

1917 2026

RHODE ISLAND
MEDICAL JOURNAL



SPECIAL SECTION

BROWN UNIVERSITY
SCHOOL *of* PUBLIC HEALTH

GUEST EDITOR: BESS H. MARCUS, PhD

APRIL 2026

VOLUME 109 • NUMBER 4

ISSN 2327-2228



Are insurance costs affecting your bottom line?

As record setting malpractice verdicts occur with increasing frequency, insurance premiums for medical practices will continue to rise. It's critical to partner with an experienced insurance broker who can advocate on your behalf to secure the best coverage at the best price.

HUB can help. Our insurance and risk management specialists work with you to develop a strategy to manage your insurance costs — so you can continue to focus on patient care.

hubinternational.com/rimed

Put our resources to work for you.

Patrick Marra ○ 978-661-6203 ○ patrick.marra@hubinternational.com



RHODE ISLAND MEDICAL JOURNAL



Bess H. Marcus, PhD

SPECIAL SECTION

Brown University School of Public Health

BESS H. MARCUS, PhD

GUEST EDITOR



On the cover: The Brown University School of Public Health building at 121 South Main Street in Providence, viewed from the College Street Bridge over the Providence River.

[WIKIMEDIA COMMONS]

- 7** Perspective: Advancing Public Health in Rhode Island and Beyond
FRANCESCA BEAUDOIN, MD, MS, PhD
- 9** Collaborative Research at the Brown University School of Public Health: An Introduction
BESS H. MARCUS, PhD
- 11** Four Decades at the Forefront of Addiction Research and Training
CHRISTOPHER W. KAHLER, PhD
- 14** Center for Gerontology & Healthcare Research
THERESA I. SHIREMAN, PhD
- 17** The Legacy and Leadership of the Center for Health Promotion and Health Equity (CHPHE)
ALISON TOVAR, PhD, MPH
- 21** The Best Health for the Most People for the Least Cost
OMAR GALÁRRAGA, PhD
- 25** Partner-Engaged Pragmatic Research in Aging Care: Case Studies from the Long-Term Care Quality & Innovation Lab
ROSA R. BAIER, MPH
- 29** Nursing Home Administrator Perspectives on the Role of State Guidance and Assistance in COVID-19 Response: A Rhode Island Case Study
JOAN F. BRAZIER, MS; AMY MEEHAN, MPH; COURTNEY HAWES, BS; ELIZA REGO, BS; EMILY A. GADBOIS, PhD
- 34** Greening in Rhode Island and Project G-SPACE
ALIANA RODRIGUEZ ACEVEDO; NAOMI ZELTZER; ABBY KATZ, MA; UGOJI NWANAJI-ENWEREM, PhD; MADELYN DEWITT; ISHA THAKKAR; BETHEL DANIEL; DIANA GRIGSBY-TOUSSAINT, PhD, MPH
- 37** Addressing Chronic Steatotic Liver Disease through Community Partnerships, Integrated Behavioral Interventions, and Point-of-Care Diagnostics
HAYLEY TRELOAR PADOVANO, PhD; MOLLIE A. MONNIG, PhD; ARDHYS DE LEON, PhD; KITTICHAJ PROMRAT, MD; MARIA DE SOUSA; JULISSA GODIN, BA; JACOB TALAMANTES, BA; ABIGAIL MORALES, AM; KEVIN MCCURDY, BA; WENDY HERNANDEZ; STEPHANIE GOLDSTEIN, PhD; PETER M. MONTI, PhD; MORGAN LEONARD

PUBLISHER

RHODE ISLAND MEDICAL SOCIETY

PRESIDENT

DINA T. HIMELFARB, MD

PRESIDENT-ELECT

MARIAH H. STUMP, MD, MPH

VICE PRESIDENT

CHRISTOPHER DIMARCO, MD

SECRETARY

STEVEN SCHECHTER, MD

TREASURER

MATTHEW J. SMITH, MD, MHL

CHIEF EXECUTIVE OFFICER

STACY PATERNO

EDITOR-IN-CHIEF

WILLIAM BINDER, MD

ASSOCIATE EDITORS

PHILIP CHAN, MD

**SENIOR EDITOR FOR RESEARCH
AND DEVELOPMENT**

ROY K. AARON, MD

EDITORS EMERITUS

JOSEPH H. FRIEDMAN, MD

EDWARD FELLER, MD

EDITORIAL ADVISORY BOARD

JANETTE BAIRD, PhD

ERIC M. COHEN, MD

MAYA COHEN, MD

STACI FISCHER, MD

ANDREW HSU, MD

EDWARD HULTEN, MD, MPH

STEVE KWON, MD, MPH

LESLIE ROTH, MD

ALESSANDRA J. SAX, MD

OLIVER J. WISCO, DO

PUBLICATION STAFF

MANAGING EDITOR

MARY KORR

mkorr@rimed.org

GRAPHIC DESIGNER

MARIANNE MIGLIORI

FOLLOW RIMJ



RHODE ISLAND MEDICAL JOURNAL (USPS 464-820), a monthly publication, is owned and published by the Rhode Island Medical Society, 225 Dyer Street, 2nd Floor, Providence RI 02903, 401-331-3207. All rights reserved. ISSN 2327-2228. Published articles represent opinions of the authors and do not necessarily reflect the official policy of the Rhode Island Medical Society, unless clearly specified. Advertisements do not imply sponsorship or endorsement by the Rhode Island Medical Society.

© COPYRIGHT 2013–2026, RHODE ISLAND MEDICAL SOCIETY, ALL RIGHTS RESERVED.

RHODE  ISLAND
MEDICAL JOURNAL

CASE REPORTS

- 46** Pediatric Invasive Group A *Streptococcus* Infections with Central Nervous System Involvement: A Single Institution Case Series in Southern New England
NATALIE QIN, MD;
JUSTIN MORRIS, DO;
KELSEY HART, MD;
HAREEM PARK, MD
- 52** A Rare Case of Seronegative anti-Glomerular Basement Membrane Disease with Pulmonary Involvement
WILLIAM DOAK, MD;
TREVAUGHN BAPTISTE, MD;
ANTHONY CHANG, MD;
ERIC S. KERNS, MD;
MATTHEW R. LYNCH, MD

PUBLIC HEALTH

- 55** HEALTH BY NUMBERS
Syndromic Surveillance of Nonfatal Firearm Injuries in Rhode Island, 2022–2024
JONATHAN BARKLEY, MPH
- 58** Vital Statistics
ZUHEIL AMORESE, DEPUTY STATE REGISTRAR

RHODE ISLAND MEDICAL JOURNAL



COMMENTARY

- 62** Determining Public Health Priorities in Rhode Island
PHILIP A. CHAN, MD, MS

HISTORICAL PERSPECTIVE

- 64** Fetal Surgery at Brown: The First 25 Years
FRANCOIS I. LUKS, MD, PhD;
JULIE MONTEAGUDO, MD;
DEBRA WATSON-SMITH, RN;
STEPHEN R. CARR, MD

HERITAGE

- 68** Rhode Island Pioneers of Public Health: Edwin M. Snow, MD, and Charles V. Chapin, MD
MARY KORR

IN THE NEWS

- 71** NRMP releases results of the 2026 Main Residency Match for more than 38,000 future residents
146 Brown medical students celebrate Match Day
- 72** Clinical trial results support use of weekly extended-release buprenorphine for treatment of opioid use disorder during pregnancy
- 73** Researchers develop AI tool to predict patients at risk of intimate partner violence
- 74** Federal judge blocks immunization schedule changes, stays ACIP member appointments
- 75** RIDOH reports statewide increase in non-fatal drug overdoses



M.J. Cunningham, MD



E. Yale



L. Holt



W. Tsonos

- 75** Saint Anne's Hospital launches innovative partnership with Somerset Fire Department to improve sepsis outcomes
- 76** Centurion Foundation completes acquisition of Roger Williams Medical Center, Our Lady of Fatima Hospital
New 501(c)3 non-profit organization, CharterCARE Health of Rhode Island (CHRI), created
- 77** Senate unveils 2026 health care legislation
- 79** Brain computer interface enables rapid communication for two people with paralysis
- 80** Gov. McKee signs executive order to make HealthSource RI coverage more affordable

PEOPLE/PLACES

- 81** Mark J. Cunningham, MD, named chief of cardiac surgery at RIH
Erin Yale named president, chief operating officer of Women & Infants
- 82** Lilia Holt, MBA, named interim president at the Rhode Island Life Science Hub
Gov. McKee nominates **William Tsonos** to chair Rhode Island Life Science Hub
- 83** Three Brown University Health hospitals named to *Newsweek's* World's Best Hospitals 2026 list
Sen. Reed celebrates U.S. Navy nurse's 105th birthday
- 84** South County Health Home Health recognized by *U.S. News & World Report's* Best Home Health Agency
VNA Home Health & Hospice ranked nationally as Best Home Health Agency by *U.S. News & World Report*
U.S. News & World Report names UOI's East Bay Surgery Center among nation's Best Ambulatory Surgery Centers for Orthopedics & Spine
- 85** Rhode Island State House illuminated teal green in honor of Miriam's 100th anniversary



Rhode Island's Medical Staffing Experts

Favorite Healthcare Staffing provides a comprehensive range of staffing services at preferred pricing to RIMS members. Call today to see why we are the favorite choice of healthcare professionals and physician practices across the US!

 401.354.7115

 MedicalStaffing@FavoriteStaffing.com



Favorite Healthcare Staffing is a Valued
Sponsor of the Rhode Island Medical Society

Perspective: Advancing Public Health in Rhode Island and Beyond

FRANCESCA BEAUDOIN, MD, MS, PhD

Over a decade ago, Brown University formally established a unified School of Public Health, bringing together epidemiologists, behavioral scientists, health services researchers, data scientists, clinicians, policy experts, and community advocates. At the base of College Hill emerged a dynamic intellectual community committed to rigorous scholarship, innovative teaching, and public impact. In this issue of the *Rhode Island Medical Journal*, we showcase the depth and breadth of that work. The centers and initiatives featured here represent both the school's foundation and trajectory—rooted in people and place, responsive to urgent challenges, and driven by a shared commitment to improving lives.

Each year, faculty and research staff at Brown dedicate more than 600,000 hours to research, produce over 1,000 peer-reviewed publications, and engage with more than 75 local organizations to promote public health. Just as importantly, the school's work is deeply embedded in Rhode Island through research, internships, service, and teaching. That engagement reflects a much longer history—one that reaches well beyond the school's formal founding in 1913.

For nearly 150 years, Brown scholars and alumni have helped shape public health here in Rhode Island, regionally, and beyond. In the early twentieth century, **CHARLES VALUE CHAPIN, MD**, a Brown University graduate, led Providence through public health crises by championing local data, targeted intervention, and community trust. The 1970s saw the creation of a department at Brown focused on community health, and in the decades that followed, researchers built an evidence base for more humane models of care, including hospice services, that helped shape national policy and expand access to end-of-life care for millions of Americans. By the mid-1990s, undergraduate advocacy led to the creation of a formal concentration in public health, a momentum that set the stage for the early 2000s, when Brown committed to establishing a full-fledged school. This special issue is guest edited by **BESS H. MARCUS, PhD**, a Professor of Behavioral and Social Sciences at Brown University and the School of Public Health's second dean. From her vantage point as former dean and as a leading public health scholar in promoting physical activity in underserved and vulnerable populations, this issue is a sampling of the diverse areas of focus of public health at Brown.

Today, the school's commitment spans addiction science, aging and long-term care, health equity, child health

innovation, global health systems, climate and environmental health, pandemic response, and health system sustainability.

When federal or local policymakers need timely analysis on how legislation may affect everyday people or health systems, they often turn to Brown researchers, who are deeply involved in the community and helping people understand how public health policy happens in practice. When local health departments seek real-time infectious disease data, they can rely on the Pandemic Center's widely distributed Tracking Report that aggregates, interprets, and contextualizes published data relevant to domestic and international infectious disease outbreaks and presents it in a concise, reader-friendly format. When families and communities confront addiction, researchers at the Center for Alcohol and Addiction Studies and the People, Place, and Health Collective partner across Rhode Island to advance evidence-based approaches to prevention, treatment, and recovery.

Recent efforts are also advancing research on youth mental health and digital media, healthcare affordability, and the health impacts of environmental exposures—issues that are felt in our homes, clinics, and communities. From the Pawtucket Heart Health Program, to working with our health systems to advance health data science, to strengthening HIV prevention and treatment efforts in Kenya, the work of the school is shaped by partnership with those most affected by the challenges we study.

THE MISSION FORWARD

This is such an important time for schools of public health and for public health more broadly. Partnerships with the federal government are strained, confidence in health systems is shaken, and public trust in science is being tested. As schools of public health nationwide ask important questions about relevance and responsibility, Rhode Island's only school of public health is uniquely positioned to respond.

Over the past 5 years, the school has grown significantly in size, and now it's time for a different kind of growth. We are focused on growing our impact, including expanding how our work shows up in the health people experience in their everyday lives, strengthening how we use data and technologies like AI, sharpening our science, and communicating that science more effectively to drive changes in policy and practice.

Our focus is also on keeping the public health workforce pipeline strong. The students the school educates are the people who will practice public health and sustain it long into the future. That means thinking strategically about our training programs and ensuring that we are preparing students for the careers and callings that await them. This is especially important at a time when public health systems have faced significant strain over the past year. Equally important in this next chapter is expanding the school's impact in the communities it serves. That includes Providence, where we work and many of us live, Rhode Island more broadly, and the communities we partner with globally—in places like China, India, the U.K., and across Europe.

The school's mission is about more than meeting the public health moment that we are in, it is recognizing our past, capitalizing on our strengths, and anticipating the future.

Author

Francesca Beaudoin, MD, MS, PhD, interim dean,
Brown University School of Public Health, Providence, RI.

Correspondence

Francesca Beaudoin, MD
Francesca_Beaudoin@brown.edu

Collaborative Research at the Brown University School of Public Health: An Introduction

BESS H. MARCUS, PhD
GUEST EDITOR

Research is the cornerstone of the Brown University School of Public Health. In fact, the Program in Public Health became a School of Public Health in 2013 in large part due to the outstanding research conducted in the research centers that were originally part of the Brown School of Medicine. Long-standing centers such as the Center for Alcohol and Addiction Studies, the Center for Biostatistics and Health Data Science, and the Center for Gerontology and Healthcare Research serve as anchors for school.

Other centers that played an important role in the School's development over its first decade include: the Center for Global Public Health, the Mindfulness Center, the Center for Health Promotion and Health Equity, the Hassenfeld Child Health Innovation Institute, the Center for Long-term Care and Quality, and the Center for Evidence-Synthesis in Health.

Newer centers that will play an important role at the school in our second 10 years and beyond include: the Pandemic Center, the Center for Climate, Environment and Health, the Center for Advancing Health Policy Through Research, and the Center for Health System Sustainability. Hospital-based Centers, including the Centers for Behavioral and Preventive Medicine and the Brown University AIDS Program remain vital to the success of our school and provide numerous opportunities for our faculty and students.

In this special issue, readers will learn about the work underway across the Brown University School of Public Health and at several of its centers that support research, training, and community partnerships. These articles highlight the range of public health research at the School, including efforts to address health equity, improve care for older adults, reduce substance use and chronic disease, strengthen global health systems and examine how environmental and social conditions affect health.

The contributions described below showcase both the history and current focus of the School's centers, and reflect their role in generating evidence to inform public health practice, and health care delivery and policy in Rhode Island and beyond.

ALISON TOVAR, PhD, MPH, is an Associate Professor of Behavioral and Social Sciences at the Brown University School of Public Health and Interim Director of the Center for Health Promotion and Health Equity. Trained in

psychology, public health, and nutrition science, her work focuses on culturally tailored interventions to promote healthy eating in Latino communities and evaluating policies that promote healthy eating. In her article, Dr. Tovar traces the evolution of the Center from its roots in community-based cardiovascular disease prevention to its work in equity-centered research addressing structural racism, environmental justice, food access, overdose prevention, and chronic-disease disparities among historically marginalized populations.

ROSA R. BAIER, MPH, is the Director of the Long-Term Care Quality & Innovation Center and Professor of the Practice of Health Services, Policy & Practice at the Brown University School of Public Health. For more than two decades, she has developed and refined pragmatic approaches to improve care for older adults, and prior to Brown, she directed the state's quality reporting program as a contractor for the Rhode Island Department of Health. In her article, she uses case-based examples to describe how the research group she directs at Brown has emerged as a national leader in equity-centered, community-based participatory aging research.

EMILY GADBOIS, PhD, is an Associate Professor of Health Services, Policy and Practice at the Brown University School of Public Health and a faculty member of the Center for Gerontology & Healthcare Research. A health services researcher and gerontologist, her work focuses on the experiences and outcomes of older adults—particularly those with Alzheimer's disease and related dementias—and how healthcare policies and organizational practices shape care quality. In her article, she examines nursing home administrator perspectives during the COVID-19 pandemic, identifying lessons to strengthen policy and emergency preparedness in long-term care.

Associate Professor of Behavioral and Social Sciences and Epidemiology **DIANA GRIGSBY-TOUSSAINT, PhD, MPH**, is a social epidemiologist at the Brown University School of Public Health. She studies how neighborhood environments influence health, with a focus on diet, physical activity, and sleep among low-income and racially and ethnically diverse populations. In her study, she describes Rhode Island's greening efforts and the Project G-SPACE study, which examines how access to green space affects children's sleep, mental health, and physical activity.

OMAR GALÁRRAGA, PhD, is Professor of Health Services, Policy and Practice and Director of the Center for Global Public Health at the Brown University School of Public Health. In his article, he highlights the Center's global partnerships and research over the past decade, showing how culturally grounded, economically sound interventions can improve population health at scale while advancing equity.

CHRISTOPHER W. KAHLER, PhD, is Professor of Behavioral and Social Sciences and Psychiatry and Human Behavior and Director of the Center for Alcohol and Addiction Studies at the Brown University School of Public Health. A Fellow of the American Psychological Association and Vice President of the Research Society on Alcohol, he is an internationally recognized addiction scientist whose work focuses on reducing alcohol and tobacco use. In his article, he highlights the Center's 43-year legacy of generating rigorous evidence that reduces substance-related harm and advances recovery.

A licensed psychologist and clinician-scientist at the Brown University School of Public Health and Warren Alpert Medical School, **HAYLEY TRELOAR PADOVANO, PhD**, is an Associate Professor of Psychiatry and Human Behavior and of Behavioral and Social Sciences. In her article, Dr. Treloar Padovano describes a community partnership with Clínica Esperanza/Hope Clinic that used on-site liver screening and culturally responsive counseling to detect previously undiagnosed liver disease and connect patients to early intervention and care.

THERESA I. SHIREMAN, PhD, is Professor of Health Services, Policy and Practice and Epidemiology and Director of the Center for Gerontology & Healthcare Research at the Brown University School of Public Health. Her research has advanced understanding of medication use and outcomes among patients on chronic dialysis, and she has helped develop novel methods to track medication exposure. In her article, she highlights the Center's leadership in

aging research, demonstrating how interdisciplinary, policy-relevant studies and national data resources have improved healthcare quality and outcomes for older adults and people with chronic conditions.

It has been my great pleasure to organize this special issue of the *Rhode Island Medical Journal*. This collection spotlights some of the important work conducted since the School's inception in 2013. Additionally, it highlights some of the exciting opportunities that lie ahead. This is an exciting time for the field of Public Health and researchers at Brown continue to be at the forefront of this important work.

Guest editor

BESS H. MARCUS, PhD, is Professor of Behavioral and Social Sciences and served as the second Dean of the School of Public Health at Brown University. She is a clinical health psychologist who has spent over 35 years conducting research on physical activity behavior and has published over 300 papers and book chapters as well as three books on this topic. She has developed a series of assessment instruments to measure psychosocial mediators of physical activity behavior and has also developed low-cost interventions to promote physical activity behavior in community, workplace, and primary care settings. Dr. Marcus is actively involved in numerous NIH grants on physical activity behavior and public health. Her work increasingly focuses on promoting physical activity in underserved and vulnerable populations.

Author

Bess H. Marcus, PhD, Professor of Behavioral and Social Sciences, School of Public Health at Brown University, Providence RI.

Correspondence

bess_marcus@brown.edu

Four Decades at the Forefront of Addiction Research and Training

CHRISTOPHER W. KAHLER, PhD

ABSTRACT

This article summarizes the accomplishments and 43-year history of the Center for Alcohol and Addiction Studies (CAAS) at the Brown University School of Public Health, with a particular focus on the Center's work on substance use and chronic disease since the school's accreditation in 2013. Select research is highlighted as examples of the Center's broad range of clinical translational research that have informed fundamental understanding of addiction and the interventions, practices, and policies that most effectively reduce harm and support recovery.

KEYWORDS: Substance use; addiction; chronic disease; treatment; harm reduction

INTRODUCTION

Established at Brown University in 1982 under Founding Director David Lewis, MD, the Center for Alcohol and Addiction Studies (CAAS) maintains a 43-year legacy as one of the nation's most influential hubs for addiction science, serving as a leading source of robust evidence for effective substance use treatment and harm-reduction strategies. Following Lewis, Peter Monti, PhD, served as the CAAS director from 2000 to 2022, providing visionary leadership while CAAS's research and training capacity grew exponentially during a period of robust National Institutes of Health (NIH) funding. Most recently, longtime CAAS faculty member Suzanne Colby, PhD, served expertly as interim director from 2022–2023, and this author has proudly held the director position since 2023.

CAAS's mission is to "Improve the health and well-being of all individuals and communities impacted by substance use and addiction through collaborative, multidisciplinary research, exceptional education and training, and meaningful community engagement." As the oldest research center in the School of Public Health, CAAS brings together more than 40 faculty in the school—including psychologists, social workers, physicians, epidemiologists, and health services and policy researchers supported by more than \$90 million in research funding—in addition to over 25 faculty affiliates across the university and affiliated hospitals. CAAS faculty have pioneered one of the nation's most influential

postdoctoral addiction research training programs, which has produced over 200 leaders improving the health of individuals and communities domestically and globally. This training program has been continuously supported for 40 years by a training grant from the National Institute on Alcohol Abuse and Alcoholism (NIAAA), and for 23 years by a training grant from the National Institute on Drug Abuse (NIDA).

SCIENTIFIC FOCUS AND INNOVATIONS

CAAS has contributed fundamental knowledge to our understanding of addiction, spanning the continuum from determining who is most at risk to which interventions work best in specific populations, and assessing the profound impact of treatment and harm reduction on individual and community health. Our faculty, trainees, students, and staff have been at the forefront of crucial advances.

Pioneering Behavioral Therapies

CAAS research established the initial evidence on cue reactivity in addiction, directly leading to the development of cue exposure and skills training as effective addiction therapies, and has provided a crucial evidence base for promoting smoking cessation in people with other substance use disorders or mental illness. We continue to lead highly influential research, adapting motivational interviewing as a harm reduction tool across diverse populations—from reducing alcohol use in those experiencing stigma, trauma, or acute illness/injury to reducing substance-related harms in adolescents and young adults.

Driving Addiction Medicine

The legacy of groundbreaking CAAS research in addiction medicine includes major trials testing the only two medications to treat alcohol use disorder that have gained U.S. Food and Drug Administration (FDA) approval in the last 30 years (naltrexone and acamprosate) and extends to current trials of novel pharmacotherapies for alcohol use disorder like GLP-1 agonists and methylenedioxymethamphetamine (MDMA).

Leveraging Technology

CAAS houses leading innovative, technology-driven research, including the application of wearable sensors,

mobile apps, and smartphone surveys to understand substance use and recovery in daily life, and applying treatment technologies like virtual reality and brain stimulation.

Informing Policy

CAAS research directly informs policy and practice, for example, by innovating methods to reduce opioid overdoses through improved availability and access to overdose reversal medications and medications that support long-term recovery. Other policy-relevant work has examined how flavors affect e-cigarette use in adolescents and adults, provided critical analysis of e-cigarette flavor policy, and generated evidence that reduced-nicotine cigarettes can reduce tobacco addiction—research used by the FDA to propose a new rule to reduce the amount of nicotine in cigarettes.

NEW DIRECTIONS IN SUBSTANCE USE AND HEALTH

Since the accreditation of the Brown University School of Public Health in 2013, CAAS has increasingly focused on addressing the critical role of substance use as a public health threat to the prevention and management of chronic disease. This work has led to the two largest NIH-funded projects in the center's history.

For 15 years, CAAS has housed the Alcohol Research Center on HIV (ARCH) funded by a program project grant from the NIAAA. In partnership with the Providence/Boston Center for AIDS Research (CFAR), ARCH-supported research among people with HIV has demonstrated that alcohol has both direct effects on liver function and indirect effects on viral control and immune function through reduced adherence to antiretroviral therapy. ARCH research has shown how alcohol contributes to brain structural abnormalities and cognitive dysfunction, as well as how alcohol is associated with systemic inflammation. Intervention research has shown that an app-based intervention can reduce unhealthy alcohol use and sexual risk behavior in men who have sex with men; demonstrated that brief interventions, motivational interviewing, and text messaging are viable approaches to address unhealthy alcohol use in HIV care; developed adaptations of individual and couples-based approaches tailored for sexual and gender minority populations with HIV; and evaluated implementation of a cascading train-the-trainer model that resulted in major increases in the rates of alcohol screening and brief intervention delivered in HIV-care settings in South Africa. The ARCH also funded a series of innovative pilot grants (some co-funded with the Providence/Boston CFAR), hosted intensive summer workshops, and supported a robust program of postdoctoral training in alcohol and HIV research.

CENTER FOR ADDICTION AND DISEASE RISK EXACERBATION

In 2019, CAAS received funding from the National Institute on General Medical Sciences (NIGMS) to establish a Center of Biomedical Research Excellence, creating the Center for Addiction and Disease Risk Exacerbation (CADRE), which facilitates rigorous, multidisciplinary research that illuminates how substance use exacerbates the progression and outcomes of chronic disease. Through its emphasis on translational human laboratory studies, real-world behavioral assessment and the recruitment of diverse and underserved populations, CADRE strengthens CAAS's capacity to conduct impactful research that informs prevention, treatment, and public health policy and benefits the community.

CADRE plays a critical role in cultivating the next generation of substance use researchers across Rhode Island. CADRE's Clinical Lab Core and REACH Core provide investigators with scientific, methodological and technical support, including clinical and laboratory support, blood processing and analysis, and participant recruitment and engagement support. Recently, CADRE purchased the only FibroScan® machine devoted solely to research at Brown University. Noninvasive liver imaging with vibration-controlled transient elastography (VCTE™) allows for early detection of liver fibrosis that can result from unhealthy alcohol use alone and in combination with metabolic syndrome. CADRE services are available to investigators both within and outside Brown University, and can be accessed through competitive pilot-funding opportunities or by fee-for-service mechanisms that allow researchers to incorporate CADRE resources into new and ongoing studies.

CADRE supports a wide array of research projects that reflect its commitment to understanding how substance use interacts with physical and mental health across diverse populations. For example, partnering with Clínica Esperanza and The Hepatology Clinic at Rhode Island Hospital, a CADRE-supported project is providing no-cost, on-site liver scans to study participants with cardiometabolic and alcohol-consumption risk factors, aiming to prevent the progression of liver disease. Another CADRE project is partnering with Rhode Island-based organizations to examine how parental alcohol use and stress shape youth behavioral risk trajectories. Current CADRE projects are examining how nicotine product use among individuals with obesity influences smoking harm reduction and health outcomes, and are leveraging wearable and mobile assessment technologies to evaluate real-time patterns of cannabis use related to mood and depressive symptoms. Prior CADRE studies have explored how alcohol use affects inflammation in people living with HIV; how incarceration, tobacco use and alcohol use intersect within the social networks of justice-involved individuals to influence cardiovascular disease risk; and how alcohol consumption may influence biological markers associated with aging and Alzheimer's disease.

