain overrepresented among the US homeless population. Homelessness continues to be a costly public health challenge that is associated with poor health outcomes and mortality. In addition, the homeless Veteran population is aging, which presents new challenges to manage the long-term care needs of housing insecure Veterans.

VA providers proactively screen and document Veterans’ housing status in their medical record, however, there is still much unknown about the factors affecting homelessness among Veterans. One study found that 3.7% of Veterans experienced a homeless episode within 5 years of military discharge. Younger age, lower military pay grade, and a mental health condition (including substance disorder) or traumatic brain injury documented at the time of discharge were associated with an increased risk of experiencing homelessness. Another study found that the one-year incidence of homelessness among Veterans referred to specialty mental health care was highest (9.3%) for Veterans between 46-55 years of age. This group’s largest risk factors for homelessness was a diagnosed substance use disorder and not being married. Work to further understand Veteran circumstances and populations most at-risk of experiencing homelessness can inform the targeting of resources.

Many of the risk factors for homelessness are also risk factors for Alzheimer’s disease and related dementias (ADRD). For example, low-socioeconomic status, traumatic brain injury, post-traumatic stress disorder, and substance use are highly correlated with homelessness and ADRD. Furthermore, Black, indigenous, and persons of color are over-represented in both homeless and ADRD populations. In certain circumstances ADRD may be a risk factor for homelessness. People living with ADRD experience losses in cognition and functional independence. Family caregivers may need to help manage finances and assist with bathing, dressing, and toileting. Without a family caregiver, people living with ADRD may be unable to live safely in the community, navigate their care needs, and manage their finances. These factors may increase their risk of becoming homeless.

We used VA data to provide the first estimates on the risk of Veterans newly diagnosed with ADRD subsequently experiencing homelessness. We expected that age of ADRD diagnosis is inversely associated with incidence of homelessness. Consistent with prior studies, we also expected that Veterans unmarried at the time of their ADRD diagnosis, or those with a diagnosis for alcohol use disorder, substance use disorder, psychoses, post-traumatic stress disorder, or traumatic brain injury are at a greater risk of eventually experiencing homelessness.
METHODS

Data
We used the U.S. Department of Veterans Affairs [VA] Corporate Data Warehouse and the Medicare Chronic Conditions ADRD algorithm [See Appendix 1, at end, for list of ADRD ICD-9/10 codes] to identify whether a Veteran ever received an ADRD diagnosis between 2010 and 2019. The VA Corporate Data Warehouse includes encounter coded diagnoses by VA providers and from contracted community providers. The first occurrence of an ADRD diagnosis served as the cohort entry or index date. We followed Veterans after their first ADRD diagnosis to determine whether they ever received a diagnosis for homelessness, died [either before or after a homeless diagnosis], or survived the entire follow-up period with or without a homeless diagnosis. We excluded Veterans who ever had a homeless diagnosis before an ADRD diagnosis and Veterans <18 years of age. We used ICD9 [V60.0] and ICD10 [Z59.0] codes (“Homelessness”) to determine a Veteran’s housing status (1 = ever homeless in the follow up period; 0 = never homeless in the follow up period).

Demographic Characteristics and Comorbidities at Time of ADRD Diagnosis
We determined the age, sex, race, marital status, degree of service-connected disability [Priority 1 or other], prior combat service, and rural or urban residential area of Veterans at the time of cohort entry. Service-connected disability determines a Veteran’s eligibility for VA paid long-term care and disability pension. At cohort entry, we also determined whether a Veteran had a diagnosis in the previous year for comorbidities associated with ADRD and homelessness including alcohol dependence, substance abuse, rheumatic disease, kidney disease, liver disease, depression, diabetes, hypertension, congestive heart failure, lung disease, stroke, post-traumatic stress disorder, schizophrenia/psychosis, or traumatic brain injury.

Statistical Analysis
We calculated descriptive characteristics of the sample at cohort entry, and we compared the demographic characteristics of Veterans who experienced homelessness after an ADRD diagnosis to those who remained stably housed using $\chi^2$ and $t$ tests. We calculated the crude incidence rate of homelessness by age of ADRD diagnosis [18–49 years, 50–59 years, 60–69 years, 70–79 years, 80–89 years, 90+ years] per 1,000 person-years. To estimate incidence rates, we calculated the denominator as the number of person-years from cohort entry until a Veteran received a homeless ICD-9/10 code (event of interest), death (prior to a homeless ICD-9/10 code), or reached the end of the follow-up period. The numerator was the number of Veterans who received a homeless diagnosis during the follow up period. Finally, we estimated a cox proportional hazards model to determine the association between demographic characteristics, comorbidities, and risk of homelessness. We graphically examined the proportional hazards assumption.

Our study was approved by the Providence VAMC Institutional Review Board and Research and Development committees.

RESULTS
We identified 383,478 with a new ADRD diagnosis between 2010 and 2019. The average (SD) age of Veterans at time of ADRD diagnosis was 78.5 (10.9), most were men [97.5%], white [77.2%], and married [63.3%] [Table 1]. Among these Veterans, 3,200 [0.83%] eventually received a homeless diagnosis. There were notable differences between Veterans who received a homeless diagnosis compared to those who remained stably housed [Table 1]. At cohort entry, Veterans who eventually received a homeless diagnosis were significantly younger [63.7 [SD = 15.2] vs. 78.7 [SD = 10.8], $p<0.001$), more likely to be Black [22.7% vs. 10.4%; $p<0.001$], and more likely to be unmarried [71.6% vs. 36.4%; $p<0.001$] than their stably housed counterparts. In addition, Veterans who received a homeless diagnosis were more likely to have a diagnosis for alcohol abuse [14.7% vs. 2.9%; $p<0.001$], substance abuse [6.1% vs. 1.0%; $p<0.001$], liver disease [6.0% vs. 2.2%; $p<0.001$], depression [35.7% vs. 16.5%; $p<0.001$], hypertension [55.5% vs. 53.6%; $p=0.001$], lung disease [17.8% vs. 14.9%; $p<0.001$], post-traumatic stress disorder [19.3% vs. 8.5%; $p<0.001$], psychosis [30.6% vs. 9.1%; $p<0.001$], traumatic brain injury [8.6% vs. 2.4%; $p<0.001$], and valvular disease [3.7% vs. 4.8%; $p<0.003$] than Veterans who remained stably housed.

The crude incidence rate of homelessness decreased as age of ADRD diagnosis increased [Table 2]. Specifically, the incidence rate of homelessness among Veterans diagnosed with ADRD between 18-49 years of age was 14.9 [95% CI: 13.6, 16.4] per 1,000 person-years. For Veterans diagnosed with ADRD who were 90+ years, the incidence of homelessness was 0.3 [95% CI: 0.2, 0.4] per 1,000 person-years.

The adjusted hazard ratios (HR) for age and being unmarried at the time of an ADRD diagnosis were 0.94 [95% CI: 0.93, 0.94] and 3.30 [95% CI: 3.04, 3.58], respectively. [Table 3]. The hazard of homelessness was higher for Black Veterans [HR 1.67, 95% CI: 1.52, 1.82] compared to White Veterans. In addition, the hazard of homelessness was higher for Veterans who had a diagnosis for alcohol use disorder [HR 1.87, 95% CI: 1.67, 2.10], substance use disorder [HR 2.15, 95% CI: 1.84, 2.53], liver disease [HR 1.24, 95% CI: 1.06, 1.45], depression [HR 1.41, 95% CI: 1.30, 1.53], hypertension [HR 1.22, 95% CI: 1.12, 1.33], lung disease [HR 1.12, 95% CI: 1.02, 1.24], post-traumatic stress disorder [HR 1.26, 95% CI: 1.13, 1.40] and psychoses [HR 1.63, 95% CI: 1.49, 1.77].
### Table 1. Demographic Characteristics of Veterans at Time of ADRD Diagnosis

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Veterans with ADRD who Eventually Received a Homeless Diagnosis</th>
<th>Veterans with ADRD who Never Received a Homeless Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=383,478</td>
<td>N=3,200</td>
<td>N=380,278</td>
</tr>
<tr>
<td>Age, mean (SD)</td>
<td>78.55 (10.93)</td>
<td>63.70 (15.16)</td>
<td>78.67 (10.80)**</td>
</tr>
<tr>
<td>Male, n (%)</td>
<td>373,716 (97.45%)</td>
<td>3,047 (95.22%)</td>
<td>370,669 (97.47%)**</td>
</tr>
<tr>
<td>Race, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>296,027 (77.20%)</td>
<td>2,195 (68.59%)</td>
<td>293,832 (77.27%)**</td>
</tr>
<tr>
<td>Black</td>
<td>40,219 (10.49%)</td>
<td>727 (22.72%)</td>
<td>39,492 (10.39%)**</td>
</tr>
<tr>
<td>Other</td>
<td>47,232 (12.32%)</td>
<td>278 (8.69%)</td>
<td>46,954 (12.35%)**</td>
</tr>
<tr>
<td>Not Married, n (%)</td>
<td>132,641 (36.66%)</td>
<td>2,156 (71.56%)</td>
<td>130,485 (36.37%)**</td>
</tr>
<tr>
<td>Service-Connected Disability (Priority 1 Status), n (%)</td>
<td>82,786 (21.67%)</td>
<td>620 (19.53%)</td>
<td>82,166 (21.69%)**</td>
</tr>
<tr>
<td>Served in Combat, n (%)</td>
<td>48,802 (12.73%)</td>
<td>535 (16.72%)</td>
<td>48,267 (12.69%)**</td>
</tr>
<tr>
<td>Rural, n (%)</td>
<td>123,327 (32.18%)</td>
<td>742 (23.21%)</td>
<td>122,585 (32.26%)**</td>
</tr>
<tr>
<td>Comorbidities, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol</td>
<td>11,732 (3.06%)</td>
<td>471 (14.72%)</td>
<td>11,261 (2.96%)***</td>
</tr>
<tr>
<td>Substance abuse</td>
<td>4,011 (1.05%)</td>
<td>196 (6.12%)</td>
<td>3,815 (1.00%)***</td>
</tr>
<tr>
<td>Rheumatic disease</td>
<td>6,140 (1.60%)</td>
<td>46 (1.44%)</td>
<td>6,094 (1.60%)**</td>
</tr>
<tr>
<td>Renal disease</td>
<td>41,479 (10.82%)</td>
<td>244 (7.62%)</td>
<td>41,235 (10.84%)**</td>
</tr>
<tr>
<td>Liver disease</td>
<td>8,511 (2.22%)</td>
<td>193 (6.03%)</td>
<td>8,318 (2.19%)***</td>
</tr>
<tr>
<td>Depression</td>
<td>63,689 (16.61%)</td>
<td>1,143 (35.72%)</td>
<td>62,546 (16.45%)**</td>
</tr>
<tr>
<td>Diabetes</td>
<td>101,978 (26.59%)</td>
<td>835 (26.09%)</td>
<td>101,143 (26.60%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>201,905 (52.65%)</td>
<td>1,775 (55.47%)</td>
<td>200,130 (52.63%)**</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>34,650 (9.04%)</td>
<td>244 (7.62%)</td>
<td>34,406 (9.05%)**</td>
</tr>
<tr>
<td>Lung Disease</td>
<td>57,179 (14.91%)</td>
<td>570 (17.81%)</td>
<td>56,609 (14.89%)**</td>
</tr>
<tr>
<td>Post-Traumatic Stress Disorder</td>
<td>32,746 (8.54%)</td>
<td>618 (19.31%)</td>
<td>32,128 (8.45%)**</td>
</tr>
<tr>
<td>Psychoses</td>
<td>35,434 (9.24%)</td>
<td>978 (30.56%)</td>
<td>34,456 (9.06%)**</td>
</tr>
<tr>
<td>Traumatic Brain Injury</td>
<td>9,464 (2.47%)</td>
<td>274 (8.56%)</td>
<td>9,190 (2.42%)**</td>
</tr>
<tr>
<td>Valvular disease</td>
<td>18,271 (4.76%)</td>
<td>117 (3.66%)</td>
<td>18,154 (4.77%)**</td>
</tr>
<tr>
<td>Stroke</td>
<td>47,771 (12.46%)</td>
<td>470 (14.69%)</td>
<td>47,301 (12.44%)**</td>
</tr>
</tbody>
</table>

Notes: P-values compare homeless to stably housed and at-risk to stably housed:
* p<0.05
** p<0.01
*** p<0.001

### Table 2. Incidence Rates of Homelessness Among Veterans Diagnosed with Alzheimer’s Disease and Related Dementias

<table>
<thead>
<tr>
<th>Age at ADRD Diagnosis</th>
<th>Number of Veterans Diagnosed with ADRD</th>
<th>Number of Veterans with a Homeless Diagnosis following an ADRD Diagnosis</th>
<th>Person-years</th>
<th>Homeless Incidence Per 1,000 Person-Years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18–49 Years</td>
<td>7,300</td>
<td>466</td>
<td>31,277</td>
<td>14.9 (13.6, 16.3)</td>
</tr>
<tr>
<td>50–59 Years</td>
<td>10,479</td>
<td>602</td>
<td>48,255</td>
<td>12.5 (11.5, 13.5)</td>
</tr>
<tr>
<td>60–69 Years</td>
<td>53,082</td>
<td>984</td>
<td>251,041</td>
<td>3.9 (3.7, 4.2)</td>
</tr>
<tr>
<td>70–79 Years</td>
<td>105,189</td>
<td>670</td>
<td>462,265</td>
<td>1.4 (1.3, 1.6)</td>
</tr>
<tr>
<td>80–89 Years</td>
<td>159,507</td>
<td>414</td>
<td>807,070</td>
<td>0.5 (0.4 0.6)</td>
</tr>
<tr>
<td>90+</td>
<td>47,921</td>
<td>64</td>
<td>209,854</td>
<td>0.3 (0.2, 0.4)</td>
</tr>
</tbody>
</table>
DISCUSSION

We provide the first estimates on the incidence of homelessness among Veterans following a new ADRD diagnosis. Only a few studies have examined the incidence of homelessness among Veterans and they do so in a population referred to mental health services and a population discharged from the military.\(^{11,12}\) Compared to these studies, we find high absolute rates of homelessness among younger Veterans diagnosed with ADRD and low rates of homelessness among older Veterans diagnosed with ADRD. We also find similar sociodemographic (e.g., not being married) and comorbid (e.g., alcohol and drug diagnoses) risk factors are strongly correlated with experiencing homelessness.

There were noticeable differences between Veterans who eventually received a homeless diagnosis compared to those who remained stably housed. As hypothesized, we found that age of ADRD diagnosis was inversely associated with homelessness, and unmarried Veterans had a greater risk of experiencing homelessness. Younger Veterans with an ADRD diagnosis may have less time to accumulate financial and social/family resources to safely age in the community. For example, a younger Veteran with alcohol use disorder and ADRD may lack strong social supports (e.g., children not old enough to provide caregiving; not married). Limited social ties is a notable risk factor for homelessness,\(^{18}\) and risks may be amplified among people who cannot independently engage in community activities. Providing Veterans with resources to build social supports may reduce the risk of homelessness. Finally, younger people with an ADRD diagnosis may not have health insurance outside of their VA benefits, they may not have stable income, and because of their care needs may be prone to spend down their assets. Furthermore, their cognitive impairments and potentially limited family resources may make it challenging to navigate Medicaid and Social Security Disability benefits.

Our findings highlight the importance of screening for housing instability for Veterans living with ADRD. The VA has integrated a homeless screening instrument into clinical practice,\(^ {10}\) but screening is dependent on a Veteran seeking care or being identified during outreach efforts. Not all Veterans regularly receive their care from the VA. In addition, Veterans with ADRD and without a family caregiver may be less likely to engage with the healthcare system;\(^ {19}\) yet, these are the Veterans at greatest risk of experiencing homelessness. Systematically identifying whether a Veteran has a caregiver may help pinpoint those with minimal social support. The importance of identifying strategies to mitigate homelessness among potentially isolated people living with ADRD is highlighted by changing demographics. In the coming decades more people are expected to be living alone with ADRD.\(^ {20,21}\) Finally, we examined the risk of homelessness after an ADRD diagnosis. An important next step is understanding the risk of ADRD following a homeless diagnosis.

As ADRD is a disease of progressive functional decline, people living with ADRD eventually need full-time care. Full-time in-home care is costly and may not be possible without family caregivers, adequate financial resources, or stable housing.\(^ {22}\) For some Veterans living with ADRD and without family/financial resources, nursing homes could provide housing and care needs. Nursing homes must be prepared for the unique needs of Veterans at risk for homelessness.\(^ {23}\) This includes being able to manage substance abuse and complex mental health diagnoses. The VA also has home and community-based services which could help Veterans with ADRD and at-risk for homelessness live in the community longer.

Our study has several limitations. We used administrative data to identify Veterans with an ADRD and homeless diagnosis. ADRD is underdiagnosed in administrative data, providers do not systematically screen for ADRD, and diagnosed ADRD is different than true disease prevalence.\(^ {24}\) In addition, an ADRD diagnosis code may be used as a catch-all for

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Table 3. Hazard ratio for the Association between Sociodemographic Characteristics, Comorbidities, and Homelessness (N=383,478)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Hazard Ratio (95% Confidence Interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>0.94 (0.93, 0.94)</td>
</tr>
<tr>
<td>Male</td>
<td>1.34 (1.13, 1.59)</td>
</tr>
<tr>
<td>Race (ref = white)</td>
<td></td>
</tr>
<tr>
<td>Black</td>
<td>1.67 (1.52, 1.82)</td>
</tr>
<tr>
<td>Other</td>
<td>0.89 (0.78, 1.02)</td>
</tr>
<tr>
<td>Not married</td>
<td>3.30 (3.04, 3.58)</td>
</tr>
<tr>
<td>Service-Connected Disability (Priority 1 Status)</td>
<td>0.54 (0.49, 0.60)</td>
</tr>
<tr>
<td>Combat experience</td>
<td>0.69 (0.62, 0.78)</td>
</tr>
<tr>
<td>Rural</td>
<td>0.67 (0.62, 0.73)</td>
</tr>
<tr>
<td>Comorbidities</td>
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<tr>
<td>Alcohol use disorder</td>
<td>1.87 (1.67, 2.10)</td>
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<tr>
<td>Substance use disorder</td>
<td>2.15 (1.84, 2.53)</td>
</tr>
<tr>
<td>Rheumatic disease</td>
<td>0.99 (0.73, 1.34)</td>
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<tr>
<td>Renal disease</td>
<td>0.78 (0.67, 0.90)</td>
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<tr>
<td>Liver disease</td>
<td>1.24 (1.06, 1.45)</td>
</tr>
<tr>
<td>Depression</td>
<td>1.41 (1.30, 1.53)</td>
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<tr>
<td>Diabetes</td>
<td>1.08 (0.98, 1.18)</td>
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<tr>
<td>Hypertension</td>
<td>1.22 (1.12, 1.33)</td>
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<tr>
<td>Congestive heart failure</td>
<td>0.95 (0.82, 1.11)</td>
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<tr>
<td>Lung disease</td>
<td>1.12 (1.02, 1.24)</td>
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<tr>
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<tr>
<td>Psychoses</td>
<td>1.63 (1.49, 1.77)</td>
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<tr>
<td>Traumatic brain injury</td>
<td>0.98 (0.86, 1.13)</td>
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<tr>
<td>Valvular disease</td>
<td>0.91 (0.74, 1.11)</td>
</tr>
<tr>
<td>Stroke</td>
<td>0.95 (0.85, 1.05)</td>
</tr>
</tbody>
</table>
multiple cognitive disorders. Finally, ADRD diagnosis codes do not reflect severity of cognitive or functional activity limitations. The VA proactively seeks to identify Veterans experiencing homelessness, but we still likely underestimate the true incidence of homelessness because receiving a diagnosis is dependent on seeking care or being identified during outreach efforts. Importantly, administrative data does not have measures on contextual factors (availability caregivers, number/age of children, financial resources) which may contribute to the risk of becoming homeless. Finally, we do not have data on healthcare utilization or diagnoses outside the VA.

**CONCLUSIONS AND IMPLICATIONS**

In conclusion, age at time of ADRD diagnosis is inversely associated with the risk of eventually experiencing homelessness. Not being married, diagnosis for alcohol use disorder, substance use disorder, post-traumatic stress disorder, and psychoses are also associated with a greater risk of a Veteran living with ADRD experiencing homelessness. Efforts should be made to systematically identify family resources of Veterans at the time of an ADRD diagnosis. Nursing homes or community housing with wraparound clinical services could help prevent homelessness among Veterans with ADRD and less family/financial resources.