THE FUTURE

In 2023–2024, CAAS underwent a comprehensive strategic planning process, culminating in the Center’s strategic plan, *CAAS Forward*. The plan identifies our mission-driven research priorities, including: (a) deepening research in harm reduction with a particular focus on medical comorbidities; (b) leading efforts to integrate laboratory and ecologic research methods; (c) expanding research on health equity and addiction; and (d) accelerating the translation of research into practice. Additionally, *CAAS Forward* prioritizes the deepening of CAAS’s engagement with the local community, serving as a trusted source of information and collaboration, a partner to researchers and clinicians throughout the state, and a contributor to policy advances. Given the massive economic, social, community, and individual health costs of substance use and addiction, CAAS can play a vital role in Rhode Island supporting effective practices and policies that reduce use and harms and support recovery in our state. As the research community navigates a challenging funding climate at NIH, robust centers like CAAS will remain essential resources to maintain research continuity, to support the next generation of addiction scholars, and to innovate solutions to some of our most pressing public health priorities. We welcome engagement in our seminar series and new community, clinical and research partnerships to ensure our vital mission is shared with all.

Author

Christopher W. Kahler, PhD, Professor of Behavioral and Social Sciences and Psychiatry and Human Behavior, and Director of the Center for Alcohol and Addiction Studies at the Brown University School of Public Health, Providence, RI.

Disclosure

The author has no disclosures to report.

Correspondence

Christopher W. Kahler, PhD
Center for Alcohol and Addiction Studies
Box G-S121-5
Brown University
Providence, RI 02912
christopher_kahler@brown.edu

Center for Gerontology & Healthcare Research

THERESA I. SHIREMAN, PhD

OVERVIEW AND HISTORY

The Center for Gerontology & Healthcare Research (CGHCR) is an internationally renowned healthcare research center grounded in interdisciplinary collaboration, located at the Brown University School of Public Health. Its foundation in 1987 followed the National Hospice Study led by David Greer, MD, former dean of the Warren Alpert Medical School, and Vincent Mor, PhD, a professor in the Department of Community Health. Through rigorous research linking national datasets, they established the multiple benefits of hospice delivery—patient and family quality of life and reduced healthcare costs—leading to a new Medicare benefit. Sidney Katz, MD, a major contributor to gerontology and creator of standardized measures such as the activities of daily living index, served as the inaugural director. The CGHCR's research and faculty expanded over the years, producing notable advances in gerontology, such as documenting the futility of feeding-tube insertion for nursing home residents with advanced dementia, culminating in a major reduction in their use nationwide; demonstrating that palliative care consultation for nursing home residents reduced invasive treatments and improved quality of life; and conceptualizing burdensome transitions at end of life, a metric in evaluating care quality.

In 2013, CGHCR became one of the core centers in the newly established School of Public Health. To this day, we remain steadfast in our mission to enhance the quality of life for vulnerable populations, especially older adults and people with chronic conditions, through rigorous, advanced methodological research and the translation of research into effective policies and practices. Given that nearly 20% of the U.S. population (61 million people) are over 65 years of age, there is an ever-expanding need to identify, test, and disseminate proven interventions and policies to meet public health expectations and maximize health-related quality of life.

FACULTY AND SCHOLARSHIP

To accomplish our mission, the CGHCR provides vital research infrastructure for faculty investigators and their research teams. Currently, we have over 30 faculty who lead project teams. Faculty come from a variety of backgrounds, including gerontology, epidemiology, health economics,

health policy, internal medicine, geriatrics, pharmacoepidemiology, and biostatistics. Their interdisciplinarity allows for an extraordinary richness in theoretical framing, study design, and methods to solve challenges for older adults. Focal areas of expertise include chronic disease management (prevention and treatment); end-of-life and palliative care; long-term care supports and services; assisted living and nursing home care; prescription medication use (pharmacoepidemiology and pharmaceutical health services research); and innovative technology adoption for direct care. More recent emerging focal areas include transgender healthcare access and quality, and the impact of climate change on older adults' health. Over the last 5 years, our faculty, staff, and students have produced over 1,000 peer-reviewed publications, accepted across high-profile aging, medicine, policy and health services research journals.

CGHCR faculty and their teams are extremely successful in securing research funding, which now exceeds \$30 million annually, mostly earned through awards from the National Institutes on Aging. Our national leadership in Alzheimer's and related-dementia research is vast and deep, as evidenced by the following projects:

In 2019, Dr. Mor, in collaboration with Susan Mitchell, MD, a colleague at Boston-based Hebrew Senior Life, secured the largest federal grant (U54AG063546) in Brown University's history, a 5-year, \$53 million award to lead national efforts to improve healthcare and quality of life for people living with dementias and their caregivers. Established in September 2019, the National Institute on Aging (NIA) IMbedded Pragmatic Alzheimer's disease (AD) and AD-Related Dementias (AD/ADRD) Clinical Trials (IMPACT) Collaboratory mission is to build the nation's capacity to conduct embedded, pragmatic clinical trials of interventions within healthcare systems, helping them provide high quality, coordinated, and equitable care to people living with dementia and their care partners. Scalable and adoptable interventions that are effective in improving the care delivered to this vulnerable population are desperately needed. Since its inception, IMPACT has advanced the conduct of embedded pragmatic clinical trials, developed and disseminated knowledge, built investigator capacity, and catalyzed stakeholder collaboration. IMPACT was recently renewed for an additional 5 years at \$84 million.

- In Fall 2024, Amal Trivedi, MD, and CGHCR colleagues secured a renewal for the 16th year of a program project grant (P01 AG027296: Alzheimer's Disease and Related Disorders Treatment and Outcomes in America: Changing Policies and Systems). Although the population living with ADRD is expected to triple by 2050, many recent policy changes aim to maximize the value of care for the "average" patient, without specific consideration of their consequences for high-cost, high-need populations, such as those with ADRD. The P01 project will undertake four synergistic projects testing the effect of recent national policies and payment changes on people living with ADRD in different states of disease progression, in different care settings, and exposed to different policies.
- Sarah Ackley, PhD, is leading a K99R00 grant modeling ADRD, entitled Mathematical Models of Tau-PET Measures and Cognitive Decline in Alzheimer's Disease Across the Lifespan.

Another vital resource offered through the CGHCR is LTCFocUS, a publicly available data resource for national and international gerontology scholars. LTCFocUS provides data on nursing home care in the U.S. Our goal is to allow researchers to trace relationships between state policies, local market forces, and the quality of long-term care, and enable policymakers to craft state and local guidelines that promote high-quality, cost-effective, equitable care for older Americans. The data contained in LTCFocUS.org provides users with the opportunity to develop reports, presentations, and publications. Researchers can use this website to examine care processes and resident outcomes within the context of their local markets and regulatory practices. Policymakers can use the information to shape state and local guidelines, policies, and regulations that promote high-quality, cost-effective, equitable care to older Americans. We have logged 322 publications acknowledging the use of LTCFocUS resources.

CGHCR faculty lead research projects and collaborate with colleagues from other centers and universities. Some of our active projects are listed below.

HEALTH POLICY AND PRACTICE

- Dr. Barnett: Physician Sub-specialization and the Health and Health Care of Older Americans
- Drs. Rahman and Kosar: Impact of Medicare and Medicaid Financial Policies on Post-acute and Long-term Care for Persons Living with Dementia
- Dr. Rahman: Assessing the Effects of Institutional Special Need Plan (I-SNP) Enrollment on Quality of Long-Term and End-of-Life care for Elderly Individuals with Dementia
- Dr. Trivedi: Effects of Expanding Medicare Advantage Enrollment to Persons with End-stage Renal Disease
- Dr. Trivedi: Impact of Randomized Payment Incentives on Disparities in Home Dialysis and Kidney Transplantation

PRESCRIPTION MEDICATION USE

- Drs. Dow and Hughto: Impact of Medicaid Prescription Cap Policies on Treatment Outcomes for Opioid Use Disorder: A National Mixed Methods Study
- Drs. Galarraga and Shireman: Impact of Prescription Caps on Health Outcomes in People Infected with HIV
- Drs. Hayes and Zullo: Prescribing Cascades among Nursing Home Residents with ADRD
- Dr. Joyce: The risks and consequences of a motor vehicle crash in older adults with Alzheimer's Disease and Related Dementias
- Dr. Zullo: Post-Acute Care Medication Use and Functional Recovery in Heart Failure
- Dr. Zullo: Clinically Significant Drug Interactions among Nursing Home Residents with ADRD

HEALTHCARE DISPARITIES

- Drs. Meyers and Hughto: Examining Health Comorbidities and Healthcare Utilization Disparities among Older Transgender and Cisgender Adults in the U.S.
- Dr. Rivera-Hernandez: Migration and outcomes among older adults with and without ADRD from Puerto Rico

CLIMATE CHANGE AND AGING

- Dr. Rivera-Hernandez: Long-Term Effects of Hurricane Maria on Healthcare Delivery, Migration and Mortality Among People with Kidney Failure in Puerto Rico
- Drs. Just and Shireman: CHAIRS-C: Climate, Health, and Aging Innovation and Research Solutions for Communities

TRAINING

Since our inception, CGHCR has actively trained future generations in contemporary health services research using a real-world learning environment. Faculty regularly include pre- and post-doctoral trainees in their funded research programs. Pre-doctoral and post-doctoral fellowship programs also embed post-doctoral trainees in the research teams of funded faculty mentors to practice and advance their research and scientific writing skills as they build toward their independence. Pre-doctoral trainees are typically graduate students in the Health Services, Policy & Practice Department or the Department of Epidemiology. These graduate students are actively involved in all stages of project development, from the development of researchable ideas to the execution of analyses and the preparation and submission of manuscripts. Faculty support post-doctoral research fellows through grant funding. In addition, the CGHCR has hosted several grants, under Linda Resnik's, PhD, leadership, to advance health services research and learning health system skills for rehabilitation faculty.

INITIATIVES WITHIN CGHCR

CGHCR provides educational and research funding and acknowledges aging-focused scholarship through generous donations, including:

- **Diamond Fund:** The Diamond Fund provides resources to the CGHCR to support several types of public health aging activities for faculty and students, including pilot awards for faculty doing implementation science projects; MPH scholarships for translational science or aging-related projects with local public health or community-based organizations; research engagement with an equity lens; and aging course development.
- **SURDNA Award:** The SURDNA fellowship is designed to provide pilot funds or tuition support to faculty in clinical departments to gain formal research training and develop an independent line of aging research.
- **Ginsberg Award:** The Irwin E. Ginsberg Award provides a modest summer stipend for Brown University medical or public health student projects related to aging, and mentored by faculty affiliated with CGHCR.
- **Gerontology Prize:** CGHCR recognizes undergraduate or Master's public health students who complete a research project in gerontology, leading to a public presentation, publication or publication-quality manuscript.

SUMMARY

The Center for Gerontology & Healthcare Research stands as a national leader in aging and healthcare research, uniquely positioned to address the complex challenges facing our rapidly aging society. With over \$30 million in annual research funding and more than 30 interdisciplinary faculty members, CGHCR combines rigorous scientific methodology with real-world impact to improve care quality and outcomes for older adults and people with chronic conditions. Our comprehensive research portfolio spans medication safety and pharmacoepidemiology, pragmatic clinical trials, federal policy evaluation, long-term care innovation, and emerging areas such as climate change impacts and transgender healthcare access. Through our nationally recognized training programs, innovative data resources like LTCFocUS.org, and strategic partnerships with healthcare systems and community organizations, CGHCR translates cutting-edge research into evidence-based practices and policies that enhance quality of life for vulnerable populations. As stewards of landmark initiatives, we remain committed to fostering the next generation of aging researchers while advancing scalable, equitable solutions for an aging America.

Author

Theresa I. Shireman, PhD, Professor, Health Services, Policy & Practice; Professor, Epidemiology; Director, Center for Gerontology & Healthcare Research, Brown University School of Public Health, Providence, RI.

Disclosure

Dr. Shireman receives grant funding from several Institutes within the National Institutes of Health.

Correspondence

Theresa I. Shireman, PhD
Brown University School of Public Health
121 South Main St.
Providence, RI 02912
theresa_shireman@brown.edu

The Legacy and Leadership of the Center for Health Promotion and Health Equity (CHPHE)

ALISON TOVAR, PhD, MPH

ABSTRACT

Over the past decade, the Center for Health Promotion and Health Equity (CHPHE) at the Brown University School of Public Health has emerged as a national leader in equity-centered research, education, and community engagement. The Center's story began decades earlier, built on pioneering work in community-based health interventions that would shape the field of public health in Rhode Island and beyond.

DEEP ROOTS: THE PAWTUCKET HEART HEALTH PROGRAM AND EARLY COMMUNITY-BASED RESEARCH

CHPHE's legacy dates back to 1980 with the launch of the groundbreaking Pawtucket Heart Health Program, a landmark cardiovascular disease prevention initiative led by Thomas Lasater, PhD, and Kim M. Gans, PhD, MPH, LDN. As one of the first federally funded, community-wide health promotion studies in the U.S., the project helped define how public health could be practiced with communities, not just in them.¹⁻¹⁰

From this foundation emerged a growing research group at the Center for Primary Care and Prevention at Memorial Hospital of Rhode Island, where Drs. Lasater and Gans continued to collaborate on numerous community-based intervention studies throughout the 1980s and 1990s. Their work laid the groundwork for what would become a dedicated research center committed to improving public health through culturally informed, equity-centered approaches.

BECOMING A CENTER: FOUNDING CHPHE (2002)

In 2002, the group officially became a center in the Brown University Program in Public Health, originally named the Institute for Community Health Promotion (ICHP). It was founded by Director Dr. Lasater and Deputy Director Dr. Gans, alongside founding faculty members Catherine Dubé, EdD, and Patricia Risica, DrPH. This designation recognized the team's growing impact in community health research and set the stage for broader interdisciplinary collaboration within Brown and the surrounding communities.

Since its founding, the Center has evolved through several identity shifts, reflecting its expanding scope and mission:

- ICHP (2002–early 2010s): Emphasized chronic disease prevention and health promotion through community-based interventions.
- Center for Health Equity Research (CHER): Signaled a growing focus on addressing structural and social determinants of health disparities.
- Center for Health Promotion and Health Equity (CHPHE, 2020–present): Represents the Center's current mission, improving health and advancing equity through community-engaged research, interdisciplinary collaboration, and advocacy on multiple levels.

A MILESTONE MOMENT: INTEGRATING INTO THE SCHOOL OF PUBLIC HEALTH (2013)

In 2013, when Brown formally launched its School of Public Health, the Center was already a vital part of its research and community engagement ecosystem. CHPHE's presence helped shape the School's emphasis on population health, health equity, and applied, interdisciplinary science.

Over the next decade, CHPHE grew into a vibrant hub of faculty, staff, students, and community partners committed to addressing the root causes of health inequities, from racism and poverty to food insecurity and environmental injustice.

NOTABLE ACHIEVEMENTS FROM 2013–2023

CHPHE has led a diverse portfolio of high-impact research and community programs. Highlights include:

Structural Discrimination and Health Inequities

Research led by Madina Agénor, ScD, MPH, describes how structural racism, measured through racially discriminatory laws and interpersonal discrimination in healthcare settings contribute to higher rates of premature death and limited access to preventive services and health insurance among Black, Latine, and LGBTQ+ communities.¹¹⁻¹⁵ These intersecting barriers underscore the need for structural, community-driven approaches to health promotion and equity.

Green Space and Child Health

Results from Project Green Space, led by Diana Grigsby-Toussaint, PhD, show that access to parks and other green spaces supports children's mental health, cognitive development, sleep, and physical activity. Using GPS tracking, parent surveys, memory tasks, and biological markers of stress, this research is uncovering how environmental exposures—like neighborhood greenery—can promote well-being, especially among children in historically marginalized communities.¹⁶⁻²²

Similarly, another project is exploring how exposure to greenspace during pregnancy affects birth outcomes. In a multidisciplinary study bridging public health, medicine, and geography, one study is investigating how exposure to greenspace during pregnancy affects birth outcomes. By exploring different measures of greenspace exposure and their relation to maternal well-being, this research seeks to clarify mechanisms and improve environmental health equity, particularly in vulnerable populations.

Promoting Physical Activity Among Latinas Through Technology

A study, led by Tanya Benitez, PhD, MSW, found that a culturally tailored, Spanish-language intervention combining a website and text messaging significantly increased physical activity among insufficiently active Latinas over 24 months. The enhanced intervention, featuring personalized text reminders, gamified engagement, and community support, led to greater long-term gains in moderate-to-vigorous physical activity than the original version. This approach offers a scalable model for addressing persistent disparities in chronic disease prevention through sustained health promotion.²³⁻²⁶

Testing Incentives to Promote Physical Activity

A randomized trial, lead by Lauren Bohlen, PhD, and David Williams, PhD, is evaluating the effectiveness of insurance-based financial incentives (such as \$100–200 reimbursements for gym visits) in increasing physical activity. The study compares gain-framed (rewards earned) and loss-framed (rewards withheld) incentive structures, with preliminary findings exploring how framing, habit formation, and anticipated regret influence sustained exercise behavior. This research informs how health plans and policy can use behavioral economics to promote physical activity at scale.²⁷

Preventing Stimulant-Involved Overdose Deaths

As fentanyl contamination fuels a deadly “fourth wave” of the opioid crisis, research led by Jaclyn White Hughto, PhD, MPH, highlights that over 60% of surveyed stimulant users unknowingly consumed fentanyl-laced drugs. The Preventing Overdoses Involving Stimulants (POINTS) study identifies critical gaps in awareness and intervention, underscoring

the need for harm reduction tools like fentanyl test strips and community drug checking. Community-informed strategies from this work are shaping local overdose prevention efforts and advancing equitable public health responses.²⁸

Evaluating a Statewide Fruit and Vegetable Incentive Program

Early evaluation, led by Alison Tovar, PhD, of Eat Well, Be Well, Rhode Island's first statewide SNAP fruit incentive program, found no overall change in fruit and vegetable intake among participants. However, the program showed promising effects among individuals with higher baseline fruit and vegetable consumption. These findings highlight the importance of refining implementation strategies, increasing incentive amounts, and expanding outreach and nutrition education to improve equity and impact among lower-consuming SNAP recipients.²⁹

Resilience Among African American/Black Adults Living with HIV

In a collaborative study led by former CHPHE faculty Akilah Dulin, PhD, and others, researchers used concept mapping to explore multilevel resilience resources among African American/Black adults living with HIV in the southern U.S. The study identified 12 clusters of resilience resources, ranging from personal strengths to neighborhood conditions, and found high consistency across different demographic and environmental contexts. Published in 2020, the study underscores the importance of culturally and contextually informed interventions, with the potential to guide future HIV care strategies that center the lived experiences and strengths of Black communities.³⁰

Housing, Homeownership, and Health: Dulin's Study

In a compelling examination of long-standing structural inequalities, Dr. Dulin's work explored how Black homeownership relates to self-rated health, offering nuanced evidence of disparities in the benefits associated with housing investment across racial groups. Specifically, findings revealed that although homeownership generally conferred better self-rated health, this advantage was smaller, but still significant, for Black homeowners compared to their White counterparts.³¹

GRANT-FUNDED EXCELLENCE

CHPHE faculty have brought in over \$10 million in competitive Centers for Disease Control and Prevention funding, and Foundations such as the Robert Wood Johnson Foundation among others, and in the past three years, reflecting both scientific excellence and deep community partnerships.

CONTINUING IMPACT: PROGRAMS THAT LAST

CHPHE's long-standing programs remain active and impactful. Other early programs such as SisterTalk, a culturally tailored weight-control intervention for Black women, continue to inform health-promotion strategies in diverse populations.³²

LOOKING AHEAD: EQUITY AS A PUBLIC HEALTH IMPERATIVE

Now more than two decades since its founding and four decades since its roots in Pawtucket, CHPHE continues to grow as a dynamic and collaborative force, grounded in science, justice, and community. Whether through pioneering research on greenspace and health, deep partnerships addressing chronic disease and food insecurity, or empowering communities impacted by HIV, CHPHE's work remains at the forefront of efforts to build a healthier, more equitable future for all.

References

- Elder JP, McGraw SA, Abrams DB, et al. Organizational and community approaches to community-wide prevention of heart disease: The first two years of the Pawtucket Heart Health Program. *Prev Med.* 1986;15(2):107-117. doi:10.1016/0091-7435(86)90081-2
- Lefebvre RC, Lasater TM, Carleton RA, Peterson GS. Theory and delivery of health programming in the community: the Pawtucket Heart Health Program. *Prev Med.* 1987;16(1):80-95. doi:10.1016/0091-7435(87)90008-9
- Assaf AR, Carleton RA. The Pawtucket Heart Health Program: II. Evaluation strategies. *R I Med J.* 1987;70(12):541-546.
- Carleton RA, Lasater TM, Assaf AR, Lefebvre RC, McKinlay SM. The Pawtucket Heart Health Program: I. An experiment in population-based disease prevention. *R I Med J.* 1987;70(12):533-538.
- Carleton RA, Lasater TM, Assaf AR, Feldman HA, McKinlay SM. The Pawtucket Heart Health Program: community changes in cardiovascular risk factors and projected disease risk. *Am J Public Health.* 1995;85(6):777-785. doi:10.2105/AJPH.85.6.777
- Hunt MK, Lefebvre RC, Hixson ML, et al. Pawtucket Heart Health Program point-of-purchase nutrition education program in supermarkets. *Am J Public Health.* 1990;80(6):730-732. doi:10.2105/AJPH.80.6.730
- Eaton CB, Lapane KL, Garber CE, et al. Effects of a community-based intervention on physical activity: the Pawtucket Heart Health Program. *Am J Public Health.* 1999;89(11):1741-1744. doi:10.2105/AJPH.89.11.1741
- Gans KM, Bain SL, Plotkin B, Lasater TM, Carleton RA. Implementation and institutionalization of heart health programming in schools: The Pawtucket Heart Health Program experience. *J Health Educ.* 1994;25(2):89-96.
- Gans KM, Lapane KL, Lasater TM, Carleton RA. Effects of intervention on compliance to referral and lifestyle recommendations given at cholesterol screening programs. *Am J Prev Med.* 1994;10(5):275-282.
- Lefebvre RC, Lasater TM, Carleton RA, Peterson G. The process of stimulating community change: The Pawtucket Heart Health Program. *Scand J Prim Health Care Suppl.* 1988;1:31-37.
- Agénor M, Zubizarreta D, Beccia AL, et al. Structural Racism-Related State Laws and Healthcare Access Among Black, Latine, and White U.S. Adults. *J Racial Ethn Health Disparities.* 2025;12(3):1432-1445. doi:10.1007/s40615-024-01976-4
- Agénor M, Perkins C, Stamoulis C, et al. Developing a Database of Structural Racism-Related State Laws for Health Equity Research and Practice in the United States. *Public Health Rep.* 2021;136(4):428-440. doi:10.1177/0033354920984168
- Jahn JL, Zubizarreta D, Chen JT, et al. Legislating inequity: structural racism in groups of state laws and associations with premature mortality rates. *Health Aff (Millwood).* 2023;42(10):1325-1333. doi:10.1377/hlthaff.2023.00471
- Noh M, Mehta N, Kim C, et al. Association between health care discrimination and medical mistrust among Black assigned female at birth adults with minoritized sexual and gender identities in the United States. *LGBT Health.* 2025;12(5):340-349. doi:10.1089/lgbt.2024.0263 pubmed.ncbi.nlm.nih.gov+1
- Singh S, Mehta N, Noh M, et al. Weight-based health care discrimination and cervical cancer screening among Black sexual and gender minoritized assigned female at birth adults in the United States. *Health Equity.* 2025;9(1):22-30. doi:10.1089/heq.2024.0158. PubMed Central+2MDSOAR+2
- Rodriguez Acevedo A, Story D, Werner L, et al. Associations between objectively and subjectively measured sleep outcomes among elementary school children in Rhode Island. *Front Pediatr.* 2025;13:1622943. doi:10.3389/fped.2025.1622943
- Guo Y, Wu D, Zuo X. Urban green spaces and public health: legal challenges and policy opportunities in green city governance. *Front Public Health.* 2025;13:1620076. doi:10.3389/fpubh.2025.1620076
- Ury B, Yang J, Rosenthal SR, et al. Associations between subjective and objective green space on children's mental health and cognitive function. *Urban For Urban Green.* 2025;81:129156. doi:10.1016/j.ufug.2025.129156
- Nwanaji-Enwerem U, McGeary JE, Grigsby-Toussaint DS. Greenspace, stress, and health: how is epigenetics involved?. *Front Public Health.* 2024;12:1333737. Published 2024 Feb 16. doi:10.3389/fpubh.2024.1333737
- Grigsby-Toussaint DS, Shin JC. COVID-19, green space exposure, and mask mandates. *Sci Total Environ.* 2022;836:155302. doi:10.1016/j.scitotenv.2022.155302
- Thakkar I, Blachford S, Hall M. Can green spaces make you happier? *The Public's Radio.* May 13, 2025. <https://thepublics-radio.org/environment/can-green-spaces-make-you-happier/>. Accessed November 11, 2025.
- Grigsby-Toussaint DS, Shin JC, Acevedo AR, et al. Project G-SPACE: protocol for exploring the influence of green space on sleep and mental health among children. *BMC Pediatr.* 2024;24:783. doi:10.1186/s12887-024-05247-3
- Benitez TJ, Cherrington A, Joseph RP, et al. Using web-based technology to promote physical activity in Latinas: Results of the Muévete Alabama pilot study. *Comput Inform Nurs.* 2015;33(7):315-324. doi:10.1097/CIN.0000000000000162
- Benitez TJ, Artigas E, Larsen B, et al. Barriers and Facilitators to Muscle-Strengthening Activity Among Latinas in the U.S.: Results From Formative Research Assessments. *Int J Behav Med.* 2024;31(2):292-304. doi:10.1007/s12529-023-10183-0
- Benitez TJ, Brown N, Marcus B, Sanchez A, Von Ash T, Joseph RP. Promotion of Muscle-Strengthening Activity Among Latina and Black/African American Women: A Review of Literature. *Am J Lifestyle Med.* Published online April 17, 2024. doi:10.1177/15598276241246734
- Benitez TJ, Dunsiger S, Marquez B, Larsen B, Pekmezi D, Marcus BH. Increases in Muscle-Strengthening Activities Among Latinas in Seamos Saludables. *Health Educ Behav.* 2022;49(3):446-454. doi:10.1177/10901981221074908

27. Williams DM, Bohlen LC, Dunsiger S, et al. Testing an insurance-based monetary incentive program for exercise: RCT design and rationale. *Contemp Clin Trials*. 2023;135:107382. doi:10.1016/j.cct.2023.107382
28. Hughto JMW, Rich JD, Kelly PJA, et al. Preventing overdoses involving stimulants: the POINTS study protocol. *BMC Public Health*. 2024;24:2325. doi:10.1186/s12889-024-19779-x
29. Tovar A, Powell LM, Leider J, Elenio E, Oddo VM, Vadiveloo MK. Evaluation of a State-Level Incentive Program to Improve Diet. *JAMA Netw Open*. 2025 Nov 3;8(11):e2544215
30. Dulin AJ, Earnshaw VA, Dale SK, et al. A Concept Mapping Study to Understand Multilevel Resilience Resources Among African American/Black Adults Living with HIV in the Southern United States. *AIDS Behav*. 2021;25(3):773-786. doi:10.1007/s10461-020-03042-6
31. Dulin A, Starks K, Yago M, Dennis K. The State of Black Rhode Island: Homeownership Report. United Way of Rhode Island; June 2022. <https://www.unitedwayri.org/wp-content/uploads/2022/06/State-of-Black-RI-Home-Ownership-Report-June2022.pdf>
32. Evans EW, Lyerly R, Gans KM, et al. Translating Research-Funded Mobile Produce Market Trials Into Sustained Public Health Programs : Food on the Move. *Public Health Rep*. 2022;137(3):425-430. doi:10.1177/00333549211012409

Author

Alison Tovar, PhD, MPH, Associate Professor of Behavioral and Social Sciences, Brown University School of Public Health; Interim Director of the Center for Health Promotion and Health Equity, Providence, RI.

Disclosures

The author has nothing to disclose.

Correspondence

Alison Tovar, PhD, MPH
 Department of Behavioral and Social Sciences
 Brown University School of Public Health
 Box G-S121-4
 Providence, RI 02912
alison_tovar@brown.edu

The Best Health for the Most People for the Least Cost

OMAR GALÁRRAGA, PhD

ABSTRACT

This article: (1) summarizes the accomplishments of the Center for Global Public Health (CGPH) at the Brown University School of Public Health, with a focus on the Center's work over the first decade following the School of Public Health's accreditation (2013–2023); and (2) provides a vision for the Center's future. Select research studies are highlighted throughout the article as examples of the Center's approaches to public health leadership and global partnerships.

KEYWORDS: Global health; low- and middle-income countries (LMICs); HIV; non-communicable diseases

INTRODUCTION

The Center for Global Public Health (CGPH) was founded in 1988 (then called the International Health Institute, IHI) to serve as a hub for Brown's international health initiatives, with a focus on strengthening faculty and student's global involvement. The goal was (and continues to be) to improve health in low- and middle-income countries (LMICs) through interdisciplinary research and training. The Center fosters research collaborations with institutions in the Global South, and provides supervised research opportunities for students at the undergraduate, master's, and doctoral level. The renaming to the Center for Global Public Health in 2025 signifies a broadened commitment to tackling complex global health issues through partnerships and innovation. The Center now integrates faculty, students, and staff from across the School of Public Health's four departments. Stephen McGarvey, PhD, was director of the Center from 1999 to 2021, Mark Lurie, PhD, was director from 2021 to 2024, and the author has been the Center's director since 2024. This article showcases the scientific contributions by CGPH members over the past decade, illustrating how the Center works to achieve the best health, for the most people, for the least cost.

THE BEST HEALTH IN CONTEXT

Comprised of 18 faculty, the CGPH has led hundreds of studies testing epidemiological, behavioral, and socioeconomic interventions for and with populations at greatest risk.

CGPH directs collaborative research, including identifying influences on adiposity and cardiometabolic phenotypes among Pacific Islanders,¹ determining migration-related risk factors for HIV-1 infection in Sub-Saharan Africa,^{2,3} understanding factors shaping the utilization of antenatal care in African women,⁴ and quantifying impacts of national health financing programs for low-income households in Latin America.⁵ This and other cutting-edge work is possible due to the unique, long-standing partnership between the Center and non-US institutions. CGPH faculty work with more than 17 research partners in 13 countries (e.g., Kenya, South Africa, Mexico, Samoa, Ghana, Ecuador), and has over \$10 million in annual funding for global health-related research.

Understanding disease spread in context

CGPH strives to help move beyond solely the biology of diseases like HIV and TB, and show how factors like migration,⁶ gender, and social networks influence disease transmission.⁷ The research provides comprehensive analyses of why HIV-infection rates remain so high among key populations. Work by previous CGPH Director Mark Lurie, for example, examined the role of migration in the spread of two diseases nearly 100 years apart: tuberculosis following the discovery of gold in 1886 and HIV in the early 1990s.⁶ Both cases found poor living and working conditions led to highly efficient transmission "hot-spots" of these diseases in South Africa when male migrant workers returned back to their rural homes. Other research by Dr. Lurie and CGPH faculty describes the syndemic effects of HIV, high fertility, gender inequality, and poor mental health contributing to sustained, high HIV-incidence among young women in Southern Africa, even as other groups' experience declined.⁷ It argues that interventions must address these larger issues to be effective; focusing solely on individual choices and behaviors is not enough to achieve health gains at the population level.

Tailored interventions

CGPH improves public health strategies through better-targeted health interventions in LMICs, especially in regions like Sub-Saharan Africa, where social and cultural factors play a critical role in infectious disease dynamics. CGPH studies focus on groups facing the highest health risks and least access to care, including migrants, youth,⁸ and sex workers.⁹ The Center's research emphasizes health

programs and health interventions that cater to these groups. CGPH faculty apply rigorous methods and evidence-based frameworks to ensure interventions for these groups are population- and context-specific. Such approaches have applied the Assessment, Decision, Administration, Production, Topical Experts–Integration, Training, and Testing (ADAPT-ITT) framework to adapt and integrate entrepreneurship curriculum with a reproductive health-education platform to improve economic opportunity and reproductive health outcomes for indigenous adolescents in Ecuador,¹⁰ and human-centered design processes to develop and tailor mobile mental-health tools to deliver evidence-based depression treatment in primary care in India.¹¹ Developing tailored and person-centered interventions enables evaluation not only of their effectiveness, but also their longer-term sustainability within the populations they are meant to serve. The work has directly informed public health programs aimed at reducing the impact of infectious and non-infectious disease at the national level, in Sub-Saharan Africa, Latin America and elsewhere.

Strengthening public health through medical expertise

The Center integrates clinical and medical expertise with public health practice; over a quarter of CGPH faculty are certified medical practitioners, with training in emergency medicine, surgery, clinical psychology, clinical psychiatry, and dentistry. Medically-trained faculty in the Center apply a population-level perspective to ensure public health strategies address individual care needs and simultaneously promote the greatest good for the most people. Examples of this work include partnering with the World Health Organization (WHO) to develop, implement, and evaluate technology-mediated education programs for dental workforce training,¹² and testing mobile phone-based surveillance systems in Ethiopia to assess community focal points to monitor cases of unaccompanied and separated children during humanitarian crises.¹³ By integrating the two disciplines—public health and clinical care—the Center transforms clinical insights into scalable solutions that have a population-level reach.

FOR THE MOST PEOPLE

Another key area for CGPH is the use of mixed-methods to evaluate on-the-ground effectiveness of interventions to guide implementation, dissemination and scale-up. The Center has a large focus on implementation science and culturally-tailored interventions, aiming to reduce health disparities while serving sexual and racial/ethnic minorities in partner communities.

Implementation science

Uncovering genetic and epidemiological patterns is just the first step. It is important to move forward to implementation studies.¹⁴ CGPH faculty and students implement culturally-adapted interventions to assess whether nurses and

community health workers, for example, can help low-income individuals in high-prevalence countries better manage their diabetes.¹⁵ Such differentiated-care models do not rely on doctors or expensive specialists; instead, they use community-trained workers and culturally-appropriate materials, making it more accessible and practical in resource-limited settings. That means resources can be made available where they are most needed and most effective. Many CGPH faculty are implementation science experts, and use implementation science frameworks and theory to guide each step of their research.

The same rationale underpins task-shifting approaches (i.e., rational redistribution of tasks among workforce teams) for improving access to care for HIV and comorbidities. For instance, as people with HIV are living longer due to wider access to antiretroviral therapy in Sub-Saharan Africa and elsewhere, they are now affected by cardiovascular, metabolic, and other non-communicable diseases. CGPH research shows that coinfection of HIV and hypertension will continue to increase in South Africa and Kenya for the next several years,¹⁶ that integrated care for HIV and cardiovascular disease is effective,¹⁷ and that the budget impact of integrated HIV/cardiovascular disease care is modest.¹⁸

Cultural context matters

CGPH researchers apply theory-based models, usually developed from Western research, to different LMIC contexts.¹⁹ Although some parts of these models may hold true across regions, cultural factors like family-oriented values and an emphasis on social conformity may shape the impacts of reduced health and how people cope with it. CGPH faculty have expertise in systematically adapting theory-informed interventions so that they have the greatest impact for target populations, including adapting trauma-informed mental health interventions for youth affected by armed conflict in Colombia,²⁰ or programs focusing on entrepreneurial skills and sexuality education for indigenous youth in Ecuador.²¹ This work highlights the importance of adapting social science theories and interventions to fit the specific cultural context of a community.

Need to address stigma and discrimination

Using qualitative approaches, CGPH research offers new models for understanding how stigma and discrimination are experienced and how they impact the psychological and behavioral health diverse populations.^{22,23} By identifying key themes like family-prioritization and the use of concealment as a coping strategy, the research provides a solid example for how to create culturally-relevant interventions to improve health outcomes for specific communities.

FOR THE LEAST COST

Another important area of CGPH in the last decade has been the combination of microsimulation modeling²⁴ with economic evaluation to demonstrate how effective

interventions can also be cost-effective or even cost-saving in the long run. This workstream is guided by the goal of policy relevance. For example, in Mexico, after showing via a randomized controlled trial (RCT) that male sex workers exhibit a high incidence of HIV acquisition (5.2 per 100 person-years),²⁵ CGPH research showed that incentive-based interventions were not only effective for increasing PrEP adherence among male sex workers at high HIV risk,⁹ but were also cost-effective for the national health system²⁶ in the short-term when compared to Mexico's willingness to pay for HIV-prevention services.

Health systems with limited resources are having to address the growing burden of non-communicable diseases among persons living with HIV in the Global South. To inform feasible approaches, the Center has led intensive modeling exercises to estimate the longer-term cost and budget impact of integrating and scaling up chronic disease management services within HIV-care programs, like those in Kenya, for both cardiovascular diseases²⁷ and mental health disorders.²⁸ Findings from this work suggest, scaling layered CVD services could offer 12% cost savings to county healthcare budgets, while reaching WHO Mental Health Action Plan targets would require 3% more of current health budgets.

To achieve long-term health gains in low-resource settings, interventions must be sustainable and, ideally, self-financing. CGPH research in Bangladesh has shown that access to microcredit can increase formal healthcare utilization and reduce catastrophic health expenditures.²⁹ Similarly, microfinance groups, where members save and lend their own money, can serve as a platform for chronic disease care delivery; our faculty have rigorously tested this approach via a cluster RCT and found group-level microfinance to be effective for improving viral suppression and retention in care among persons with HIV in rural Kenya.³⁰⁻³²

THE FUTURE

The past decade of CGPH has helped shape our understanding of how metabolic, infectious, and non-communicable diseases affect diverse populations, and how public health researchers and clinicians can help mitigate these effects on a national^{33,34} and global scale.³⁵ Looking forward, the Center will continue to focus on the health and socioeconomic needs of the most health-disadvantaged populations in the Global South, strengthening its existing partnerships and creating new ones. The Center will expand its interdisciplinary programs for training both faculty and the next generation of early-career scientists. Key focus areas will include: (1) using implementation science to increase access to both oral and injectable long-acting pre-exposure prophylaxis (PrEP) for HIV prevention, (2) quantifying the health and economic impact(s) of integrating NCD services for aging populations living with HIV in settings outside East

Africa, and (3) using modeling and quasi-experimental methods to evaluate impacts of changes in national health policies and foreign aid spending. With this agenda, the Center will respond to the latest research priorities,³⁶⁻³⁸ increasing its impact through a focus on health equity in the Global South.³⁹

References

1. Minster RL, Hawley NL, Su CT, et al. A thrifty variant in CREBRF strongly influences body mass index in Samoans. *Nat Genet.* 2016;48(9):1049-1054. doi:10.1038/ng.3620.
2. Lurie MN, Williams BG, Zuma K, et al. Who infects whom? HIV-1 concordance and discordance among migrant and non-migrant couples in South Africa. *AIDS.* 2003;17(15). doi:10.1097/0002030-200310170-00013.
3. Lurie MN, Williams BG, Zuma K, et al. The impact of migration on HIV-1 transmission in South Africa: A study of migrant and nonmigrant men and their partners. *Sex Transm Dis.* 2003;30(2). doi:10.1097/00007435-200302000-00011.
4. Myer L, Harrison A. Why do women seek antenatal care late? Perspectives from rural South Africa. *J Midwifery Womens Health.* 2003;48(4). doi:10.1016/S1526-9523(02)00421-X.
5. Sosa-Rubí SG, Galárraga O, Harris JE. Heterogeneous impact of the "Seguro Popular" program on the utilization of obstetrical services in Mexico, 2001-2006: A multinomial probit model with a discrete endogenous variable. *J Health Econ.* 2009;28(1):20-34. doi:10.1016/j.jhealeco.2008.08.002.
6. Lurie MN, Williams BG. Migration and health in Southern Africa: 100 years and still circulating. *Health Psychol Behav Med.* 2014;2(1):34-40. doi:10.1080/21642850.2013.866898.
7. Harrison A, Colvin CJ, Kuo C, Swartz A, Lurie M. Sustained High HIV Incidence in Young Women in Southern Africa: Social, Behavioral, and Structural Factors and Emerging Intervention Approaches. *Curr HIV/AIDS Rep.* 2015;12:207-215. doi:10.1007/s11904-015-0261-0.
8. Galárraga O, Kuo C, Mtukushe B, Maughan-Brown B, Harrison A, Hoare J. iSAY (incentives for South African youth): Stated preferences of young people living with HIV. *Soc Sci Med.* 2020;265(August):113333. <https://doi.org/10.1016/j.socscimed.2020.113333>.
9. Galárraga O, Wilson-Barthes M, Chivardi C, et al. Incentivizing adherence to pre-exposure prophylaxis for HIV prevention: a randomized pilot trial among male sex workers in Mexico. *European Journal of Health Economics.* 2025;26(2):299-311. doi:10.1007/s10198-024-01705-y.
10. Tituaña A, Wilson-Barthes M, Desrosiers A, et al. Adaptation, acceptability and preliminary impacts of a sexual health and financial literacy intervention for indigenous adolescents in Ecuador: A mixed-methods pilot study. *Public Health.* 2026;251:106088. doi:10.1016/j.puhe.2025.106088.
11. Black CJ, Berent JM, Joshi U, et al. *Applying Human-Centered Design in Global Mental Health to Improve Reach Among Underserved Populations in the United States and India.* www.ghspjournal.org.
12. Seymour B, Hackley D, Muriithi M, et al. Developing a WHO African Region mOral Health Curriculum for Community Health Workers. *Ann Glob Health.* 2025;91(1). doi:10.5334/aogh.4655.
13. MacFarlane M, Rubenstein BL, Saw T, Mekonnen D, Spencer C, Stark L. Community-based surveillance of unaccompanied and separated children in drought-affected northern Ethiopia. *BMC Int Health Hum Rights.* 2019;19(1). doi:10.1186/s12914-019-0203-9.
14. Sarker M, Ahuja S, Alonge O, Irazola V, Mahendradhata Y, Montagu D. Five ways to bridge the 'know-do' continuum in global health. *Nat Hum Behav.* 2025;9(3):429-432. doi:10.1038/s41562-025-02106-8.

15. De Pue JD, Dunsiger S, Seiden AD, et al. Nurse-community health worker team improves diabetes care in American Samoa: Results of a randomized controlled trial. *Diabetes Care*. 2013;36(7):1947-1953. doi:10.2337/dc12-1969.
16. Osetinsky B, Hontelez JAC, Lurie MN, et al. Epidemiological and Health Systems Implications of Evolving HIV and Hypertension in South Africa and Kenya. *Health Aff*. 2019;38(7):1173-1181. doi:10.1377/hlthaff.2018.05287.
17. Osetinsky B, Genberg BL, Bloomfield GS, et al. Hypertension Control and Retention in Care Among HIV-Infected Patients. *JAIDS Journal of Acquired Immune Deficiency Syndromes*. 2019. doi:10.1097/qai.0000000000002154.
18. Osetinsky B, Mwangi A, Pastakia S, et al. Layering and scaling up chronic non-communicable disease care on existing HIV care systems and acute care settings in Kenya: a cost and budget impact analysis. *J Int AIDS Soc*. 2020. doi:10.1002/jia2.25496.
19. Sun S, Hoyt WT, Tarantino N, et al. Cultural Context Matters: Testing the Minority Stress Model Among Chinese Sexual Minority Men. *J Couns Psychol*. 2021;68(5):526-537. doi:10.1037/cou0000535.
20. Desrosiers A, Pineros-Leano M, Saran I, et al. Integrating a culturally adapted mental health intervention within entrepreneurship training for displaced youth in Colombia: a pilot randomized controlled trial. *Confl Health*. 2025;19(1). doi:10.1186/s13031-025-00675-z.
21. Tituaña A, Herrán K, Galárraga O, Palacios I. How to decrease teenage pregnancy: rural perspectives in Ecuador. *Front Public Health*. 2024;12. doi:10.3389/fpubh.2024.1370507.
22. Sun S, Budge S, Shen W, Xu G, Liu M, Feng S. Minority stress and health: A grounded theory exploration among men who have sex with men in China and implications for health research and interventions. *Soc Sci Med*. 2020;252. doi:10.1016/j.socscimed.2020.112917.
23. Sun S, Xu S, Guy A, et al. Analysis of Psychiatric Symptoms and Suicide Risk among Younger Adults in China by Gender Identity and Sexual Orientation. *JAMA Netw Open*. 2023;6(3):E232294. doi:10.1001/jamanetworkopen.2023.2294.
24. Hontelez JAC, Lurie MN, Bärnighausen T, et al. Elimination of HIV in South Africa through expanded access to antiretroviral therapy: a model comparison study. *PLoS Med*. 2013;10(10):e1001534. doi:10.1371/journal.pmed.1001534.
25. Ganley K, Wilson-Barthes M, Zullo A, et al. Incidence and time-varying predictors of HIV and sexually transmitted infections among male sex workers in Mexico City. *Infect Dis Poverty*. 2021;10(7):1-10. doi:10.1186/s40249-020-00792-2.
26. Chivardi C, Zamudio-Sosa A, Wilson-Barthes M, et al. Cost-Effectiveness of Using Conditional Economic Incentives to Improve Pre-exposure Prophylaxis Adherence Among Male Sex Workers. *Pharmacoecon Open*. 2025. doi:10.1007/s41669-025-00569-z.
27. Osetinsky B, Mwangi A, Pastakia S, et al. Layering and scaling up chronic non-communicable disease care on existing HIV care systems and acute care settings in Kenya: a cost and budget impact analysis. *J Int AIDS Soc*. 2020. doi:10.1002/jia2.25496.
28. Yego F, Sawe S, Osetinsky B, Wilson-Barthes M, Galárraga O. Economic Evaluation Cost and Budget Impact of Layering Depression Care Onto Existing HIV and Noncommunicable Disease Care Services in Western Kenya. *Value Health Reg Issues*. 2025;50(1):101171. doi:10.1016/j.vhri.2.
29. Nazmul Islam M, Rabbani A, De Allegri M, Sarker M. Medical treatment loans and their effects on health care utilization and out-of-pocket expenditure: Evidence from an experiment in northern Bangladesh. *World Dev*. 2024;184. doi:10.1016/j.worlddev.2024.106757.
30. Genberg BL, Wachira J, Steingrímsson JA, et al. Integrated community-based HIV and non-communicable disease care within microfinance groups in Kenya: study protocol for the Harambee cluster randomised trial. *BMJ Open*. 2021;11(5):e042662. doi:10.1136/bmjopen-2020-042662.
31. Genberg BL, Wilson-Barthes MG, Omodi V, et al. Microfinance, retention in care, and mortality among patients enrolled in HIV care in East Africa. *AIDS*. 2021;35(12):1997-2005. doi:10.1097/QAD.0000000000002987.
32. Wilson-Barthes M, Steingrímsson J, Lee Y, et al. Economic Outcomes Among Microfinance Group Members Receiving Community-based Chronic Disease Care: Cluster Randomized Trial Evidence From Kenya. *Soc Sci Med*. 2024;351:116993. doi:10.1016/j.socscimed.2024.116993.
33. Galárraga O, Harris JE. Effect of an abrupt change in sexual and reproductive health policy on teen birth rates in Ecuador, 2008–2017. *Econ Hum Biol*. 2021;41(May):100967. doi:10.1016/j.ehb.2020.100967.
34. Galárraga O, Quijano-Ruiz A, Faytong-Haro M. The effects of mobile primary health teams: Evidence from the Médico del Barrio strategy in Ecuador. *World Dev*. 2024;181(May):106659. doi:10.1016/j.worlddev.2024.106659.
35. Stanberry LR, Makadzange T, James WG, et al. Proposal for a fourth indicator on vaccine uptake in the joint external evaluation tool. *Bull World Health Organ*. 2025;103(3):226-228. doi:10.2471/BLT.24.292086.
36. Kintu A, Sando D, Okello S, et al. Integrating care for non-communicable diseases into routine HIV services: key considerations for policy design in sub-Saharan Africa. 2020. doi:10.1002/jia2.25508/full.
37. Crabtree-Ramírez B, Río C Del, Grinsztejn B, Sierra-Madero J. *HIV and Noncommunicable Diseases (NCDs) in Latin America: A Call for an Integrated and Comprehensive Response*; 2014. <http://www.paho.org/bra/index>.
38. ViiV HealthCare. PROGRESS CONTINUES TO ACCELERATE ACCESS TO CABOTEGRAVIR LA FOR PREP IN LOW AND MIDDLE-INCOME COUNTRIES. 2025. <https://viiivhealthcare.com/hiv-news-and-media/news/company-statements/progress-continues-to-accelerate-access/#>. Accessed February 17, 2026.
39. Spencer C. Ebola and a Decade of Disparities — Forging a Future for Global Health Equity. *New England Journal of Medicine*. 2025;392(4):313-315. doi:10.1056/nejmp2413298.

Author

Omar Galárraga, PhD, Director of the Center for Global Public Health (CGPH), Professor of Health Services Policy and Practice, Brown University School of Public Health, Providence, RI.

Disclosure

The author asserts no conflicts of interest.

Correspondence

Omar Galárraga, PhD
Center for Global Public Health
Brown University School of Public Health
121 South Main Street, G-S121-2
Providence, RI
omar_galarraga@brown.edu
.....

Partner-Engaged Pragmatic Research in Aging Care: Case Studies from the Long-Term Care Quality & Innovation Lab

ROSA R. BAIER, MPH

ABSTRACT

Since 2015, the Long-Term Care Quality & Innovation (Q&I) Lab at the Brown University School of Public Health has advanced pragmatic, partner-engaged research to improve care for older adults and chronically ill individuals receiving post-acute and long-term care. Rather than evaluating interventions under controlled conditions, Q&I researchers conduct embedded studies in real-world care settings, working with clinicians and frontline staff to implement interventions and assess their effectiveness and feasibility in routine practice. In parallel, researchers also collaborate with health systems and public agencies to generate practice-relevant evidence on operational priorities, positioning the lab as a translational research platform. This article presents two nursing home case studies: a pragmatic trial of a personalized music intervention for residents living with dementia and a portfolio of COVID-19-related partnered research. Together, these examples demonstrate how embedded, partner-engaged approaches generate actionable evidence, inform practice and policy, and position Rhode Island health system partners as contributors to evidence generation at scale in aging care.

KEYWORDS: Pragmatic research; embedded research; partner engagement; long-term care; nursing homes; translational research

EMBEDDED PRAGMATIC RESEARCH AS A PARTNERSHIP MODEL

The Long-Term Care Quality & Innovation (Q&I) Lab was founded in 2015 at the Brown University School of Public Health to generate evidence for strategies that improve care for older adults and chronically ill persons, with particular emphasis on those receiving post-acute and long-term care. Rather than testing interventions under tightly-controlled conditions, Q&I advances pragmatic, partner-engaged research in real-world care environments, working alongside health system leaders, clinicians, and frontline staff to identify research needs and design studies.

In some of Q&I's studies, such as pragmatic trials, this involves testing interventions embedded within routine

clinical workflows and delivered by provider staff rather than researchers. In other work, the research itself is embedded: investigators collaborate closely with health systems to examine organizational priorities, generate evidence to inform decision-making, and guide practice improvement. Over time, these approaches have enabled Q&I to serve as a translational platform that combines partnership infrastructure, data resources, and applied research methods to support rapid-cycle feasibility and pilot studies, as well as multi-site effectiveness research.

Partnership is central to the success of this model; health system collaborators may be responsible for day-to-day implementation of research protocols and also play critical roles in identifying priorities, co-designing studies, facilitating access to care settings and data, and interpreting findings in light of operational realities. This helps ensure that research agendas align with frontline clinical needs, resulting in research that is useful and used, and that study procedures are feasible within real-world constraints.

Embedded pragmatic clinical trials (ePCTs) are one of Q&I's core strengths within this broader model of partner-engaged pragmatic research. ePCTs are effectiveness studies that differ from traditional randomized controlled trials (RCTs) in both design and purpose; interventions are delivered by clinical staff rather than research personnel, and outcomes are ascertained, when possible, using existing clinical and administrative data.¹ Implementing interventions through the same operational processes health systems routinely use to introduce change generates evidence that is immediately relevant and may increase the likelihood that effective approaches can be scaled.

This article examines two case studies that illustrate Q&I's model in practice: an ePCT trial evaluating a personalized music intervention for nursing home residents living with dementia, and a portfolio of COVID-19-related research. Together, these examples demonstrate how embedded, partner-engaged approaches shape study design, support implementation, and accelerate translation of evidence into practice. They further illustrate how early collaboration with regional providers can inform national research and infrastructure, positioning Rhode Island health system partners as contributors to evidence generation at scale in aging care.

CASE STUDY 1

A Trial of Personalized Music in Nursing Homes

An early illustration of Q&I's embedded pragmatic model emerged from national efforts to reduce antipsychotic medication use among nursing home residents living with dementia.² Although black box warnings caution against the use of antipsychotics to manage behavioral and psychological symptoms of dementia, these medications are sometimes used off-label to address agitation and aggression that affect residents' quality of life and can complicate caregiving.³ A lack of feasible, evidence-based, non-pharmacologic alternatives complicates efforts to reduce antipsychotic use.

Awareness of personalized music as a potential intervention was heightened by the 2014 documentary *Alive Inside*, which illustrated music's capacity to calm and engage individuals living with dementia.⁴ The film highlighted Music & Memory, a popular program involving the use of individualized playlists based on music preferences from young adulthood, typically between the ages of 16 and 26.⁵ Recognizing both the promise of the intervention and the absence of rigorous effectiveness data, Q&I researchers first conducted exploratory analyses of outcomes among residents in participating nursing homes⁶ and subsequently secured foundation funding to partner with a small group of nursing homes to prepare for real-world testing.

Participating facilities, including several in Rhode Island, collaborated with researchers to document how to identify residents, ascertain their music preferences, and manage the logistics of loading music devices with personalized music, and incorporating music into daily care (unpublished). These early partners played a central role in the research's early phase, helping to protocolize the program before the research scaled nationally for evaluation.