**References**


**Conflict of Interest Disclosures**

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Appendix 1. Chronic Condition Warehouse Alzheimer’s Disease and Related Dementias (ADRD) ICD-10 Codes

<table>
<thead>
<tr>
<th>ICD-10 Code</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>F01.50</td>
<td>Vascular dementia without behavioral disturbance</td>
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<tr>
<td>F01.51</td>
<td>Vascular dementia with behavioral disturbance</td>
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<tr>
<td>F02.80</td>
<td>Dementia in other diseases classified elsewhere without behavioral disturbance</td>
</tr>
<tr>
<td>F02.81</td>
<td>Dementia in other diseases classified elsewhere with behavioral disturbance</td>
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<tr>
<td>F03.90</td>
<td>Unspecified dementia without behavioral disturbance</td>
</tr>
<tr>
<td>F03.91</td>
<td>Unspecified dementia with behavioral disturbance</td>
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<tr>
<td>F04</td>
<td>Amnestic disorder due to known physiological condition</td>
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<tr>
<td>G13.8</td>
<td>Systemic atrophy primarily affecting central nervous system in other diseases classified elsewhere</td>
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<td>Delirium due to known physiological condition</td>
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<td>F06.8</td>
<td>Other specified mental disorders due to known physiological condition</td>
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<td>G30.0</td>
<td>Alzheimer's disease with early onset</td>
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<td>G30.1</td>
<td>Alzheimer's disease with late onset</td>
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<tr>
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<td>G30.9</td>
<td>Alzheimer’s disease, unspecified</td>
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<td>G31.1</td>
<td>Senile degeneration of brain, not elsewhere classified</td>
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<td>G31.2</td>
<td>Degeneration of nervous system due to alcohol</td>
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<td>G31.01</td>
<td>Pick’s disease</td>
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<td>Other frontotemporal dementia</td>
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<td>G94</td>
<td>Other disorders of brain in diseases classified elsewhere</td>
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<td>R41.81</td>
<td>Age-related cognitive decline</td>
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<td>R54</td>
<td>Age-related physical debility</td>
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<table>
<thead>
<tr>
<th>ICD-9 Code</th>
<th>Description</th>
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<td>Alzheimer’s disease</td>
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<td>331.11</td>
<td>Pick’s disease</td>
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<td>Other frontotemporal dementia</td>
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<td>Senile degeneration of brain</td>
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<td>331.7</td>
<td>Cerebral degeneration in diseases classified elsewhere</td>
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<td>Senile dementia, uncomplicated</td>
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<tr>
<td>290.10</td>
<td>Presenile dementia</td>
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<tr>
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<td>Presenile dementia with delirium</td>
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<td>290.12</td>
<td>Presenile dementia with delusional features</td>
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<td>290.13</td>
<td>Presenile dementia with depressive features</td>
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<td>290.21</td>
<td>Senile dementia with depressive features</td>
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<td>290.0</td>
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<td>294.10</td>
<td>Dementia in conditions classified elsewhere without behavioral disturbance</td>
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<tr>
<td>294.11</td>
<td>Dementia in conditions classified elsewhere with behavioral disturbance</td>
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<td>Dementia, unspecified, with behavioral disturbance</td>
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<tr>
<td>294.8</td>
<td>Other persistent mental disorders due to conditions classified elsewhere</td>
</tr>
<tr>
<td>797</td>
<td>Senility without mention of psychosis</td>
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ABSTRACT
In 2017, 12.5% of the population was estimated to be food insecure (FI) with wide regional variation. County-level FI is closely associated with, but likely more complex, than the county-level poverty rates. Therefore, we sought to identify a more nuanced framework for understanding factors contributing to FI. In an exploratory design, we studied 32 counties stratified by high and low FI and poverty, which were defined in terms of the national averages. Once stratified, counties were analyzed across 14 metrics within four summary domains: food access, food affordability, overall health environment, and county innovation. Having a stronger health environment was correlated with lower FI; correlations between the remaining three summary domains and FI were not significant. This was an initial effort to conceptualize potential markers of FI into a coherent framework using publicly available population-level health metrics. Future research could expand the sample and add additional metrics.

KEYWORDS: food insecurity, framework, social determinants of health

INTRODUCTION
In 2017, an estimated 12.5% of United States households were food insecure.1 Food insecurity (FI) is defined as a “lack of consistent access to enough food for an active, healthy life.”2 FI contributes to the selection of poorer quality foods, delaying necessary medical care and medications, increased emergency department use, and increased hospitalizations.3,4 In the US, there are wide county-level variations in FI, ranging from a high of 36% in Jefferson County, MS, to only 2.9% in Steele County, ND.5 FI disproportionately impacts specific areas of the country including the South, rural areas, and low-income areas.5

The Supplemental Nutrition Assistance Program (SNAP) is the nation’s largest federal food assistance program.6 However, while SNAP has been shown to significantly reduce FI, beneficiaries can remain food insecure even while enrolled in SNAP.6 Beyond federal food assistance programs like SNAP, WIC, funding through the Older Americans Act, and the School Meal Program, there are many local, regional, state, and national organizations working to combat FI. This ranges from national anti-hunger organizations such as Feeding America,5 to local food pantries and soup kitchens, to innovative non-profits like Health Leads which works with health systems to connect at-risk patients to social services including food,7 to progressive health systems such as Cincinnati Children’s8 and Boston Medical Center that have developed in-hospital food pantries and food prescription programs.9 There are also a number of novel insurer non-profit initiatives.10,11

While there are many innovative efforts across the country aiming to reduce FI, the scope, degree, and reach of these programs varies widely. Given the complex nature of FI and the variation in the availability of resources, health systems, policy makers, non-profits, and other entities need to understand qualities contributing to a county’s ability to address FI in order to prioritize the development and piloting of interventions and community partnerships for at-risk populations. To better understand the characteristics that may contribute to counties’ ability to address FI, we first examined the correlation between county FI rates and county poverty rates. Recognizing that there are many other factors also impacting food availability and access, we developed a set of 14 metrics across four domains we hypothesized would be associated with FI rates. We then examined how these characteristics varied across 32 counties within the four summary domains: counties with low FI rates and low poverty rates, low FI and high poverty, high FI and low poverty, and high FI and high poverty.

METHODS
Food Insecurity Framework
Counties with low FI were defined as those with FI rates below the 2017 national average of 12.5%.5 high FI was defined as being above the national average. Low poverty counties were defined as those with poverty rates below the national average of 12.3%.5 high poverty counties were above the national average.12 County-level food insecurity data were obtained from Feeding America’s Map the Meal Gap,5 and county-level poverty data were obtained from the U.S. Census Bureau’s Small Area Income and Poverty Estimates.13 We then sampled 32 counties nationally from urban and rural geographies stratified across four summary
domains: counties with low FI rates and low poverty rates, counties with low FI and high poverty, counties with high rates of FI and low poverty, and counties with high FI and high poverty.

A member of the research team (ET) conducted exploratory key informant interviews with a resource coordinator from a large food bank, peer navigators from a community non-profit that helps connect food insecure individuals with local resources, and a physician at a major academic medical center that has led several initiatives to address patient food insecurity. Informed by relevant literature and findings from these exploratory interviews, we then developed a framework to further contextualize county-level indicators of FI using 14 metrics across four domains: access to food, affordability of food, overall health environment, and local innovation/leadership [Figure 1].

Figure 1. Food Insecurity (FI) Framework

Notes:
* Broad-based Categorical Eligibility (BBCE) is defined as when states opt to enable individuals and households to become categorically eligible for SNAP if they qualify for other non-cash Temporary Assistance for Needy Families or state Maintenance-of-Effort programs (e.g., earned income tax credits, subsidized employment, Head Start, etc.). Counties received 1 point if they are within a state that has adopted any form of BBCE and 0 if they adopted none.
** Receipt of FINI grants (2015-2018): established in the 2014 Farm Bill and administered by the USDA's Food and Nutrition Service and National Institute of Food and Agriculture; it is designed to incentivize the purchase of fruits and vegetables by SNAP clients; awards are given to farmers markets, supermarkets, convenience stores, and retail food stores; awards are either pilot programs (1 year, up to $100,000), multi-year community-based projects (up to $500,000), and multi-year large-scale projects ($500,000 or greater)21
*** CDFI loans and investment per capita (2013-2016): Investments to programs that is designed to finance food retailers that opt to locate in an area that otherwise lacks healthy food access13

Measures and Data Sources

Access Domain
The access domain was comprised of the following county-level measures:
• Number of full-service supermarkets
• Number of SNAP retailers
• Number of residents with “low food access,” defined as the prevalence of limited supermarket access per 1,000 inhabitants in a county

Data for these measures were obtained from the Robert Wood Johnson Foundation’s (RWJF’s) Healthy Food Access Portal. Raw county-level numbers for each measure were divided by county population to facilitate comparison across counties. Measures were binary, with values above the county mean for each measure coded as “1” and values below the mean coded as “0.” Scoring for these and all subsequent measures are detailed in Appendix Table 1.

Affordability Domain
The affordability domain was comprised of the following measures:
• Ease of applying for SNAP
• SNAP eligibility qualifications
• Percent of SNAP eligible population enrolled
• Average cost per meal

Each of these measures was assessed at the state-level with the exception of average cost per meal, which was available at the county-level.

Ease of applying for SNAP was a composite variable defined by whether a state 1) allowed online applications and 2) allowed joint application and processing of Medicaid and SNAP applications. Data were sourced from the USDA’s Food and Nutrition Service 2017 SNAP State Options report.15

A state’s SNAP eligibility qualifications was a composite measure defined as 1) whether a state had adopted some form of Broad-Based Categorical Eligibility (BBCE) and 2) the SNAP eligibility threshold for gross income as a percent of the federal poverty level (FPL, baseline federal criteria is gross income <130% of the FPL). Data were obtained from the USDA State Options Report and the Economic Research Service’s SNAP policy database.15,16 BBCE
enables individuals and households to become categorically eligible for SNAP if they qualify for other cash assistance programs such as Temporary Assistance for Needy Families (TANF) or state Maintenance-of-Effort programs (e.g., earned income tax credits, subsidized employment, Head Start, etc.). 84% percent of the counties were in states that had adopted some form of BBCE. Increases of the gross income limit for SNAP eligibility beyond 130% of the FPL reflect the additional leniency adopted by states enabled by BBCE.

The percent of a states’ eligible beneficiaries enrolled in SNAP was determined using a Mathematica report on enrollment trends among eligible beneficiaries in 2015. We focused on SNAP rather than other federal food assistance programs that target FI (i.e., The Special Supplemental Nutrition Program for Women, Infants, and Children [WIC], school-sponsored lunch programs, etc.) as SNAP has been shown to substantially reduce FI and provides a metric for all US households rather than only households with children.

County-level cost per meal was determined using data from Feeding America’s Map the Meal Gap, which is calculated using the average dollar amount spent on food per week by food-secure individuals divided by 21 meals and weighted for the national average cost per meal and local cost-of-food indices.

**Health Environment Domain**
The health environment domain included the following measures:
- County-level obesity rate (2017)
- County-level diabetes prevalence (2017)
- State Medicaid expansion status (2018)
- County-level public transportation access per capita (2015)
- County-level percent of population that eats 0-2 fruit/ veg. per day (2013)

Each of the variables was assessed at the county-level except for Medicaid expansion status as of 2018, which was assessed at the state level. We reviewed RWJF’s Healthy Food Access portal reports contain data on fruit/vegetables consumption as well as their 2017 “County Health Rankings” detailing the county-level diabetes and adult obesity prevalence. To classify the access to public transportation, we reviewed the 2015 Unlinked Passenger Trips Per Capita data published by the American Public Transportation Association to assess the number of unlinked passenger trips, which we then divided by the total population.

The Kaiser Family Foundation provides data on the Medicaid expansion status as of 2018. The local innovation and leadership domain was comprised of the following measures:
- Receipt of FINI grants (2015–2018) – pilot programs, multi-year community-based, multi-year large-scale

Receipt of USDA Food Insecurity Nutrition Incentive (FINI) grants between 2015-2018 was assessed at the state level while Community Development Finance Institution (CDFI) loans/investments per capita between 2013 and 2018 were assessed at the county level. FINI grants were chosen as an indicator of the presence of SNAP incentive programs as they are awarded for projects aimed at increasing and incentivizing the purchase of fruits and vegetables by SNAP beneficiaries. CDFI loans and investment per capita [2013-2016] were selected as they were viewed as investments designed to finance food retailers that opt to locate in an area that otherwise lacks healthy food access. They were detailed in the RWJF Healthy Food Access portal reports.

**Statistical Analyses**
Descriptive data for each of the 32 counties in the framework were compiled for each of the 14 metrics. Counties were then given a summary score across each of the four domains, which are summarized in Table 1. The summary score indicates the county’s performance within the four domains. Scoring criteria are detailed in Appendix Table 1.

**RESULTS**

**Sample Characteristics**
Among the 32 counties studied, rates of food insecurity ranged from a low of 5.4% to a high of 36.3% [mean 14.4%]. Poverty rates ranged from 5.0% to 39.9% [mean 16.0%]. Counties represented 26 states from throughout the country with less representation of the East Coast. Full sample characteristics are listed in Appendix Table 2.

**Relationship between FI and the 4 Domains of Food Access, Food Affordability, Health Environment, and Local Innovation**
We found a statistically significant, positive correlation between FI rates and poverty rates across the 32 counties (r=0.78, p<.001) [Appendix Figure 1]. We scored each county, and determined there was no single criteria sufficient to conclude whether a county had a high or low FI rate [Table 2]. Figure 2 highlights the association between the four summary domains for FI and the county-level FI rates. Overall, Figure 2 supports the conclusions from Table 2 that there is no sufficient indicator to explain the variation in FI rates across poverty categories. However, we see that...
The health environment was negatively associated with food insecurity. Access: For access, there was a non-significant, slightly positive association between higher Food Access scores (i.e., better access to full-service supermarkets and SNAP retailers, and a lower population with low food access) and higher FI rates ($r = 0.16$, $p = 0.37$) (Figure 2, panel A).

Affordability: We did not find a significant relationship between our summary affordability domain (defined by SNAP eligibility, application qualifications, and enrollment rates and the cost per meal in the county) and FI rates ($r = -0.07$, $p = 0.72$) (Figure 2, panel B). While counties with low FI rates and low poverty tended to have the highest affordability scores, there were counties with low poverty and high FI rates and high poverty and low FI rates that also scored highly in the affordability domain.

Health: There was a statistically significant negative correlation between a higher Health Environment score and a higher FI rate ($r = -0.6$, $p < 0.001$; Figure 2, panel C).

Counties that scored higher in the Health Environment criteria (i.e., had a lower prevalence of adult obesity and diabetes, a lower percentage of the population eating only 0–2 servings of fruits and vegetables per day, more use of public transportation [which we viewed as a proxy of better access], and were in Medicaid Expansion states) had lower FI rates. This inverse relationship is exemplified by Jefferson County, MS, which had a FI rate of 36% and a corresponding 0 points in the Health Environment category.

Innovation: There was a non-significant negative correlation between our summary Local Innovation and Leadership domain and FI rates ($r = -0.15$, $p = 0.43$). Counties with low FI and low poverty were highly prevalent among those with the highest Innovation scores (Figure 2, panel D). Whereas counties high FI and high poverty rates were less likely to have received FINI or CDFI grant funding, which could spur innovative interventions to reduce FI.

### Table 1. Summary of County-Level Food Insecurity across Four Domains

<table>
<thead>
<tr>
<th>Food insecurity summary domains</th>
<th>Access</th>
<th>Affordability</th>
<th>Health Environment</th>
<th>Local Innovation &amp; Leadership</th>
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<td>max score 3</td>
<td>max score 6</td>
<td>max score 5</td>
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<tr>
<td>High resources and low food insecurity</td>
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<tr>
<td>Low resources and high food insecurity</td>
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<td></td>
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<td>Jefferson, MS</td>
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<td>0</td>
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<td>Greene, AL</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Edgecombe, NC</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>2</td>
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<td>Lake, TN</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Houston, TX</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Vanderburgh, IN</td>
<td>2</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Somerset, MD</td>
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<tr>
<td>Apache, AZ</td>
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</tr>
</tbody>
</table>
DISCUSSION

In this work we used publicly available data to characterize local FI. Specifically, we combined county- and state-level measures of the food environment, health environment, state-level policies, and local leadership into a coherent framework. We found that while poverty rates are highly correlated with FI rates, of the other domains we had hypothesized would be correlated with FI, only the health environment had a statistically significant relationship with FI. This underscores the complex nature of food insecurity, and the difficulty of distilling non-financial aspects of food insecurity such as limited access to foods or local leadership into composite scores or metrics. While many of the metrics used were not independently associated with FI, a more nuanced scoring system and/or modelling to adjust for multiple covariates may have allowed for a better understanding of these relationships. Analysis of our framework highlights that across metrics, counties with low FI did not have universally high scores whereas counties with high FI did not have universally low scores across summary domains. This heterogeneity across metrics accentuates both the complexity of FI and also that a well-coordinated response requires a network of state policy makers, initiatives, and investments.

There were several limitations to this research. First, counties were selected based on poverty and FI rates, and therefore they often represented regions that were more extreme. This selection criteria also likely influences the relationship between the summary domains and county-level FI. Second, some of the metrics may be collinear and we did not standardize scoring across metrics, which collectively might either over-weight or under-weight the influence of certain concepts in our scorings. Third, in many instances we dichotomized continuous measures, which may have masked variability in those measures across the 32 counties. Fourth, the findings are based on 32 counties out of 3,141 counties nationally, which may limit the external validity. Although in this exploratory study several of our summary domains were not significantly associated with FI, it is possible results would vary with a larger national sample. Fifth, our findings are observational and reflect associations, not causation. Finally, none of the criteria directly measure the degree or number of agencies seeking to address FI in each county. Future research could build on these findings to further understand the key determinants of county-level FI to help address the wide disparities we see in FI rates across the country.5

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ABSTRACT

BACKGROUND: Home-based Primary Care (HBPC) provides comprehensive primary care to Veterans who may be at risk of adverse health outcomes due to their social determinants of health. Area Deprivation Index (ADI) can be used as a surrogate measure of a Veteran’s social needs.

OBJECTIVE: To estimate the effect of neighborhood disadvantage, as measured by ADI, on HBPC enrollment for a sample of Veterans.

METHODS: We estimated a linear multivariate model in which the exposure was ADI and the outcome was enrollment in HBPC. Controls included clinical and demographic characteristics.

RESULTS: In a final sample of 12,005,453 observations (total Veteran months) on 353,485 individual Veterans, 18.4% lived in high-deprivation neighborhoods (ADI greater than 80). Mean monthly probability of new HBPC enrollment was 0.0061. Controlling for clinical characteristics, housing instability, and distance from the medical center, Veterans residing in high-deprivation neighborhoods were 1.4% to 14.8% less likely to enroll in HBPC, though the association was not statistically significant.

CONCLUSIONS: More research is needed to determine the relationship between Veterans’ social needs and HBPC enrollment.

KEYWORDS: Veterans, social determinants of health, Home-Based Primary Care

BACKGROUND

Socioeconomic disparities continue to exist within health systems and it is imperative to investigate and dismantle these disparities. Wong and colleagues assert that eliminating disparities will require an examination of social determinants of health (SDH). One critical SDH is the neighborhoods in which people live. Neighborhoods with lower socioeconomic status typically have more factors that negatively affect health such as fewer healthy food options, fewer recreational spaces, more crime, and subpar housing. One measure of neighborhood socioeconomic disadvantage is the Area Deprivation Index (ADI). Previous research has demonstrated that patients residing in more disadvantaged neighborhoods have significantly higher 30-day hospital readmission risks than those residing in less disadvantaged neighborhoods. While ADI has been used to predict readmission risk, little is known about the association between ADI and enrollment in other comprehensive primary care services.

The Department of Veterans Affairs (VA) Home Based Primary Care (HBPC) program was established in 1972 to provide in-home interdisciplinary care to chronically ill or disabled Veterans with complex social, behavioral, or medical needs. The primary goal of the HBPC program is to promote maximum functioning and independence of the Veteran in their home to maintain quality of life and reduce institutionalization, hospitalization, and emergency room visits. Veterans are referred by their primary care physician or upon hospital discharge and are subsequently evaluated for admission by HBPC staff using a standardized screening tool. HBPC becomes the primary care provider and this role is fulfilled by the HBPC medical director alone or in collaboration with a nurse practitioner or physician assistant. The frequency of home visits depends on the composition and structure of the team, which is ultimately determined by the needs of the Veteran. The interdisciplinary care team assesses the enrollees, develops a plan of care, provides all necessary primary care services, and refers enrollees to other services as needed. The HBPC interdisciplinary teams are comprised of the physician, nurse practitioners (NPs) or physician assistants (PAs), nurses, social workers, rehabilitation therapists, psychologists, dieticians, pharmacists, and administrative personnel.

Veterans enrolled in HBPC are predominantly male, over the age of 75, with more than eight chronic conditions. The number of Veterans aged 85 and older tripled between 2000 and 2012, and the HBPC census increased from 7,300 to 30,000. Edwards and colleagues found that the further a Veteran lived from a HBPC site, the less likely that they were enrolled in HBPC and that those Veterans enrolled in HBPC had the highest quartile of medical complexity with significantly lower odds of ambulatory care-sensitive condition hospitalizations. Thus far, the impact of a Veteran’s neighborhood socioeconomic status on HBPC enrollment has not been examined.