The resulting protocol became the foundation for the METRICAL study, a five-year National Institute on Aging-funded ePCT evaluating the effectiveness of personalized music for nursing home residents living with dementia.^{7,8} Because of pandemic-related disruption, the study ultimately consisted of two consecutive cluster RCTs conducted in 2019–2020^{9,10} and 2021–2022,¹¹ respectively, in 81 nursing homes operated by four multi-state corporations. Consistent with pragmatic trial design, frontline staff, rather than researchers, delivered the intervention within usual care processes. Facilities received structured training and implementation guidance while retaining flexibility to adapt delivery to local workflows.

The research team simultaneously evaluated clinical outcomes and real-world feasibility, and implementation insights from the first RCT-informed adaptations in the second RCT, particularly as competing operational pressures intensified during the pandemic.¹¹ To reduce staff burden and improve fidelity, responsibility for identifying music preferences and creating playlists shifted from facility staff to the

research team, illustrating how ePCTs evolve in response to contextual realities.

Findings from the first RCT demonstrated measurable effects among residents exposed to the intervention. In analyses using the Agitated Behavior Mapping Instrument, residents in intervention facilities were more likely to have no verbally agitated behaviors observed relative to residents receiving usual care.¹⁰ They were also more likely to be observed experiencing pleasure during observation periods, suggesting an effect on affective state even when broader agitation measures did not change. By contrast, analyses relying on staff-reported or administrative measures of agitation did not demonstrate statistically significant differences.⁹

Equally important were insights generated through mixed-methods implementation evaluation.^{11,12} Participating facilities identified key facilitators, including leadership engagement, family involvement in playlist development, and integration of music into care planning. They also surfaced barriers ranging from staff-time constraints and competing clinical demands, to challenges maintaining and managing music devices. These findings not only informed protocol refinements between METRICAL's two RCTs but also subsequent Q&I studies focused on using technology-enabled approaches to help staff tailor and time non-pharmacologic dementia interventions.

This case illustrates defining features of Q&I's approach: interventions originating from frontline clinical priorities; development conducted in partnership with health system partners; and pragmatic methods designed to test effectiveness under real-world conditions while simultaneously assessing implementation barriers and facilitators.

CASE STUDY 2

Partnered Research During the COVID-19 Pandemic

While METRICAL demonstrates how partner-engaged pragmatic methods can support evaluation of a discrete intervention in real-world care settings, this second case study highlights how sustained partnership enables research to pivot when contextual conditions shift. When the COVID-19 pandemic emerged, nursing homes were among the earliest and most severely affected healthcare settings,¹³ yet little empirical evidence existed to guide operational, workforce, or policy responses. Long-standing collaborative relationships with nursing homes across the U.S. positioned Q&I researchers to rapidly align projects with urgent frontline priorities while generating practice-relevant evidence during a period of unprecedented system strain.

Within three months of the first reported U.S. nursing home COVID-19 outbreak, a Q&I research team launched a national survey to characterize frontline staff experiences. Findings, initially disseminated through issue briefs¹⁴⁻¹⁶ and subsequently in the peer-reviewed literature,¹⁷ provided

some of the earliest insight into the pandemic's impact on nursing home operations and workforce, including staffing shortages, psychological distress, and rapidly evolving infection-control demands. These findings informed national understanding of conditions on the ground in nursing homes, while also shaping Q&I researchers' subsequent research agenda and partnership strategy.

Early translational work emerging from these findings included collaboration with a state public health agency to design and pilot an infection-control coaching intervention tailored to nursing home operational realities.¹⁸ The program was later disseminated nationally by a provider association and incorporated into the Centers for Disease Control and Prevention's Project FirstLine training,¹⁹ illustrating how rapid, partner-engaged research could inform workforce development and infection-prevention practice.

Q&I researchers simultaneously leveraged existing partnerships to establish data-sharing collaborations capable of rapidly generating insight. Working with clinical leaders from a large, multi-state nursing home corporation—including facilities in Rhode Island—the team obtained electronic health record data in near real-time and examined COVID-19 infections,^{20,21} transmission patterns,²² testing,²³ vaccination,^{24,25} and more. Early analyses demonstrated, for example, that outbreak risk was associated with facility size and surrounding community prevalence, not quality ratings.²⁰ Findings informed clinical decision-making, operational adaptations, and federal and state policy discussions during a period when facility-level data were limited.

This collaboration expanded to include 12 large, multi-state nursing home corporations participating in a data-sharing partnership. That partnership, in turn, laid the foundation for the Long-Term Care Data Cooperative, a national initiative launched in 2023 that aggregates electronic health record data from enrolled facilities, and links them with administrative and claims data to support benchmarking, effectiveness research, and public health surveillance.²⁶ This progression demonstrates how sustained partner engagement can extend beyond individual projects to establish shared research infrastructure capable of supporting ongoing learning.

Collectively, this pandemic-era portfolio illustrates the adaptability of a partner-engaged embedded research platform under crisis conditions. Rather than focusing on single interventions, this work addressed workforce experience, infection prevention, organizational response, and data infrastructure simultaneously. Existing partnerships evolved and expanded to include co-production of research and analytic capacity, demonstrating how embedded research collaborations can generate rapid, policy-relevant evidence while strengthening the systems required to sustain inquiry beyond the immediate crisis.

FROM STUDIES TO SUSTAINED RESEARCH INFRASTRUCTURE

These nursing home case studies illustrate the evolution of Q&I's partner-engaged embedded research model. The MET-RICAL trial demonstrated how co-designed pragmatic studies can evaluate targeted interventions under real-world conditions while generating implementation insight to support scalability. The COVID-19 portfolio, by contrast, illustrates how sustained partnership enables research to mobilize rapidly in response to emergent system needs, expanding from individual projects to coordinated bodies of work and shared data infrastructure.

Across both examples, partnership functions to ensure research relevance, feasibility, and translational impact. Health system partners help surface priorities, shape protocols, interpret findings, and identify pathways for dissemination. In turn, embedded research generates evidence that is immediately actionable within real-world contexts and constraints, while informing broader policy and practice discussions.

Rhode Island has played a distinctive role within this model. The state's interconnected health care, academic, and policy communities facilitate collaboration and early testing, allowing interventions and research approaches to be piloted and refined before scaling nationally. In this way, the state functions as a local laboratory for innovation and contributes to national evidence and impact.

As the population continues to age and the health care system faces increasing clinical, workforce, and financial complexity, demand is growing for research models capable of producing timely, practice-relevant evidence. Embedded pragmatic partnerships offer one such mechanism. By aligning scientific rigor with sustained collaboration and understanding of real-world considerations and constraints, these platforms can accelerate translation of evidence into practice while establishing the partnership, data, and analytic infrastructure necessary to support ongoing translational research.

References

1. O'Brien EC, Weinfurt KP. What is a pragmatic clinical trial? In: *Rethinking Clinical Trials: A Living Textbook of Pragmatic Clinical Trials*. NIH Pragmatic Trials Collaboratory; 2025. Accessed February 14, 2026. <https://rethinkingclinicaltrials.org/chapters/design/what-is-a-pragmatic-clinical-trial/>
2. Centers for Medicare & Medicaid Services. National Partnership to Improve Dementia Care in Nursing Homes. Updated 2024. Accessed February 14, 2026. <https://www.cms.gov/medicare/health-safety-standards/quality-safety-oversight-general-information/national-partnership-improve-dementia-care-nursing-homes>
3. Office of Inspector General, U.S. Department of Health and Human Services. Long-Term Trends of Psychotropic Drug Use in Nursing Homes. 2022. Accessed February 14, 2026. <https://oig.hhs.gov/reports/all/2022/long-term-trends-of-psychotropic-drug-use-in-nursing-homes/>

4. Rossato-Bennett M. *Alive Inside*. Projector Media; 2014. Accessed February 14, 2026. <https://www.aliveinside.us/>
5. Music & Memory. Accessed February 14, 2026. <https://musicandmemory.org/>
6. Thomas KS, Baier R, Kosar C, Ogarek J, Trepman A, Mor V. Individualized music program is associated with improved outcomes for U.S. nursing home residents with dementia. *Am J Geriatr Psychiatry*. 2017;25(9):931-938. doi:10.1016/j.jagp.2017.04.008
7. ClinicalTrials.gov. *Music @ Memory: A Pragmatic Trial for Nursing Home Residents With Alzheimer's Disease (MET-RICAL)*. Identifier: NCT03821844. Updated January 27, 2023. Accessed February 14, 2026. <https://clinicaltrials.gov/study/NCT03821844>
8. McCreedy EM, Gutman R, Baier R, et al. Measuring the effects of a personalized music intervention on agitated behaviors among nursing home residents with dementia: design features for cluster-randomized adaptive trial. *Trials*. 2021 Oct 7;22(1):681. doi: 10.1186/s13063-021-05620-y. PMID: 34620193; PMCID: PMC8496617.
9. McCreedy EM, Sisti A, Gutman R, et al. Pragmatic trial of personalized music for agitation and antipsychotic use in nursing home residents with dementia. *J Am Med Dir Assoc*. 2022;23(7):1171-1177. doi:10.1016/j.jamda.2021.12.030
10. Sisti A, Gutman R, Mor V, et al. Using structured observations to evaluate the effects of a personalized music intervention on agitated behaviors and mood in nursing home residents with dementia: Results from an embedded, pragmatic randomized controlled trial. *Am J Geriatr Psychiatry*. 2024 Mar;32(3):300-311. doi: 10.1016/j.jagp.2023.10.016.
11. McCreedy EM, Dewji A, Dionne L, et al. Pragmatic implementation of a music intervention in nursing homes before and during COVID-19. *J Am Med Dir Assoc*. 2024;25(2):314-320. doi:10.1016/j.jamda.2023.10.021
12. Weems JA, Wittenberg GF, Baier RR, et al. Moderators of adherence within a nursing home pragmatic trial of personalized music. *Gerontologist*. 2025;65(6):gnaf128. doi:10.1093/geront/gnaf128
13. Konetzka RT, Grabowski DC, Mor V. Four years and more than 200,000 deaths later: Lessons learned from the COVID-19 pandemic in U.S. nursing homes. *Health Aff (Millwood)*. 2024;43(7):985-993.
14. White EM, Reddy A, Wetle T, Baier RR. Front-line nursing home staff perspectives during the COVID-19 pandemic: Personal protective equipment (PPE). Issue brief #1; June 2020. Accessed February 14, 2026. https://qandi.sph.brown.edu/sites/default/files/docs/01_PPE_in_nursing_homes_0620.pdf
15. White EM, Reddy A, Wetle T, Baier RR. Front-line nursing home staff perspectives on staffing challenges during the COVID-19 pandemic. Issue brief #2; July 2020. Accessed February 14, 2026. https://qandi.sph.brown.edu/sites/default/files/docs/02_Staffing_in_nursing_homes_0720.pdf
16. White EM, Reddy A, Wetle T, Baier RR. Nursing home front-line staff experiences during the COVID-19 pandemic. Issue brief #3; July 2020. Accessed February 14, 2026. https://qandi.sph.brown.edu/sites/default/files/docs/03_Staff_Perspectives_in_nursing_homes_0720.pdf
17. White EM, Wetle TF, Reddy A, Baier RR. Front-line nursing home staff experiences during the COVID-19 pandemic. *J Am Med Dir Assoc*. 2021;22(1):199-203. doi:10.1016/j.jamda.2020.11.022
18. Wittenberg GF, Reddy A, Gifford DR, McLaughlin MM, Leung V, Baier RR. Design of a nursing home infection prevention and control peer coaching program. *J Am Med Dir Assoc*. 2023;24(4):573-579. doi:10.1016/j.jamda.2022.12.022
19. Centers for Disease Control and Prevention. Nursing home infection preventionist training. Accessed February 14, 2026. <https://www.cdc.gov/long-term-care-facilities/hcp/training/>
20. White EM, Kosar CM, Feifer RA, et al. Variation in SARS-CoV-2 prevalence in U.S. skilled nursing facilities. *J Am Geriatr Soc*. 2020;68(10):2167-2173.
21. White EM, Santostefano CM, Feifer RA, et al. Asymptomatic and presymptomatic SARS-CoV-2 infection in skilled nursing facilities. *JAMA Intern Med*. 2020;180(12):1709-1711.
22. Blackman C, Farber S, Feifer RA, Mor V, White EM. An illustration of SARS-CoV-2 spread in a skilled nursing facility using heat maps. *J Am Geriatr Soc*. 2020;68(10):2174-2178.
23. Recker A, White EM, Yang X, et al. Factors affecting SARS-CoV-2 test discordance in skilled nursing facilities. *J Am Med Dir Assoc*. 2022 Aug;23(8):1279-1282.
24. White EM, Yang X, Blackman C, Feifer RA, Gravenstein S, Mor V. Incident SARS-CoV-2 infection among mRNA-vaccinated and unvaccinated nursing home residents. *N Engl J Med*. 2021 Jul 29;385(5):474-476.
25. Mor V, Gutman R, Yang X, et al. Short-term impact of nursing home SARS-CoV-2 vaccinations on infections, hospitalizations, and deaths. *J Am Geriatr Soc*. 2021;69(8):2063-2069.
26. Long-Term Care Data Cooperative. Accessed February 14, 2026. <https://www.ltcdacooperative.org/>

Author

Rosa R. Baier, MPH, Lead of the Long-Term Care Quality & Innovation Lab; Professor of the Practice of Health Services, Policy & Practice, Brown University School of Public Health, Providence, RI.

Disclosures

Conflicts of interest: The author reports no conflicts of interest.

Acknowledgments: Q&I's studies involve teams of academic and health system partners dedicated to improving care for older adults and people living with chronic illness in Rhode Island and across the country. Their insight, ideas, and expertise have made this work possible. The author gives particular thanks to Ellen McCreedy, PhD, Vincent Mor, PhD, and Elizabeth White, PhD, for their leadership of work described in the case studies. The author also acknowledges the investigators and research staff who support Q&I's partnered research platform across studies, partners, and topics.

Correspondence

Rosa R. Baier, MPH
Brown University School of Public Health
121 South Main Street
Box G-S121-6
Providence, RI 02912
Rosa_Baier@Brown.edu

Nursing Home Administrator Perspectives on the Role of State Guidance and Assistance in COVID-19 Response: A Rhode Island Case Study

JOAN F. BRAZIER, MS; AMY MEEHAN, MPH; COURTNEY HAWES, BS; ELIZA REGO, BS; EMILY A. GADBOIS, PhD

ABSTRACT

OBJECTIVE: The COVID-19 pandemic significantly impacted nursing homes in the United States. The Departments of Health within each state played a substantial role in providing guidance, issuing regulations, and supplying resources to help organizations respond to this health emergency. This research characterizes nursing home administrator perspectives on the role of Rhode Island's state agencies during the COVID-19 pandemic.

DESIGN AND METHODS: This qualitative case study includes data from 19 repeated interviews with administrators of six nursing homes, conducted from July 2020-December 2021. In-depth, semi-structured interviews focused on their COVID-19 response, including infection control, vaccination, and interactions with state agencies, among other topics. Interview transcripts were qualitatively analyzed to determine overarching themes.

RESULTS: Three themes emerged from analysis of interview transcripts: 1. Nursing home administrators described the regulatory guidance and communications from Rhode Island's Department of Health, which shaped their COVID-19 response. 2. Administrators discussed the tangible resources and support, such as personal protective equipment and staffing support, they received from the state. 3. Administrators identified the strengths and challenges in collaborating with state agencies and noted areas for improvement.

CONCLUSIONS: Study findings have implications for how states help nursing homes respond during emergencies. While the vaccine has reduced the impact of COVID-19 on nursing home residents and staff, insights provided by administrators in this case study suggest best practices for improving future health emergency communications around guidance and regulations, and suggestions for necessary resources.

KEYWORDS: COVID-19; regulations; guidance; Rhode Island; skilled nursing facility

INTRODUCTION

Nursing homes (NHs), were particularly impacted by the SARS-CoV-2 virus, resulting in significant loss of life for residents and staff.¹ Research shows that during the COVID-19 pandemic, NHs experienced viral outbreaks, extensive staffing shortages, stringent infection-control protocols, and frequently changing regulatory guidelines.²⁻⁹ Since the advent of the COVID-19 vaccine in December 2020 and the lifting of the health emergency in May 2023, the severity of COVID-19 on NH residents and staff has dropped significantly^{10,11}; yet, COVID-19 outbreaks, staffing shortages, and financial repercussions in NHs persist.¹²

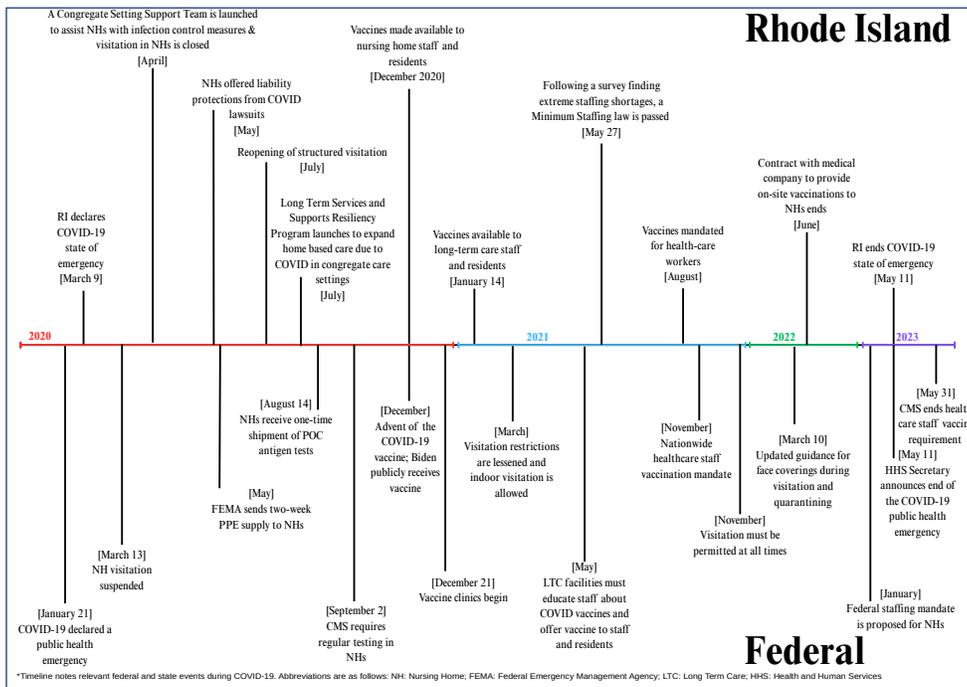
Throughout the pandemic, federal, state, and local agencies were responsible for the dissemination and enforcement of rapidly changing regulatory requirements, information, resources, and guidance for managing COVID-19 in NHs. In the United States (U.S.), states varied in their public health infrastructure, resources, support, and dissemination of information. Rhode Island (RI) currently has 76 NHs in operation, all of which were significantly impacted by COVID-19 [Figure 1]. In this article, RI presents as a case study for assessing the role of government in coordinating vital resources and disseminating information. Interviews with NH administrators provide context for how RI health officials communicated and implemented critically important regulatory and guidance information, tangible resources, and support during a major health emergency.

METHODS

This case study used data from the qualitative arm of a large mixed-methods study. Repeated, semi-structured interviews with NH administrators were conducted from July 2020-December 2021. Brown University Institutional Review Board approval was not needed because this study was determined not to be human subjects' research. This paper presents a subanalysis of the larger qualitative dataset and focuses on NH-administrator perspectives on COVID-19 in RI. Methods are outlined below with additional details published previously.^{8,9,13}

NHs with varying bed count, percentage of Medicare-paid residents, quality ratings, and profit status were selected from eight diverse U.S. healthcare markets. Administrators of the selected NHs in RI were recruited via email and cold

Figure 1. Timeline of Relevant Federal and Rhode Island Events During the COVID-19 Pandemic



calls to participate in four interviews spaced three months apart. Participants received compensation. An interview guide was developed by the qualitative team in collaboration with content experts, which included questions on state and federal resources and guidance during the COVID-19 pandemic. Two qualitative researchers conducted each 30–60-minute interview by telephone or Zoom. Participant consent was obtained for permission to audiorecord. The recorded audio was professionally transcribed, de-identified, and checked for accuracy.

Interview transcripts were analyzed in a two-step process. First, using a modified grounded theory approach,¹⁴ a coding scheme was developed based on interview questions and further edited throughout data collection and analysis. To ensure coding rigor, team members coded each transcript independently, then met weekly to reconcile line-by-line. A comprehensive audit trail¹⁵ was kept throughout data collection and analysis to record team decisions, code definitions, and emerging themes. Coded data were entered into NVivo Version 12 Plus (QSR International). Second, relevant NVivo coding reports were compiled for each primary theme identified by the first round of analysis. Each primary theme was reanalyzed using thematic analysis.¹⁶

RESULTS

NH administrators from six RI facilities participated in at least one interview (n=19) between July 2020–July 2021. Facilities varied by CMS star-rating category, bed count, and profit status. Three themes emerged from our analysis

of interview transcripts. Representative quotes for each theme are in **Tables 1, 2, and 3.**

First, RI’s Department of Health (RIDOH) provided critical regulatory guidance around NH admissions, visitation, infection control, and vaccinations, which shaped COVID-19 responses. Administrators reported that admissions guidance and regulations specified whether or not NHs could admit residents with COVID-19, and imposed quarantining requirements. Similar guidance was issued for visitation, including the need for visitor screening, scheduling, and supervision. Participants noted that during COVID-19 outbreaks, the state required patients to be cohorted to reduce exposure. Lastly, administrators reported

on early vaccine guidelines, and expressed a need for more education as well as the hope that vaccination would allow for visitation to re-open.

Second, in addition to developing regulations and guidance, RIDOH provided NHs with tangible resources. Such resources included the provision of personal protective equipment (PPE), which participants described as extremely valuable due to shortages. RIDOH also supported COVID-19 testing with staffing and lab contracting, and coordinated initial vaccine implementation by connecting local pharmacies with NHs for in-facility vaccine clinics. NH administrators described the financial support of stimulus funding and forgivable workforce stabilization loans, which were used to meet COVID-19-related costs. Lastly, administrators recognized the staffing support they received from the state, often from the National Guard, who helped prepare for and respond to infection-control surveys and administer COVID-19 tests.

Third, in discussing the resources and support provided by RI state agencies to NHs, administrators reflected on the strengths and challenges of working with these entities, and noted suggestions for improvement. The open lines of communication with RIDOH for questions and advice, access to a Quality Improvement Organization (QIO) that provided additional support, and state teams assigned during COVID-19 outbreaks, were identified as strengths of the RI state response. Administrators also noted that state guidance and regulations enabled them to redirect NH resident and family member frustrations and questions away from the NH staff towards an outside agency. Lastly, administrators expressed

that regular communication with and assistance from state regulators built new, more collaborative relationships. However, participants also reported on challenges, such as frequently changing guidelines from different government sources, inconsistencies between state and federal regulations, and the speed required to implement new regulations.

Administrators stated that it was often a burden to implement regulations specific to NHs, and expressed the desire to contribute to policy development to ensure NH-specific resources, such as staffing, financial support, activities, and facility needs were included.

Table 1. Quotes Supporting Theme 1: The State Developed Regulations and Provided Guidance Regarding COVID-19 Response.

Sub-Theme	Quote & ID
Admissions: Infection control guidelines affect admissions and census	Obviously, when an outbreak happens, the Department of Health shuts us down to admissions. So, our census even prior to the outbreak, the biggest census we could have in the [name] building which is 120 beds would be 108 because on our rehab unit, we can only admit single people even to a semi-private room. We can only have one person in each room. Our census now in the [name] building is 77. (N2.3_2-21)
Visitation: DOH allows visits be scheduled, but at odds with what news is saying, families are frustrated	Visitation has been very difficult to explain to some because we are following the Department of Health guidance. The guidance says that visits can be scheduled. About 135 residents has been about our regular census. Just saying, "Come and visit any time", really doesn't make a lot of sense. That could be a lot of people visiting. So we have done schedules which is perfectly within the guidance of DOH. There were some news stories that were out there that said, nursing homes are going back to pre-COVID visiting. But that was the comment, so a lot of families have challenged us on that saying, "But we were told that it's pre-COVID visiting." And we're like, "Well, but that's not how the guidance is written." ...The Department of Health has been in several times to visit our visitation policy because there have been complaints filed and they have never found us to be deficient. (N2.4_5-21)
Cohorting: State cohorting requirements increased exposure, "sheer, utter incompetence"	We would have someone in a room with somebody else and one of the residents in the room would test positive for COVID. And we knew damn well that their roommate was going to test positive the next time we tested three or four days later. The state made us take that roommate who tested negative, and transfer them to someone else who was not exposed to COVID, who also tested negative. So, I don't need to tell you what happens when you do that. So, if the Department of Health had changed that policy and basically said, "Well, even though the person tested negative, they've been exposed. Don't move them," quite honestly, the death toll in nursing homes would have been a hell of a lot less, not the thousand people that died. The Department of Health screwed up big time. Sheer, utter incompetence, in my opinion. (N5.4_7-21)
Vaccination: There needs to be education about guidelines and vaccines	It's just my concern is everybody thinks, "I'm going to get a vaccine and life's going to reopen back to normal." And there needs to be more education on the longevity that's going to happen before. This is just one step in a process. (N4.3_1-21)

Table 2. Quotes Supporting Theme 2: Tangible Support and Resources the State Provided to NHs

Sub-Theme	Quote & ID
PPE: Providing PPE, helps reduce re-using PPE	I have had to utilize the state reserves three times and that was fairly easy turnaround. There were a couple times they just sent stuff.... Because initially when we were wearing, having to re-wear stuff, use our masks for three days in a row. And then when it was like, "it's not an issue, we have the equipment, if you need the equipment it's here for you." Thank you State of Rhode Island. (N4.2_10-20)
Testing: State is reimbursing for costs of testing	I know the state has set aside some money to pay for testing, that's where we do our bulk of it. So we get some reimbursement for it. (N1.2_10-20)
Vaccination: State coordinated initial vaccine implementation	Vaccinations are going great. The state has put a good plan in place where we now we can get our new residents vaccinated quicker, where then we had two or three clinics set up and that was it. Now they've contracted with other partners to get us the vaccine, so we have another clinic next week and they will vaccinate residents that are new and any staff that want to get vaccinated. (N3.4_4-21)
Financial support: Forgivable workforce stabilization loan used to increase staff wages	So a couple of things that the state did which were helpful, is they did this workforce stabilization loan, it's a forgivable loan, provided the funds are spent on direct-care staff. So I know we applied for it. And I believe most every nursing home and assisted living in the state did. So we were able to give our employees an additional bump by using these funds. (N5.1_10-20)
Staffing: National Guard handles weekly testing	We have the National Guard, this will be, I think, week six. We have, the National Guard comes here every Thursday 1:00 to 4:00, and they test all our staff. And when I say all our staff, they test all our staff. Every person comes in whether it's their day off, they're off-shift. They have been absolutely amazing and vigilant in this process. If they can't make it in that day, we have certain other times either the day before or the day after that we'll make arrangements for them, as long as they reach out to us, and we have had 100% compliance every week. (N2.1_7-20)

Table 3. Quotes Supporting Theme 3: Strengths and Challenges of Guidance and Resources Provided by the State

Sub-Theme	Quote & ID
Strengths: Team assigned during outbreak, collaboration	When we had our first identified case, you get assigned a team. We email them regularly with questions, and they are very responsive, always helping us out. It's nice to have that relationship, the collaborative, which is not necessarily something that's always been the case with state surveyors... But both of us have collaborated. I feel the nursing homes and the Department of Health have been good resources for each other. (N2.2_10-20)
Strengths: Surveyors more collaborative	They [surveyors] do regular communications with us on a weekly basis now... They've been accessible, so if we have questions it's easy to reach out and to talk to them. They've been in all of our buildings doing infection control surveys. They've hit every home in the state, which was a requirement that most of us have found that when they've come, the surveyors that have come out have been very helpful. (N3.1_7-20)
Challenges: Guidelines change frequently requiring constant review	I have an inspection control COVID policy book, that's a huge binder. A lot of those policies come from the Department of Health, CMS Department of Health...We have a consultant company that comes in and assists us in our policies and practices...And they change frequently, especially screening forms when staff come in the building... We get a new policy, we go over it in the morning meeting... because it's been so confusing implementing... I'm still learning with the ever changing policies with the Department of Health. (N1rep.1_4-21)
Challenges: State's regulations might be too strict	They don't always match up. The state has some more stringent rules than the CDC does... It seems to me it would have been the other way around. Don't get me wrong. [governor] has done a good job so, you know, [laugh], dealing with this crisis but, you know, it's just some of it and maybe because she did do overkill. (N4.2_10-20)
Challenges: Disconnect between policymakers and NH realities	My frustration is with government... you've got people making rules and regulations and passing legislation that are not in the trenches, don't understand the realities of the way our facilities function. They try. But without physically doing it you just don't get it. So they're coming up with things that, you know, sometimes it's pounding a square into a circle. You just have to get a bigger hammer. (laughs) (N5.4_7-21)
Thoughts on future, need financial support	I think we all know we can't go back to business as usual, but that was all being talked about before COVID, how do we survive, how does long-term care survive, what do we become? ... What we need, like you said, is the support though, and so that has to come in the way of some kind of financial support. (N3.4_4-21)

DISCUSSION

This qualitative study reflects NH-administrator perspectives on how RI state agencies communicated and implemented COVID-19 regulations and guidelines. Early in the pandemic, guidelines focused on COVID-19 positive admissions requirements, and infection-control measures around visitation, screening, testing, and viral outbreak management. To assist with implementing guidelines, the state supported NHs with PPE, COVID-19 testing and support, additional staffing via the National Guard, financial loans, stimulus funding, and a coordinated vaccine roll-out. Although NH administrators noted many strengths to RI's approach to managing resources and communications during the pandemic, they also reported on the challenges they experienced and offered suggestions for improvement. Findings from this study highlight several key takeaways.