As a first step to investigating socioeconomic disparities in HBPC enrollment, we assessed associations between
neighborhood disadvantage and HBPC enrollment for a sample of older Veterans. Thus, we aimed to address the question: What is the effect of neighborhood socioeconomic status, as measured by ADI, on enrollment in the VA’s HBPC program? The authors hypothesize that Veterans in neighborhoods with lower socioeconomic status, or high-deprivation, are less likely to enroll in HBPC than Veterans in higher SES, or low-deprivation, neighborhoods at the same VA Medical Center (VAMC). \( \text{Figures 1 A, B} \)

**METHODS**

**Sample**

Data were obtained from the VA’s Corporate Data Warehouse. The study sample began with Veterans age 65 and older who received primary care at one of 156 sites (VA medical centers or outpatient clinics) that participated in a Social Work PACT Staffing Program and had an active HBPC program in the period from October 1, 2016 to September 30, 2019. Veterans who had primary care visits at more than one site were assigned to the site where they had the most primary care visits in that year. Observations were at the Veteran-month level. Clinical characteristics were identified within 12 months of an index date, either the fifteenth of a calendar month or the day of their first primary care visit in that month. In order to identify new enrollment, Veterans were excluded from the sample if they had any HBPC visits in the 12 months prior to the study start date. We also excluded Veterans who died within the month of their index date or if they resided in a nursing home for greater than 90 days within the previous 120 days of their index month. Veterans with prolonged nursing home stays were excluded from the sample as these Veterans were likely still residing in nursing homes and not eligible for enrollment in HBPC.

**Outcome**

We measured one main outcome: Veteran enrollment in HBPC. We measured this outcome over a thirty-day period from the index date.

**Exposure**

We operationalized neighborhood deprivation using the area deprivation index (ADI), a composite measure of census variables related to health outcomes reported as a percentile rank among census blocks.\(^{16}\) We used the national ADI measure. We defined exposure as living in a “high deprivation” neighborhood in three ways: the 50th, 80th, and 95th percentile or higher, compared to the lower percentiles. In order to assign ADI to the census tract in which a Veteran lived, we took the average ADI of the census blocks within a tract and matched it to the federal information processing system (FIPS) code associated with a Veteran’s home address in file in the VA record.

**Covariates**

Demographic characteristics were included from each Veteran’s enrollment file, and included sex, race, age, number of hospitalizations in the prior year, Rural-Urban Commuting Area code of the Veteran’s home residence, driving distance from closest VAMC and VA enrollment priority group for a service-connected disability. We operationalized age in 5-year bins in the OLS model. Based on diagnoses recorded in the electronic health record within twelve months before the index date, we included indicators for congestive heart failure, hypertension, complicated hypertension, lymphoma, fluid
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Overall (n=12,005,453)</th>
<th>ADI Grouping of the Patient’s Neighborhood of Residence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Least Disadvantaged (National ADI Rank &lt;80) (n=9,799,012)</td>
</tr>
<tr>
<td>Age</td>
<td>74.90 (7.43)</td>
<td>74.89 (7.36)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>12,467,336 (97.87%)</td>
<td>9,600,937 (97.98%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>10,871,366 (85.34%)</td>
<td>8,502,797 (86.77%)</td>
</tr>
<tr>
<td>Black</td>
<td>517,115 (4.06%)</td>
<td>267,464 (2.73%)</td>
</tr>
<tr>
<td>Unknown Race</td>
<td>930,894 (7.31%)</td>
<td>710,480 (7.25%)</td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>151,201 (1.19%)</td>
<td>107,562 (1.10%)</td>
</tr>
<tr>
<td>Asian</td>
<td>161,096 (1.26%)</td>
<td>145,285 (1.48%)</td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>106,808 (0.84%)</td>
<td>65,424 (0.67%)</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
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<tr>
<td>Congestive Heart Failure</td>
<td>647,423 (5.08%)</td>
<td>465,562 (4.75%)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>7,136,665 (56.02%)</td>
<td>5,529,485 (56.43%)</td>
</tr>
<tr>
<td>Anemia</td>
<td>1,029,546 (8.08%)</td>
<td>741,381 (7.57%)</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>1,086,400 (8.53%)</td>
<td>806,099 (8.23%)</td>
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<tr>
<td>Stroke</td>
<td>637,665 (5.01%)</td>
<td>476,838 (4.87%)</td>
</tr>
<tr>
<td>Hypothyroidism</td>
<td>1,094,583 (8.59%)</td>
<td>844,941 (8.62%)</td>
</tr>
<tr>
<td>Peripheral Vascular Disease</td>
<td>894,137 (7.02%)</td>
<td>675,948 (6.90%)</td>
</tr>
<tr>
<td>Depression</td>
<td>1,273,940 (10.00%)</td>
<td>969,447 (9.89%)</td>
</tr>
<tr>
<td>Post-traumatic Stress Disorder</td>
<td>1,096,126 (8.60%)</td>
<td>848,081 (8.65%)</td>
</tr>
<tr>
<td>Psychiatric Diagnosis</td>
<td>2,395,800 (18.81%)</td>
<td>1,845,650 (18.84%)</td>
</tr>
<tr>
<td>Obesity</td>
<td>1,462,809 (11.48%)</td>
<td>1,155,659 (11.79%)</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>3,082,909 (24.20%)</td>
<td>2,347,855 (23.96%)</td>
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<tr>
<td>Pulmonary Disease</td>
<td>2,017,033 (15.83%)</td>
<td>1,497,169 (15.28%)</td>
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<tr>
<td>Dementia</td>
<td>396,950 (3.12%)</td>
<td>295,446 (3.02%)</td>
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<tr>
<td>Alzheimer’s Disease and Related Dementias</td>
<td>402,359 (3.16%)</td>
<td>300,976 (3.07%)</td>
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<tr>
<td>Substance Use Disorder</td>
<td>507,064 (3.98%)</td>
<td>377,573 (3.85%)</td>
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<tr>
<td>Alcohol Use</td>
<td>411,606 (3.23%)</td>
<td>310,421 (3.17%)</td>
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<td>Current Smoker</td>
<td>1,587,615 (12.46%)</td>
<td>1,155,699 (11.79%)</td>
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<tr>
<td>Former Smoker</td>
<td>2,914,525 (22.88%)</td>
<td>2,274,671 (22.31%)</td>
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<tr>
<td>Homeless</td>
<td>55,885 (0.44%)</td>
<td>37,866 (0.39%)</td>
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<tr>
<td>Unstably Housed</td>
<td>191,601 (1.50%)</td>
<td>133,157 (1.36%)</td>
</tr>
<tr>
<td>VA Priority group</td>
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<td></td>
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<tr>
<td>Group 1: Service-Connected Disability ( &gt;50% disabling)</td>
<td>3,136,027 (25.28%)</td>
<td>2,448,800 (24.99%)</td>
</tr>
<tr>
<td>Veteran Residence Rural-Urban Commuting Area</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>4,229,849 (33.21%)</td>
<td>3,356,760 (34.26%)</td>
</tr>
<tr>
<td>Rural</td>
<td>7,195,575 (56.49%)</td>
<td>5,463,717 (55.76%)</td>
</tr>
<tr>
<td>Highly Rural</td>
<td>1,262,530 (9.91%)</td>
<td>978,535 (9.99%)</td>
</tr>
<tr>
<td>HBPC Enrollment</td>
<td>78,151 (0.61%)</td>
<td>55,978 (0.57%)</td>
</tr>
</tbody>
</table>
and electrolyte imbalances, obesity, coagulopathy, stroke, traumatic brain injury, psychoses, valvular disease, renal failure, peripheral vascular disease, depression, post-traumatic stress disorder, paralysis, other neurological conditions, hypothyroidism, liver disease, peptic ulcer disease, pulmonary hypertension, human immunodeficiency virus, diabetes, complicated diabetes, substance use disorder, psychiatric diagnosis, metastatic cancer, solitary tumor, rheumatoid arthritis, weight loss, blood loss anemia, and anemia.  

### Table 1

#### Analysis

To estimate the effect of neighborhood disadvantage on HBPC enrollment, we estimated the following linear probability model:

\[ HBPC_{ijkt} = \beta_0 + \beta_1 \text{HighDep}_j + X_{ijt} + \lambda_k + \epsilon_{ijt} \]

In this model, \( i \) indexes the individual Veteran, \( j \) is the census tract, \( k \) is the site where the Veteran gets their primary care, and \( t \) is month. \( HBPC_{ijkt} \) is a binary variable that is 1 if a Veteran enrolls in HBPC visits in month \( t \), and 0 otherwise, and \( \text{HighDep} \) is an indicator for national HighDep and 0 otherwise, and \( X_{ijt} \) are fixed effects for the VA medical center to control for differences between hospital systems in their HBPC programs, and \( Y_t \) are year fixed effects. To account for serial correlation of a Veteran’s outcomes, we estimated robust standard errors clustered at the Veteran level.

Datasets were assembled using SQL and R. Regression models were estimated and bincsatter plots were generated using Stata version 15. The bincsatter plots serve as visual representations of the multivariate regression of the change in probability of enrolling in HBPC at different values of a Veteran’s neighborhood ADI. We used one panel (Panel A) to represent the linear regression of HBPC enrollment on neighborhood ADI without adjustments, and a second panel (Panel B) to represent the regression of controlling for Veteran demographic and clinical characteristics. To create Panel B, we regressed ADI and HBPC on the set of control variables, and generated residuals from these regressions. We then grouped these residuals into 20 equal-sized bins, computed the mean of ADI and HBPC enrollment in each bin, and created a scatter plot of these 20 data points.

As part of quality-improvement activities, this work was determined exempt from review by the Providence VA Medical Center institutional review board.

#### RESULTS

In our final analytic sample, we had 12,005,453 observations on 353,485 individual Veterans, 18.4% of whom have addresses in high-deprivation (ADI greater than 80) neighborhoods. Veterans had slightly higher prevalence of chronic conditions in high-deprivation neighborhoods than in low-deprivation neighborhoods, such as hypertension (62.2% vs. 56.4%), diabetes (28.3% vs. 23.9%) psychiatric diagnosis (21.4% vs. 18.8%), and substance use disorders (5.1% vs. 3.8%). Veterans in high-deprivation neighborhoods were also more likely to be unstably housed (2.0% vs. 1.3%) and homeless (0.7% vs. 0.3%). The unadjusted rate of enrollment in the high-deprivation neighborhoods was 0.74% per month and in low-deprivation neighborhoods was 0.57% per month, and 0.61% overall.

### Table 2. Association of SDH with HBPC Enrollment By ADI Ranking of the Veteran’s Neighborhood of Residence (n=12,005,453)

<table>
<thead>
<tr>
<th>High-deprivation definition</th>
<th>ADI&gt;50</th>
<th>ADI&gt;80</th>
<th>ADI&gt;95</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-deprivation neighborhood</td>
<td>-0.00039***</td>
<td>-0.0008</td>
<td>-0.00096</td>
</tr>
<tr>
<td>(0.00001, 0.00002)</td>
<td>(-0.00095, -0.00043)</td>
<td>(-0.00223, -0.000031)</td>
<td></td>
</tr>
<tr>
<td>Homeless</td>
<td>-0.0296***</td>
<td>-0.02958***</td>
<td>-0.02957***</td>
</tr>
<tr>
<td>(0.0327, -0.0265)</td>
<td>(0.03267, -0.02649)</td>
<td>(0.03266, -0.02647)</td>
<td></td>
</tr>
<tr>
<td>Unstably housed</td>
<td>0.04433***</td>
<td>0.04349***</td>
<td>0.04350***</td>
</tr>
<tr>
<td>(0.04046, 0.0482)</td>
<td>(0.03962, 0.04736)</td>
<td>(0.03963, 0.04737)</td>
<td></td>
</tr>
<tr>
<td>Driving distance to nearest VAMC</td>
<td>-0.00002***</td>
<td>-0.00002***</td>
<td>-0.00002***</td>
</tr>
<tr>
<td>(-0.000003, -0.001)</td>
<td>(-0.000003, -0.000001)</td>
<td>(-0.0003, -0.000001)</td>
<td></td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Notes: Each column represents a linear multivariate model of the probability of enrolling in HBPC with different specifications for high-deprivation neighborhoods. Model covariates not shown include: age, sex, race, Veteran residence Rural-Urban Commuting Area, service connection, hospitalizations, congestive heart failure, hypertension, lymphoma, fluid and electrolyte imbalances, obesity, coagulopathy, stroke, traumatic brain injury, psychoses, complicated hypertension, valvular disease, renal failure, peripheral vascular disease, depression, post-traumatic stress disorder, paralysis, pulmonary hypertension, other neurological conditions, hypothyroidism, liver disease, peptic ulcer disease, human immunodeficiency virus, diabetes, complicated diabetes, substance use disorder, psychiatric diagnosis, metastatic cancer, solitary tumor, rheumatoid arthritis, weight loss, blood loss anemia, and anemia. HBPC = Home-Based Primary Care. SDH = Social Determinants of Health. ADI = Area Deprivation Index. VAMC = Veterans Administration Medical Center.
In high-deprivation neighborhoods where ADI is greater than 95, Veterans had a 0.0009 lower likelihood of enrolling in HBPC in a given month (a 14.8% difference from the overall mean) than those in neighborhoods with ADI less than 95 [-0.00223, 0.00031]. In neighborhoods with ADI greater than the median, Veterans had a .00039 lower likelihood of HBPC enrollment (a 6.4% difference from the overall mean) than below the median [-0.00081, 0.00002]. In Figure 1 we show two plots that illustrate the relationship between National ADI Rank and the likelihood of HBPC enrollment for our sample of Veterans. In Panel A, the unadjusted association is positive, suggesting that as neighborhood deprivation increases, so does HBPC enrollment. However, when we adjust for demographic and clinical characteristics in Panel B, the correlation of ADI with HBPC enrollment is weakly negative.

Distance and other social factors significantly affected enrollment. For every additional mile a Veteran lived from a VAMC, probability of HBPC enrollment decreased by 0.00002 (a 0.3% difference from the overall mean). Homeless Veterans had .0296 lower likelihood of enrollment [-0.03267, –.02649] than Veterans with stable housing, a more than fourfold difference from the overall mean; while Veterans with unstable housing had .044 higher likelihood of enrolling [.03962, .04736] than Veterans with stable housing, more than seven times the average rate of enrollment.

**DISCUSSION**

This analysis of the impact of ADI on HBPC enrollment serves as an example of a novel utilization of ADI to examine the influence of SDH on HBPC enrollment. Clinicians can evaluate Veterans’ social needs utilizing measures of SDH, such as ADI, to broaden access to those Veterans most in need of comprehensive primary care services. Although our results were not statistically significant, we found a slight decrease in enrollment associated with living in a higher-deprivation neighborhood, suggesting that after controlling for clinical characteristics, neighborhood characteristics may present some obstacles to participation in the HBPC program.

Unadjusted differences showed that the marginal probability of enrolling in HBPC increases with neighborhood deprivation, which is consistent with the goals of the HBPC program because Veterans in more deprived neighborhoods also had more chronic conditions, hospital admissions, and overall acuity than Veterans in less-deprived neighborhoods. The engagement of HBPC with unstably housed Veterans suggests consideration of the social fragility necessary to manage their care. The logistic concerns of managing HBPC programs likely limit enrollment of Veterans experiencing homelessness, which is supported by this analysis. HBPC teams do not generally enroll homeless Veterans, as they do not have an address or physical residence at which to provide the care in the home. However, Veterans who are unstably housed and residing in high-deprivation neighborhoods may have more complex medical needs and be most in need of HBPC services. This is consistent with findings from previous work that Veterans who are frail or have complex medical needs are likely to benefit more from HBPC, but that more research is needed to determine who benefits most from HBPC services.²⁸ Our findings are also consistent with previous reports that the farther a Veteran resides from a HBPC site, the less likely they are to be enrolled.⁹

Two mechanisms drove our hypothesis regarding ADI and HBPC enrollment. First, ADI served as a surrogate measure of Veteran socioeconomic status and second, ADI served as a surrogate of actual neighborhood effects such as environmental health, food deserts, housing safety, and perceived safety of the HBPC team. It is important to note that area level measures, such as ADI, are aggregate measures of individual-level statuses of people living in that area. Consequently, not all Veterans living in high-deprivation neighborhoods have high social needs and conversely, there may be Veterans living in low-deprivation neighborhoods that have high social needs. Generally, our findings support the hypothesis that a surrogate measure for SDH, such as ADI combined with other social needs identified in the health record, may be useful for health care planning and clinical practice in order to identify Veterans in need of social support or to flag potential barriers of access to care.¹⁷

It is important to acknowledge that Veterans residing in lower-deprivation neighborhoods or urban areas surrounding VAMCs may have more access to HBPC, yet those Veterans in highest need of comprehensive primary care management may reside in higher-deprivation neighborhoods or highly rural areas. Therefore, by serving Veterans residing closest to HBPC sites, and potentially not serving highly rural Veterans, HBPC may not be not serving the Veterans with the greatest need for in-home medical care.

Other barriers related to access to care for Veterans in high-deprivation neighborhoods near urban centers may include the ability of clinicians to obtain parking nearby Veteran’s homes and traffic congestion in urban neighborhoods. These barriers are especially challenging to HBPC clinicians who are caring for Veterans surrounding VAMCs in major cities, where VAMCs are often located. VA employees are not reimbursed for, and therefore do not utilize, public transportation when travelling to Veteran homes, so traffic and lack of available and affordable parking present barriers to care in high-deprivation or urban neighborhoods surrounding VAMCs within cities.

Perceived safety for clinicians providing home-care services may also present a barrier to enrollment in HBPC. While there is limited literature systematically measuring home health care workers’ perceived safety of neighborhoods where they provide care, reports of home health care workers experiencing violence in dangerous or urban neighborhoods...
or feeling threatened by neighbors, family or weapons in the home are prevalent.\textsuperscript{19,20} These threats may contribute to a decreased likelihood of enrollment in HBPC of at-risk Veterans residing in high-deprivation or urban neighborhoods. Telehealth HBPC services could mitigate some of these risks to HBPC clinicians and improve access to HBPC services for Veterans residing in these communities.

Our findings have potential implications for clinical practice, not only for the clinicians in the HBPC program but perhaps more so for the providers who may wish to refer their patients in to the program. In the VA, primary care is organized into interprofessional teams called Patient Aligned Care Teams (PACTs). Rarely would a Veteran independently seek to enroll in HBPC; instead, a member of the Veteran’s PACT often identifies a patient who is homebound and/or has complex medical needs, and refers them to the program. Therefore, issues that potentially affect access to HBPC are particularly salient to any members of the PACT – such as primary care physicians, nurse care managers, specialists, or social workers – who are in a position to recognize a Veteran’s need for more comprehensive services. PACT social workers play a pivotal role in assessing the SDH that present barriers to timely and appropriate care. Social workers can serve as a bridge between the Veteran’s primary care provider and the HBPC team. Because PACT social workers identify social needs and develop rapport with a Veteran, they are well positioned for a warm hand-off to the HBPC social worker if a Veteran chooses to enroll in HBPC. Thus, a strong connection between the PACT social worker and the HBPC interdisciplinary team can improve access to care. Physicians, too, should be aware that their social workers can play this pivotal role in reducing barriers to access for Veterans with social needs.

The Covid-19 pandemic has also presented a unique opportunity for HBPC programs to utilize and improve home telehealth services for at-risk Veterans. Anecdotally, HBPC clinicians have utilized telephone and video encounters to bridge the gap between Veteran care needs and the risks of providing and receiving in-person care during the Covid-19 pandemic. This presents a broader opportunity for HBPC to establish sustainable and effective home telehealth encounters for Veterans who live farther away from HBPC programs or who may encounter barriers to HBPC as a result of their neighborhood of residence. There remains room for improvement with regards to Veteran access to these home telehealth services due to the complexity of home telehealth interventions, the lack of home telehealth adaptability and usability, and adherence issues for Veterans.\textsuperscript{21} Shigekawa and colleagues identified that video telehealth in HBPC may be underutilized, as well.\textsuperscript{22} Veterans residing in highly rural areas may experience a lack of access to traditional in-person HBPC because the long drive times from an HBPC site to their homes make home visits burdensome for HBPC staff. Home telehealth encounters in HBPC could serve to improve care for rural and highly rural at-risk Veterans or those residing in high-deprivation neighborhoods. Utilizing ADI as a measure of SDH is a novel approach to examining access to HBPC for older Veterans.

LIMITATIONS

Limitations are important to note. First, we linked Veterans’ addresses to census tracts blocks and used the mean ADI of the census blocks associated with that tract. By introducing [likely random] measurement error, this may have attenuated our estimates toward zero. Second, although we included an extensive list of diagnoses, there were many aspects of their frailty and medical acuity that we did not control for in our model. For instance, we did not have a measure of functional status. If Veterans in high-ADI neighborhoods also have more need for HBPC in unmeasured ways, that also would bias our estimates toward the null. Third, in terms of external validity, although the VAMCs that participate in the Social Work PACT Staffing Program represent a broad, national sample, they may not be representative of the VA as a whole. In order to participate in the program, VAMCs must serve some rural Veteran populations, and they may have higher PACT social work staffing levels than non-participating sites.

CONCLUSIONS

The VA HBPC program provides beneficial comprehensive, primary care services to Veterans at risk of poor health outcomes. However, a Veteran’s SDH could prevent enrollment. More research is needed to explore the relationship between social needs and access to services such as HBPC.