First, as NH administrators in this study reported, RIDOH and QIO provided critically needed support, information and guidance, and became increasingly collaborative over the course of the pandemic. However, the speed with which regulations and guidance changed, along with inconsistencies between state and federal regulations, were a source of frustration and confusion. In preparation for a future health emergency requiring critically important coordination of information and resources, policymakers should consider centralizing communication pathways to reduce duplicative or contradictory directives.¹³

Second, as reported in this study, federal and state guidelines and regulations were frequently implemented with

little advance notice for NH administrators to effectively and efficiently train staff.^{17,18} Additionally, state governmental entities frequently transferred the responsibility of enforcement onto NHs, rather than as a unified public health directive. For example, the COVID-19 vaccine was initially well received by NHs and the public alike as a lifesaving tool to reduce impacts of the virus on NHs, and as the first step towards NHs returning to normal operations. Despite its efficacy in reducing morbidity and mortality of COVID-19,¹⁹ vaccine acceptance has waned in part due to inconsistent enforcement by government bodies. As the long-term care industry works with policymakers to create protocols for future emergencies, addressing inconsistent messaging around public health measures is critically important.

Lastly, given the frequency of changing regulations and guidelines around COVID-19 infection-control measures prior to the vaccine, and the reported disconnect on the part of policymakers with NH experiences,²⁰ administrators in this study indicated that their expertise could contribute towards policy development, improving federal and state understanding of needed resources, staffing, and financial support.

Although our findings may not be generalizable to all RI NHs and reflect administrator perspectives from July 2020–December 2021, they align with a recent report and call to action from the Office of the Inspector General.¹² As recommended in the report and reflected in our findings, effective communication, guidance, and assistance from state

and federal entities during a public health emergency was critically important to the long-term care industry. Policy-makers and industry experts should consider collaborating with NH administrators as they design and improve NH policies and protocols.

References

1. CDC. COVID Data Tracker. Centers for Disease Control and Prevention. March 28, 2020. Accessed September 7, 2023. <https://covid.cdc.gov/covid-data-tracker>
2. U.S. Government Accountability Office. COVID-19 in Nursing Homes: Most Homes Had Multiple Outbreaks and Weeks of Sustained Transmission from May 2020 through January 2021 | U.S. GAO. U. S. Government Accountability Office. May 19, 2021. Accessed August 29, 2025. <https://www.gao.gov/products/gao-21-367>
3. Brazier JF, Meehan A, Shield RR, et al. "All Hands on Deck": Administrator Perspectives on Managing COVID-19 Outbreaks in U.S. Nursing Homes. *JLTC*. Published online November 8, 2023;297-310. doi:10.31389/jltc.237
4. Leland NE, Prusynski RA, Shore AD, et al. Skilled nursing facility staffing shortages: Sources, strategies, and impacts on staff who stayed. *Health Services Research*. 2024;59(6):e14355. doi:10.1111/1475-6773.14355
5. Brazier JF, Geng F, Meehan A, et al. Examination of Staffing Shortages at US Nursing Homes During the COVID-19 Pandemic. *JAMA Netw Open*. 2023;6(7):e2325993. doi:10.1001/jamanetworkopen.2023.25993
6. Crnich CJ. Reimagining Infection Control in U.S. Nursing Homes in the Era of COVID-19. *Journal of the American Medical Directors Association*. 2022;23(12):1909-1915. doi:10.1016/j.jamda.2022.10.022
7. D'Souza GC, Kraschnewski JL, Francis E, et al. Implementation of COVID-19 infection control best practices in nursing homes amid the pandemic. *BMC Health Serv Res*. 2024;24(1):941. doi:10.1186/s12913-024-11407-z
8. Brazier JF, White EM, Meehan A, et al. Rethinking Infection Control: Nursing Home Administrator Experiences during the COVID-19 Pandemic. *Journal of the American Medical Directors Association*. 2024;25(8):105071. doi:10.1016/j.jamda.2024.105071
9. Meehan A, Gadbois EA, Brazier JF, Madrigal C, Grabowski DC, Shield RR. "It's Not a Sprint, It's a Marathon": Stages of Managing a Nursing Home Throughout the Pandemic. *Journal of the American Medical Directors Association*. 2023;24(10):1579-1585.e2. doi:10.1016/j.jamda.2023.04.024
10. End of the Federal COVID-19 Public Health Emergency (PHE) Declaration | CDC. April 5, 2024. Accessed August 29, 2025. https://archive.cdc.gov/www_cdc_gov/coronavirus/2019-ncov/your-health/end-of-phe.html
11. Centers for Disease Control and Prevention. CDC Museum COVID-19 Timeline. March 15, 2023. Accessed June 21, 2024. <https://www.cdc.gov/museum/timeline/covid19.html>
12. Grimm CA. *Lessons Learned During the Pandemic Can Help Improve Care in Nursing Homes*. 2024. <https://oig.hhs.gov/documents/evaluation/9808/OEI-02-20-00492.pdf>
13. Gadbois EA, Brazier JF, Meehan A, et al. Perspectives of nursing home administrators across the United States during the COVID-19 pandemic. *Health Services Research*. 2023;58(3):686-696. doi:10.1111/1475-6773.14104
14. Alnsour MA. Using modified grounded theory for conducting systematic research study on sustainable project management field. *Methods X*. 2022;9. doi:10.1016/j.mex.2022.101897
15. Ritchie J, Lewis J, McNaughton Nicholls C, Ormston R. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. Sage Publications. 2013.
16. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77-101. doi:10.1191/1478088706qp0630a
17. Giri S, Chenn LM, Romero-Ortuno R. Nursing homes during the COVID-19 pandemic: a scoping review of challenges and responses. *Eur Geriatr Med*. 2021;12(6):1127-1136. doi:10.1007/s41999-021-00531-2
18. Davidson PM, Szanton SL. Nursing homes and COVID-19: We can and should do better. *J Clin Nurs*. 2020;29(15-16):2758-2759. doi:10.1111/jocn.15297
19. Zheng C, Shao W, Chen X, Zhang B, Wang G, Zhang W. Real-world effectiveness of COVID-19 vaccines: a literature review and meta-analysis. *International Journal of Infectious Diseases*. 2022;114:252-260. doi:10.1016/j.ijid.2021.11.009
20. Chapman S, Harrington C. Policies Matter! Factors Contributing to Nursing Home Outbreaks During the COVID-19 Pandemic. *Policy, Politics, & Nursing Practice*. 2020;21(4):191-192. doi:10.1177/1527154420959021

Authors

Joan F. Brazier, MS, Brown University School of Public Health, Providence, RI.

Amy Meehan, MPH, Brown University School of Public Health, Providence, RI.

Courtney Hawes, BS, Brown University School of Public Health, Providence, RI.

Eliza Rego, BS, Brown University School of Public Health, Providence, RI.

Emily A. Gadbois, PhD, Brown University School of Public Health, Providence, RI.

Disclosures

Conflicts of interest: Authors declare no conflicts of interest.

Acknowledgment: This work was funded by the Warren Alpert Foundation.

Correspondence

Joan Brazier
Project Director
Center for Gerontology and Healthcare Research
Brown University School of Public Health
121 S. Main St.
Providence, RI 02903
joan_brazier@brown.edu

Greening in Rhode Island and Project G-SPACE

ALIANA RODRIGUEZ ACEVEDO; NAOMI ZELTZER; ABBY KATZ, MA; UGOJI NWANAJI-ENWEREM, PhD; MADELYN DEWITT; ISHA THAKKAR; BETHEL DANIEL; DIANA GRIGSBY-TOUSSAINT, PhD, MPH

ABSTRACT

This article (1) summarizes historical and present greening initiatives across Rhode Island, and (2) illustrates how Project Greenspace, Sleep Patterns, Activity Space, and Environment (G-SPACE) benefits from and builds upon this public health work.

KEYWORDS: Children; greenspace; community greening; sleep; mental health; physical activity

HISTORY OF GREEN INITIATIVES IN RHODE ISLAND

Tree planting and tree equity

Besides enhancing a city's physical beauty, urban forests reduce air pollution, provide natural stormwater management, and offer habitats for birds and pollinators.¹ The American Forests' "Tree Equity Score Analyzer" (TESA) determines the percentages of canopy cover across neighborhoods, and can be used by community organizations to promote tree equity, defined as the right number of trees for all community members to experience the health, economic, social, and other benefits of trees. There are several organizations that have historically engaged in greening initiatives in Rhode Island (RI), particularly Providence and the surrounding urban areas. One such organization is the Providence Neighborhood Planting Program (PNPP), started in 1989 with three goals: to plant street trees across the city, train residents to maintain plantings through a stewardship program, and instill the importance and value of trees and urban forests.² Over 16,000 trees have been planted and maintained in Providence as a result of the PNPP.² Another organization involved with greening initiatives is GroundworkRI, whose Tree Equity Initiative started in 2023, aims to plant 2,000 trees in low-canopy communities of Central Falls, Cumberland, Lincoln, and Woonsocket (GroundworkRI).³ This project continues the work of the previous Trees4US Pawtucket-Central Falls initiative, which planted 197 trees through the Pawtucket-Central Falls Health Equity Zone's Trees for Human Health grant.

Greening schoolyards

In addition to greening city streets, there have been several efforts to increase green spaces in schools. The Providence

Green Schoolyard Initiative is a collaboration between the City of Providence and community partners to transform schoolyards into vibrant green spaces that promote children's health and development.⁴ In 2022, Bailey Elementary School opened Providence's first green schoolyard.⁵ Another initiative is the Children & Nature Network (CNN), a collaborative focused on partnering with cities, including Providence, to enhance green spaces and outdoor learning opportunities; with over \$6 million invested from CNN, Providence has been able to develop a detailed action plan and implement green schoolyard renovations.²

PROJECT G-SPACE

How does Project G-SPACE relate?

Greening efforts by organizations like the PNPP and GroundworkRI have not only allowed for an increase in access to greenspaces by residents, but also enhanced the ability to research how greening efforts impact local communities. Project Greenspace, Sleep Patterns, Activity Space, and Environment (G-SPACE), from the Social Epidemiology (Epi) Lab out of Brown University's School of Public Health, is an ongoing study investigating how access to green space influences the sleep, mental health, and physical activity of elementary school children.⁶ Notwithstanding physical health benefits, few prior studies have explicitly examined the relationships between greenspace, sleep, and mental health. Since 2021, the Lab has worked with children and their families in an attempt to fully disentangle underlying mechanisms accounting for the associations between these critical pillars of overall health and well-being. Ultimately, we hope that findings from Project G-SPACE will provide further evidence to support intervention programs promoting green space access among school-aged children in RI, such as the greening efforts of the organizations already discussed, and serving on the study's advisory board.

Advisory board

The Project G-SPACE advisory board, composed of members from four organizations focused on creating healthier and more equitable communities, has served as a gateway to connecting with our community. In addition to GroundworkRI, the Rhode Island Healthy Schools Coalition (RIHSC) sits on the board. The mission of the RIHSC lies in making schools

across the state healthier by advocating for policies that promote nutrition, physical activity, and mental and emotional wellness for children.⁷ The City of Providence is also represented on the board,⁸ in addition to Thrive Outside, an organization based in Bristol with a mission of ensuring every child has the opportunity to access nature.⁹ The Project G-SPACE advisory board has provided invaluable guidance and strategic advice, and has assisted greatly with expanding our reach across Rhode Island and creating long-lasting community partnerships.

Community work

A key component to the success of Project G-SPACE lies with our community partnerships and their ability to spread awareness of this study to eligible families. The study team has had the privilege of collaborating with five public school districts and nine independent schools across RI, including schools in Bristol-Warren, Central Falls, Cranston, Johnston, Providence, and Newport. In total, public school districts have allowed Project G-SPACE to achieve a student reach of over 6,000, while independent schools have allowed for a student reach of over 3,500. Beyond the mission of G-SPACE, the Lab actively strives to give back to our school communities; one such example was a donation of protective sunglasses to several partnered elementary schools to watch the solar eclipse in April 2024.

In addition to schools, the Lab has been fortunate to collaborate with several other organizations across RI to inform the study protocol and recruitment strategy. The Lab maintains both a virtual and physical outreach presence in an attempt to reach and recruit families within the study demographic, tabling at local events throughout the year, such as farmer's markets, and running radio and social media advertisements. The Lab has also formed connections with both grassroots and institutional environmental health advocates in the state, including GroundworkRI and the Providence Parks Department. The partnership with GroundworkRI is a noteworthy example of the symbiotic relationships the Lab has forged with community organizations through this project; the executive director of GroundworkRI serves on the study's advisory board, offering feedback and recruitment support, while the Lab has provided data collection and analysis expertise to measure the efficacy of their tree-planting initiatives.

CONCLUSION

Importance of this work

Ideally, results from Project G-SPACE will add a health perspective to the important greenspace work already going on in Rhode Island communities, and justify the existence and expansion of these programs. Greenspace exposure is a significant environmental determinant of child morbidity and mortality.¹⁰ Findings from a 2024 study of 2,103 children

ages 2 to 5 years old report that increased greenspace exposure is associated with fewer early-childhood internalizing symptoms such as anxiety and depression.¹¹ However, limited research has been conducted in diverse cohorts of United States children in middle-to-late childhood living specifically in urban cities, a key gap addressed by Project G-SPACE. Childhood consists of important developmental windows where factors such as a lack of daily exposure to greenspace and insufficient sleep can have cumulative effects on learning, emotional health, and long-term wellbeing. In urban communities like Providence, understanding the role of greenspace in attenuating adverse health effects and promoting improved wellness strengthens efforts to address disparate health outcomes facing the city. Project G-SPACE is not only relevant to the community as a collective, but also has significant implications for families, schools, and city-wide organizations that strive to mobilize evidence-based research to enhance children's quality of life and daily habits; through generating locally grounded data, the study can inform programming and tailored public-health initiatives that seek to ensure each child has access to safe and quality greenspace, bridging research with practice.

The Future

Project G-SPACE illustrates the strength of research-community partnerships to promote the health and wellbeing of Rhode Islanders. Preliminary findings suggest there are protective effects of greenspace exposure and physical activity on sleep quality and mental health of elementary school-aged children. Given the diverse population across the state, it is important to investigate these outcomes stratified by sociodemographic factors to uncover potential health disparities. Forthcoming longitudinal analyses will further elucidate these pathways to help identify mechanisms for equitable research and policy intervention. Existing greening initiatives such as tree planting and landscape design are likely to have indirectly impacted these results. To maximize greenspace resource allocation and related health benefits, future work should leverage strategic collaborations between researchers, community organizations, and other stakeholders to directly evaluate greening programs and initiatives.

References

1. Marrazzo G, Raimondi A. 2025. The role of urban trees as nature-based solutions for stormwater runoff control. *Urban Forestry and Urban Greening*. 2025; 103:128598.
2. Nature Everywhere Community Spotlight: Providence, Rhode Island | C&NN. *Children @ Nature Network*. Retrieved November 25, 2025, from <https://www.childrenandnature.org/resources/community-spotlight-providence-rhode-island/>
3. GroundworkRI. 2025. *Groundwork Rhode Island*. <https://groundworkri.org/>
4. Groundwork Rhode Island. *About – Groundwork Rhode Island*. <https://groundworkri.org/about/>

5. Providence Neighborhood Planting Program. 2025. <https://pnpp.org/>
6. Providence opens first 'green schoolyard.' 2022, November 21. *WPRI.com*. <https://www.wpri.com/news/local-news/providence/providence-opens-first-green-schoolyard/>
7. Grigsby-Toussaint DS, Shin JC, Acevedo AR, et al. 2024. Project G-SPACE: protocol for exploring the influence of green space on sleep and mental health among children. *BMC Pediatrics*. 24(1): 783. <https://doi.org/10.1186/s12887-024-05247-3>
8. Rhode Island Healthy Schools Coalition. *Our organization*. <https://www.rihsc.org/our-organization/>
9. The Providence Green Schoolyard Initiative—Outdoor Learning Ideascapes -11172022. *City of Providence*. Retrieved November 25, 2025, from <https://www.providenceri.gov/the-providence-green-schoolyard-initiative-outdoor-learning-ideascapes-11172022/>
10. Who we are | Thrive outside. Thrive Outside. <https://www.thriveoutside.info/about-5>
11. Zhang L, Wang Q, Lei R, et al. Greenness on mortality of infant and under-5 child: A nationwide study in 147 Chinese cities. *Ecotoxicology and Environmental Safety*. 2024;286:117184.
12. Towe-Goodman N, McArthur KL, Willoughby M, et al. Green Space and Internalizing or Externalizing Symptoms Among Children. *JAMA Netw Open*. 2024;7(4):e245742. doi:10.1001/jamanetworkopen.2024.5742

Authors

- Aliana Rodriguez Acevedo, Brown University School of Public Health, Providence, RI.
- Naomi Zeltzer, Brown University School of Public Health, Providence, RI.
- Abby Katz; MA, Brown University School of Public Health, Providence, RI.
- Ugoji Nwanaji-Enwerem, PhD, Brown University School of Public Health, Providence, RI.
- Madelyn Dewitt, Brown University School of Public Health, Providence, RI.
- Isha Thakkar, Brown University School of Public Health, Providence, RI.
- Bethel Daniel, Brown University School of Public Health, Providence, RI.
- Diana Grigsby-Toussaint, PhD, MPH, Brown University School of Public Health, Providence, RI.

Disclosure

None of the authors has anything to disclose.

Correspondence

Diana Grigsby-Toussaint, PhD, MPH
Brown University School of Public Health
121 South Main St.
Providence, RI 02903
diana_grigsby-toussaint@brown.edu

Addressing Chronic Steatotic Liver Disease through Community Partnerships, Integrated Behavioral Interventions, and Point-of-Care Diagnostics

HAYLEY TRELOAR PADOVANO, PhD; MOLLIE A. MONNIG, PhD; ARDHYS DE LEON, PhD; KITTICHAJ PROMRAT, MD; MARIA DE SOUSA; JULISSA GODIN, BA; JACOB TALAMANTES, BA; ABIGAIL MORALES, AM; KEVIN MCCURDY, BA; WENDY HERNANDEZ; STEPHANIE GOLDSTEIN, PhD; PETER M. MONTI, PhD; MORGAN LEONARD

ABSTRACT

OBJECTIVE: To evaluate the feasibility of a community-based, point-of-care (POC) screening and intervention model for Metabolic and Alcohol-associated Liver Disease (MetALD) in an underserved Rhode Island population.

APPROACH: A partnership between the Brown University CADRE and Clínica Esperanza/Hope Clinic (CEHC) utilized electronic health record (EHR) screening followed by on-site FibroScan® imaging and a Motivational Interviewing (MI) lifestyle intervention.

RESULTS: Preliminary pilot data identified liver stiffness (fibrosis) in 21% of participants and steatosis in 57%. All identified patients were previously unaware of their condition.

CONCLUSIONS: Integrating POC diagnostics with culturally attuned behavioral interventions in a community-centric clinic can bypass traditional barriers to care and detect “silent” liver disease at treatable stages.

KEYWORDS: MetALD; metabolic and alcohol-associated liver disease; community-based participatory research; steatotic liver disease; vibration-controlled transient elastography; VCTE™; FibroScan®

INTRODUCTION

Steatotic liver disease (SLD) affects approximately 40% of North Americans,¹ with progression to advanced stages posing a major threat to individual lives and global public health.^{2,3} Common, intersecting lifestyle risk factors include at-risk drinking and weight-related behaviors, both of which are preventable.⁴ In the United States (U.S.), alcohol consumption is now the leading cause of liver transplantation and liver-related deaths, with mortality rates doubling from 1999 to 2022, with an 8.9% increase since 2018.⁵ This trend is worsened by a growing global presence of metabolic syndrome, which acts synergistically with alcohol use to produce cirrhosis and hepatocellular carcinoma.^{6,7} Community-based interventions targeting these modifiable behaviors could save the U.S. hundreds of billions of dollars annually and save tens of thousands of lives.^{8,9}

In Rhode Island (RI), the impact of intersecting risks could be devastating.¹⁰ Two-thirds of RI adults experience

overweight or obesity,¹¹ and the obesity rate is expected to increase 47% by 2030.¹² One in 10 Rhode Islanders have a diabetes diagnosis, and one in four report a complete lack of any physical activity or exercise outside their regular job.¹³ Post-COVID-19 economic hardships have further linked food insecurity to poorer diet quality and problematic alcohol use.^{14,15} On average, 367 RI residents die annually from alcohol-related chronic conditions, two-thirds of which are attributed to alcohol-associated liver disease (ALD).¹⁶ Alcohol use disorder (AUD) diagnoses were cited for the majority of the remaining deaths (30.5%), with the prevalence of undiagnosed liver disease unknown among them.¹⁶⁻¹⁹ The number of RI women dying from these conditions rose by 34.2% in just five years,¹⁶ aligning with national trends.²⁰ Fully alcohol-attributable deaths from chronic conditions peaked in 2020, underscoring the potential influence of limited care access.¹⁶

SLDs are classified by etiology and include metabolic dysfunction-associated steatotic liver disease (MASLD), alcohol-associated liver disease (ALD), and a recently added diagnosis of MASLD with excessive alcohol consumption, designated metabolic and alcohol-associated liver disease (MetALD).²¹ Crucially, MetALD recognizes dual contributions of cardiometabolic factors and alcohol use.²¹ Combined effects of metabolic and alcohol risk-pathways work synergistically to increase risk for steatosis (liver fat), fibrosis (liver scarring), and hepatocellular carcinoma (HCC) liver cancer.²²⁻²⁴ Despite compounding risks,²⁵ the combination of alcohol and obesity-related pathways in MetALD is rarely studied or treated together.²⁶ Without intervention, the prevalence of modifiable lifestyle risk factors will continue to rise.²⁷ Deaths could double by 2040, with populations experiencing health disparities hit the hardest.^{28,29} Importantly, silently progressing steatosis and/or fibrosis caused by MetALD often go unnoticed until later stages, yet would be preventable or treatable if addressed earlier.³⁰ Screening and intervention strategies that support earlier detection of risk factors and/or liver disease progression among populations experiencing disparities are sorely needed.³¹

RI disparities in liver health

Although liver-related mortality continues to rise across RI and nationally, the burden is not shared equally. Nationwide, acceleration in alcohol-associated liver deaths is

significantly worse for adults ages 25 to 44, females, and Hispanic communities, highlighting a crisis in early detection and linkage to care.^{5,20} Similarly, the prevalence of obesity and chronic disease comorbidities is disproportionately high in people experiencing poverty, those without health insurance, and in Hispanic communities.³² Where MetALD prevalence is ≈2.2–2.6% among U.S. adults overall,^{26,33} it is ≈8.0–12.6% among Hispanic adults, a 4-to-6-fold disparity.²⁴ Likewise, liver cancer incidence and mortality disproportionately affect Hispanic communities in RI, and the rate for Hispanic females was higher (7.9) than the national rate (6.1).³⁴ According to assessments of community needs, residents living in Providence, Central Falls, and Pawtucket neighborhoods are more likely to die of preventable chronic diseases and lack of healthcare access due to elevated poverty, language barriers, and high rates of uninsurance.³⁵

There is a critical, unmet need for integrated interventions that are culturally relevant and delivered through existing community healthcare systems to reduce disparities via early disease detection and connection to life-saving care.³⁶ Socially constructed systems of disadvantage contribute to disparities in income, resources, and insurance status, creating insurmountable barriers at each phase of liver-health care, from screening to diagnosis and treatment.³⁷ People who eventually die of preventable liver damage often have multiple missed opportunities for detection and intervention for alcohol- and weight-related risk factors.^{4,38} Current care systems predominantly focus on disease management rather than targeted prevention, and people from populations most affected are often unaware of their diagnosis until advanced stages.³⁹ Improving early detection of steatosis and fibrosis at point-of-care (POC) settings offers a crucial response to this growing crisis, leveraging established health-disparity research frameworks and partnerships with RI community clinics serving at-risk populations.⁴⁰

Brief behavioral interventions are effective for changing modifiable lifestyle risks, but they are not available to most who need them.⁴¹ Access to preventative and early-intervention resources are especially lacking among RI communities experiencing poverty and disparities in fatal diseases and cancers.³⁴ Although compliance with behavior-change recommendations is a challenge for any chronic, fluctuating health problem, the stigma around alcohol-related health conditions and obesity is staggering.⁴² Too often, individuals are blamed for health problems caused by modifiable behaviors, without acknowledgment of the vast evidence that socioeconomic health determinants intersect with personal risks to drive disparities in health outcomes.⁴³ Experts are calling for a multipronged approach to decrease the morbidity and mortality of chronic SLDs, including population-based screening in primary care settings to detect behavioral risk factors and liver damage at early stages.⁴⁴

Early detection to save livers and lives

To dismantle logistical barriers, the clinical paradigm must shift from passive referral-based models to active POC efforts that extend and integrate the care continuum directly into the communities experiencing liver-related health disparities. **Table 1** provides a comparison of traditional, referral-based liver screening pathways that require patients to navigate a complex health-system structure versus an integrative, POC model that provides rapid results and mitigates risk of patients falling through the cracks of fragmented care systems. Traditional pathways often require separate appointments for lab work, imaging at specialty centers, and follow-up consultations. These are inadequate to support RI communities facing practical barriers to proper health-care access. POC diagnostic testing, specifically vibration-controlled transient elastography (VCTE™) with FibroScan®, can offer a cost-effective solution to condense this timeline and save RI lives.

The Center for Addiction and Disease Risk Exacerbation (CADRE) leverages RI’s status as an IDeA state to drive biomedical and clinical innovation. Funded by the National Institute of General Medical Sciences (NIGMS), CADRE is a Center of Biomedical Research Excellence (COBRE) that seeks to understand mechanisms through which alcohol and other drugs increase risk for and progression of chronic diseases. CADRE-supported research included the Pathways project, a specialty-care initiative based at the Rhode Island Hospital (RIH) Hepatology Clinic on Chapman Street in Providence, RI, designed to identify and treat

Table 1. Comparison of logistical barriers in a traditional liver health screening pathway versus a point-of-care (POC) diagnostic testing model.

	Traditional Referral Model	Point-of-Care (POC) Testing
Diagnostic Speed	Weeks to months (separate labs/imaging, appointments, locations)	Minutes to hours (same-day appointments and results)
Patient Burden	High (multiple commutes, time off work, need to secure childcare)	Low (single visit in familiar location)
Loss to Follow-up	High (attrition at every referral step)	Minimal (immediate linkage to first-stage intervention and resource access)
Primary Focus	Specialist (lacking care coordination)	Community, Primary care (patient navigators/ navegantes are advocates and liaison to providers)
Stigma Mitigation	Weak (depends on patient-initiated action & referrals to “other” care)	Strong (screening is a part of linguistically and culturally appropriate routine care)
Overall Goal	Treatment, disease management	Early detection, disease prevention

moderate-to-severe AUD as an underlying cause of ALD in patients with advanced disease. This study utilized ecological momentary assessment (EMA), implemented on a customized smartphone application, and blood-based biomarkers (eg, phosphatidylethanol [PEth], a direct alcohol metabolite), to bridge the gap between clinical visits and daily life. While Pathways demonstrated the efficacy of telehealth-delivered motivational interviewing (MI), it also highlighted a critical need. Most individuals at highest risk of chronic SLD from behavioral etiologies never reach specialty clinics until their disease is advanced. To bridge this gap, the CADRE mobilized a team science focus to implement a community-based, POC model by partnering with Clínica Esperanza/Hope Clinic (CEHC).

CEHC partnership

CEHC is a nonprofit, holistic care center founded in 2007 to provide high-quality, culturally attuned and linguistically appropriate healthcare to uninsured adults in RI. It serves as a vital medical home for those who have been marginalized by traditional healthcare systems. Clinic demographics match those identified in community-based needs assessments. Most (90%) are Spanish-speaking, and 80% are living below the federal poverty line with an annual income less than \$20,000. Common chronic diseases among CEHC patients include hypertension (59%), diabetes (41%), and hyperlipidemia (22%). Since 2013, the clinic's visit and patient volume increased nearly four-fold, demonstrating an extraordinary and accelerating need for care. Total visits peaked at over 11,200 visits annually by 2025, serving 3,317 unique individuals and showing record-high engagement at 3.41 visits per patient, on average. Moreover, new patient acquisition has scaled nearly ten-fold since CEHC opened. Together, these dramatic increases signal that the community need is not only growing but that patients are increasingly relying on CEHC for consistent, high-frequency support. CEHC's strong community engagement provided the foundation for our partnership, which aimed to improve screening, reduce stigma, and offer no-cost diagnostic liver imaging with FibroScan®.

APPROACH

Conceptual framework

The Liver Health Study at CEHC was designed as an interdisciplinary collaboration leveraging expertise in hepatology, alcohol science, biomarker discovery, and weight management. This team initiative investigated the viability of screening for MetALD at the POC in a community clinic. The key premise was that providing personalized feedback from POC diagnostics can reduce biobehavioral risk factors and prevent the progression of liver damage to advanced disease. The project also established procedures to explore a non-invasive plasma biomarker panel that predicts steatosis

and fibrosis, using FibroScan® as a reference standard. A scaffolded flow of screening, risk stratification, and preventative intervention is possible through combining chart reviews, behavioral screening, and POC diagnostic testing. Moreover, immediate access to proven behavioral interventions can be aligned with the cultural and readiness-to-change needs of the patients served. This pilot initiative was approved by the Brown University Institutional Review Board.

Screening and risk stratification

The Liver Health Study used an efficient two-stage screening process to target adults over the age of 21 with multiple health-risk factors. Review of electronic health records (EHRs) identified patients with body mass index (BMI) of 25+ and an Alcohol Use Disorder Identification Test—Consumption⁴⁵ (AUDIT-C) score of 3 for women and 4 for men, respectively.⁴⁶ Positive EHR results prompted POC behavioral screening with a semi-structured timeline followback interview to quantify recent alcohol intake⁴⁷ and diagnostic imaging using VCTE™ with FibroScan® to detect steatosis and fibrosis.⁴⁸ CADRE's ability to locally support other research teams aiming to use FibroScan® at POC offers a reproducible model for clinical partnerships throughout the state. Randomization procedures were piloted to allocate patients into either standard or enhanced brief MI lifestyle intervention. After BMI/AUDIT-C screening and Fibro Scan®-informed risk classification, the intervention was delivered by a bilingual and bicultural interventionist with doctoral-level training in clinical psychology and MI supervised by the primary researcher, an RI-licensed psychologist. The interventionist sought to ensure the nuances of cultural health beliefs and language were respected.

MI lifestyle intervention

The brief MI lifestyle intervention spanned one month, beginning with a 60-minute in-person session following baseline assessments, followed by two 10-minute telephonic check-ins, and concluding with a 30-minute in-person booster session after follow-up. The intervention applied MI principles and techniques to enhance patients' perceived importance of modifying lifestyle risks for MetALD, while fostering the confidence and autonomy necessary for change.⁴⁹ Adherence to the relational pillars of partnership and empathy was supported by a detailed manual with semi-scripted prompts, drawing on decades of established research.^{50,51} Technical components, such as cultivating change talk and softening sustain talk, were strategically employed to guide patients in developing initial change plans that capitalized on personal facilitators while preemptively addressing barriers.

In the standard (control) condition, a clinical handout facilitated discussions by providing information on the progressive course of steatotic liver disease, as well as connections between liver health and alcohol consumption, dietary quality, and physical activity [Figure 1].⁵² In the enhanced

Figure 1. Liver health information and personalized feedback report

[A] Information on lifestyle risks and the progressive course of steatotic liver disease and [B] personalized feedback with alcohol-consumption risk stratification, enhanced with fibrosis (kPA) and [C] steatosis (CAP™) scores and [D] liver health connections. All participants received information depicted in A and D; those randomized to the enhanced condition also received personalized feedback depicted in B and C.

A School of Public Health

Mantener nuestro hígado saludable

¿Qué hace el hígado?

El hígado es uno de nuestros órganos más grandes e importantes. Tiene muchas funciones:

- Limpia nuestra sangre
- Produce proteínas que nos ayudan a sanar
- Guarda vitaminas, azúcares y grasas
- Ayuda a regular las hormonas
- Envía nutrientes para alimentar tu cuerpo
- Produce la bilis necesaria para digerir las grasas



¿Cómo daña el alcohol a nuestro hígado?

Beber alcohol de cualquier tipo daña nuestro hígado. Aquí te explico cómo:

- Algunas células del hígado mueren al tratar de eliminar el alcohol de nuestra sangre.
- El consumo de alcohol hace que se acumule grasa en el hígado.
- Beber mucho o durante mucho tiempo reemplaza las células sanas por cicatrices.
- Si tienes cicatrices en el hígado (cirrosis), ninguna cantidad de alcohol es saludable.

Beber menos es mejor para la salud que beber más.
Los especialistas del hígado coinciden en que las mujeres que toman >1 bebidas al día, de forma regular, tienen más probabilidades de desarrollar una enfermedad hepática. El daño al hígado o otros efectos en la salud pueden ocurrir también, aunque bebamos mucho menos.

La mala noticia es:

- Si no hacemos nada, el daño a nuestro hígado puede empeorar, aunque no lo notamos de inmediato.
- Cosas como comer alimentos altos en grasa o no hacer ejercicio empeoran los efectos del alcohol a nuestro hígado.

La buena noticia es:

- Muchas cosas que dañan el hígado, como lo que comemos o bebemos, son cosas que podemos cambiar.
- Nuestro hígado a menudo puede sanarse a sí mismo si bebemos menos o dejamos de beber a tiempo.

B School of Public Health

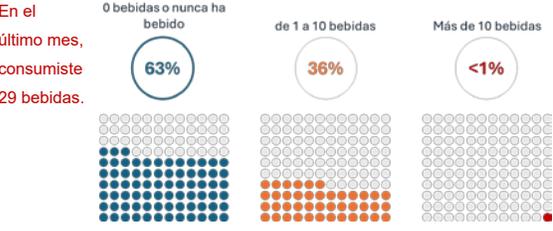
Mantener nuestro hígado saludable

¿Cómo se compara tu # total de bebidas?

Esta figura muestra el porcentaje de mujeres hispanas o latinas en los EE. UU. que tomaron 0 tragos, De 1 a 10 bebidas, o Más de 10 bebidas (en los últimos 30 días).

En el último mes, consumiste 29 bebidas.

Categoría	Porcentaje
0 bebidas o nunca ha bebido	63%
de 1 a 10 bebidas	36%
Más de 10 bebidas	<1%



Riesgo Grave = 6 a 12 puntos. Solo el 1% bebe en este rango.
Riesgo Alto = 3 a 7 puntos. Solo el 2% bebe en este rango.
Riesgo Medio = 3 a 5 puntos. Only 15% drink in this range.
Riesgo Bajo = 0 a 2 puntos. El 62% bebe en este rango o no bebe en absoluto.

• = 1 de cada 100 mujeres

Su puntaje de riesgo = 7

Según sus informes de consumo en el último año, obtuviste un puntaje en la zona de riesgo ALTO.

Solo el 15% de las mujeres beben a este nivel.
El 82% de las mujeres bebe menos.

C School of Public Health

Mantener nuestro hígado saludable

El Estado de su Hígado

La fibrosis (cicatrices en el hígado) se clasifica en etapas, desde F0 = Buena salud hepática hasta F4 = Cicatrices hepáticas graves.

Su Resultado:
kPA = 5.2
Etapa de fibrosis = F0



La esteatosis (grasa en el hígado) se clasifica en etapas, desde S0 = Muy poca o ninguna acumulación de grasa en el hígado hasta S3 = Acumulación severa de grasa en el hígado.

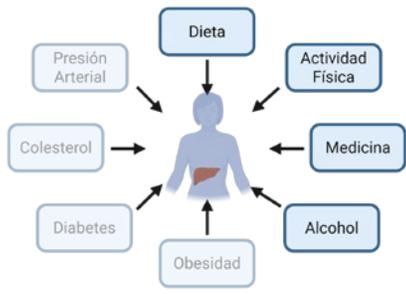
Su Resultado:
CAP™ = 270
Etapa de esteatosis = S2



D School of Public Health

Mantener nuestro hígado saludable

Conexiones de Salud Hepática



Sources:
American Liver Foundation. (2023). *What does your liver do?* American Liver Foundation. <https://liverfoundation.org/about-your-liver/facts-about-liver-disease/what-does-your-liver-do/>
Cleveland Clinic. (2023). *Fatty liver disease.* Cleveland Clinic. <https://my.clevelandclinic.org/health/diseases/15831-fatty-liver-disease>
U.S. Department of Veterans Affairs. (n.d.). *Hepatitis and alcohol: Single page.* U.S. Department of Veterans Affairs. <https://www.hepatitis.va.gov/alcohol/patient/single-page.asp>

(experimental) condition, the handout also provided personalized risk stratification based on self-reported drinking patterns, gender, ethnicity, and FibroScan® results. The interventionist used this report to highlight discrepancies between the patient's current lifestyle and their stated values or future goals.⁵³ Throughout the process, the interventionist remained attuned to the participant's fluctuating readiness to change, implementing specific strategies to facilitate the transition from building motivation to strengthening commitment and action planning. Importantly, study outcome assessors were masked to condition.

FibroScan® integration

For liver screening, the trained operator positions the probe in the intercostal space along the mid-axillary line lateral to the xiphoid and perpendicular to the abdominal skin surface, such that the probe can non-invasively and painlessly assess the center of the liver. The probe emits a shear wave through tissue to obtain the liver stiffness measurement (LSM) for fibrosis assessment and, simultaneously, an ultrasound wave to obtain the controlled attenuation parameter (CAP™) for steatosis assessment. The SmartExam Acquisition Interface screen simultaneously displays ultrasound quality control metrics, probe feedback, CAP™ acquisition progress, and the real-time shear wave propagation map.

Strategic integration of FibroScan® screening and MI lifestyle intervention hinged on the integration of Navegantes (ie, community health workers), a designated CEHC staff liaison to study staff, and collaboration between CEHC leadership and the Brown University investigative team. Navegantes facilitated communication, assisted with administrative tasks, and conducted community outreach. This reciprocal model ensured that the research was mutually beneficial through enhancing the clinic's capacity to serve its patients. The capstone of the CEHC and CADRE collaboration was the implementation of VCTE™ with FibroScan®. Traditionally, liver imaging includes logistical barriers that preclude inclusion of CEHC patients in no-cost liver-health screening and behavior-change support, including separate appointments and significant travel. By bringing the FibroScan® directly into the CEHC clinic and pairing it with immediate brief MI intervention and personalized feedback, the diagnostic timeline was condensed from months or weeks to hours or minutes. Moreover, intervention to promote multiple behavioral lifestyle changes was implemented in a familiar setting, with linkage to specialty AUD and hepatology care facilitated by project and clinic staff already familiar to patients. Diagnostic testing at the POC identified silently progressing fibrosis and steatosis in an at-risk population experiencing poverty and cultural and linguistic barriers to traditional liver-screening pathways. **Figure 1** provides an example of visual and numerical personalized feedback that helped patients understand their liver health risks, serving as a biologically-based anchor for

encouraging behavior change. The personalized report and all study materials were provided in Spanish; for an English translation, see **Supplemental Material** (please email corresponding author for supplemental material).

Community integration and infrastructure

All participants regardless of condition underwent FibroScan®. Acquisition of the FibroScan® device and staff training and certification for its proper use were made possible by the CADRE Clinical Lab Core (CLC). The CLC is committed to advancing scientific discovery through technologies capable of producing objective, quantitative measures of disease progression or improvement in response to investigational interventions. The FibroScan® instrument exemplifies this capacity and has become increasingly relevant due to the growing burden of liver disease over the past decade. Interest in FibroScan® has been diverse among RI research teams. For example, studies have evaluated its potential role in routine clinical examinations and investigated how comorbidities such as heart failure may influence liver health. FibroScan® diagnostic results are concordant with those obtained from more costly and less accessible technologies. The CADRE CLC operates under a fee-for-service model; interested investigators can access a list of available services at <https://cadre.sph.brown.edu/cores/clc>. Investigators interested in scientific collaboration may contact the corresponding author.

Preliminary findings and clinical impact

There were over 300 EHRs reviewed, ultimately leading to enrollment of 14 patients in no-cost VCTE™ screening with FibroScan®. Of 58 initial screens completed, 43% were potentially eligible to participate. Of 17 in-person screenings, 14 patients met all participation criteria (82% eligibility rate). All 14 eligible patients enrolled in the study and received no-cost blood tests and FibroScan® screening (100% acceptability rate), and 13 engaged in an MI lifestyle intervention to address modifiable risk factors for MetALD (93% acceptability rate). Twelve participants completed all baseline and follow-up assessments (86% retention rate). Due to budget and timeline constraints, the protocol of the pilot trial did not include a repeated FibroScan®, though blood tests were repeated and there are proposals under review to conduct a full-scale randomized controlled trial.

Of relevance for the RI medical community, VCTE™ with FibroScan® identified three CEHC patients with LSM (kPA) scores indicating fibrosis—21% of study participants. When the study physician indicated that a participant had an abnormal blood or FibroScan® result, both results were sent by encrypted email to the clinic coordinator and lead clinic physician. For non-urgent results, the clinic added their results to their EHR to address at the next upcoming appointment. For urgent results, an appointment was made at CEHC as soon as possible with a referral to the RIH

Hepatology Clinic. The CAP™ score identified eight patients with liver-fat buildup—57% of study participants. Prior to participation, these patients were unaware of their disease and had not received liver-health screening or specialty services. Detailed empirical findings from this exemplary research partnership are forthcoming (Treloar Padovano et al, in preparation), and primary feasibility and acceptability outcomes are publicly registered at clinicaltrials.gov under record number NCT06924281.

DISCUSSION

Reciprocity in research and clinical benefit is paramount. The vital partnership between the Brown University CADRE and CEHC exemplifies a strategic model that bridges the gap between clinical research and community benefit. By integrating specialized liver-health resources into a trusted medical home, the collaboration addressed four critical needs: (1) reducing disparities by overcoming linguistic and logistical barriers to screening; (2) implementing personalized, POC alcohol and weight-related behavioral interventions; (3) mitigating the stigma associated with liver disease through culturally attuned motivational interviewing; and (4) providing no-cost diagnostic imaging to an at-risk, uninsured population.

CEHC's role was foundational to this success. The clinic facilitated seamless integration by embedding research objectives within existing workflows, facilitating patient outreach through Navegantes, and supporting administrative tasks, such as scheduling and follow-up. This synergy allowed for the immediate provision of personalized feedback from FibroScan® results, which served as a catalyst for behavior change. With just 14 scans, we identified three patients with fibrosis and eight with steatosis. The Liver Health Study's high hit rate underscores the immense need for targeted screening and preventative interventions for SLD among RI's Hispanic communities. Integrating screening and behavior-change support into the medical home, especially one as trusted as CEHC, allows the "silent" progression of MetALD to be interrupted and patient voices to be heard. Importantly, upon completion of the study, the corresponding author and interventionist disseminated results of the successful pilot trial to CEHC stakeholders, including Navegantes, leadership, and providers.

CONCLUSIONS

The partnership between the CADRE and CEHC represents a shift toward strategic health promotion by providing accessible screening, early detection, and chronic disease prevention. When a patient receives a FibroScan® result showing liver fat or stiffness, they see firsthand the body's reaction to their lifestyle behaviors. Congruently, by using POC diagnostic testing and culturally attuned behavioral

interventions, clinicians can detect liver disease at stages where lifestyle change is a viable solution and then provide immediate support. To save the lives of Rhode Islanders most in need, multidisciplinary teams must continue to dismantle the logistical and societal barriers to chronic disease prevention.

References

- Almahanna Y, Idalsoaga F, Díaz LA, et al. Natural history and outcomes of MASLD and MetALD following non-alcoholic fatty liver disease reclassification in a Canadian cohort. *Annals of Hepatology*. 2026;31(1):102166. doi:10.1016/j.aohp.2025.102166
- Ginès P, Serra-Burriel M, Kamath PS. Metabolic Dysfunction-Associated Steatotic Liver Disease—The New Epidemic of Chronic Liver Disease. *JAMA Netw Open*. 2025;8(6):e2516381. doi:10.1001/jamanetworkopen.2025.16381
- Balakrishnan M, Rehm J. A public health perspective on mitigating the global burden of chronic liver disease. *Hepatology*. 2024;79(2):451-459. doi:10.1097/HEP.0000000000000679
- Monnig MA, Treloar Padovano H, Monti PM. Alcohol-associated liver disease and behavioral and medical cofactors: unmet needs and opportunities. *Frontiers in Public Health*. 2024;12. doi:10.3389/fpubh.2024.1322460
- Pan CW, Abboud Y, Chitnis A, Zhang W, Singal AK, Wong RJ. Alcohol-Associated Liver Disease Mortality. *JAMA Netw Open*. 2025;8(6):e2514857. doi:10.1001/jamanetworkopen.2025.14857
- Siegel AB, Zhu AX. Metabolic Syndrome and Hepatocellular Carcinoma: Two Growing Epidemics with a Potential Link. *Cancer*. 2009;115(24):5651-5661. doi:10.1002/cncr.24687
- Lonardo A, Weiskirchen R. Liver and obesity: a narrative review. *Explor Med*. 2025;6:1001334. doi:10.37349/emed.2025.1001334
- World Obesity Day Atlases | Obesity Atlas 2025. World Obesity Federation Global Obesity Observatory. Accessed October 2, 2025. <https://data.worldobesity.org/publications/?cat=23>
- Sacks JJ, Gonzales KR, Bouchery EE, Tomedi LE, Brewer RD. 2010 National and State Costs of Excessive Alcohol Consumption. *American Journal of Preventive Medicine*. 2015;49(5):e73-e79. doi:10.1016/j.amepre.2015.05.031
- Community Health Needs Assessment (CHNA) Report. CharterCARE Health Partners, 2022. Accessed January 15, 2026. <https://www.chartercare.org/globalassets/chartercare-2022-chna-report.pdf>
- BRFSS Prevalence & Trends Data. Published online 2023. Accessed January 15, 2026. <https://www.cdc.gov/brfss/brfssprevalence/>
- Ward ZJ, Bleich SN, Cradock AL, et al. Projected U.S. State-Level Prevalence of Adult Obesity and Severe Obesity. *N Engl J Med*. 2019;381(25):2440-2450. doi:10.1056/NEJMsa1909301
- McAtee CM, Gadkari I. Physical Inactivity Among Rhode Island Adults. *RI Med J* (2013). 2025 Nov 3;108(11):54-56. PMID: 41150628.
- Pan L, Sherry B, Njai R, Blanck HM. Food Insecurity Is Associated with Obesity among US Adults in 12 States. *Journal of the Academy of Nutrition and Dietetics*. 2012;112(9):1403-1409. doi:10.1016/j.jand.2012.06.011
- Nagata JM, Whittle HJ, Ganson KT, Tabler J, Hahn JA, Weiser SD. Food insecurity risk and alcohol use disorder in US young adults: Findings from the National Longitudinal Study of Adolescent to Adult Health. *American J Addict*. 2021;30(6):601-608. doi:10.1111/ajad.13218
- Ledingham EM, St John K, Hallowell BD. Deaths Involving Fully Alcohol-Attributable Chronic Conditions in Rhode Island: 2018-2022. *RI Med J* (2013). 2023 Nov 1;106(10):60-63. PMID: 37890068.
- Åberg F, Byrne CD, Piroola CJ, Männistö V, Sookoian S. Alcohol consumption and metabolic syndrome: Clinical and epidemiological impact on liver disease. *Journal of Hepatology*. 2023;78(1):191-206. doi:10.1016/j.jhep.2022.08.030
- Åberg F, Färkkilä M, Männistö V. Interaction Between Alcohol Use and Metabolic Risk Factors for Liver Disease: A Critical Review of Epidemiological Studies. *Alcoholism: Clinical*