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13. In the VHA, all social workers are required to be licensed or certified by a state to independently practice social work at the master’s degree level. See Department of Veterans Affairs. Social worker qualification standard [Internet]. Washington (DC): VA; 2019 Sep 10 [cited 2020 Mar 3]. [VA Handbook 5005/120, Part II, Appendix G39]. Available for download from: https://www.va.gov/vhapublications/ViewPublication.asp?Pub_ID=1061&FType=2 Google Scholar


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Disclaimer
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Collaboration is in our DNA.
So is meeting patients where they are.

We don't advocate for health equity by staying on the sidelines. And neither do you. You need a health plan to work with who understands that every patient is a big deal.

We work harder. We work smarter. We work to ensure our medical policies are without bias. We speak our members' language. We're there alongside community- and faith-based organizations and local officials connecting our members with resources, right in their community.

We cover Rhode Islanders through employer groups and on Medicaid, so that all families can access the care they need to stay healthy.

We know how important it is for Rhode Islanders to have access to high-quality care they can trust. Let's earn their trust together.
A Pain in the Neck Diagnosis: Crowned Dens Syndrome

SAMUEL GOLDMAN, MD, MPH; AMY MATSON, MD

CASE REPORT
A man in his 70s presented to the Emergency Department with two days of atraumatic neck pain. The patient reported no significant medical history and was on no medications. The patient described acute onset of midline neck pain, which was worse with movement of the neck and associated with low-grade fevers. On examination, the patient has elicitation of symptoms with passive flexion and rotation of the neck. Vital signs were notable for temperature of 100.4°F.

A CT of the cervical spine was obtained. (Figures 1,2)

DIAGNOSIS
CT scan demonstrated attenuation in the location of the transverse ligament of the atlas consistent with Crowned Dens Syndrome.

DISCUSSION
Crowned Dens Syndrome (CDS) is a rare condition characterized by the deposition of calcium pyrophosphate (CPP) crystals in and around the atlanto-axial articulation resulting in pseudogout of the cervical spine. Crystal deposition results in a crown-shaped distribution of calcifications surrounding the dens, leading to both its radiographic appearance as well as its descriptive name. Most commonly, patients with CDS present with neck pain, neck rigidity, and fever. Inflammatory markers are typically elevated. Given the clinical overlap with other life-threatening conditions, many patients undergo invasive procedures such as lumbar puncture prior to diagnosis of CDS. Diagnosis is most often made after CT imaging. Treatment is similar to that of pseudogout of other joints, with NSAIDs resulting in rapid clinical improvement in the majority of cases. Steroids have also been shown to be useful in severe or refractory cases. While rare, cases have been reported of severe depositions resulting in myelopathy or atlas fracture.

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Encapsulating Peritoneal Sclerosis: Imitator of Common Abdominal Disorders

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KEYWORDS: encapsulating sclerosing peritonitis, peritoneal dialysis, hemodialysis, tamoxifen

INTRODUCTION
Encapsulating peritoneal sclerosis (EPS) is a rare but catastrophic complication of long-term peritoneal dialysis (PD) and is associated with frequent small bowel obstruction, malnutrition, with significant morbidity and mortality. It is characterized by extensive fibro-collagenous changes in the peritoneal membrane, leading to formation of a fibrous cocoon encapsulating the bowel.

CASE PRESENTATION
A 45-year-old male with a history of end-stage renal disease on PD for 10 years, and a recent admission for culture negative peritonitis, presented to the emergency department with four days of dizziness, diarrhea, poor oral intake, and diffuse abdominal pain. He reported cloudy peritoneal fluid during PD exchanges. Physical exam-vital signs were within normal limits; abdominal exam was notable for left lower quadrant tenderness, no masses or organomegaly, and no signs of peritoneal irritation. Peritoneal fluid analysis revealed a total cell count of 2,519/mm³ with 98% polymorphonuclear leukocytes; intraperitoneal vancomycin and ceftazidime were initiated. Oral vancomycin for Clostridioides difficile colitis was begun following a positive PCR for the bacterium.

Despite down trending of the peritoneal fluid cell count and persistent negative cultures, his generalized abdominal pain continued. A Computed Tomography (CT) scan of the abdomen and pelvis showed diffuse thickening and enhancement of peritoneal membranes along with moderate ascites. Thickening of the sigmoid colon and rectum was also noted with extensive areas of calcified loops of distal small bowel [Figure 1].

Subsequently, repeat peritoneal fluid analysis showed an increased total fluid cell count = 1,564/mm³. Repeat CBC also showed an increased peripheral WBC = 16,000 per microliter. Based on the imaging and laboratory findings, EPS and refractory peritonitis were suspected. The PD catheter was removed and the patient was switched to hemodialysis. He underwent a diagnostic exploratory laparotomy. Biopsy revealed thickened, fibrin-encased abdominal structures throughout the peritoneum and filmy adhesions confirming the diagnosis of EPS [Figure 2]. He also had elevated fungal biomarkers serum beta-d-glucan and galactomannan levels in the peritoneal fluid and was started on Amphotericin B for suspicion of a fungal peritonitis. He was also started on tamoxifen. Steroids were held given the concern for fungal peritonitis. Tamoxifen was stopped after a week.

Figure 1. Axial and sagittal contrast-enhanced CT. Extensive, mixed-attenuating ascites with peritoneal thickening and enhancement (arrows). The bowel does not float dependently within ascites, but is instead pushed posteriorly.

Figure 2. Peritoneal membrane biopsy with dense acute and chronic inflammation, necrosis, fibrin deposition.
as he was not tolerating oral intake. He did not improve. Subsequently, paracentesis revealed grossly hemorrhagic, purulent fluid with an increasing total fluid cell count = 46,048/mm³. Eventually, he was unable to tolerate hemodialysis due to hemodynamic instability and was transitioned to comfort measures only.

**Discussion**

EPS is a rare complication of PD with a reported incidence of 0.3 to 3.3%. The pathogenesis of EPS remains poorly understood. It is believed that the disease is a result of peritoneal inflammation leading to hyperplasia of peritoneal mesothelial cells. Risk factors for EPS include long-term PD with toxic, high dextrose-based dialysate. Less common causes include medications, solid organ transplantation, endometriosis, systemic inflammatory diseases, and recurrent peritonitis. Johnson and colleagues, in a matched case-control analysis, observed that duration of PD independently predicted EPS.

EPS most commonly presents with abdominal pain, vomiting, anorexia, ascites and bowel obstruction. While there are no specific laboratory findings that confirm EPS, early in the disease course, there is often a decrease in ultrafiltration as measured by serial peritoneal equilibration tests.

The non-specific symptoms of EPS, coupled with laboratory data mimicking more common abdominal disorders, commonly lead to a delay in diagnosis and treatment. Treatment includes steroids, tamoxifen and nutritional support, and eliminating the triggering factor - PD in our case. While previously contraindicated in patients with EPS, surgical management is now utilized in selected cases of bowel obstruction.

**Conclusion**

Patients with EPS often develop mechanical small bowel obstruction due to their increased risk for adhesive disease. Unexplained abdominal complaints in patients on long-term PD should lead to consideration of EPS. Early suspicion and prompt diagnosis may reduce the risk of catastrophic consequences.

**References**


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Whipple’s Disease Mimicking Common Digestive Disorders

Yousef Elnagely, MD; Sehrish Jamot, MD; Kwame Dapaah-Afriyie, MD; Sean Fine, MD

Abstract

Whipple’s disease is a rare infectious disease caused by the bacterium *Tropheryma whipplei*. The prevalence of Whipple’s disease is 3/1,000,000 in Western populations. It most often causes a malabsorption disorder with weight loss and diarrhea as common presenting symptoms. In one-third of patients, however, there are no gastrointestinal symptoms at presentation; patients instead report a wide variety of non-specific extraintestinal complaints, potentially involving every organ system. We report a case of a 37-year-old man who presented with a 3-month history of non-bloody diarrhea and 15-pound weight loss. He was ultimately diagnosed with biopsy-confirmed Whipple’s disease. Despite its rarity, Whipple’s disease remains an important clinical entity and should be included on the differential diagnosis for selected patients presenting with an array of non-specific symptoms.

Keywords: Whipple’s Disease, pathology, gastroenterology

Introduction

Whipple’s disease was first described in 1907 by Dr. George Hoyt Whipple. The first small bowel biopsy diagnosis of Whipple’s disease was made in 1958. Since then, the organism has been identified and cultured, its genome sequenced, and new PCR-based bacterial identification and immunohistochemical (IHC) diagnostic tests developed. Whipple’s disease remains a rare disease that mainly affects middle-aged Caucasian men. Recent studies suggest a prevalence of 3/1,000,000.

Due to its rarity and protean manifestations, the average time between the appearance of the first clinical signs and the diagnosis may be as long as 6 years. Patients most often present with joint pains associated with gastrointestinal symptoms such as diarrhea, malabsorption, and weight loss. However, one-third of patients do not present with classic signs and symptoms. Whipple’s disease can also present as a wide spectrum of isolated or multi-system involvement of every organ. The diagnosis is made by the presence of Periodic Acid-Schiff (PAS)-positive macrophages in the lamina propria of the small bowel or positivity of IHC using antibodies specifically directed against the bacteria. IHC increases the specificity and sensitivity of the diagnosis especially by decreasing false positives due to PAS-positive staining in cases of Mycobacterium infections.

Case Report

Our patient is a 37-year-old Caucasian man with a history of microcytic anemia (diagnosed two months prior to presentation) and a 3-month history of diarrhea, weight loss and abdominal bloating admitted to the hematology service for workup of anemia and possible malignancy. Physical exam revealed a thin, pale man with notable findings of conjunctival pallor, dry mucous membranes and diffuse abdominal tenderness to palpation. Complete blood count was notable for WBC count of 10,500 with 89% neutrophils, hemoglobin of 9.6 with an MCV of 69, and platelets of 530,000/mcl. Iron studies were most consistent with mixed iron deficiency anemia and anemia of chronic disease. Human Immunodeficiency Virus (HIV) Antibody/Antigen Combination test was non-reactive. Computed tomography (CT) scan revealed

Timeline

April 2018
Start of symptoms

July 30, 2018
Persistent anemia. Hospitalized

August 1, 2018
UGI/lower GI endoscopy, diffuse small bowel inflammation

August 3, 2018
Patient improving

August 28, 2018
Outpatient f/u; asymptomatic. Plan: Bactrimx 1 year

June 2018
Hematology consulted. Workup negative. Oral iron started.

July 31, 2018
GI consulted

August 2, 2018
Path suspicious for Whipple’s. ID consulted. started on Ceftriaxone

August 6, 2018
Discharged home with IV CTX
numerous low attenuating, enlarged mesenteric and retroperitoneal lymph nodes [Image A].

His hospital course was complicated by rectal bleeding requiring transfusion of 4 units PRBCs and iron infusions. UGI endoscopy and colonoscopy revealed severe duodenal and ileal inflammation and friability [Image B] with biopsy showing villous blunting, dilated lymphatics, foamy macrophages that were periodic acid-Schiff (PAS) positive and acid-fast bacilli (AFB) negative [Image C].

Pathology results were consistent with Whipple’s disease. Infectious disease was consulted and recommended starting ceftriaxone 2g daily for 2 weeks, then 1 year of Sulfamethoxazole/Trimethoprim 800-160 mg tablet every 12 hours with weekly labs. He reported improvement in symptoms shortly after starting antibiotics; at discharge, his diarrhea had resolved and he was eating a normal diet. Confirmatory testing for Tropheryma whipplei by polymerase chain reaction (PCR) was sent to an outside lab and returned positive. The patient was seen a few weeks after discharge at an outpatient clinic. He reported compliance with the antibiotic regimen and resolution of his symptoms; his weight was stable and diarrhea had resolved.

DISCUSSION
Whipple’s disease is a rare systemic, chronic infection that may present initially with rheumatologic manifestations that precede gastrointestinal symptoms. The typical patient is a middle-aged white man, but as our case indicates, it can occur at all ages, although pediatric cases are very uncommon.3 Although not seen in our patient, immunodeficiency is commonly associated with Whipple’s disease. Immunosuppressive therapy, such as treatment with corticosteroids or tumor necrosis factor antagonists, can precede presentation of symptoms.4

The classic tetrad seen in a minority of patients is fever, diarrhea, abdominal pain, and arthralgias.5 The majority of patients present with heterogeneous clinical complaints.6 Symptoms can vary widely and involve only one organ or multiple organ systems such as the heart, brain, eyes, lungs, and skin.7 For example, neurologic symptoms secondary to Whipple’s disease are wide-ranging and include confusion, memory impairment, encephalopathy, ataxia, vertigo, diplopia, proximal muscle weakness, seizures, and paresthesia.1

Our patient was initially admitted for evaluation of a possible malignancy because of his weight loss, anemia, and diffuse intraabdominal lymph node enlargement on imaging.
His initial presentation and reason for admission highlight the non-specific symptoms in Whipple’s disease. This diagnosis is commonly missed or delayed. In one large cases series reported in 2020, the median time from symptoms to diagnosis was 3 years. Firstly, given its rarity, the index of suspicion for Whipple’s disease may be low. Secondly, with a wide array of non-specific symptoms, Whipple’s disease can mimic more common neoplastic, infectious, or inflammatory disorders. Thirdly, relapse can occur even years after treatment, with a different presentation and thus, not linked by patient or physician to prior Whipple’s disease. Our patient was ultimately diagnosed on duodenal biopsy obtained during upper endoscopy.

Accurate diagnosis is important. Without treatment, the disease is fatal. Current treatment recommendations are antibiotic therapy capable of crossing the blood-brain barrier, given the possibility for neurologic manifestations. Patients are often initially treated with intravenous antibiotics (ceftriaxone or penicillin G) for 2 weeks before transitioning to oral administration of Trimethoprim-Sulfamethoxazole for 1 to 2 years.

CONCLUSION
We report a rare case of Whipple’s disease. Our patient demonstrates the importance of considering this rare disease in selected patients presenting with a wide array of non-specific symptoms. Timely diagnosis and initiation of appropriate treatment greatly improves prognosis in a potentially fatal disease.

References

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ABSTRACT
Inferior vena cava filters (IVCF) are associated with many long-term complications. Often, these complications manifest as acute events, such as shock. However, we report a case of a patient who presented with chronic hypotension and dizziness due to a thrombosed IVCF filter.

KEYWORDS: THRO [Thrombectomy], VCF [Vena Cava Filter], CS [Shock, Cardiogenic], FBR [Foreign Body Retrieval], PE [Pulmonary Embolism], VC [Vena Cava]

BACKGROUND
Inferior vena cava filters (IVCF) are often used in conjunction with or as a substitute to anticoagulation therapy in patients with venous thromboembolism (VTE), aimed at preventing pulmonary embolism (PE). These filters are either permeant or retrievable, but few filters are retrieved from patients following implantation, increasing the likelihood of long-term complications, including thrombosis of the filter. Most IVCF thrombosis cases are asymptomatic or accompanied by a severely acute presentation. We describe a patient who had an IVCF placed 15 years prior and presented with chronic hypotension and dizziness secondary to IVC obstruction due to a thrombosed filter.

CASE PRESENTATION
A 46-year-old male with a history of Hodgkin’s Lymphoma [in remission], antiphospholipid antibody syndrome with multiple deep venous thromboses [DVT] and PE in the past, and chronic kidney disease stage III presented with complaints of dizziness and lightheadedness. He underwent IVCF placement 15 years prior [in 2005] after suffering multiple spine injuries from a motor vehicle accident. The patient reported little to no follow-up following his filter placement and questionable compliance to anticoagulation therapy. He reported symptoms of dizziness and lightheadedness with minimal exertion for several months, which had gotten progressively worse for the past 3 weeks. He also reported worsening chronic lower extremity edema for the past 2 weeks.

On presentation, he was found to be hypotensive with a blood pressure of 85/55 mmHg, heart rate of 85 beats per minute, respiratory rate of 16 per minute, and oxygen saturation of 100% on room air. Orthostatic vital signs were remarkable for a drop of blood pressure to 70/35 mmHg, and an increase in the heart rate to 112 beats per minute, with significant dizziness. Cardiopulmonary examination revealed normal S1 and S2 without any murmur and clear bilateral lung fields. The abdominal examination was unremarkable. Extremities showed bilateral 2+ pitting edema extending up to the mid-calf. Initial laboratory work-up was unremarkable with hemoglobin of 14 g/dl, white blood count of 5600 cells/mm³, platelets of 400,000 cells/mm³, creatinine of 1.35 mg/dl [baseline], blood urea nitrogen of 13 mg/dl, and normal electrolytes. Whole blood lactate was normal at 1.1 mEq/L.

He received fluid boluses [2.5L normal saline] with no significant improvement in blood pressure. Cardiogenic, septic, and endocrine etiologies of hypotension and shock were considered, and relevant laboratory and imaging workup was initiated. The liver function panel and urinalysis were unremarkable. TSH was 3.63 uIu/ml, ACTH was 16 pg/ml, morning cortisol was 13.2 ug/dL, and cosyntropin stimulation test was normal. Blood culture and urine culture remained negative. Chest X-ray showed normal bilateral lung fields, and no infiltrates. A venous duplex scan of bilateral lower extremities did not show evidence of acute DVT. An echocardiogram showed normal systolic and diastolic ventricular function and no significant valvular abnormalities. Broad-spectrum antibiotics, which were initially started for suspicion of septic shock, were discontinued. Midodrine and fludrocortisone were also initiated. However, no significant improvement in blood pressure was noted. Subsequently, a computed tomography (CT) scan of the abdomen and pelvis was performed, which did not show a source of infection or bleeding. However, it revealed an occluded IVCF [Figure 1] and extensive pelvic and lumbar collateral vessels [Figure 2].

Based on these imaging findings and no other identifiable explanation of hypotension, we hypothesized a decreased cardiac preload from a chronically occluded ilio-caval system from a thrombosed IVCF to be the reason for the patient’s hypotension and symptoms. Interventional radiology and vascular surgery teams were consulted. The IVCF was retrieved, and the IVC and bilateral common iliac veins were reconstructed. Covered stents were placed to block collateral venous flow. Following the procedure, the patient’s
blood pressure improved with systolic blood pressure ranging between 95–115 mmHg and diastolic blood pressure ranging from 65–90 mmHg. The patient also reported significant improvement in orthostasis and dizziness and improvement in bilateral lower extremity edema.

**DISCUSSION**

This case represents an unusual cause of refractory hypotension with dizziness. Given the improvement following the retrieval of the IVCF and venous reconstruction, the patient’s hypotension was likely due to decreased cardiac preload, secondary to IVC occlusion, due to thrombosis of a long-standing IVCF. The blockage likely developed slowly over time, with development of venous collaterals. Symptoms were gradual and chronic, unlike previous reports, where hypotension secondary to thrombosed IVCF is associated with a more acute presentation. Clots may have collected in situ or migrated from the lower extremity and lodged in the filter, occluding the ICV over time. Clinicians, when presented with cases of hypotension or shock, should be alerted to the possibility of obstruction of pre-existing IVCF.

This case illustrates one of the risks associated with ICVF placement and the necessity for follow-up. Indeed, IVCF use has risen remarkably in recent years. In general, IVCF placement is indicated for increased risk of PE in patients for whom anticoagulation is contraindicated or in whom anticoagulation alone is felt to be insufficient to prevent PE. Remarkably, however, little data support the efficacy and safety of IVCFs, despite their prolific use. Of the few randomized trials conducted, the PREPIC study divided patients with proximal DVT and PE risk into two cohorts, one group receiving anticoagulation alone and another a permeant IVCF with anticoagulation. The study found only a small reduction in symptomatic and asymptomatic PE at the 12-day mark but an increased rate of recurrent DVT amongst the filter group across an 8-year follow-up. Moreover, long-term complications associated with IVCFs (e.g., filter migration, thrombosis, and perforation) make their prompt removal after placement even more critical.

**Figure 1.** Computed tomography of abdomen and pelvis (axial and coronal scans) showing thrombosed inferior vena cava filter (arrow).

**Figure 2.** Computed tomography of abdomen and pelvis (axial and coronal scans) showing extensive collateral vessels in pelvis (arrow).
However, only a small proportion of retrievable filters associated with greater complication rates than permanent ones are removed. Indeed, clinical practice guidelines issued by the American College of Radiology (ACR), American College of Chest Physicians (ACCP), and European Society of Cardiology (ESC), all recommend against IVCF placement unless there is a contraindication to anticoagulation therapy or recurrent PE despite anticoagulation therapy. As such, clinicians should balance the risks of ICVF placement and ensure rigorous follow-up and a timeline for retrieval. In our patient, more attentive follow-up following IVCF placement might have averted this complication.

CONCLUSION

In conclusion, IVCFs, even when correctly positioned, are well known for their long-term complications. However, the above presentation of chronic hypotension and dizziness secondary to IVC obstruction due to thrombosis of an IVCF is a rare and clinically notable occurrence – this being the first report, to our knowledge, in the literature. As such, our case reinforces the risks associated with IVCF placement. Indeed, they should be used as a last resort with very close follow-up and a punctual plan for retrieval.