- and Experimental Research. 2020;44(2):384-403. doi:10.1111/acer.14271
19. Åberg F, Färkkilä M. Drinking and Obesity: Alcoholic Liver Disease/Nonalcoholic Fatty Liver Disease Interactions. *Seminars in Liver Disease*. 2020;40(2):154-162. doi:10.1055/s-0040-1701443
 20. Singal AK, Arsalan A, Dunn W, et al. Alcohol-associated liver disease in the United States is associated with severe forms of disease among young, females and Hispanics. *Alimentary Pharmacology & Therapeutics*. 2021;54(4):451-461. doi:10.1111/apt.16461
 21. Rinella ME, Lazarus JV, Ratziu V, et al. A multisociety Delphi consensus statement on new fatty liver disease nomenclature. *Ann Hepatol*. 2024;29(1):101133. doi:10.1016/j.aohep.2023.101133
 22. Idalsoaga F, Kulkarni AV, Mousa OY, Arrese M, Arab JP. Non-alcoholic Fatty Liver Disease and Alcohol-Related Liver Disease: Two Intertwined Entities. *Frontiers in Medicine*. 2020;7(August):1-17. doi:10.3389/fmed.2020.00448
 23. Szabo G, Kamath PS, Shah VH, Thursz M, Mathurin P. Alcohol-Related Liver Disease: Areas of Consensus, Unmet Needs and Opportunities for Further Study. *Hepatology*. 2019;69(5):2271-2283. doi:10.1002/hep.30369
 24. Ochoa-Allemant P, Marrero JA, Serper M. Racial and ethnic differences and the role of unfavorable social determinants of health across steatotic liver disease subtypes in the United States. *Hepatol Commun*. 2023;7(12):e0324. doi:10.1097/HCP.0000000000000324
 25. Loomba R, Wong VWS. Implications of the new nomenclature of steatotic liver disease and definition of metabolic dysfunction-associated steatotic liver disease. *Aliment Pharmacol Ther*. 2024;59(2):150-156. doi:10.1111/apt.17846
 26. Kalligeros M, Vassilopoulos A, Vassilopoulos S, Victor DW, Mylonakis E, Nouredin M. Prevalence of Steatotic Liver Disease (MASLD, MetALD, and ALD) in the United States: NHANES 2017–2020. *Clinical Gastroenterology and Hepatology*. 2024;22(6):1330-1332.e4. doi:10.1016/j.cgh.2023.11.003
 27. Huang DQ, Mathurin P, Cortez-Pinto H, Loomba R. Global epidemiology of alcohol-associated cirrhosis and HCC: trends, projections and risk factors. *Nat Rev Gastroenterol Hepatol*. 2023;20(1):37-49. doi:10.1038/s41575-022-00688-6
 28. Hales CM, Carroll MD, Fryar CD, Ogden CL. Prevalence of Obesity and Severe Obesity Among Adults: United States, 2017–2018. *NCHS data brief*. 2020;(360):1-8.
 29. Julien J, Ayer T, Tapper EB, Barbosa C, Dowd WN, Chhatwal J. Effect of increased alcohol consumption during COVID-19 pandemic on alcohol-associated liver disease: A modeling study. *Hepatology*. 2022;75(6):1480-1490. doi:10.1002/hep.32272
 30. Cancer of the Liver and Intrahepatic Bile Duct - Cancer Stat Facts. SEER. Accessed October 2, 2025. <https://seer.cancer.gov/statfacts/html/livibd.html>
 31. Pustjens J, Brouwer WP, Ayada I, Janssen HLA, Van Kleef LA. Considerations and clinical utility of referral pathways for early detection of liver disease in at-risk populations. *World J Gastroenterol*. 2025;31(37). doi:10.3748/wjg.v31.i37.107665
 32. Velasco-Mondragon E, Jimenez A, Palladino-Davis AG, Davis D, Escamilla-Cejudo JA. Hispanic health in the USA: a scoping review of the literature. *Public Health Reviews*. 2016;37(1):31. doi:10.1186/s40985-016-0043-2
 33. Lee BP, Dodge JL, Terrault NA. National prevalence estimates for steatotic liver disease and subclassifications using consensus nomenclature. *Hepatology*. 2024;79(3):666-673. doi:10.1097/HEP.0000000000000604
 34. U.S. Cancer Statistics Working Group. U.S. Department of Health and Human Services C for DC and P and NCI. U.S. Cancer Statistics Data Visualizations Tool. <https://www.cdc.gov/cancer/dataviz>. June 2024.
 35. CharterCARE Health Partners. 2022 Community Health Needs Assessment (CHNA) Report. 2022, www.chartercare.org/global/assets/chartercare-2022-chna-report.pdf. Accessed 14 Jan. 2026.
 36. Kreuter MW, Thompson T, McQueen A, Garg R. Addressing Social Needs in Health Care Settings: Evidence, Challenges, and Opportunities for Public Health. *Annu Rev Public Health*. 2021;42(1):329-344. doi:10.1146/annurev-publhealth-090419-102204
 37. Brahmania M, Rogal S, Serper M, et al. Pragmatic strategies to address health disparities along the continuum of care in chronic liver disease. *Hepatol Commun*. 2024;8(5):e0413. doi:10.1097/HCP.0000000000000413
 38. Subhani M, Elleray R, Bethea J, Morling JR, Ryder SD. Alcohol-related liver disease mortality and missed opportunities in secondary care: A United Kingdom retrospective observational study. *Drug Alcohol Rev*. 2022;41(6):1331-1340. doi:10.1111/dar.13482
 39. Harris R, Harman DJ, Card TR, Aithal GP, Guha IN. Prevalence of clinically significant liver disease within the general population, as defined by non-invasive markers of liver fibrosis: a systematic review. *Lancet Gastroenterol Hepatol*. 2017;2(4):288-297. doi:10.1016/S2468-1253(16)30205-9
 40. Williams R, Aspinall R, Bellis M, et al. Addressing liver disease in the UK: A blueprint for attaining excellence in health care and reducing premature mortality from lifestyle issues of excess consumption of alcohol, obesity, and viral hepatitis. *The Lancet*. 2014;384(9958):1953-1997. doi:10.1016/S0140-6736(14)61838-9
 41. Wang B, Shen Q, Xiao M, et al. Towards a better understanding of brief lifestyle interventions in noncommunicable diseases: a concept analysis. *BMC Public Health*. 2025;25(1):3497. doi:10.1186/s12889-025-23744-7
 42. Westbury S, Oyebo O, Van Rens T, Barber TM. Obesity Stigma: Causes, Consequences, and Potential Solutions. *Curr Obes Rep*. 2023;12(1):10-23. doi:10.1007/s13679-023-00495-3
 43. Committee on Community-Based Solutions to Promote Health Equity in the United States, Board on Population Health and Public Health Practice, Health and Medicine Division, National Academies of Sciences, Engineering, and Medicine. *Communities in Action: Pathways to Health Equity*. (Weinstein JN, Geller A, Negussie Y, Baciu A, eds.). National Academies Press; 2017:24624. doi:10.17226/24624
 44. Asrani SK, Mellinger J, Sterling S, et al. Reducing alcohol-associated liver disease burden in the general population. *The Lancet Gastroenterology & Hepatology*. 2025;10(12):1117-1131. doi:10.1016/S2468-1253(25)00193-1
 45. Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG. *The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care*. 2001.
 46. Bradley KA, DeBenedetti AF, Volk RJ, Williams EC, Frank D, Kivlahan DR. AUDIT-C as a Brief Screen for Alcohol Misuse in Primary Care. *Alcoholism Clin Exp Res*. 2007;31(7):1208-1217. doi:10.1111/j.1530-0277.2007.00403.x
 47. Sobell LC, Sobell MB. Timeline follow-back: A technique for assessing self-reported alcohol consumption. In: Litten R, Allen K, eds. *Measuring Alcohol Consumption*. Human Press; 1992: 41-65.
 48. Subhani M, Harman DJ, Scott RA, et al. Transient Elastography in Community Alcohol Services: Can It Detect Significant Liver Disease and Impact Drinking Behaviour? *Biomedicine*. 2022;10(2):1-9. doi:10.3390/biomedicine10020477
 49. Miller WR, Rollnick S. *Motivational Interviewing: Helping People Change*. Guilford Press; 2013. Accessed July 1, 2014. <http://books.google.com/books?id=o1-ZpM7QqVQC&pgis=1>
 50. Kahler CW, Pantalone DW, Mastroleo NR, et al. Motivational interviewing with personalized feedback to reduce alcohol use in HIV-infected men who have sex with men: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*. 2018;86(8):645-656. doi:10.1037/ccp0000322
 51. Morgenstern J, Kuerbis A, Shao S, et al. An efficacy trial of adaptive interventions for alcohol use disorder. *Journal of Substance Abuse Treatment*. 2021;123:108264. doi:10.1016/j.jsat.2020.108264
 52. Mellinger JL, Winder GS. Alcohol Use Disorders in Alcohol-Related Liver Disease. *Clinics in Liver Disease*. 2019;23(1):55-69. doi:10.1016/j.cld.2018.09.004
 53. Monti PM, Barnett NP, Colby SM, et al. Motivational interviewing versus feedback only in emergency care for young adult problem drinking. *Addiction*. 2007;102(8):1234-1243. doi:10.1111/j.1360-0443.2007.01878.x

Authors

Hayley Treloar Padovano, PhD, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Mollie A. Monnig, PhD, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Ardhys De Leon, PhD, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Kittichai Promrat, MD, Providence VA Medical Center and Brown University Health, Providence, RI.

Maria De Sousa, Clínica Esperanza/Hope Clinic, Providence, RI.

Julissa Godin, BA, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Jacob Talamantes, BA, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Abigail Morales, AM, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Kevin McCurdy, BA, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Wendy Hernandez, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Stephanie Goldstein, PhD, The Miriam Hospital Weight Control & Diabetes Research Center, Warren Alpert Medical School of Brown University, Providence, RI.

Peter M. Monti, PhD, Center for Alcohol and Addiction Studies, Center for Addiction and Disease Risk Exacerbation, Brown University, Providence, RI.

Morgan Leonard, Clínica Esperanza/Hope Clinic, Providence, RI.

Disclosures

None of the authors have relevant circumstances or disclosures to report.

Acknowledgments: Drs. Treloar Padovano and Monnig share co-first authorship. The authors extend our gratitude to the patients who participated and the team of Navegantes, staff, and providers at Clínica Esperanza/Hope Clinic. Data collection and dissemination is supported by a National Institutes of General Medical Sciences supplement to the Center for Addiction and Disease Risk Exacerbation (CADRE), a Center of Biomedical Research Excellence (P20GM130414, PI: Monti; 06S1, MPI: Treloar Padovano, Monnig, Promrat, Goldstein).

Correspondence

Hayley Treloar Padovano, PhD
Brown University Center for Alcohol and Addiction Studies
Box G-S121-4
Providence, RI 02912
hayley_treloar@brown.edu

FREE TO FOCUS ON KARLY.



With healthcare's constant complexities and distractions, it can be difficult to focus on patients. We can help, with proven medical professional liability insurance and so much more. So you are free to focus on delivering superior patient care.

- Medical Professional Liability Insurance
- Claims Analytics
- Risk Mitigation
- Medicare Contractual Risk Protection
- And more

coverys.com 800.225.6168

COVERYS



FREE TO FOCUSSM

Pediatric Invasive Group A *Streptococcus* Infections with Central Nervous System Involvement: A Single Institution Case Series in Southern New England

NATALIE QIN, MD; JUSTIN MORRIS, DO; KELSEY HART, MD; HAREEM PARK, MD

ABSTRACT

Pediatric invasive Group A *Streptococcus* (iGAS) infections are rare, affecting sterile sites including the central nervous system (CNS), and cause significant morbidity and mortality. An increased incidence of pediatric iGAS infections, including cases with CNS involvement, has been noted following the COVID-19 pandemic both domestically and internationally. Regional New England iGAS data specific to pediatric populations have been limited. This case series describes three pediatric cases of iGAS with CNS involvement which presented within the same two-month period in early 2025, all from within 20 miles in Massachusetts. All were initially admitted to the pediatric intensive care unit, patients had meningitis and subdural collections on brain imaging, and subsequently required at least four weeks of intravenous antibiotics. One underwent surgical intervention. All three had seizures requiring long-term anti-epileptic therapy, and each had residual symptoms, including seizures, focal weakness, and developmental delay. GAS infections with intracranial involvement are often severe and life-threatening. This series of three pediatric intracranial iGAS cases is particularly unique due to their similar presentations, timing, and geographic proximity. With recent literature indicating rising rates of iGAS infections globally and our regional experience, GAS should be considered a potential culprit for patients presenting with invasive bacterial infections.

KEYWORDS: Invasive Group A *Streptococcus*; intracranial infection; bacterial meningitis; subdural empyema

INTRODUCTION

Infections caused by *Streptococcus pyogenes*, or Group A *Streptococcus* (GAS), are typically benign and commonly present as throat or skin infections. Invasive disease is defined as an infection of sterile sites, often requiring prolonged hospitalizations and antibiotic therapy.¹ These may more commonly include bacteremia and cellulitis, and less commonly meningitis and/or central nervous system (CNS) disease.²⁻⁴ Historically, invasive GAS (iGAS) disease has been rare, especially in pediatric patients. In the United States (U.S.) from 1997 to 2014, the annual incidence of

pediatric iGAS ranged from 1.4 to 2.3 cases per 100,000.⁵ It is estimated that meningitis and/or CNS disease accounted for approximately 1.9 to 5.2% of annual pediatric iGAS cases.⁵

The COVID-19 pandemic saw a 28% reduction in iGAS cases in the U.S.,⁶ followed by a surge in cases both domestically^{7,8} and internationally.⁹⁻¹¹ This increase is attributed to a historic low in GAS infections during the pandemic, most likely due to social distancing and masking requirements, leading to reduced population immunity, followed by resurgence of viral respiratory infections pre-disposing iGAS after the lifting of mandates.^{4,7,8} Limited data on the regional burden of iGAS in several New England states (Massachusetts, Vermont, and Rhode Island) are consistent with the aforementioned trends in iGAS incidence.¹²⁻¹⁴ However, little is known about the regional burden of iGAS specific to the pediatric population.

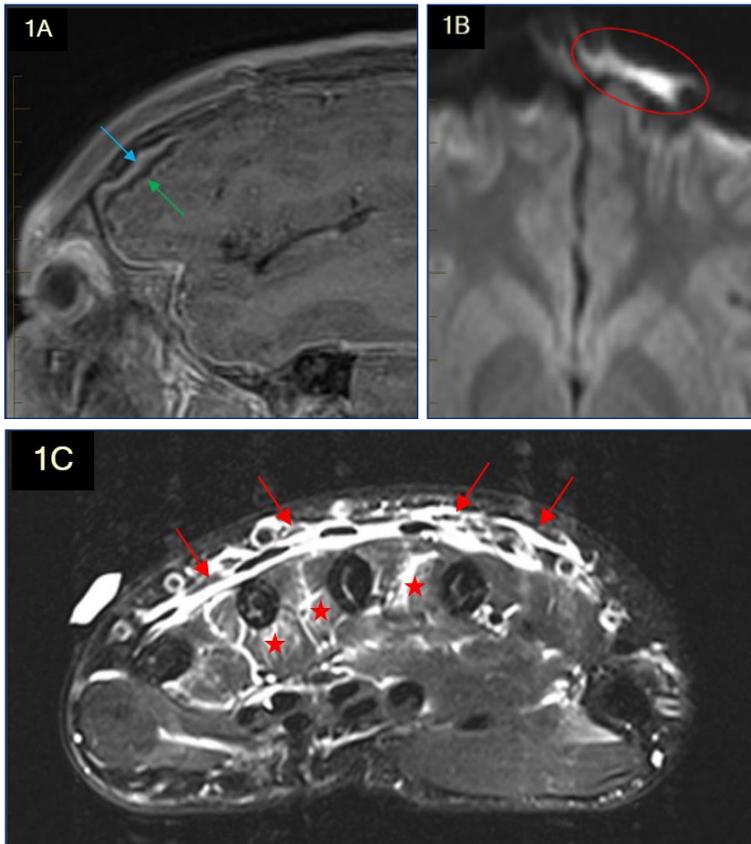
We describe three pediatric cases of iGAS, all with CNS involvement, occurring in patients from nearby municipalities in Massachusetts, within the same two-month period in early 2025: (1) a 12-year-old male with GAS bacteremia, meningitis, subdural empyema, and tenosynovitis; (2) a 9-year-old female with GAS sinusitis complicated by meningitis, subdural empyema and abscess; and (3) a 3-month-old female with GAS meningitis and bacteremia.

Case 1

A 12-year-old male with a past medical history of migraines presented to the Emergency Department (ED) with a four-day history of progressive headache and one day of vomiting, fever, neck pain, and sore throat. Household members had mild respiratory infections the week prior. The patient had no recent travel, animal bites or scratches, or consumption of raw or undercooked foods. He had all age-appropriate immunizations.

On physical exam, the temperature was 38.2°C, the heart rate was 98 beats per minute, the respiratory rate was 18 breaths per minute, and the blood pressure was 110/57 mm Hg. He was ill-appearing and had nuchal rigidity, though had normal mental status and a non-focal neurologic exam. During his ED course, he developed a diffuse erythematous maculopapular rash on the left upper extremity and left torso, as well as pain with palpation and active movement of the left hand and wrist. His laboratory testing revealed a WBC count of 14.4 x 10⁹/L with 9% band forms and a C-

Figure 1. [A] Fat-saturated, parasagittal T1-weighted MR image after contrast administration shows non-enhancing subdural fluid between enhancing left frontal dura (blue arrow) and leptomeninges (green arrow). [B] Trace diffusion-weighted image in transverse axial plane shows hyperintense signal consistent with purulent fluid in left frontal subdural collection, consistent with subdural empyema. [C] Fat-saturated, T2-weighted image shows hyperintense signal of multiple extensor tendon sheaths (red arrows) and interosseous muscles (red stars) of multiple fingers consistent with extensor tendinitis and myositis.



reactive protein (CRP) level of 175.03 mg/L (reference range 0–10 mg/L). Throat PCR for GAS was positive. His respiratory pathogen testing was positive for non-SARS Coronavirus. A blood culture was drawn, and a lumbar puncture was performed, significant for a cerebrospinal fluid (CSF) glucose of 76 mg/dL (reference range 42–91 mg/dL), protein of 151 mg/dL (reference range 13–43 mg/dL), 559 nucleated cells per mm³ (88% polymorphonuclear cells (reference range 0–7 per mm³)), and 31 red blood cells (reference range 0–5 per mm³) in tube 4. Multiplex meningitis/encephalitis PCR from the CSF was negative, and gram stain showed gram-positive cocci. Ceftriaxone (CTX) and vancomycin were initiated. MRI of the brain with contrast on Hospital Day (HD) 1 revealed circumferential dural enhancement with left cerebral convexity subdural empyema without ventriculitis [Figure 1A,B]. CSF and blood cultures both were positive for GAS, and antibiotics were narrowed to CTX monotherapy.

Throughout the first week of hospitalization, the patient

initially showed improvement; inflammatory markers downtrended with resolution of fever. On HD 5, left upper extremity pain worsened, and he developed left hand weakness. On HD 7, a contrast-enhanced MRI of the left hand was consistent with extensor tenosynovitis and myositis without abscess formation [Figure 1C], and the pain dissipated over time. On HD 8, the patient developed acute worsening of headache and vomiting, agitation, confusion, and global aphasia, and he was transferred to the pediatric intensive care unit (PICU). Methylprednisolone and rifampin were briefly added due to concern for encephalitis and incomplete penetration of the empyema, respectively. On HD 10, he developed generalized seizures and was started on levetiracetam. A repeat MRI/MRV on HD 11 showed new left lateral temporal lobe diffusion restriction concerning for stroke due to vasospasm vs vasculitis. He received two 1g/kg doses of intravenous (IV) immune globulin for possible auto-immune vasculitis and encephalitis, though high-resolution MRI of the vessel walls was normal. He was also started on verapamil for possible vasospasm and amitriptyline for migraine headaches.

The patient did not require surgical intervention and completed six weeks of CTX. Follow-up MRI at six weeks of therapy showed residual diffuse pachymeningeal enhancement with resolution of the subdural empyema and temporal reduced-diffusivity. His left upper extremity tenosynovitis and aphasia have resolved. At the time of this writing, he continues on levetiracetam and amitriptyline, is weaning from verapamil, and continues to follow with Neurology for management of breakthrough seizures and headaches.

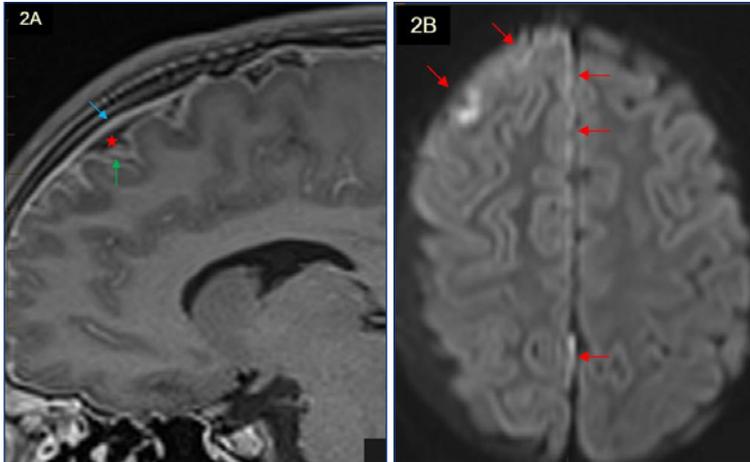
Case 2

A 9-year-old female with no significant past medical history presented to an urgent care center with one week of fatigue, malaise, rhinorrhea, post-tussive emesis, progressive fronto-temporal headache and one day of sudden-onset disorientation, difficulty ambulating, and left-sided weakness. There were known sick contacts at home and at school. She had no recent travel, animal bites or scratches, or consumption of raw or undercooked foods. She had all age-appropriate immunizations except for SARS-CoV-2 and influenza.

On physical exam, the temperature was 36.4°C, the heart rate was 110 beats per minute, the respiratory rate was 20 breaths per minute, and the blood pressure was 60/30 mm Hg. She was lethargic with left-sided weakness, left ptosis, right-sided gaze preference, impaired left-hand grip, and left lower extremity weakness.

Upon arrival at our facility, the patient was admitted to the PICU and required an epinephrine infusion. Her laboratory

Figure 2. [A] Post-contrast T1-weighted parasagittal image through right frontal lobe shows non-enhancing hypointense fluid (red star) between enhancing dura (blue arrow) and leptomeninges (green arrow) over surface of frontal lobe. [B] Trace diffusion-weighted MR imaging in transverse axial plane shows hyperintense signal (red arrows) over right frontal convexity and along interhemispheric falx consistent with purulent fluid.



testing revealed a WBC count of $12.5 \times 10^9/L$ with 5% band forms, hemoglobin of 10.6 g/dL, platelet count of $86 \times 10^9/L$, as well as hyponatremia and hypokalemia to 134 mEq/L and 3.2 mEq/L, respectively. Throat PCR and CRP were not obtained. Respiratory pathogen testing was negative. CT of the head with contrast revealed a right subdural fluid collection, and opacification of the bilateral frontal, left ethmoid, and left sphenoid sinuses. A contrast-enhanced MRI of the brain revealed a right cerebral convexity subdural empyema with leptomeningitis [Figure 2A,B]. The patient underwent decompressive right craniectomy with subdural empyema evacuation and endoscopic sinus debridement. She was started on vancomycin, ceftriaxone, and metronidazole. Cultures of the blood and subdural fluid collection grew GAS. Antibiotics were subsequently narrowed to CTX monotherapy. On HD 5, the patient experienced status epilepticus with left-sided tonic-clonic movements and received levetiracetam and lacosamide. A surveillance MRI of the brain after four weeks of therapy showed a possible new abscess vs. post-surgical hemorrhagic changes in the right lateral superior parietal lobe, which prompted the decision to extend her antibiotic course.

Follow-up MRI after six weeks of therapy showed an interval decrease in the size of the lesion attributed to

cerebral abscess. The patient completed nine total weeks of therapy for GAS; CTX was stopped at eight weeks and replaced with levofloxacin due to drug-induced liver injury and choledocholithiasis requiring cholecystectomy. At the time of this writing, the patient continues on anti-epileptics with Neurology follow-up and continues to work with Physical Therapy for residual left-sided weakness.

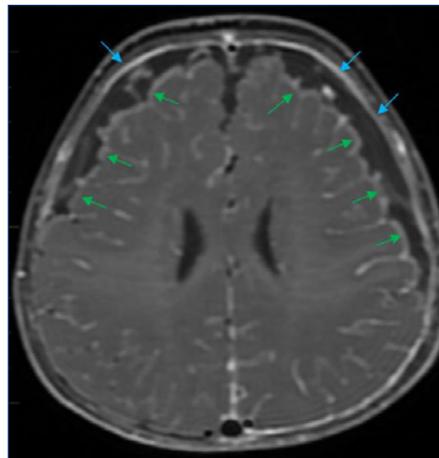
Case 3

A 3-month-old female with no prenatal or postnatal history was sent to the ED by her pediatrician for "bacteria in the blood." She had a two-day history of fever, increased sleepiness, decreased urine output, and one day of emesis. She had no sick contacts at home. She had no recent travel, animal bites or scratches, or exposure to unpasteurized dairy products. She had received all age-appropriate immunizations.

On physical exam, the temperature was $40.4^\circ C$, maximum heart rate was 218 beats per minute, respiratory rate was 43 breaths per minute, and blood pressure was 96/69 mm Hg. Her exam was notable for an ill-appearing, sleepy infant with a full anterior fontanelle. She had upward gaze deviation and was not tracking. She was minimally responsive and did not cry with IV line placement or urinary catheterization. Review of the laboratory testing obtained by her pediatrician showed a gram-stain of blood positive for gram positive cocci in chains. Her laboratory testing in the emergency room revealed WBC $20.6 \times 10^9/L$ with 5% band forms, CRP 177.01 mg/L, and platelet count of $462 \times 10^9/L$. Respiratory pathogen testing was positive for Adenovirus. Urinalysis was negative for leukocytes, nitrites, and WBCs. A second blood culture was obtained, and lumbar puncture was performed. CSF studies revealed pink, cloudy fluid with a glucose of less than 5 mg/dL (reference range: 42–91 mg/dL), protein 528 mg/dL (reference range: 13–43 mg/dL), 891 nucleated cells per mm³, and 12,000 red blood cells per mm³. A multiplex meningitis/encephalitis PCR was negative, and CSF gram stain showed gram positive cocci. CT head was negative for acute intracranial pathology. Ceftriaxone and vancomycin were initiated, and she was admitted to the PICU.

The first blood culture drawn by her pediatrician and CSF culture grew GAS, and antibiotics were narrowed to ampicillin monotherapy. On HD 3, an MRI brain scan with and

Figure 3. Post-contrast T1-weighted image in transverse axial plane shows abnormal enhancement of both dura (blue arrows) and leptomeninges (green arrows) over surface of the frontal lobes. Diffusion-weighted imaging (not shown) did not demonstrate reduced water-diffusivity.



without contrast was obtained, which showed diffuse leptomeningeal and pachymeningeal enhancement consistent with meningitis, bilateral subdural effusions, and no focal cerebritis [Figure 3]. The clinical course was complicated by episodes of abnormal movements with apnea on HD 11, with seizure activity noted in the left temporal lobe on electroencephalogram (EEG). She was started on levetiracetam without further seizure or apneic episodes.

The patient ultimately completed a four-week course of IV CTX. Surveillance MRI obtained prior to discharge showed an interval decrease in both bifrontal and left parafalcine effusions and bifrontal leptomeningeal enhancement. The hearing screen was normal. Physical exam throughout admission showed low axial tone with head lag. She was discharged home on levetiracetam with outpatient Neurology follow-up and a referral for Early Intervention services for motor delays.

At the time of this writing, the patient continues to follow with Neurology and at her most recent appointment at 6 months old, she was able to roll over, hold head up and sit with support, but was not yet sitting independently or reaching for objects. Repeat EEG three months after discharge was normal and discontinuation of levetiracetam is being considered.

DISCUSSION

The timing and geographic proximity of our patients are notable. All three presented within the same two-month period in early 2025, and their homes in Massachusetts are located within 20 miles of each other, though there was no known epidemiological link among these three cases. All three presented as ill-appearing and required intensive care during their hospital course. They were all found to have CNS involvement with meningitis and subdural collections seen on brain imaging and required at least four weeks of IV antibiotics. Of the three, one patient underwent surgical intervention (Case 2), and one patient had symptoms and imaging suggestive of ischemic stroke (Case 1). All three had seizures requiring anti-epileptic agents. At the time of this writing, all are continuing on long-term anti-epileptic therapy. All three patients showed significant improvement although continue with persistent symptoms including headaches and breakthrough seizures (Case 1), residual left-sided weakness (Case 2), and persistent gross motor delay (Case 3).

The global incidence and severity of GAS infections have increased in the post-pandemic years. Although epidemiologic data on iGAS have been published recently in Europe,^{10,15} Australia,¹¹ and Canada,⁴ pediatric data are lacking from the New England region in the U.S. The Massachusetts Department of Public Health has reported 148 cases of adult and pediatric iGAS in the first half of 2025, with the highest number of cases in long-term care facilities, but not

stratified by age group.¹² Similarly, the Rhode Island Department of Health has shown an increase in the incidence of iGAS cases in the 0–54-year-old population (1.87 to 5.75 per 100,000 persons from 2021 to 2024).¹⁴

Historically, GAS is a rare etiology of bacterial meningitis, representing 2.2% of cases in 2001–2004.¹⁶ In their 2023 review of case reports from 2001–2020, Hutton and colleagues found 115 cases of intracranial iGAS, with 92% showing meningeal involvement, evidence of intraparenchymal abscess in 8.7%, and a case fatality rate of 10.4%.¹⁷ Of 1272 children with iGAS in 10 U.S. states from 2013 to 2022, 3.5% had meningitis.¹⁸ Recent data looking only at post-pandemic cases reveal that intracranial iGAS remains rare. Of 154 iGAS cases in Southeast Texas from June 2022 to May 2023, 5.8% had CNS involvement.¹⁹ Another study from Italy documented two cases of GAS meningitis out of 34 cases of iGAS from April 2023 to July 2024,²⁰ and in Ireland, two out of 167 iGAS pediatric cases from 2022 to 2023 had CNS involvement.⁹ A recent Dutch cohort study from August 2025 showed increased incidence of meningitis/encephalitis due to GAS after the COVID-19 pandemic, with an incidence ratio of 12.30 in January 2022 to May 2024 compared to January 2015 to March 2020.²¹

Concurrent viral respiratory infections have been seen in 28–52% of patients with iGAS.^{1,4,8,22} Some literature demonstrates an association between influenza and iGAS diseases such as toxic shock syndrome, bacteremia, and pleural empyema.^{23–25} Of our three patients, two had respiratory viruses identified (non-SARS Coronavirus and Adenovirus).