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From the Case Records of the Alpert Medical School of Brown University Residency in Emergency Medicine

DR. REBECCA LEVIN: A 2-year-old otherwise healthy female presented to the pediatric emergency department (ED) with fever, fussiness and worsening rash. Her first visit to the pediatric ED was on day of illness number two where she was noted to have a fever to 101°F, rhinorrhea, mild abdominal pain but an otherwise normal exam. COVID-19 PCR testing was performed and she was discharged home with antipyretic instructions. The following day she developed an itchy, raised, red rash on her left foot that progressed cephalad and ultimately involved her legs, back, trunk, arms and face. The rash spared her palms and soles and coalesced periorally. The patient was evaluated by her pediatrician who diagnosed her with hand-foot-and-mouth disease and sent her home with supportive care.

The child returned to the ED on day of illness number five with concern for persistent fevers, worsening rash and irritability. Her COVID test sent from the first ED visit was negative. Her exam was notable for irritability and discomfort, erythematous posterior pharynx without exudate, tachypnea (respiratory rate in the 30s) with clear breath sounds, and tachycardia (heart rate 140s) with otherwise normal heart sounds. Her abdomen was soft but diffusely tender without rigidity or guarding. She had no lymphadenopathy. She had a diffuse erythematous macular rash over her entire body sparing the palms and soles. It was now coalesced around the mouth and nose but also involved the forehead/brow region as well as her upper and lower eyelids. The rash was pruritic and blanching without open lesions or vesicles (Figure 1).

DR. LYDIA CIAIRALLO: What is on your differential?

DR. LEVIN: The differential for fever and rash is, of course, very broad, and includes other viral illnesses, sepsis, Kawasaki disease, drug reaction, serum sickness, rickettsial infection, myocarditis, and oncologic processes. Other immunologic or rheumatologic syndromes such as systemic juvenile arthritis, hemophagocytic lymphohistiocytosis, and macrophage activation syndrome could be considered as well.

DR. ERIKA CONSTANTINE: Did she have any exposure to COVID-19?

DR. LEVIN: Both parents tested positive for COVID six weeks prior. Mom reported that both the patient and her siblings (14-year-old brother and 8-year-old sister) tested negative and have been asymptomatic. There was no other known exposure since that time. The patient does not go to daycare and her siblings are in online-only school. The mother works at a store and the father is a driver for a supply company.

DR. JONATHAN VALENTE: Does she meet the criteria for Kawasaki disease?

DR. ELIZABETH JACOBS: One must certainly entertain the diagnosis of Kawasaki disease in this patient. She had 5 days of fever with two additional clinical criteria:
erythematous pharynx and rash. However, she would require a total of four of the five clinical criteria of complete Kawasaki disease: conjunctival injection, oral mucous membrane involvement, peripheral extremity involvement, rash, and cervical lymphadenopathy.

**DR. VALENTE:** When should you also consider MIS-C?

**DR. JACOBS:** On May 14, 2020, the Centers for Disease Control and Prevention (CDC) issued the following case definition of MIS-C:

- “An individual aged <21 years presenting with fever ≥38.0°C for ≥24 hours, or report of subjective fever lasting ≥24 hours, laboratory evidence of inflammation, and evidence of clinically severe illness requiring hospitalization, with multisystem (≥2) organ involvement (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic, or neurological); AND
- No alternative plausible diagnoses; AND
- Positive for current or recent SARS-CoV-2 (COVID-19) infection by RT-PCR, serology, or antigen test; or COVID-19 exposure within the 4 weeks prior to the onset of symptom.”

As there is a fair amount of overlap between the clinical presentations of MIS-C and Kawasaki disease (KD), labs and history of a known exposure to COVID-19 might help distinguish the two disease processes.

The age, race, and gender of the patient may also be helpful. The median age of children presenting with MIS-C is 9 years, while in the US the peak incidence of KD is in the 18–24 month age group. 2,3 66% of reported cases have occurred in Hispanic/Latino or Black/Non-Hispanic children while KD presents more commonly in Asian populations. 2,3

While an elevated ESR and CRP are frequently both seen in either MIS-C or KD, thrombocytopenia, hyponatremia, and AKI are more characteristic of MIS-C. Shock can occur with either disease process but is more common with MIS-C than Kawasaki disease.

Our patient was found to have thrombocytopenia (platelets 86 x10^9/L) and hyponatremia (sodium 131 meq/L). While in the emergency department, she developed hypotension and shock requiring fluid resuscitation and cardiovascular support in the form of an epinephrine infusion. This constellation of lab findings, clinical presentation, and history of COVID-exposure made MIS-C the more likely diagnosis.

**DR. JANE PREOTLE:** When should MIS-C work-up be initiated and what does it entail? Should any specialists be consulted if there is concern for MIS-C?

**DR. LEVIN:** The definition of MIS-C is vague, and many febrile pediatric patients (especially early in their illness presentation) have not yet developed secondary symptoms of a viral illness (such as cough, rhinorrhea, or GI symptoms). Clinical suspicion and history/physical exam should focus on:

- Tachycardia (with or especially without fever)
- Persistent/refractory fever
- Altered mental status
- Hypotension
- Decreased urine output

For patients who are not critically ill, latest guidance recommends a tiered approach to the workup. 4 A flowchart published by the American College of Rheumatology outlining work-up for MIS-C can be found in Figure 2. 4 Of note, this flowchart only describes the work-up for MIS-C itself. All children undergoing MIS-C work-up should also be evaluated for other infectious and non-infectious causes of their symptoms. 1 This additional testing may include a group A strep testing, viral panels (either respiratory or stool), urinalysis, chest X-ray and blood cultures.

If patients are severely ill or hypotensive, it is important to include bacterial causes of sepsis in the differential, obtain cultures and initiate coverage with broad spectrum antibiotics.

Because our understanding of this new disease process continues to evolve, the American Academy of Pediatrics Interim MIS-C guideline advises that patients with suspected MIS-C are best managed by a multidisciplinary pediatric team. 1 These teams differ by institution and may include (though are not limited to) pediatric infectious disease, rheumatology, cardiology, hematology, hospital medicine, and critical care specialists. This allows for careful deliberation of the diagnosis and potential need for specific treatments based off of each individual patient’s clinical presentation.

**DR. WILLIAM BINDER:** What are the complications of MIS-C?

**DR. JACOBS:** MIS-C patients have been noted to have cardiac dysfunction, myocarditis, shock, and/or coronary artery aneurysms (CAA). 4,5 Thromboses have also been reported. Rarely, patients have required ECMO or died from these complications. In a New England Journal of Medicine report detailing children in New York State with MIS-C, 53% had myocarditis, and 8% had CAA’s. 62% required vasopressor support. 5

Certain demographic factors seem to be associated with an increased complication rate. In a recent retrospective study of over 1,000 patients who met the case definition of MIS-C, ICU admission was significantly more likely in older (age six years and above) children. The odds of developing shock also increased in the older age groups, with 2.5 times greater odds of developing shock in ages 13 and older as compared to children aged zero to five. Rates of complications such as decreased cardiac function, shock, and myocarditis were
similarly found for non-Hispanic Black patients as compared to non-Hispanic White patients. Coronary artery abnormalities were found more commonly in male patients.7

Our patient developed hypotension and shock requiring a continuous epinephrine infusion. Her coronary arteries were normal. She had an elevated troponin to 0.092 ng/mL and BNP >5000pg/mL. Her echocardiogram revealed mild four-chamber dilation, moderate biventricular systolic dysfunction, and mild bilateral AV valve regurgitation consistent with myocarditis. Of note, she also had a D Dimer that peaked at 2,064 ng/mL and she underwent bilateral upper and lower extremity ultrasound studies that were negative for thrombosis. Her SARS-CoV-2 antibody titers were positive.

**DR. MELANIE LIPPMAN:** What is the treatment of MIS-C? What is the prognosis of MIS-C?

**DR. LEVIN:** Patients should receive a screening echocardiogram for cardiac function and coronary artery anomalies. In addition to supportive care and blood pressure support as needed, treatments for MIS-C may include intravenous immune globulin (IVIG), steroids, anticoagulation, and/or aspirin. Medication regimens vary depending on several clinical factors and should be decided by a multidisciplinary team. Our patient received IVIG, steroids, and aspirin in addition to a continuous epinephrine infusion for hypotension.

Luckily, MIS-C is a rare complication of COVID-19 infection and children are recovering quite well, albeit frequently with need for intensive care level support. As of March 1, 2021, there were 2,617 cases of MIS-C meeting the case definition reported in the United States with 33 deaths attributed to complications from MIS-C (1.3%). There have been fewer than 24 cases in Rhode Island and fewer than 100 in Massachusetts.3

The patient was weaned off of the epinephrine infusion and her echocardiogram normalized prior to discharge. She was discharged home five days after admission on aspirin 81 mg daily in addition to a steroid taper. As of her last outpatient cardiology visits, she is doing well, her cardiac dysfunction has completely resolved, and she will continue to be followed closely.

**DR. ERICA LASH:** What else wouldn’t you want to miss?

**DR. LEVIN:** Children undergoing work-up for possible MIS-C should also be evaluated for other infectious and non-infectious pathology. Several articles have discussed the potential harm of premature closure and anchoring on a diagnosis of MIS-C.8-11 While we must have a low threshold to add MIS-C to our differential for pediatric patients, MIS-C remains relatively uncommon despite high numbers of COVID-19 cases in our communities. Many MIS-C patients may initially have clinical presentations that are consistent with more common, mild diagnoses such as viral illness or gastroenteritis that do not typically warrant lab workup or hospital admission. It is important for all providers to give families anticipatory guidance regarding reasons to return.
to care such as continued fevers, mental status changes or ill appearance. The current diagnostic criteria for MIS-C are relatively nonspecific and rely upon clinicians to rule out any other potential diagnoses. There are many “do-not-miss” diagnoses that should be entertained. Among others, sepsis, bacteremia, myocarditis, appendicitis, tick-borne illnesses, and oncologic processes can have similar presentations. Like many MIS-C patients, our patient appropriately received empiric antibiotic coverage with ceftriaxone before a multidisciplinary team determined the patient’s ultimate diagnosis.

References

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Decision Making Regarding Trauma Patients in Rhode Island who Present on Anticoagulants and Antiplatelet Agents: A Multidisciplinary and Collaborative Approach

ANDREW H. STEPHEN, MD; RICHEL G. GORIPATHI, MD; LINDA GIROUARD, PA; MEGAN GERNT, RNP; TAREQ KHEIRBEK, MD; STEPHANIE N. LUECKEL, MD

ABSTRACT

OBJECTIVES: Use of anticoagulant and antiplatelet medications (AAMs) is increasing significantly with our growing population of older adults. AAMs worsen outcomes in trauma patients. Our goal was to improve collaboration between trauma and outpatient providers and to improve safety in making decisions on anticoagulant and antiplatelet medications (AAMs) after injuries.

DESIGN: A risk management initiative.

SETTING AND PARTICIPANTS: Patients that suffered traumatic injury while on anticoagulation or antiplatelets medications at a level I university trauma center.

METHODS: IRB approval was obtained to review records for medications, demographics, mechanism and type of injury, and indication for preinjury AAM use. Inpatient trauma team providers contacted the primary prescriber. A collaborative decision was made regarding AAM plans.

RESULTS: One hundred and five patients, mean age 79 years, were followed. The three most common AAMs were warfarin (69 patients), clopidogrel (24), and Factor Xa inhibitors (16). Atrial fibrillation was the most common indication for AAMs (70 patients), venous thrombosis (14) and TIA/CVA (11). Falls were the most frequent injury mechanism, 79.4%. Soft tissue hematomas (27.4%), TBI (16%), and pelvic fractures (12.3%) were the most common injuries. In 56.6% AAMs were held until follow-up, 31.1% had AAMs resumed at discharge, and AAMs were held indefinitely in 12.3%. Patients discharged to home versus facility (37 vs 18% p<0.05), <75 years of age (47 vs 27% p<0.05) were more likely to have AAMs resumed at discharge. Patients who suffered falls versus MVC mechanism were less likely to have AAMs resumed at discharge (28 vs 82% p<0.05). CHA2DS2-VASc scores were similar between decision groups.

CONCLUSIONS AND IMPLICATIONS: This is the first description of mandatory communication between trauma and outpatient providers to guide decision making on AAMs after injury. Efforts should be made to determine if this mitigates risk by following patients longterm. This communication should become standard for a population that is often elderly, frail, and at risk of repeat injuries.

KEYWORDS: trauma, injury, anticoagulation, primary care

INTRODUCTION

The use of anticoagulant and antiplatelet medications (AAMs) is increasing significantly as atrial arrhythmias, vascular diseases and other forms of cardiovascular disease are prevalent in our growing population of older adults. Older adults comprise a sector of our population that is expected to double in the coming years, resulting in estimates that nearly 20% of the United States population in 2030 will be over the age of 65.1 Based on local registry data the mean age of admitted trauma patients at Rhode Island’s only level one trauma center is 59 years compared to a national mean of 52 years. Warfarin has been reported to be used in approximately 13% of patients over 65.2 In 2010 direct oral anticoagulants (DOACs) were introduced and most of the increase in anticoagulant use from 2009 to 2014 was due to increased prescribing of dabigatran, apixaban, and rivaroxaban.3 Prior to the introduction of DOACs many physicians felt that anticoagulation had been underutilized for patients with atrial fibrillation. Then in 2014 the American College of Cardiology and the AHA released a report supporting the use of the CHA2DS2-VASc score to guide anticoagulation decision making for atrial fibrillation patients.4

AAMs are known to increase bleeding risk and worsen outcomes in trauma patients, particularly in those with traumatic brain injury (TBI).5,6 Inpatient trauma practitioners have had to increase their breadth of knowledge regarding the potential for exacerbation of hemorrhage from AAM use and to understand the reversal options for AAMs. To this point, though, there remain few published guidelines or recommendations as to when and whether AAMs should be restarted for patients that suffer traumatic injuries, especially higher risk older adults.

Outpatient prescribers of AAMs, usually a primary care physician or cardiologist, carefully weigh the benefits of AAMs including prevention of thromboembolic and cardiovascular events against the likelihood of injury. Trauma providers only come to know patients on AAMs after they have suffered injuries and possibly exacerbation of hemorrhage which likely affects their perspective on the safety and utility of AAMs. Outpatient prescribers have a unique knowledge of their patients compared to those who admit them to the inpatient setting. Our goal was to improve collaboration between trauma and outpatient prescribers and to improve safety in making decisions on AAMs after injuries. Here we present a descriptive review of the findings from patients enrolled in a quality and risk management communication initiative and to suggest this as a generalizable standard of care.
METHODS
This risk management and quality improvement initiative was submitted and accepted by Lifespan at Rhode Island Hospital with funding provided for data collection and maintenance. Inpatient trauma team providers contacted the outpatient primary prescriber for all adult patients on AAMs admitted to the trauma service. A collaborative decision was then made regarding AAM plans and a paper data collection form was completed. Support and approval was given to enroll patients for a one-year period and consent by patients or proxies was not required as this was considered a clinical quality initiative (CQI) with potential for immediate improvement in clinical care and was of low risk to patients. At the conclusion of the period an interval report was submitted and enrollment was extended 6 months. At the conclusion of the 18 months IRB approval was obtained to review patients that had suffered injuries while on AAMs. IRB approval was provided to the trauma registry and basic patient data was obtained. The remainder of patient data was obtained through chart review.

Charts were reviewed for demographics, which AAMs were being used at the time of injury, indications for preinjury AAM use, mechanism of injury, and types of injuries. AAMs were categorized for simplicity as warfarin, clopidogrel, factor Xa inhibitors, dabigatran, or multiple AAMs. Collaborative decisions between trauma providers and outpatient prescribers on AAMs were categorized as “hold indefinitely”, “hold AAM until follow up with prescriber”, “resume AAM before discharge.” Charts were also reviewed for subjective text accounts of the conversation between the trauma provider and the outpatient prescriber as recorded by the trauma provider. Patient discharge disposition was reviewed and categorized as discharged to home or facility. Facility was defined to include nursing homes and rehabilitation centers.

CHA2DS2-VASc scores, head injury abbreviated injury severity (AIS) scores, and presenting INR were determined for each patient by chart review. Univariate analysis was done with these factors to determine if there were associations with decision making results. Associations between decision results and age, injury mechanism, and discharge disposition were also examined.

Descriptive data are presented as frequencies, means for parametric continuous variables, and medians for nonparametric continuous variables. We applied Pearson’s Chi square test with Fisher exact test for sparse values to test independence for categorical data. Parametric continuous data were compared using ANOVA. Nonparametric data were analyzed using Kruskal Wallis test. Significance was set at $p=0.05$. We completed all analyses using Stata/SE statistical software, version 14.0 for Windows 10, copyright 1985–2015 Statacorp LP, College Station, TX, USA.

RESULTS
One hundred and two patients, mean age 79 years, were enrolled. The three most common preinjury AAMs were warfarin [65 patients], clopidogrel [19], and Factor Xa inhibitors [11] (Table 1). Atrial fibrillation was the most common indication for AAMs [59 patients], followed by pulmonary embolism (PE) [11], TIA/CVA [7], and coronary artery disease (CAD) [6] (Table 2). Falls were the most frequent injury mechanism occurring in 82 patients [80.4% of our sample]. Soft tissue hematomas in 29 patients [28.4%], traumatic brain injury (TBI) in 18 patients [17.6%], and hemothorax in 13 patients [12.7%] were the most common injuries (Table 3). In 54.9% AAMs were held until follow up, 33.3% had AAMs resumed at discharge, and AAMs were held indefinitely in 11.8% (Table 4).

No differences regarding plans to resume or hold AAMs were found when the different AAM agents were compared. Patients age greater than 75 years were less likely to have AAMs resumed at discharge [26.5% vs. 47.1%; $p=0.05$] and more likely to have them held until follow-up [63.2% vs 38.2%; $p=0.05$] compared to those less than 75 years of age. Those discharged to home versus a facility were more likely to have AAMs resumed at discharge [36.8% vs. 9.1%; $p=0.05$]. Head AIS and CHA2DS2-VASc scores were similar between the three decision groups (Table 5). Patients who suffered falls versus MVC mechanism were less likely to have AAMs resumed at discharge [28 vs 82%; $p<0.05$].

Table 1. Demographics and preinjury AAM use, $n=102$ patients

<table>
<thead>
<tr>
<th>Mean age</th>
<th>78.9 years</th>
</tr>
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<tbody>
<tr>
<td>Male sex</td>
<td>60/102</td>
</tr>
<tr>
<td>Warfarin</td>
<td>65</td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>19</td>
</tr>
<tr>
<td>Dabigatran</td>
<td>2</td>
</tr>
<tr>
<td>Factor X Inhibitor</td>
<td>11</td>
</tr>
<tr>
<td>Multiple AAM</td>
<td>5</td>
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</table>

Table 2. Indication for preinjury AAM use, $n=102$ patients

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>$n$</th>
<th>$%$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrial fibrillation</td>
<td>59</td>
<td>57.8%</td>
</tr>
<tr>
<td>TIA/CVA</td>
<td>7</td>
<td>6.9%</td>
</tr>
<tr>
<td>DVT</td>
<td>3</td>
<td>2.9%</td>
</tr>
<tr>
<td>PE</td>
<td>11</td>
<td>10.8%</td>
</tr>
<tr>
<td>CAD</td>
<td>6</td>
<td>5.9%</td>
</tr>
<tr>
<td>Unknown/Other</td>
<td>16</td>
<td>15.7%</td>
</tr>
</tbody>
</table>
### Table 3. Mechanism of injury, injuries suffered

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>82</td>
<td>80.4%</td>
</tr>
<tr>
<td>MVC</td>
<td>11</td>
<td>10.8%</td>
</tr>
<tr>
<td>MCC</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>Unknown/Other</td>
<td>7</td>
<td>6.9%</td>
</tr>
<tr>
<td><strong>Injuries</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TBI</td>
<td>18</td>
<td>17.6%</td>
</tr>
<tr>
<td>Pelvic Fracture</td>
<td>9</td>
<td>8.8%</td>
</tr>
<tr>
<td>Solid Organ Injury</td>
<td>4</td>
<td>3.9%</td>
</tr>
<tr>
<td>HTX</td>
<td>13</td>
<td>12.7%</td>
</tr>
<tr>
<td>Soft Tissue Hematoma</td>
<td>29</td>
<td>28.4%</td>
</tr>
</tbody>
</table>

### Table 4. Results of collaborative conversation regarding AAMs

<table>
<thead>
<tr>
<th>Result</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hold indefinitely</td>
<td>12</td>
<td>11.8%</td>
</tr>
<tr>
<td>Resume</td>
<td>34</td>
<td>33.3%</td>
</tr>
<tr>
<td>Hold Until Follow-up</td>
<td>56</td>
<td>54.9%</td>
</tr>
</tbody>
</table>

### Table 5. Factors and association with AAM decisions

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Held indefinitely</th>
<th>Resumed at discharge</th>
<th>Held until follow up</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Warfarin</td>
<td>65</td>
<td>9 (13.9%)</td>
<td>19 (29.2%)</td>
<td>37 (56.9%)</td>
<td></td>
</tr>
<tr>
<td>Clopidogrel</td>
<td>19</td>
<td>3 (15.8%)</td>
<td>6 (31.6%)</td>
<td>10 (52.6%)</td>
<td></td>
</tr>
<tr>
<td>Dabigatran</td>
<td>2</td>
<td>0</td>
<td>2 (100%)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Factor X Inhibitor</td>
<td>11</td>
<td>0</td>
<td>3 (27.3%)</td>
<td>8 (72.7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years, SD)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.07</td>
</tr>
<tr>
<td>Age &gt;75</td>
<td>n = 68 (66.7%)</td>
<td>7 (10.3%)</td>
<td>18 (26.5%)</td>
<td>43 (63.2%)</td>
<td></td>
</tr>
<tr>
<td>Age &lt;75</td>
<td>n = 34 (33.3%)</td>
<td>5 (14.7%)</td>
<td>16 (47.1%)</td>
<td>13 (38.2%)</td>
<td></td>
</tr>
<tr>
<td><strong>Disposition</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Home</td>
<td>n = 87 (88.8%)</td>
<td>8 (9.2%)</td>
<td>32 (36.8%)</td>
<td>47 (54%)</td>
<td></td>
</tr>
<tr>
<td>Facility</td>
<td>n = 11 (11.2%)</td>
<td>3 (27.3%)</td>
<td>2 (9.1%)</td>
<td>7 (63.6%)</td>
<td></td>
</tr>
<tr>
<td>Head AIS (if TBI) – (median, IQR)</td>
<td>3 (2–5)</td>
<td>3 (3–3)</td>
<td>2 (2–3)</td>
<td>3 (2–5)</td>
<td>0.4</td>
</tr>
<tr>
<td>INR (median, IQR)</td>
<td>2.9 (2.3 – 3.6)</td>
<td>4.2 (2.8 – 6)</td>
<td>3.2 (2.2 – 3.6)</td>
<td>2.7 (2 – 3.3)</td>
<td>0.02</td>
</tr>
<tr>
<td>CHA2DS2Vasc (median, IQR)</td>
<td>4 (3–4)</td>
<td>4 (3–4)</td>
<td>4 (3–4)</td>
<td>4 (3–4)</td>
<td>0.25</td>
</tr>
</tbody>
</table>

### DISCUSSION

In this quality initiative of just more than 100 patients we showed feasibility of making it a routine process for the inpatient trauma team to communicate with the primary AAM prescriber after patients are admitted with injuries and to document decision making. We have since maintained this practice to promote collaboration with our colleagues in cardiology and primary care. To our knowledge this project is the first to attempt to formalize and describe this practice. We are encouraged that the practice may be generalizable not just to trauma services but to any inpatient service that admits patients on AAMs.

With our growing population of older adults and increased longevity, the use of AAMs will continue to increase in Rhode Island and beyond. Recent estimates from a 2015 American Heart Association (AHA) report that over 3 million Americans have atrial fibrillation and nationwide there are about 75,000 new cases of venous thromboembolism diagnosed annually. This past decade use of oral anticoagulants has nearly doubled for atrial fibrillation in the United States but warfarin use has remained stable. Antiplatelet medication use has also increased substantially with the introduction of clopidogrel in 1997 and more recently with the third-generation agents ticagrelor and prasugrel. DOACs pose a particularly unique challenge when patients present on these agents while bleeding after injury. Degree of anticoagulation while on a DOAC cannot be readily assessed by traditional laboratory means such as prothrombin and partial thromboplastin times and reversal is similarly uncertain. At our institution we do now have idarucizumab available to block dabigatran and use PCCs for the other DOACs.

It is important for inpatient providers, especially trauma teams, to be aware of the emergence of DOACs and CHA2DS2-VASc and the overall increased use of anticoagulants. Any patient of advanced age that suffers trauma should be queried immediately on presentation as to whether they are on an AAM and reversal should be considered based on the options and severity of injuries. As the hospital course progresses and injuries have stabilized, the inpatient trauma team can determine a patient’s CHA2DS2-VASc score, assess risk of future traumatic events, and communicate with the primary AAM prescriber. It is likely that inpatient trauma teams have a bias towards holding AAMs longterm as they regularly receive patients who have suffered exacerbations of injury from AAM use. However, our results showed that more than half of trauma patients had AAMs held until follow-up, one third were resumed at discharge, and only 12 percent were held indefinitely. Unfortunately, we do not have a comparison group from prior to initiation of the communication practice but it appears that shared decision making has not resulted in an overly conservative approach to AAMs after injury.

Falls were the most common mechanism of injury in our cohort and these patients were less likely to have AAMs
resumed on discharge compared to those that suffered an MVC. These results are not surprising as a fall is often considered an event that indicates some level of patient frailty and may occur serially while an MVC may be considered a random event. While multiple frailty indicators exist, there is not substantial data regarding these indicators to predict subsequent falls. Radiologic scoring of sarcopenia has been found to be a predictor of mortality and postoperative complications in elderly patients, but few studies have evaluated it as a predictor of falls.\textsuperscript{10,11} This further supports the need to communicate with the AAM prescriber that has an ongoing relationship with the patient while we continue to create and analyze objective tools that assess risk of suffering trauma. PCPs may be alerted after the communication to adjust medications such as antihypertensive agents, provide calcium or vitamin D supplementation, or refer a patient for outpatient physical therapy for strength and balance improvement. Also, PCPs have been shown to play a key role in assessing and reducing risk of falls in the elderly. In 2013 the Centers for Disease Control released a tool kit titled Stopping Elderly Accidents, Deaths, and Injuries (STEADI) with algorithms designed for primary care providers to specifically assess fall risk.\textsuperscript{12}

We should also determine how to better apply bleeding risk scores to trauma patients who have been on AAMs. HAS-BLED, ORBIT and ATRIA are three scoring systems that have emerged recently to assess risk of a major bleeding event while on anticoagulation for atrial fibrillation.\textsuperscript{13,14} Prior to the development of scoring systems, decisions to start or resume anticoagulation were primarily based on thromboembolic risk through clinical assessment and use of the CHA\textsubscript{2}DS\textsubscript{2}-VASc score. Risk of a bleeding event was considered secondarily. In older patients CHA\textsubscript{2}DS\textsubscript{2}-VASc and one of the bleeding risk scores such as the HAS-BLED system should now be considered concurrently when making decisions as HAS-BLED has been shown to predict clinically relevant major bleeding events.\textsuperscript{14} We now routinely determine HAS-BLED scores alongside CHA\textsubscript{2}DS\textsubscript{2}-VASc before discussions with the primary prescriber.

A Danish registry study compared resumption of anticoagulation for atrial fibrillation to non-resumption in over 4000 patients who had suffered major injury. Patients that resumed anticoagulation had lower mean HAS-BLED scores [2 vs 3] but had similar CHA\textsubscript{2}DS\textsubscript{2}-VASc scores and were of similar age when compared to those that did not resume anticoagulation.\textsuperscript{15} Unfortunately the authors do not include mechanism of injury, only types of injuries suffered. We are unable to determine whether falls compared to other mechanisms were associated with decisions about anticoagulation. All of the bleeding risk scores are comprised of mostly medical comorbidities that exacerbate bleeding risk and only the age component addresses risk of a traumatic event and does so crudely. A future goal should be to create a bleeding risk score that incorporates medical comorbidities and some of the developing frailty and fall assessment tools.

For too long anticoagulation has been a siloed area of study. CHA\textsubscript{2}DS\textsubscript{2}-VASc was created several years before most of the bleeding risk scores. This is an indicator of how anticoagulation for atrial fibrillation was mostly thought of as a cardiology or primary care issue. Anticoagulation decisions need to be multidisciplinary processes that include expertise and experience of the prescribers and those that care for patients when they are injured. There are examples of improvements in care when communication is enhanced with other medical issues. Oncology is a truly multidisciplinary field and increased communication between oncologists and surgeons has been shown to improve outcomes in patients with advanced stage colon cancer.\textsuperscript{16} Patient care is improved when pulmonologists and thoracic surgeons, and transplants surgeons and nephrologists work together closely.

LIMITATIONS

There are important limitations to our study. During the study period there may have been data acquisition fatigue or failure as a data collection sheet was required for each patient to be captured. Rates of entry and collection regarding the conversation with the primary prescriber could be improved by allowing entry into the electronic health record. Our enrollment and data collection also took place without use of a bleeding risk score which could improve decision making regarding restarting AAMs. Decisions also may have been affected by biases and how information regarding trauma mechanism and injuries is shared and discussed among the reporting trauma team provider and the primary prescriber.

CONCLUSIONS AND IMPLICATIONS

In this quality and risk management initiative we show feasibility of making communication between inpatient trauma providers and outpatient AAM prescribers a routine process. This is now the standard at our center and should be generalizable at other centers. With a growing population of advanced-age patients presenting on AAMs it will be important to continue to explore how to improve their outcomes after injury in a multidisciplinary fashion. To show this intervention improves safety will likely require a comparison group and longitudinal follow-up. We are committed to performing a multidisciplinary project combined with primary prescribers that follows patients on AAMs a year and beyond. We also need to further develop and regularly use objective assessment tools for frailty to predict falls and bleeding risk.
References


Acknowledgments

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Disclosures

There are no conflicts of interest.

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¹ www.cdc.gov/tobacco/data_statistics/fact_sheets/cessation/quitting/index.htm
Rhode Island Monthly Vital Statistics Report
Provisional Occurrence Data from the Division of Vital Records

<table>
<thead>
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<th>VITAL EVENTS</th>
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<th>12 MONTHS ENDING WITH NOVEMBER 2020</th>
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<tr>
<td>Deaths</td>
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* Rates per 1,000 estimated population
# Rates per 1,000 live births

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<td>COPD</td>
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(a) Cause of death statistics were derived from the underlying cause of death reported by physicians on death certificates.
(b) Rates per 100,000 estimated population of 1,059,361 for 2019 (www.census.gov)
(c) Years of Potential Life Lost (YPLL).

NOTE: Totals represent vital events, which occurred in Rhode Island for the reporting periods listed above.
Monthly provisional totals should be analyzed with caution because the numbers may be small and subject to seasonal variation.
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My Life My Quit promotional images and cessation services are provided by National Jewish Health, with support from the Rhode Island Department of Health.
Working for You: RIMS advocacy activities

April 1, Thursday
Legislative hearings

April 5, Monday
RIMS Council meeting: Catherine A. Cummings, MD, President, featuring RI Attorney General Peter Neronha

April 6, Tuesday
Physician Health Program Governance Committee: Jerry Fingerut, MD, Chair

April 7, Wednesday
Legislative hearings

April 8, Thursday
Legislative hearings

April 9, Friday
Legislative hearings

April 12, Monday
Legislative hearings

April 13, Tuesday
RI Department of Health (RIDOH) Diabetes prevention program
RI Care Transformation Committee: webinar Road to Equity
American Medical Association (AMA) call on Prediabetes Prevention Project
Tufts Health Plan meeting: Catherine A. Cummings, MD, RIMS President, Elizabeth Lange, MD, RIMS President-elect
RIMS meeting regarding Federal Stimulus monies: Catherine A. Cummings, MD, RIMS President, Elizabeth Lange, MD, RIMS President-elect, Thomas Bledsoe, MD, Vice President, RIMS staff
Legislative hearings

April 14, Wednesday
RIDOH Board of Medical Licensure and Discipline monthly meeting
Governor’s Overdose Intervention and Prevention Task Force: Sarah Fessler, MD, RIMS Past President
Meeting with RI Business Group on Health: Catherine A. Cummings, MD, RIMS President
Meeting with RI Public Health Institute and American Heart Association regarding sugary beverage tax legislation

Meeting of RI House of Representative Step Therapy Commission: Steve DeToy, Commission member
Legislative hearings

April 15, Thursday
RIMS Nominations Committee: E. Christine Brousseau, MD, Immediate Past President, Chair; Elizabeth Lang, MD, President-Elect; Thomas Bledsoe, MD, Vice President; Kathleen Carney-Godley, MD, Steven Schechter, MD; Richard Terek, MD
Legislative hearings

April 16, Friday
Legislative hearings

April 19, Monday
RIMS’ Member-only State House Update: Michael Migliori, MD, Public Laws Chair
Legislative recess

April 20, Tuesday
Meeting with RI Health Policy Alliance regarding Legislation
Office of the Health Insurance Commissioner (OHIC) Health Insurance Advisory Council (HIAC): Catherine A. Cummings, MD, President
AMA/Manatt Health webinar: Improving Access to Substance Use Disorder Treatment
Legislative recess

April 21, Wednesday
RIDOH Primary Care Physician Advisory Committee (PCPAC): Elizabeth Lange, MD, President-elect
Diabetes Prevention Programs (DPP) Stakeholder’s call
AMA webinar: Taming the Electronic Health Record
RI-ACP Advocacy Committee with Michael Migliori, MD, RIMS Public Laws Chair
Legislative recess

April 22, Thursday
Meeting with RI Parity project: Catherine A. Cummings, MD, RIMS President
Legislative recess

April 23, Friday
Legislative recess

April 26, Monday
Legislative hearings

April 27, Tuesday
Tobacco Harm Reduction webinar: Global Tobacco & Nicotine Forum
Legislative hearings

April 28, Wednesday
Legislative hearings
Warren Alpert Medical School Student Awards, including presentation of the RIMS-endowed Dr. Amos Throop Award and the Dr. Herbert Rakatansky Award

April 29, Thursday
Racial Equity Working Group/Prevent Overdose RI
Legislative hearings

April 30, Friday
Legislative hearings
The Rhode Island Medical Society continues to drive forward into the future with the implementation of various new programs. As such, RIMS is expanded its Affinity Program to allow for more of our colleagues in healthcare and related business to work with our membership. RIMS thanks these participants for their support of our membership.

Contact Marc Bialek for more information: 401-331-3207 or mbialek@rimed.org

RIPCPC is an independent practice association (IPA) of primary care physicians located throughout the state of Rhode Island. The IPA, originally formed in 1994, represent 150 physicians from Family Practice, Internal Medicine and Pediatrics. RIPCPC also has an affiliation with over 200 specialty-care member physicians. Our PCP’s act as primary care providers for over 340,000 patients throughout the state of Rhode Island. The IPA was formed to provide a venue for the smaller independent practices to work together with the ultimate goal of improving quality of care for our patients.

Neighborhood Health Plan of Rhode Island is a non-profit HMO founded in 1993 in partnership with Rhode Island's Community Health Centers. Serving over 185,000 members, Neighborhood has doubled in membership, revenue and staff since November 2013. In January 2014, Neighborhood extended its service, benefits and value through the HealthSource RI health insurance exchange, serving 49% the RI exchange market. Neighborhood has been rated by National Committee for Quality Assurance (NCQA) as one of the Top 10 Medicaid health plans in America, every year since ratings began twelve years ago.
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Top 10 countries in 2021:

1. US
2. Australia
3. Canada
4. UK
5. India
6. Germany
7. Brazil
8. China
9. Italy
10. Japan

Wherever you happen to be quarantining or social distancing, visit the Journal on your mobile device, and send us a photo: mkorr@rimed.org.

ZOOM, USA

The Rhode Island Medical Journal (RIMJ) editorial and design team met in their bi-monthly issue review and planning session in April. From left, clockwise, are William Binder, MD, Co-Editor-in-Chief; Managing editor Mary Korr; Edward Feller, MD, Co-Editor-in-Chief; Kenneth S. Korr, MD, Associate Editor, and Graphic designer Marianne Migliori.
Q&A with Megan Ranney, MD

Emergency medicine physician MEGAN RANNEY, MD, MPH, has been busy not only on the frontlines at Rhode Island Hospital, but on primetime as a medical analyst, both before and during the pandemic.

The spotlight has been on her as she voices her expertise across a spectrum of topics and issues: PPE, vaccine hesitancy, gun violence and digital health, to name a few. In this month’s Spotlight feature, RIMJ asked her to share her journey from Peace Corps volunteer to the present, and to offer some pearls of wisdom to public health and medical students today.

RIMJ: What led to your role as a medical analyst on CNN and other major news outlets?

DR. RANNEY: It was honestly a lot of luck! I got asked by our Lifespan public relations officer to take an invitation for a CNN segment on John King in mid-March. I guess I must have done a good job, as I kept getting asked back. It’s been a huge learning curve but also a lot of fun – and a chance to do good, in a very different way than my day-to-day practice or my research.

RIMJ: What do you see as the biggest challenge in getting out scientific information to the general public, and addressing vaccine hesitancy?

DR. RANNEY: The biggest challenges are twofold.

First, it’s tough to get folks to really listen. Even with my occasional TV appearances and Twitter presence, I often feel like I [and my colleagues] are shouting into the void. It’s why it matters to have a lot of us out there: our voices are more likely to be heard when we raise them together!

Second, the nuances involved in public health messaging isn’t always seen as newsworthy. People want sound bites and yes-or-no answers. It’s tougher to communicate the unknowns.

At the end of the day, it doesn’t feel all that different from trying to explain to a patient why they really don’t need an MRI, or why they really do need blood pressure medications. It requires patience, listening, and a willingness to reach people where they are.

RIMJ: As founding director of The Brown-Lifespan Center for Digital Health, how did you first get involved in digital health and what do you envision as its next frontier, as well as its coalescence with the School of Public Health under your new appointment?

DR. RANNEY: I first got involved with digital health as a resident working in Kenya as part of the AMPATH program (a collaboration between Moi University, Indiana University, and Brown University). Although I was already focused largely on violence prevention, I was intrigued by an ongoing study using text messaging to improve adherence to antiretrovirals among villagers with HIV. It was the first place that I’d seen people use texting in the U.S. for health promotion or behavioral health. I returned to the U.S. with this idea in mind – it was possible to use technology to identify and deliver automated public health interventions – and spent the next few years developing my first application of text messaging to violence prevention (a grant that was funded by the Society for Academic Emergency Medicine).

Over the last 15 years, of course, the concept of “digital health” has become commonplace. It’s rare to find someone who does not use text messaging, apps, wearables, social media, or some other form of technology to manage their health. But we still have far to go. Many digital health programs are created by private

Brief bio

Education
Harvard, BA, 1997
Columbia University College of Physicians and Surgeons, MD, 2004
Brown University Program in Public Health, MPH, 2010

Current
Warren Alpert Endowed Associate Professor in the Department of Emergency Medicine
Assistant Dean for Digital Health Innovation, Director of the Brown-Lifespan Center for Digital Health
Associate Professor of Health Services, Policy and Practice
Associate Dean of Strategy and Innovation for the School of Public Health
Chief Research Officer, American Foundation for Firearm Injury Reduction in Medicine
Founding partner, GetUsPPE.org
companies without an obligation to basic concepts of equity and privacy. The majority of digital health programs lack rigorous proof of efficacy. And we continue to lack programs developed specifically for the patient populations that I, as an emergency physician, care about most: the people with multiple chronic conditions, the people facing structural barriers to health, the people with behavioral health conditions that impair their ability to effectively manage their own care.

It is this deficit that spurred our creation of the Brown-Lifespan Center for Digital Health. Through this collaboration between the university and the hospital system, we hope to serve as a hub where creative minds from Brown and Lifespan can collaboratively design, test, and deploy digital health solutions to society’s most pressing health challenges.

RIMJ: A social media presence is de facto today. When the NRA tweeted in 2018 that: “Someone should tell self-important anti-gun doctors to stay in their lane,” what was your response to that – was it a clarion call to action on your part?

DR. RANNEY: By the time that we created the #ThisIsOurLane hashtag, I’d already been active on social media for almost a decade. I first started to talk and write about the power of social media in healthcare back in 2012, wrote 2 papers using only Twitter in 2015 and 2017, and had been the creator or participant in multiple viral social media movements (including short videos to save the ACA, a series of tweets about the health effects of gun violence using #docs4gunsense after Parkland, and more).

I don’t think that #ThisIsOurLane would have happened had we not done the hard work over the years prior to, first, create a welcoming medical Twitter (“#medtwitter”) community; and, second, to start to talk about firearm injury as a public health problem. Once the hashtag was coined, the rest happened organically.

Today, we’re seeing medical professionals branch out into different forms of social media, ranging from TikTok to Discord servers. I’m excited to see the communities and change that occur as a result.

RIMJ: A few retrospective questions: Can you share some lessons learned as a Peace Corps volunteer in Cote D’Ivoire, Africa?

DR. RANNEY: The adage is that the Peace Corps is “the toughest job you’ll ever love.” This is so very true. I learned so much about community, humility, and mental and emotional toughness. I also learned to not take good health for granted.

RIMJ: What is your favorite escape from work?

DR. RANNEY: In non-COVID times, I would say travel!! But now it’s going for walks outside – nature forces me to put my phone (email, social media, and to-do lists) away and reconnect with the real world.
A Poem and Poppies: Legacy of a WW I Physician

MARY KORR
RIMJ MANAGING EDITOR

An editorial in the May 1918 Rhode Island Medical Journal (RIMJ) mentions the obituary of Dr. John Mccrae, who gave his life in devotion to men, all of them like himself, fighting for civilization in Flanders...going from our midst in silence to his death, McCrae signifies—everything!

Dr. McCrae, born in Ontario, Canada, was an 1898 graduate of the University of Toronto Medical School, which he followed with an internship at Johns Hopkins Hospital in Baltimore and a fellowship in pathology at McGill University in Montreal. He served in the Boer War in South Africa for two years, and upon his return took a teaching position in pathology at the University of Vermont from 1902–1911.

When World War I broke out, he volunteered as a combat surgeon with Canada’s First Brigade Artillery, serving on the Belgium battlefield in Flanders. (Image 1) The RIMJ 1918 editorial quotes Dr. McCrae’s now-famous poem, “In Flanders Field,” written after presiding over the funeral service of friend and fallen comrade, Lieut. Alexis Helmer, in May 1915, in a field of white wooden crosses dotted with crimson poppies. (Image 2) The next day, Dr. McCrae composed the poem (Image 3) sitting in the back of an ambulance outside a dressing center for the wounded.

In Flanders Field

In Flanders fields the poppies blow
Between the crosses, row on row,
That mark our place; and in the sky
The larks, still bravely singing, fly
Scarce heard amid the guns below.

We are the Dead. Short days ago
We lived, felt dawn, saw sunset glow,
Loved and were loved, and now we lie
In Flanders fields.

Take up our quarrel with the foe:
To you from failing hands we throw
The torch; be yours to hold it high
If ye break faith with us who die
We shall not sleep, though poppies grow
In Flanders fields.

Image 1. Dr. John McCrae in uniform, 1914. [WILLIAM NOTMAN AND SON, WIKIMEDIA.ORG]

Image 2. Poppies in Flanders Field. [WIKIMEDIA.ORG]

Image 3. At right, John McCrae Memorial “book” close-up. McCrae House, Guelph, Ontario, Canada. The poem was first published in December 1915 in the British magazine Punch. [WIKIMEDIA.ORG]
Flower of Remembrance
Dr. McCrae’s poem “presented a striking image of the bright red flowers blooming among the rows of white crosses and became a rallying cry to all who fought in the First World War,” according to a history of the red poppy on the website of the US Dept. of Veterans Affairs. The poppy was adopted as the official memorial flower of the Veterans of Foreign Wars (VFW) at its national convention in Seattle, in 1922. In 1924, the first poppy factory was built in Pittsburgh and the VFW registered the name “Buddy Poppy” with the U.S. Patent Office. The term “Buddy” was coined as a tribute to the fallen or for returning wounded veterans. [Image 4]

Roll call of RI Physicians Veterans who have passed on

During the month of May when veterans around the country are honored on Memorial Day, RiMJ recognizes the following Rhode Island physicians/veterans who have passed on in 2020–2021 to date.
Their obituaries are archived on the RiMJ website at rimedj.org in the issue following their deaths.
http://rimed.org/rimedicaljournal-archives.asp

2020
David M. Barry, MD, January 6, 2020.
Vincent A. DeConti, MD, 90, February 1, 2020.
Alfred F. Parisi, MD, 82, April 15, 2020.
George N. Cooper, Jr., MD, December 13, 2020.

2021
Charles J. McDonald, MD, 89, January 10, 2021.
Francis L. McNelis, MD, 100, February 8, 2021.
Howard Sturim, MD, March 12, 2021.

In 1920, the poppy became the official flower of The American Legion. The Friday before Memorial Day, this year on May 28th, is designated as National Poppy Day. The Legion’s Auxiliary program offers a variety of poppy programs and distributes handmade crepe poppies with all donations supporting veterans, as well as active-duty military personnel and their families with medical and financial needs.

Dr. McCrae, an asthmatic, died of cerebral meningitis in France, on Jan. 28, 1918, at the age of 45. He was buried with full military honors in Wimereux Cemetery, just north of Boulogne, not far from the fields of Flanders. [Image 5]

His poem remains an enduring elegy to all those who have fallen in the service of their country, and resonates today, during the COVID pandemic, when so many lives have been lost on the viral battlefield. The final stanza echoes across the ages – as an inspiration and a challenge:

To you from failing hands we throw
The torch; by yours to hold it high
If ye break faith with us who die
We shall not sleep, though poppies grow
In Flanders fields.
CDC issues interim public health recommendations for fully vaccinated people

On April 27th, the Centers for Disease Control issued a Summary of Recent Changes. This set of public health recommendations for fully vaccinated people will be updated and expanded based on the level of community spread of SARS-CoV-2, the proportion of the population that is fully vaccinated, and the rapidly evolving science on COVID-19 vaccines.

For the purposes of this guidance, people are considered fully vaccinated for COVID-19 ≥2 weeks after they have received the second dose in a 2-dose series (Pfizer-BioNTech or Moderna), or ≥2 weeks after they have received a single-dose vaccine (Johnson and Johnson [J&J]/Janssen).

This guidance applies to COVID-19 vaccines currently authorized for emergency use by the U.S. Food and Drug Administration: Pfizer-BioNTech, Moderna, and Johnson and Johnson [J&J]/Janssen COVID-19 vaccines. This guidance can also be applied to COVID-19 vaccines that have been authorized for emergency use by the World Health Organization (e.g. AstraZeneca/Oxford).

The following recommendations apply to non-healthcare settings. For related information for healthcare settings, visit Updated Healthcare Infection Prevention and Control Recommendations in Response to COVID-19 Vaccination.

**Fully vaccinated people can:**
- Visit with other fully vaccinated people indoors without wearing masks or physical distancing
- Visit with unvaccinated people (including children) from a single household who are at low risk for severe COVID-19 disease indoors without wearing masks or physical distancing
- Participate in outdoor activities and recreation without a mask, except in certain crowded settings and venues
- Resume domestic travel and refrain from testing before or after travel or self-quarantine after travel.
- Refrain from testing before leaving the United States for international travel (unless required by the destination) and refrain from self-quarantine after arriving back in the United States.
- Refrain from testing following a known exposure, if asymptomatic, with some exceptions for specific settings
- Refrain from quarantine following a known exposure if asymptomatic
- Refrain from routine screening testing if asymptomatic and feasible

**For now, fully vaccinated people should continue to:**
- Take precautions in indoor public settings like wearing a well-fitted mask
- Wear masks that fit snugly when visiting indoors with unvaccinated people who are at increased risk for severe COVID-19 disease or who have an unvaccinated household member who is at increased risk for severe COVID-19 disease
- Wear well-fitted masks when visiting indoors with unvaccinated people from multiple households
- Avoid indoor large-sized in-person gatherings
- Get tested if experiencing COVID-19 symptoms
- Follow guidance issued by individual employers
- Follow CDC and health department travel requirements and recommendations

Complete guidelines can be found at: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/fully-vaccinated-guidance.html#anchor_1619526673330
Neighborhood Health Plan, Thundermist Health Center, Algorex Health partner on food program

SMITHFIELD – Neighborhood Health Plan of Rhode Island (Neighborhood), Thundermist Health Center (Thundermist) and Algorex Health have partnered on an innovative food program to address extreme food insecurity in Woonsocket. The “Neighborhood-Thundermist Food Access Program” is a six-month pilot aimed at 140 Neighborhood Medicaid members who live in Woonsocket and access health care through Thundermist’s Woonsocket location. The program’s primary objective is to test whether supplemental groceries delivered to the homes of members with significant food access challenges have a positive impact, particularly when combined with the engagement of a clinical team, on the health and quality of life of participants. Rolled out over the December holidays, the pilot program will culminate in mid-June and use both quantitative and qualitative measurements to determine impact on participants’ health.

Participants in the program receive weekly or bi-weekly, depending on household size, boxes of shelf-stable foods delivered to their homes to address gaps in food access. The boxes also include face masks and hand sanitizer to support pandemic safety measures. The design of the program was informed by Social Determinants Of Health (SDOH) data and is unique compared to other food intervention programs in Rhode Island because of its integration of clinical engagement with participants.

“As one of the Nation’s top safety net health plans, Neighborhood’s number one goal is to ensure its members have access to the resources they need to live healthy lives,” said PETER MARINO, president and CEO of Neighborhood. “This program is an example of our commitment to that goal. We have terrific partners in Thundermist and Algorex Health, and our combined efforts will help address challenges that are often the most significant barriers to food access – economic stability, access to transportation and availability of healthy foods.”

As an early advocate for using SDOH data to inform and action programs to spur change, Neighborhood engaged Boston-based data science company Algorex Health to conduct an analysis of Neighborhood’s membership. Together, Neighborhood and Algorex Health identified Medicaid members living in a “food desert” in Woonsocket. The data showed that there are significant challenges to accessing healthy food in many parts of Woonsocket when taking into account income, proximity to retail outlets including supermarkets (Woonsocket has no supermarkets), and vehicle access among residents.

Neighborhood then collaborated with Thundermist to implement a new home-delivery food program. Thundermist is an ideal community partner given its 50-year history of serving at-risk populations in Woonsocket and as one of Neighborhood’s 14 community health center founders more than 25 years ago.

“Access to healthy food is integral to improving overall health,” said SAPNA CHOWDHRY, MD, medical director at Thundermist. “If a patient goes to bed hungry or lacks access to nutritious food, it is difficult for them to focus on other aspects of health. Our partnership with Neighborhood will reduce barriers patients face in improving their health and wellbeing.”

Developing solutions to food insecurity, like other Social Determinants of Health, is particularly challenging given the range of underlying causes and their connectedness to one another. Issues such as poverty, unemployment/under-employment, lack of transportation and inconsistent access to enough healthy food are often deeply interconnected. By collaborating with partners mutually vested in the health of Rhode Island’s vulnerable populations, Neighborhood, Thundermist and Algorex Health aim to make a difference. Together, they aspire to achieve improved clinical and health outcomes for the individuals and their families in the program, as well as improve use of primary care services at Thundermist.

The unique aspect of the “Neighborhood-Thundermist Food Access Program” is the consistent engagement by Thundermist’s Community Health Team (CHT) with participants of the program. As part of the enrollment process...
of patients who met the criteria for the program, CHT staff provided assistance with selecting a food box type – vegetarian, non-vegetarian, and ready-to-eat options – that would best meet the distinctive health needs of the patients and their families. At the same time, they administered a short survey about food security status to serve as a benchmark for follow up surveys. For the duration of the program, CHT staff will connect with patients each month as well as conduct mid- and end-campaign surveys to assess for changes.

Following the program’s conclusion in June, Neighborhood will analyze its impact and consider expansion. Evaluation criteria will include improvements in self-reported food insecurity, levels of access to food, health status including stress levels and adherence to primary care provider and CHT appointments, plus reduced overall financial strain.

To date, participant feedback about the program has been positive, indicating the program’s design may be effectively addressing the barriers to food access in Woonsocket. Participant comments include how helpful the program is due to lack of transportation, limited financial resources and Supplemental Nutrition Association Program (SNAP) benefits falling short at the end of the month.

Marino remarked, “Given the impact food insecurity has on families, we are committed to supporting our members in need through a home delivery program in partnership with Thundermist. We also aim to use the learnings from this pilot program to expand our efforts to address this issue. Our goal, over time, is to make a collective difference in tackling food insecurity.”

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**Medical students, physicians launch nationwide COVID-19 vaccination study**

_Hoping to determine beliefs, perspectives among country’s diverse populations_

**PROVIDENCE** – As millions of people continue to roll up their sleeves each and every day to get vaccinated against COVID-19, researchers at the Alpert Medical School of Brown University are conducting a study to gauge perspectives about the vaccine and to determine if there are significant differences in opinion about it among varying populations in the United States.

Brown University’s Institutional Review Board approved the study, which consists of an anonymous online survey. It aims to determine if there are significant differences in participants’ vaccination perspectives along racial, geographic, socioeconomic, linguistic, and political bounds. The study is being conducted by the SURGE Lab, which is focused on research related to Social Determinants of Health and healthcare disparities.

**DR. CARLA MOREIRA** – a vascular surgeon with Brown Surgical Associates – established the SURGE lab in 2019 and is overseeing the students conducting the research project.

“This study is an opportunity to gain valuable information on the different factors that may influence a person’s decision to get vaccinated,” said Dr. Moreira, who is also an assistant professor at the Warren Alpert School of Medicine. “We hope to recruit study participants from every community but specifically from communities of color which have been disproportionately affected by the COVID-19 pandemic.”

**SKENDA JEAN-CHARLES**, who is conducting the study along with **KIARA CORCORAN RUIZ** and **GIANCARLO MEDINA PEREZ**, conceptualized the research after having conversations with her own close family members about vaccinations.

“It got me thinking about what wider vaccination perspectives may be and how those perspectives can shift across different communities. Kiara and I felt that a national, multilingual survey on these perspectives could help us to understand community concerns with vaccination,” Jean-Charles said. “Ultimately, we have all seen the negative impact of COVID-19 on the lives of so many and the disproportionate effects on historically marginalized communities. We hope that this survey can serve as a launch point for interventions that are aimed at reaching our most vulnerable communities, particularly when it comes to being vaccinated.”

The COVID-19 survey can be found online and is open to anyone 18 years old or above residing in the United States.
Providence air shows progress, Lung Association reports

Three counties receive failing grades for ozone level

PROVIDENCE – This year’s “State of the Air” report from the American Lung Association finds that Rhode Island reported progress on air pollution throughout its counties and metro areas. The Providence metro area (including Boston and Worcester Massachusetts) was among the cleanest cities for short-term particle pollution and showed improvement for year-round particle pollution. Counties within the metro area also recorded fewer unhealthy days for ozone pollution. Particle pollution and ozone pollution are two of the most harmful and widespread types of air pollution. (See the full report at Lung.org/sota.)

“In many ways, Rhode Island’s report tells the story of air quality throughout the nation. The American Lung Association’s 2021 ‘State of the Air’ report demonstrates long-term and gradual progress in the state, and the critical need to continue our work to improve air quality for Rhode Island residents,” said American Lung Association Director of Advocacy in Rhode Island DANIEL FITZGERALD. “The report also reinforced that people of color are significantly more likely to breathe polluted air. Our elected officials must continue to act boldly to recognize climate change, understand and move forward the cause of environmental justice, and acknowledge air pollution as a serious public health concern.”

Emissions, climate change

Overall, the report reinforced the fact that emissions from factories, power plants, diesel- and gasoline-powered motor vehicles (cars and trucks) and equipment play a role in forming ozone and generating dangerous fine particle pollution. Together, with the rising temperatures due to climate change, air quality in the United States is in danger of being degraded, and residents across the country are at an increased risk of air pollution harming health. In addition, studies show that air pollution exposure is linked to greater risk of respiratory infections, including some evidence that suggests that exposure to air pollution may make people more vulnerable to COVID-19 infection.

RI legislation

The Lung Association recently applauded Rhode Island for joining the Transportation and Climate Initiative (TCI) Program and passing the Rhode Island Act on Climate. These initiatives represent big, bold and necessary steps forward for public health. Together they will reduce transportation pollution, improve air quality, reduce the carbon pollution that causes climate change, improve health and invest in cleaner, faster and more reliable public transportation. They stand to make a significant impact throughout the state for the coming years, but especially for Providence and other heavily trafficked metro areas.

“The report also reinforced that people of color are significantly more likely to breathe polluted air. Our elected officials must continue to act boldly to recognize climate change, understand and move forward the cause of environmental justice, and acknowledge air pollution as a serious public health concern.”

— Daniel Fitzgerald,
American Lung Association Director of Advocacy, RI

Notable County grades on ozone

• All three reporting counties, Kent, Providence and Washington, maintained failing grades from last year’s report
• Despite failing grades, each county reported decreased levels of ozone pollution
• All other counties did not collect this data

Notable county grades on particle pollution

• All three reporting counties maintained A grades for short-term particle pollution
• All counties continued to meet the national standard for year-round particle pollution
• All three reporting counties reported improved levels of year-round particle pollution
• Providence county ranked as the most polluted for year-round particle pollution in the Boston-Worcester-Providence metro area
• All other counties did not collect this data

Fitzgerald continued, “We know that during the COVID-19 pandemic, people across the country are facing multiple threats to their lung health at once, including from unhealthy air pollution. It’s critical to keep looking at the state of our air quality and the things that impact it – like climate change and emissions. We simply must do more to protect and preserve everyone’s right to breathe clean, healthy air and protect themselves from harmful air pollution.”

In Rhode Island, more than 200,000 residents are living with lung diseases like asthma, COPD and lung cancer, as well as heart disease. They are already at risk, making them more vulnerable to the effects of air pollution.

The Lung Association’s annual air quality “report card” tracks and grades Americans’ exposure to unhealthful levels of particle pollution (also known as soot) and ozone (smog) over a three-year period – this year’s report covers 2017–2019.
LUNG FORCE Walk Providence to support lung health, COVID-19 Action Initiative to take place in June

PROVIDENCE – The American Lung Association in Rhode Island announced that its LUNG FORCE Walk Providence will take place on June 12, 2021 at Roger Williams Park Temple of Music. The event will support research, advocacy and education for lung diseases, lung cancer and COVID-19. All participants will be required to follow current Centers for Disease Control (CDC) guidelines.

The LUNG FORCE Walk PROVIDENCE is in its 7th year, with participants completing a just over 2-mile route, around the park. In addition to the walk, the event will include a kick-off celebration where LUNG FORCE Heroes will share their stories, and information and resources on lung health will be available. Social distancing and mask wearing will be required throughout the event.

“Through events like the LUNG FORCE Walk Providence, we are able to continue our work to improve air quality, educate residents on lung health and COVID-19, and support people who live with lung disease,” said KAREN WHITEFIELD, executive director for the Lung Association in Rhode Island. “This mission has never been more important than it is today, and we are looking forward to masking up and rallying our Rhode Island based LUNG FORCE community to advance this work that makes people’s lives better every day.”

Money raised at the LUNG FORCE Walk will fund the Lung Association’s efforts to end lung cancer and lung disease, as well as support the Lung Association’s COVID-19 Action Initiative. The COVID-19 Action Initiative is a $25 million investment to address COVID-19 and protect against future respiratory virus pandemics. The initiative works with public and private entities to increase research collaboration and develop new vaccines, detection tests and treatment therapies.

There is no registration fee for the LUNG FORCE Walk Providence but donations are encouraged. More information and registration are available at LUNGFORCE.org/Providence.

Fentanyl-contaminated drugs continue to accelerate state’s overdose crisis

PROVIDENCE – As data from the Rhode Island Department of Health [RIDOH]’s Office of the State Medical Examiners (OSME) indicate a continued increase in overdose deaths involving fentanyl, the State is working to expand community-level access to resources and supports to prevent overdoses and save lives.

During the first 11 months of 2020, 256 Rhode Islanders lost their lives to a fentanyl-involved overdose, accounting for 73% of all overdose deaths during this time. These data compare to 69% in 2019. (It can take up to 90 days for the OSME to confirm a decedent’s cause and manner of death. For this reason, Rhode Island’s 2020 overdose death data is not yet final.)

This increase in fentanyl-related overdose deaths has contributed to an increase in overall drug overdose deaths. There were 356 accidental drug overdose deaths between January 2020 to November 2020 in Rhode Island, more than any year on record to date. In addition to the increased presence of fentanyl and fentanyl analogs, other contributing factors could include COVID-19-related social isolation and people using drugs alone.

In addition to fentanyl, methamphetamine is becoming an emerging drug threat in New England.

State-level initiatives
A number of efforts are currently underway to address the drug overdose crisis in Rhode Island:

Community-based organizations have increased street outreach presence in overdose hotspots across the state. Certified peer recovery support specialists (CPRSs) distribute naloxone, sterile syringes, and fentanyl test strips, and provide wrap-around services and basic needs to people who use drugs.

• Project Weber/RENEW conducts outreach in Providence’s Kennedy Plaza in partnership with the Downtown Providence Community Overdose Engagement (CODE) Collaborative.

• Rhode Island’s 10,000 Chances Project has distributed more than 10,000 free kits of intranasal naloxone to Rhode Islanders who are at risk of overdose and families and friends of people who are at risk.

• Increased housing supports have been made available for people in Woonsocket and Providence through the West Elmwood 02907 and Woonsocket CODE Collaborative projects, key initiatives of the West Elmwood and Woonsocket Health Equity Zones (HEZ).

• Strategic placement of Substance Abuse and Misuse Teams (SMART) at Rhode Island and Landmark Hospital Emergency Departments. Trained ED staff are ready to connect patients who have recently experienced an overdose to local treatment and recovery support services.
Thrive Behavioral Health, CODAC partner to launch MAT program

WARWICK – Thrive Behavioral Health and CODAC Behavioral Healthcare have partnered to provide medication-assisted treatment (MAT) for opioid use disorder in Kent County. The program, which recently launched at Thrive's 50 Health Lane location adjacent to Kent Hospital, will increase treatment options for adults seeking support for substance use disorders.

As a Certified Community Behavioral Health Clinic (CCBHC), Thrive provides a comprehensive range of services that increase access, stabilize individuals in crisis, and treat children, adults and families facing serious, complex mental illnesses and substance use disorders. CCBHCs integrate additional services to ensure its approach to healthcare emphasizes recovery, wellness, trauma-informed care and physical-behavioral health integration. Thrive has partnered with CODAC, a leader in medication-assisted treatment (MAT), to better serve individuals in the Kent County area who are living with a substance use disorder.

“When Thrive applied for the CCBHC grant, we were charged with identifying gaps in services and creating solutions to those gaps that would break down treatment barriers,” stated DAWN ALLEN, CCBHC Project Director. “We determined that there was a need for medication-assisted treatment in Kent County. Together with CODAC, we are connecting our community members to high quality treatment, decreasing their risk of experiencing a fatal overdose, expediting their transitions into long-term recovery, and providing support for them to live healthy, fulfilling lives.”

“We wanted to partner with CODAC not just because they are a statewide leader in the field of opioid use disorder treatment, but because their staff employ a service model that seeks to provide both follow-up and multiple avenues of support to better ensure the longevity of recovery,” stated DAN KUBAS-MEYER, President & CEO of Thrive.

CODAC's President and CEO LINDA HURLEY stated, “We are proud to partner with Thrive Behavioral Health on this important initiative. Together, we are moving forward in treating individuals struggling with addiction as patients, just like those facing diabetes or cancer, and offering them the most comprehensive, evidence-based therapeutic approaches available.” Founded in 1971, CODAC has provided MAT services in Rhode Island for more than 40 years, and is the state’s longest-running not-for-profit outpatient opioid use disorder treatment provider.

While CODAC will administer the MAT Program, additional clinical support will be offered to participants through Thrive’s Adult Outpatient Program. It offers wraparound services including individual, group, and family counseling, psychiatric medication evaluation and management; case management services, and an Intensive Outpatient Program for substance use and co-occurring substance use and mental health disorders.

Butler program reports positive outcomes on MRI-Guided Laser Surgery for OCD

PROVIDENCE – New research by Butler Hospital Psychiatric Neurosurgery Program shows positive results into the use of a new lesion surgery to treat severe obsessive-compulsive disorder (OCD).

The research focused on assessing the clinical outcomes and safety profile in 10 patients who underwent bilateral ventral capsulotomy, which is carried out using magnetic resonance imaging-guided laser interstitial thermal therapy (LITT). LITT is a minimally invasive ablative technique performed with precise targeting and use of thermography under magnetic resonance guidance. In prior studies, lesions of the ventral anterior limb of the internal capsule using other techniques (e.g. gamma knife) have been effective.

Led by NICOLE C. MCLAUGHLIN, PhD, neuropsychologist, Butler Hospital, Assistant Professor (Research) at the Alpert Medical School of Brown University, the psychiatric neurosurgery team followed the patients for six months to two years.

“This is the largest sample published thus far showing positive outcomes using this new method, LITT, to treat patients with treatment-resistant OCD. We hope that adding a new technique will provide more treatment options for these severely ill patients,” said McLaughlin.

McLaughlin added that the results were positive, with seven of the nine patients considered full responders, with a change of ≥35% on the Yale-Brown Obsessive-Compulsive Scale. Two patients showed transient apathy/amotivation after surgery; one patient had a small hemorrhage along the tract where the laser fiber crossed the cerebral cortex, as well as persistent insomnia post-surgery. One individual died after a drug overdose seven months after the surgery, which was not considered related to the surgery.

“Overall, LITT ventral capsulotomy was generally well tolerated, with promising evidence of effectiveness in the largest such series to date,” McLaughlin said. “Results were comparable to those after gamma knife ventral capsulotomy, as well as deep brain stimulation.”
Women & Infants Hospital launches donor milk program with Mothers’ Milk Bank Northeast

PROVIDENCE – Women & Infants Hospital launched a new donor milk program, in partnership with Mothers’ Milk Bank Northeast, a nonprofit community milk bank operating under the guidelines of the Human Milk Banking Association of North America (HMBANA).

“I’m a pediatrician, but more importantly, I’m also the father of a former premature baby, and I can tell you firsthand that I feel extremely confident that if my family needed to use donor breast milk, it would be the best for my son,” said ROBERT M. INSOFT, MD, FAAP, Medical Director of Mothers’ Milk Bank Northeast, Senior Vice President of Medical Affairs and Quality and Chief Medical Officer at Women & Infants Hospital of Rhode Island.

A neonatologist and Professor of Pediatrics at the Alpert Medical School, Dr. Insoft previously served as Medical Director of the Neonatal Intensive Care Unit (NICU) and Neonatal Respiratory Services at Brigham and Women’s Hospital, where he was also the quality officer in the NICU, and Assistant Professor of Pediatrics at Harvard Medical School.

Human milk can be lifesaving for preterm infants. It is especially protective against a life-threatening condition called necrotizing enterocolitis (NEC), which affects one in ten of the smallest preterm infants. Human breast milk is estimated to lower the risk of this condition by 79%. It also lowers hospital costs by reducing costs for care and shortening hospital stays.

Donor milk is rapidly becoming the standard supplement to mothers’ milk for preterm infants in neonatal intensive care units (NICUs). In addition, an increasing number of community hospitals with regular and special care nurseries use donor milk when babies need a supplement to their mothers’ own milk.

The milk bank providing donor milk to the hospital collects milk from mothers who have more than their babies need; screens, pasteurizes, and tests the milk; then dispenses it by prescription or physician order to babies whose mothers do not have enough milk for them. Milk donor screening, modeled after blood donor screening, includes health history, physician approval, and a blood test. Milk from mothers who pass the screening is also pasteurized and tested by an independent lab to ensure safety before being dispensed to hospitals or families.

About Mother’s Milk Bank Northeast

Mothers’ Milk Bank Northeast is a nonprofit community milk bank accredited by the Human Milk Banking Association of North America (HMBANA). The milk bank has been screening donors, pasteurizing milk, and dispensing to over 90 hospitals and to families throughout the Northeastern United States since 2011. Families and healthcare providers seeking more information on receiving or donating milk can check the milk bank’s website at https://milkbankne.org/.

Lifespan, CNE file Hospital Conversion Act application with RIDOH, AG

PROVIDENCE – Lifespan and Care New England began the next step in their plans to bring the two organizations together by filing the Hospital Conversion Act application with the state Department of Health and the Attorney General’s office. On April 14, Lifespan and Care New England submitted the Hart-Scott-Rodino Act antitrust filing with the Federal Trade Commission. It is anticipated the regulatory approval process will take several months.

“The uniting of Lifespan and Care New England in partnership with Brown University will be the catalyst for care transformation for the state. It will provide greater access for patients, enhance population health, and will address the social determinants of health. The collaboration means clinical care, education, and research will be intertwined and advanced like never before. This leading-edge system will allow Rhode Island to continue to attract and keep the best doctors and researchers, through a strong, unified health care system, supporting jobs and powering Rhode Island’s economy,” said Lifespan President and CEO TIMOTHY J. BABINEAU, MD.

Brown has committed to provide a minimum of $125 million over five years in support of the development of the new academic health system with Lifespan and Care New England. Brown will participate on the governing board of the newly merged health system and play a key role in integrating medical education and research with clinical practice across the system’s hospitals.

“The reaction that we have had from the community, within our organization, and beyond, since announcing the intent to merge and talking about this very real vision for the future has been outstanding. It is easy to understand the logical reasons that an integrated academic health system makes a very tangible difference for the people of the region. Speaking with the researchers and clinicians about their excitement over the ability to advance their work and share it more broadly, more quickly, allows everyone to benefit from the bench to bedside approach. Additionally, we are learning more each day about how communities that are intentional about their health care system can see substantial uptick in so many economic metrics beyond those that seem solely health-related. Bringing jobs, families, and therefore the amenities they need into the region encourages other businesses to flourish and becomes just as much an important aspect of these conversations as the increased level of care quality and access through the creation of seamless continuum of care for our patients,” said JAMES E. FANALE, MD, Care New England President and CEO.
**Funding opportunity on impact of structural racism and discrimination on minority health and health disparities**

The National Institute of Minority Health and Health Disparities (NIMHD) is leading an initiative to support observational or interventional research to understand and address the impact of structural racism and discrimination on minority health and health disparities.

Prior research has focused on the health consequences of structural racism and discrimination exposures (e.g., interpersonal racism or residential segregation) and not on community strategies to reduce or mitigate those exposures. Intervention research has rarely emphasized reduction of structural racism and discrimination as a strategy to improve health and reduce disparities. Research on mitigation is needed to inform health care and social policies at all levels.

NIMHD and participating NIH institutes and centers have issued a funding opportunity announcement for projects that use approaches that encompass multiple research domains (e.g., behavioral, socio-cultural, health system) and multiple levels (e.g., community, societal) to understand and address the impact of structural racism and discrimination in order to improve minority health, promote health equity, and eliminate health disparities (see the NIMHD Research Framework).

Projects must address structural racism and discrimination in one or more NIH-designated health disparity populations in the U.S. and discuss documented disparities in health outcomes. Applications should provide a justification for 1) why the specific types of discrimination constitute structural racism and discrimination, such as how the racism or discrimination is structural rather than reflecting individual-level behavior and 2) how the structural racism and discrimination results in differential treatment or outcomes for less advantaged individuals, groups, or populations. The due date is August 24, 2021.

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**With variants on the rise in RI, delegation announces $1.48M in federal funding to RIDOH to track COVID mutations**

WASHINGTON, DC – U.S. Senators JACK REED and SHELDON WHITEHOUSE and Congressmen JIM LANGEVIN and DAVID CICILLINE announced in April that the Rhode Island Department of Health (RIDOH) has been awarded $1,481,992 from the Centers for Disease Control and Prevention (CDC) to expand COVID-19 genomic sequencing. The funding, which was included in the American Rescue Plan, will allow RIDOH to expand and improve activities to sequence genomes and identify mutations in SARS-CoV-2. Sequencing efforts in Rhode Island are coordinated by RIDOH’s State Health Laboratories.

Specifically, the funding will support collection of COVID specimens, sequencing of COVID viruses, and data sharing. This initial funding will be distributed in early May. Additional funding for genomic sequencing will be invested over the next several years.

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**NIH funding for research on impact of structural racism on biomedical career progression**

The National Institute of General Medical Sciences (NIGMS) has issued two notices of special interest (NOSIs) to study and/or address the impacts of structural racism and discrimination on biomedical career progression.

NIGMS provides leadership in training the next generation of scientists, in enhancing the diversity of the scientific workforce, and in developing research capacity throughout the country. Many NIGMS training and capacity building programs focus on enhancing diversity in the biomedical research workforce through greater opportunities for individuals from diverse backgrounds, including those from underrepresented populations and underserved regions.

The first NOSI includes three funding mechanisms to support research aimed at promoting and enhancing inclusive, safe, and supportive research environments. This Notice applies to due dates on or after May 17, 2021 and subsequent due dates through October 4, 2022.

- Science of Science Policy Approach to Analyzing and Innovating the Biomedical Research Enterprise (SCISIPBIO), a collaborative program with the National Science Foundation
- Research to Understand and Inform Interventions that Promote the Research Careers of Individuals in the Biomedical Sciences (R01)
- Maximizing Investigators’ Research Award (MIRA) (R35) for established and early stage investigators

The second NOSI calls for applications to create training modules that impact individuals from a broad range of scientific disciplines and career stages and cover material not typically taught as part of current institutional coursework. The modules can take many different formats and approaches and should be timely, informative, engaging, easily accessible, and free to everyone. Applications must specify the skills and knowledge that will be gained by the audience and how the module will help the audience address the structures and ways of thinking that are barriers to success. The due date is June 18, 2021.
Reed, Whitehouse & McKee announce $840,000 grant for RI Veterans Home to provide COVID-19 resources

BRISTOL – Recently, U.S. Senators JACK REED and SHELDON WHITEHOUSE joined Governor DANIEL J. MCKEE and Rhode Island Office of Veterans Services Director KASIM YARN to announce a new $840,000 federal grant for the state-run Rhode Island Veterans Home. This federal aid stems from a $100 million emergency payment to State Veteran Homes nationwide that Senators Reed and Whitehouse supported in the Coronavirus Response and Relief Supplemental Appropriations Act, which was signed into law in December.

The federal funds may be used to help improve the care and treatment of veterans during the pandemic, including by enhancing cleaning services, purchasing additional personal protective equipment (PPE), temporarily expanding staffing levels, and other investments designed to enhance health, safety and well-being of residents. The U.S. Department of Veterans Affairs (VA) will issue guidelines on how the federal funds may be used for health care-related expenses or lost revenues attributable to COVID-19 and Senators Reed and Whitehouse are urging the VA to provide states with flexibility to put the federal funds to areas of greatest need that will protect veterans from COVID-19 and improve their care.

The Senators also note that more help is on the way for the Rhode Island Veterans Home and veterans across the state as a result of the American Rescue Plan. The new law directs $17 billion in federal funding to help the VA support veterans, including $14.5 billion for veterans’ COVID-19 related health care. It also sets aside a total of $750 million for State Veteran Homes around the country, including $500 million for construction and $250 million for direct payments. The State Veteran Homes funding will be awarded to states at a later date, but Senators Reed and Whitehouse estimate the Rhode Island Veterans Home should receive about $2 million from this next round.

One of the provisions in the new law will also make federal funds available to Rhode Island to deploy nursing “surge teams” to respond to future COVID-19 outbreaks at long-term care facilities across the state. COVID-19 surge teams are composed of about eight to 10 members from among local emergency responders, medical workers, non-profits, private businesses, clergy, and sometimes members of the National Guard. If an outbreak hits a long-term care facility, the surge teams can bring more resources and personnel to the scene and can replace staff that is quarantining and provide safe, high-quality care for vulnerable residents.

Nursing “surge teams” have already been used with success in various states, including Massachusetts, to ramp up care in locations that have experienced high rates of COVID-19 cases.

The Rhode Island Veterans Home is a 110-acre complex on Mount Hope Bay in Bristol. The $121 million long-term care facility opened in 2017, and about 200 veterans can call it home at any one time. The facility provides quality nursing and residential care to Rhode Island war veterans, including social, medical, nursing, and rehabilitative services.

Coastal Medical joins Lifespan team

Coastal Medical and Lifespan have finalized an agreement for Coastal Medical to become part of the Lifespan health system. This action follows Coastal Medical and Lifespan signing a letter of intent to affiliate in February 2020 and more recently an asset purchase agreement in January 2021.

The two organizations have a long history of successful collaboration in caring for patients. Coastal is a national model for coordinated primary care, while Lifespan offers complementary strengths in specialty services, research, and education. Combining Lifespan’s vast specialty care capabilities with Coastal’s primary care expertise will benefit patients across the state, offering enhanced value through a continuum of coordinated, high-quality patient care.

“Coastal shares Lifespan's commitment to Rhode Island, fostering innovation and ensuring value, to deliver excellence in care,” said ALAN KUROSE, MD, Coastal President and CEO. “As part of the Lifespan system, our practices and providers will help reach more patients, with a positive impact on healthcare. This is good for Rhode Island, the people who live here, and the quality and cost of health care.”

“Bringing together these two organizations will be transformative for healthcare in our state,” said TIMOTHY J. BABINEAU, MD, Lifespan President and CEO. “Coastal has a national reputation for delivering high quality, patient-centered care that has made a powerful impact on the health of our community. With Coastal, Lifespan can accelerate its journey to provide more value based care, which will advance quality, increase access and ensure patients receive care in the most appropriate setting. This is an exciting time in healthcare and we are truly pleased to welcome our colleagues from Coastal to the Lifespan team.”

Coastal Medical is particularly known for its team-based and value-focused approach to providing high-quality care and improving patient wellness. All Coastal practices are recognized by the National Committee for Quality Assurance (NCQA) as patient-centered medical homes and have earned a NCQA distinction for Integrated Behavioral Health, while simultaneously lowering the overall cost of care delivery.
Appointments

Beth Ryder, MD, named director of Center for Bariatric Surgery

BETH RYDER, MD, has been appointed director of the Center for Bariatric Surgery, a program of The Miriam Hospital and Rhode Island Hospital.

Dr. Ryder is an active researcher of advanced surgical techniques and the metabolic and physiological effects of weight loss surgery and has made significant contributions to the scientific literature as co-author of many peer-reviewed publications. In addition to bariatric surgery, she specializes in emerging technologies for minimally invasive surgery, and surgical education.

Dr. Ryder is Associate Professor of Surgery (clinician educator) and an Associate Professor of Medical Science (clinician educator) at the Alpert Medical School of Brown University. She received her medical degree from Tufts University School of Medicine and completed her residency in general surgery and a fellowship in minimally invasive surgery at Brown and Rhode Island Hospital.

She is a fellow of the American College of Surgeons, and belongs to the American Society for Metabolic and Bariatric Surgery, the Society of American Gastrointestinal and Endoscopic Surgeons, the Association for Surgical Education, the New England Society for Metabolic and Bariatric Surgery, the New England Surgical Society, the Rhode Island Medical Women’s Association and the Providence Surgical Society.

David Vegari, MD, joins Ortho, RI; South County Health medical staff

WESTERLY – DAVID VEGARI, MD, a board-certified orthopedic surgeon, has joined Ortho Rhode Island and was recently approved to practice at South County Hospital.

He specializes in reconstruction of the hip and knee in adults, including total hip and knee replacement, partial knee replacement, and revision hip and knee replacement.

After earning his medical degree from the Drexel University College of Medicine, Dr. Vegari completed his orthopedic residency at Thomas Jefferson University, and his fellowship training at OrthoCarolina.

Brittany Star Hampton, MD, invited to be ABOG examiner

BRITTANY STAR HAMPTON, MD, has been invited to be an examiner for the American Board of Obstetrics and Gynecology Female Pelvic Medicine and Reconstructive Surgery (FPMRS) Subspecialty Certifying Exam. She joins her colleagues, Dr. Vivian Sung, who is already an ABOG FPMRS subspecialty examiner and Dr. Charles Rardin who was selected as an ABOG OB/GYN specialty examiner.

In this position, annually, Dr. Hampton will be evaluating, via oral exam, candidates for board certification in their specialty of FPMRS. There are a limited number of certifying examiners nationally. Overall, the department of Obstetrics and Gynecology at Women & Infants Hospital has a total of 13 ABOG examiners, for general Ob/Gyn as well as different subspecialties.

Listed below are the ABOG examiners from the Division of Urogynecology and Reconstructive Pelvic Surgery:

Dr. Brittany Star Hampton: FPMRS examiner
Dr. Vivian Sung: FPMRS examiner
Dr. Charles Rardin: OB/GYN [specialty] examiner
Dr. Deborah Myers: former OB/GYN specialty and FPMRS examiner
Recognition

Frank Sellke, MD, to receive Distinguished Research Achievement Award

PROVIDENCE – Brown University will award Research Achievement Awards to six faculty members as part of its annual program honoring extraordinary scholars for their research across a wide range of academic disciplines.

FRANK SELKE, MD, (cardiothoracic surgery) will receive a Distinguished Research Achievement Award. Sellke specializes in the study of microvascular cardiac injury, as well as restoring blood flow to the heart. His translational research focuses on optimizing outcomes after cardiac surgery and the microcirculation of the heart, lung, brain and other organs. Sellke’s research has been funded continuously by the National Institutes of Health for more than 28 years, and he has mentored and trained more than 80 pre- and postdoctoral students. He has won many awards, served on the editorial boards of nine journals, edited three textbooks, and has more than 540 peer-reviewed publications. He is professor of cardiothoracic surgery at the Warren Alpert Medical School and chief of cardiothoracic surgery at Rhode Island Hospital and the Miriam Hospital.

Nominations for the awards were sought in multiple categories and reviewed by panels of Brown faculty. In addition to the awards, the winners will each receive a $5,000 research stipend. They will be honored at a virtual Celebration of Research program on Tuesday, May 18.
LEONOR A. DELAPENA, MD, 77, of Cumberland, passed away April 14, 2021 at Rhode Island Hospital. Born in the Philippines, she was the daughter of the late Constantino and Leonor (Aguilar) DelaPena, Sr. She was a graduate of the University of Santo Tomas in Manila, Philippines. Dr. DelaPena was an anesthesiologist and she was employed at the former Fogarty Hospital and Our Lady of Fatima Hospital.

She leaves her brothers, Renato Constantitino DelaPena Jr.; her sister-in-law, Carmencita P. DelaPena, as well as her four nieces and six nephews. Burial will take place at a time to be announced in the Philippines.

Donations may be made in her memory to the Franciscan Apostolic Sisters, 66 5th Avenue, East Greenwich, RI 02818.

DR. FOUAD EDWARD YAZBAK, 89, of West Falmouth, MA, passed away peacefully on April 8th, 2021, joining his cherished wife of 61 years, Maureen (Moynahan) Yazbak, who passed way 17 months earlier.

Born in Damanhour, Egypt, he was the son of Dr. Edouard and Eugenie (Farazli) Yazbak. After arriving in the United States in 1957, Dr. Yazbak continued his medical training as an intern at St. Clare's Hospital, New York, NY, before joining the faculty of Brown University’s Institute of Health Sciences and medical staff of Charles V. Chapin Hospital in 1959.

Dr. and Mrs. Yazbak (a nurse) subsequently started a pediatric practice in Cumberland, in 1963, from which he retired in 1997. He is survived by four children and their spouses: Edward (Donna), Eugene (Barbara), Dr. Philip (Darlene) and Kathleen (Stephen), 15 grandchildren, seven great-grandchildren, and two nephews and their wives.