There are no guidelines specific to the management of iGAS with CNS involvement. GAS is universally susceptible to penicillin with a typical duration of four weeks for uncomplicated disease. However, an extended course or alternative antibiotic choice may be made to broaden coverage, such as in the case of subdural empyema, as seen in our cases. GAS resistance to certain antibiotics has increased over time in the U.S. (27.4%, 26.4%, and 32.1% isolates were resistant to macrolides, clindamycin, and tetracyclines, respectively, in 2023).^{26,27}

Given the recent literature and cases presented above, it may be prudent to consider GAS as a culprit when approaching patients presenting with intracranial bacterial infections. Furthermore, because intracranial iGAS infections commonly require intensive care and have a high case fatality rate,²² prompt identification of clinical symptoms is necessary. Providers should also be aware that GAS is not a target included on many commercially available multiplex CSF PCR assays for meningitis/encephalitis. Dedicated surveillance of pediatric iGAS cases and their associated clinical outcomes will be an important step towards a better understanding of the regional burden of this pathology in the pediatric population.

CONCLUSION

Rates of GAS and iGAS infections have been rising globally in recent years since the COVID-19 pandemic. iGAS infections are often severe and may involve the central nervous system, leading to significant long-term sequelae. Providers evaluating patients with signs of severe invasive bacterial infection should be mindful of GAS as a culprit of increasing prevalence.

References

- Nygaard U, Hartling UB, Munkstrup C, et al. Invasive group A streptococcal infections in children and adolescents in Denmark during 2022-23 compared with 2016-17 to 2021-22: a nationwide, multicentre, population-based cohort study. *Lancet Child Adolesc Health*. 2024 Feb;8(2):112-121. doi: 10.1016/S2352-4642(23)00295-X. Epub 2023 Dec 13. PMID: 38103567.
- Walker MJ, Barnett TC, McArthur JD, et al. Disease manifestations and pathogenic mechanisms of Group A Streptococcus. *Clin Microbiol Rev*. 2014 Apr;27(2):264-301. doi: 10.1128/CMR.001101-13. PMID: 24696436.
- Hankins JD, Johnson CL, Sanchez BC, et al. Increased Incidence and Severity of Group A Streptococcal Infections in Children in Southeast Texas From June 2022 to May 2023. *Pediatr Infect Dis J*. 2025 Feb 1;44(2):118-124. doi: 10.1097/INF.0000000000004577. Epub 2025 Jan 10. PMID: 39886927.
- Dabaja-Younis H, Kandel C, Green K, et al; Toronto Invasive Bacterial Diseases Network. Invasive Group A Streptococcal Infection in Children, 1992-2023. *JAMA Netw Open*. 2025 Apr 1;8(4):e252861. doi: 10.1001/jamanetworkopen.2025.2861. PMID: 40168022.
- Link-Gelles R, Toews KA, Schaffner W, et al. Characteristics of Intracranial Group A Streptococcal Infections in US Children, 1997-2014. *J Pediatric Infect Dis Soc*. 2020 Feb 28;9(1):30-35. doi: 10.1093/jpids/piy108. PMID: 30462264.
- Prasad N, Rhodes J, Deng L, et al. Changes in the Incidence of Invasive Bacterial Disease During the COVID-19 Pandemic in the United States, 2014-2020. *J Infect Dis*. 2023 Apr 12;227(7):907-916. doi: 10.1093/infdis/jiad028. PMID: 36723871.
- Barnes M, Youngkin E, Zipprich J, et al. Notes from the Field: Increase in Pediatric Invasive Group A Streptococcus Infections - Colorado and Minnesota, October-December 2022. *MMWR Morb Mortal Wkly Rep*. 2023 Mar 10;72(10):265-267. doi: 10.15585/mmwr.mm7210a4. PMID: 36893049.
- Ho EC, Cataldi JR, Silveira LJ, et al. Outbreak of Invasive Group A Streptococcus in Children-Colorado, October 2022-April 2023. *J Pediatric Infect Dis Soc*. 2023 Oct 28;12(10):540-548. doi: 10.1093/jpids/piad080. PMID: 37792995.
- Foley DJ, Cotter O, Davidson L, et al. Changes in Epidemiology in Pediatric Invasive Group A Streptococcal Infections in Ireland During the 2022-2023 Outbreak. *Pediatr Infect Dis J*. 2025 Jun 1;44(6):511-516. doi: 10.1097/INF.0000000000004746. Epub 2025 Mar 17. PMID: 40106787.
- Vieira A, Wan Y, Ryan Y, et al. Rapid expansion and international spread of M1UK in the post-pandemic UK upsurge of Streptococcus pyogenes. *Nat Commun*. 2024 May 10;15(1):3916. doi: 10.1038/s41467-024-47929-7. PMID: 38729927.
- Morris JM, Lacey JA, Stevens K, et al. Genomic interrogation of invasive group A *Streptococcus* (iGAS) epidemiology and COVID-19 impacts in Victoria, Australia: a 6-year retrospective study. *Lancet Reg Health West Pac*. 2025 Jan 29;55:101467. doi: 10.1016/j.lanwpc.2025.101467. PMID: 39944419.
- Madoff L, Brown CM. Clinical Advisory: Invasive Group A Streptococcus Infections. June 24, 2025. Accessed September 11, 2025. Available from: <https://files.constantcontact.com/a3b-372fa701/39c9e849-e27b-4ac9-b6b4-efb6ab3bfedd.pdf?rd=1>
- Nicolai LA. Health Advisory: Increase in Invasive Group A Streptococcus Cases in Vermont. February 28, 2024. Accessed September 11, 2025. Available from: <https://www.healthvermont.gov/sites/default/files/document/han-invasive-group-a-strep.pdf#:~:text=The%20Vermont%20Department%20of%20Health%20has%20observed%20a,susceptible%20to%20streptococcal%20infections%20of%20the%20affected%20area>
- State of Rhode Island Department of Health. Streptococcal Disease, Group A (Group A Strep). January 11, 2025. Accessed September 11, 2025. Available from: <https://health.ri.gov/data/group-a-strep>
- World Health Organization. Disease Outbreak News; Increased incidence of scarlet fever and invasive Group A Streptococcus infection - multi-country. December 15, 2022. Accessed September 17, 2025. Available from: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON429>.
- Nigrovic LE, Kuppermann N, Malley R; Bacterial Meningitis Study Group of the Pediatric Emergency Medicine Collaborative Research Committee of the American Academy of Pediatrics. Children with bacterial meningitis presenting to the emergency department during the pneumococcal conjugate vaccine era. *Acad Emerg Med*. 2008 Jun;15(6):522-8. doi: 10.1111/j.1553-2712.2008.00117.x. PMID: 18616437.
- Hutton D, Kameda-Smith M, Afshari FT, et al. Intracranial invasive group A streptococcus: a neurosurgical emergency in children. *J Neurosurg Pediatr*. 2023 Jul 7;32(4):478-487. doi: 10.3171/2023.5.PEDS23109. PMID: 37439477.
- Gregory CJ, Okaro JO, Reingold A, et al. Invasive Group A Streptococcal Infections in 10 US States. *JAMA*. 2025 May 6;333(17):1498-1507. doi: 10.1001/jama.2025.0910. PMID: 40193120.
- Hankins JD, Johnson CL, Sanchez BC, et al. Increased Incidence and Severity of Group A Streptococcal Infections in Children in Southeast Texas From June 2022 to May 2023. *Pediatr Infect Dis J*. 2025 Feb 1;44(2):118-124. doi: 10.1097/INF.0000000000004577. Epub 2025 Jan 10. PMID: 39886927.
- Di Meglio L, De Luca M, Cursi L, et al. Unraveling Pediatric Group A Streptococcus Meningitis: Lessons from Two Case Reports and a Systematic Review. *Microorganisms*. 2025 May 9;13(5):1100. doi: 10.3390/microorganisms13051100. PMID: 40431273.
- van Kempen EB, Tulling AJ, von Asmuth EGJ, et al. Risk Factors for Severe Pediatric Invasive Group A Streptococcal Disease. *JAMA Netw Open*. 2025 Aug 1;8(8):e2527717. doi: 10.1001/jamanetworkopen.2025.27717. PMID: 40828532.
- Abo YN, Oliver J, McMinn A, et al. Increase in invasive group A streptococcal disease among Australian children coinciding with northern hemisphere surges. *Lancet Reg Health West Pac*. 2023 Aug 22;41:100873. doi: 10.1016/j.lanwpc.2023.100873. PMID: 38223399.
- de Gier B, Vlamincx BJM, Woudt SHS, van Sorge NM, van Asten L. Associations between common respiratory viruses and invasive group A streptococcal infection: A time-series analysis. *Influenza Other Respir Viruses*. 2019 Sep;13(5):453-458. doi: 10.1111/irv.12658. Epub 2019 Jun 25. PMID: 31237087
- Modler J, Morris SK, Bettinger JA, et al; Canadian Immunization Monitoring Program Active (IMPACT) Investigators. Bloodstream Infections in Children Hospitalized for Influenza, the Canadian Immunization Monitoring Program Active. *Pediatr Infect Dis J*. 2024 Apr 1;43(4):301-306. doi: 10.1097/INF.0000000000004199. Epub 2023 Dec 1. PMID: 38048641.
- Lassoued Y, Assad Z, Ouldali N, et al. Unexpected Increase in Invasive Group A Streptococcal Infections in Children After Respiratory Viruses Outbreak in France: A 15-Year Time-Series Analysis. *Open Forum Infect Dis*. 2023 Apr 6;10(5):ofad188. doi: 10.1093/ofid/ofad188. PMID: 37180594.
- Li Y, Rivers J, Mathis S, et al. Continued Increase of Erythromycin Nonsusceptibility and Clindamycin Nonsusceptibility Among Invasive Group A Streptococci Driven by Genomic Clusters, United States, 2018-2019. *Clin Infect Dis*. 2023 Feb 8;76(3):e1266-e1269. doi: 10.1093/cid/ciac468. PMID: 35684991.
- U.S. Centers for Disease Control and Prevention. Active Bacterial Core Surveillance-Antibiotic Resistance Data Dashboard. 2025 Aug 21. Accessed November 14, 2025. Available from: <https://www.cdc.gov/abcs/bact-facts/data-dashboard.html>

Authors

Natalie Qin, MD, Pediatrics Residency Program, Hasbro Children's Brown University Health, Providence, RI.

Justin Morris, DO, Division of Pediatric Infectious Diseases, Hasbro Children's Brown University Health, Providence, RI.

Kelsey Hart, MD, Division of Pediatric Hospital Medicine, Hasbro Children's Brown University Health, Providence, RI.

Hareem Park, MD, Division of Pediatric Hospital Medicine, Hasbro Children's Brown University Health, Providence, RI.

Correspondence

Natalie Qin, MD
Pediatrics Residency Program
Hasbro Children's Brown University Health
593 Eddy St.

Providence, RI 02903
NQin@brownhealth.org

Disclosures

Acknowledgments: The authors acknowledge and thank Glenn Tung, MD, for his review and compilation of the MR imaging and legends within the figures. Informed consent was obtained from the patients' caregivers.

Ethical Approvals: Our institution does not require ethical approval for reporting individual cases or case series including three or fewer patients.

A Rare Case of Seronegative anti-Glomerular Basement Membrane Disease with Pulmonary Involvement

WILLIAM DOAK, MD; TREVAUGHN BAPTISTE, MD; ANTHONY CHANG, MD; ERIC S. KERNS, MD; MATTHEW R. LYNCH, MD

ABSTRACT

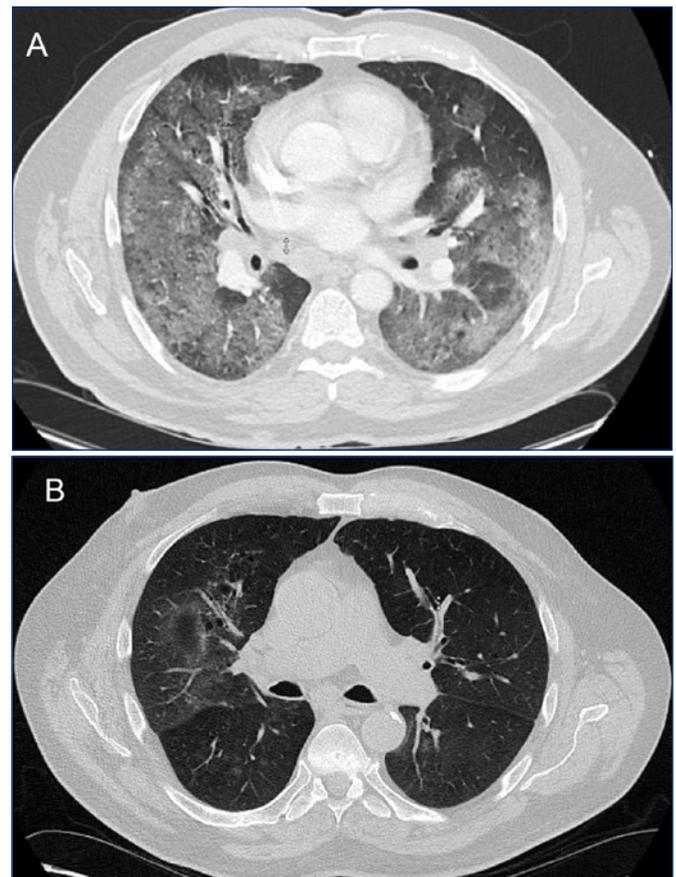
Seronegative anti-glomerular basement membrane (GBM) disease with pulmonary involvement is exceedingly rare. Most published cases involve patients with extensive smoking histories, and the prognosis is more favorable than classic, seropositive, anti-GBM disease. Herein, we describe the case of a 62-year-old man with a solitary kidney after right nephrectomy who presented with dyspnea, hemoptysis, and severe acute kidney injury. Kidney biopsy was delayed due to negative serologic evaluation, anchoring to a diagnosis of acute tubular necrosis (ATN), and presence of a solitary kidney; however, progressive kidney injury with microhematuria and proteinuria eventually prompted a biopsy that showed crescentic glomerulonephritis with linear GBM staining. The patient started immunosuppressive treatment and responded very well; he remains stable and off dialysis one year after the diagnosis.

KEYWORDS: Seronegative glomerular basement membrane disease; Atypical Goodpasture syndrome; Solitary kidney biopsy; Glomerulonephritis

CASE PRESENTATION

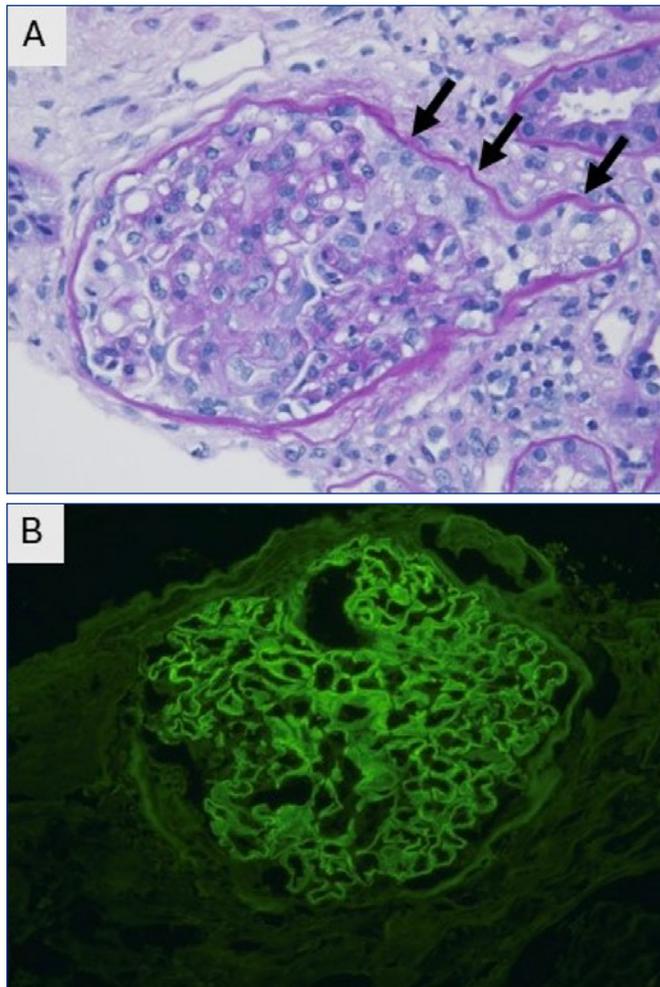
A 62-year-old man with asthma, hypertension, renal clear cell cancer (RCC) status-post right radical nephrectomy, and stage 3b chronic kidney disease with baseline serum creatinine 1.8 mg/dl, presented with dyspnea, hemoptysis, melena, and weakness of several weeks' duration. There was no cigarette smoking history. He was found to have acute kidney injury with serum creatinine 5.1 mg/dl, severe anemia with hemoglobin 3.6 gm/dl, and bilateral ground glass opacities (GGO) with a left lobe subsegmental pulmonary embolism on chest imaging [Figure 1]. A urinalysis showed microscopic hematuria with >100 RBCs/hpf and sub-nephrotic proteinuria with urine protein-creatinine ratio 1.2–1.8 g/g. Serologic studies were sent on the day of admission, and these returned negative for glomerular basement membrane (GBM) antibodies, as well as negative ANCA and ANA screens. Bronchoscopy on the second hospital day showed blood on serial lavage, findings consistent with alveolar hemorrhage. Bronchoalveolar lavage fluid cultures were

Figure 1. [A] Axial contrast-enhanced chest CT shows diffuse bilateral ground glass opacities (GGO) at the time of diagnosis. **[B]** Non-contrast CT shows near complete resolution of multifocal airspace disease six months after treatment.



negative. There was no evidence of gastrointestinal bleed on endoscopy. The kidney function transiently stabilized after blood transfusions and a brief course of oral prednisone for presumptive asthma flare. Due to the presence of a solitary kidney, as well as initial anchoring to a diagnosis of acute tubular necrosis (from severe anemia) as a cause of acute kidney injury, a diagnostic kidney biopsy was delayed until two weeks into the admission, at which time the serum creatinine had increased to 6.9 mg/dl. The biopsy showed five glomeruli, of which three contained cellular crescents. There was linear staining of the glomerular capillary walls

Figure 2. [A] Periodic Acid-Schiff (PAS) stain shows a glomerulus with a cellular crescent, marked by black arrows. **[B]** Immunofluorescence stain displays linear staining of glomerular capillary walls for IgG (3+).



with IgG, consistent with crescentic anti-GBM glomerulonephritis [Figure 2]. The patient started intravenous methylprednisolone, underwent six sessions of plasmapheresis, and was transitioned to oral cyclophosphamide and prednisone at time of discharge—in accordance with 2021 Kidney Disease: Improving Global Outcomes (KDIGO) guidelines for induction treatment of anti-GBM disease or Goodpasture's syndrome. The serum creatinine improved to 3.7 mg/dl, the hematuria improved, and the proteinuria remained stable at 1.0 g/g, and he did not require dialysis. GBM antibody levels remained negative throughout, and hence they could not be used to track disease activity. Though the post-discharge treatment course was complicated by anemia, requiring several hospitalizations for transfusions, the patient is now off immunosuppression and remains off dialysis one year after the initial diagnosis.

DISCUSSION

Anti-glomerular basement membrane disease is a rare diagnosis with an annual incidence of 1.5 per million people.¹ Patients typically present with a rapidly progressive glomerulonephritis characterized by sub-nephrotic proteinuria, hematuria, and a doubling of serum creatinine over the course of days to weeks, often preceded by a prodromal period of malaise, fatigue, weight loss, and low-grade fevers. The overall patient and renal survival at one year are 80–90% and 26%, respectively, with treatment. In addition to glomerulonephritis, pulmonary hemorrhage is common, occurring in 30–60% of cases.¹ The triad of acute kidney injury, pulmonary hemorrhage, and GBM antibodies is often referred to as Goodpasture's syndrome. The disease is diagnosed by the detection of autoantibodies to components of GBM in the serum, most commonly the non-collagenous domain (NC1) of the alpha-3 subunit of type IV collagen ($\alpha3NC1$), using conventional enzyme-linked immunosorbent assay (ELISA). On kidney biopsy, there is linear IgG deposition along the glomerular basement membrane on immunofluorescence and a diffuse crescentic glomerulonephritis on light microscopy.²

In recent years, several cases of antibody-negative anti-GBM disease have been described, often with atypical clinical presentations such as nephrotic range proteinuria, less severe kidney injury, absent pulmonary involvement, and variable patterns of histological injury on light microscopy.^{3–7} Cases where patients who had previous seropositive anti-GBM disease that later became seronegative during disease relapse have also been described.⁸ There is speculation as to why anti-GBM antibodies are undetectable in these cases of so-called “atypical anti-GBM disease.” One theory is that autoantibodies to different alpha subunits, other than $\alpha3NC1$, cause disease—there are six subunits in total—and these are undetectable by standard assays. Other theories are that the levels of circulating anti-GBM antibodies are too low or of insufficient affinity to be detected.^{6,7} Some groups have successfully run specialized serologic assays for IgG subclasses 1–4 after initially negative or equivocal anti-GBM ELISA to isolate IgG subclasses involved in some atypical cases.^{9–11} As was true in our case, patients with atypical anti-GBM disease tend to present with less severe disease and have a more favorable long-term renal prognosis.

Our case presented a unique challenge because the patient had a solitary kidney, which is considered a relative contraindication to kidney biopsy. The risks of native kidney biopsy are well-established. A systematic review and meta-analysis of the literature from 1983 to 2018, including a total of 118,000 kidney biopsies, showed an 11% risk of perinephric hematoma, 3.5% risk of hematuria, 1.6% risk of transfusion, and 0.3% risk of intervention to stop bleeding after biopsy; all these risks were substantially higher in hospitalized patients with acute kidney injury.¹² The study did not specifically examine outcomes in solitary kidney

biopsies or comment on the risk of nephrectomy after biopsy. Only one study reported on the outcomes of eight patients who underwent solitary kidney biopsies—none experienced serious complications.¹³ The presence of a solitary kidney is not considered an absolute contraindication to biopsy, and biopsy of a solitary kidney has been utilized in cases of seropositive GBM.^{14,15}

The patient presented herein was presumptively diagnosed with ischemic acute tubular necrosis (ATN) based on profound anemia, and his failure to recover kidney function in the first week of admission was attributed to contrast-associated nephropathy. A kidney biopsy was further delayed due to presence of a solitary kidney and the need for anticoagulation for pulmonary embolism, with heparin bridge necessary in advance of the biopsy. Ultimately, a kidney biopsy was essential to make the correct diagnosis and arrive at a treatment plan that has kept the patient free of dialysis for at least one year. The case illustrates the importance of maintaining a high index of suspicion for glomerulonephritis in the appropriate clinical context and never relying solely on serologic studies to rule out glomerular diseases.

References

1. Segelmark M, Hellmark T. Anti-glomerular basement membrane disease: an update on subgroups, pathogenesis and therapies. *Nephrol Dial Transplant*. 2019;34(11):1826-1832. doi:10.1093/ndt/gfy327
2. Troxell ML, Houghton DC. Atypical anti-glomerular basement membrane disease. *Clin Kidney J*. 2016;9(2):211-221. doi:10.1093/ckj/sfv140
3. Salama AD, Dougan T, Levy JB, et al. Goodpasture's disease in the absence of circulating anti-glomerular basement membrane antibodies as detected by standard techniques. *Am J Kidney Dis*. 2002;39(6):1162-1167. doi:10.1053/ajkd.2002.33385
4. Serisier DJ, Wong RCW, Armstrong JG. Alveolar haemorrhage in anti-glomerular basement membrane disease without detectable antibodies by conventional assays. *Thorax*. 2006;61(7):636-639. doi:10.1136/thx.2004.028985
5. Liu P, Waheed S, Boujelbane L, Maursetter LJ. Multiple recurrences of anti-glomerular basement membrane disease with variable antibody detection: can the laboratory be trusted? *Clin Kidney J*. 2016;9(5):657-660. doi:10.1093/ckj/sfw038
6. Nasr SH, Collins AB, Alexander MP, et al. The clinicopathologic characteristics and outcome of atypical anti-glomerular basement membrane nephritis. *Kidney Int*. 2016;89(4):897-908. doi:10.1016/j.kint.2016.02.001
7. Liang D, Liang S, Xu F, et al. Clinicopathological features and outcome of antibody-negative anti-glomerular basement membrane disease. *J Clin Pathol*. 2019;72(1):31-37. doi:10.1136/jclinpath-2018-205278
8. Rohm CL, Acree S, Shrivastava A, Saberi AA, Lovett L. Antibody-Negative Relapse of Goodpasture Syndrome with Pulmonary Hemorrhage. *Case Rep Med*. 2019;2019:2975131. doi:10.1155/2019/2975131
9. Ohlsson S, Herlitz H, Lundberg S, et al. Circulating anti-glomerular basement membrane antibodies with predominance of subclass IgG4 and false-negative immunoassay test results in anti-glomerular basement membrane disease. *Am J Kidney Dis*. 2014;63(2):289-293. doi:10.1053/j.ajkd.2013.08.032
10. Bae JY, Hussein KI, Leibert E, Archer HM. Seronegative Goodpasture's syndrome associated with organising pneumonia. *BMJ Case Rep*. 2021;14(2):e239390. doi:10.1136/bcr-2020-239390
11. Bharati J, Yang Y, Sharma P, Jhaveri KD. Atypical Anti-Glomerular Basement Membrane Disease. *Kidney Int Rep*. 2023;8(6):1151-1161. doi:10.1016/j.ekir.2023.03.010
12. Poggio E, McClelland R, Blank K, Hansen S, et al. Systematic Review and Meta-Analysis of Native Kidney Biopsy. *Clinical Journal of the American Society of Nephrology*. 2020 Nov 6;15(11):1595-1602. doi:10.2215/CJN.04710420. Epub 2020 Oct 15. Erratum in: *Clin J Am Soc Nephrol*. 2021 Feb 8;16(2):293. doi:10.2215/CJN.18391120. PMID: 33060160; PMCID: PMC7646247. Accessed November 16, 2025. https://journals.lww.com/cjasn/fulltext/2020/11000/systematic_review_and_meta_analysis_of_native.10.aspx
13. Mendelssohn DC, Cole EH. Outcomes of percutaneous kidney biopsy, including those of solitary native kidneys. *Am J Kidney Dis*. 1995;26(4):580-585. doi:10.1016/0272-6386(95)90592-8
14. Hogan JJ, Mocanu M, Berns JS. The Native Kidney Biopsy: Update and Evidence for Best Practice. *Clin J Am Soc Nephrol*. 2016;11(2):354-362. doi:10.2215/CJN.05750515
15. Coleman M, Horn R, Goral S. An uncommon disease in a patient with a solitary kidney. *Am J Kidney Dis*. 2001;38(4):896-900. doi:10.1053/ajkd.2001.27724

Authors

William Doak, MD, Brown University Health, Providence, Rhode Island.

Trevaughn Baptiste, MD, Brown University Health, Providence, Rhode Island.

Anthony Chang, MD, Department of Pathology, University of Chicago, Chicago, Illinois.

Eric S. Kerns, MD, Warren Alpert Medical School of Brown University, Division of Hypertension and Nephrology, Brown Medicine, Providence, Rhode Island.

Matthew R. Lynch, MD, Warren Alpert Medical School of Brown University, Division of Hypertension and Nephrology, Brown Medicine, Providence, Rhode Island.

Disclosures

The authors have no disclosures.

Correspondence

Eric S. Kerns, MD
375 Wampanoag Trail, Suite 402
East Providence, RI 02915
401-649-4060
Fax 401-649-4061
Eric.Kerns@brownphysicians.org

Syndromic Surveillance of Nonfatal Firearm Injuries in Rhode Island, 2022–2024

JONATHAN BARKLEY, MPH

BACKGROUND

Firearm injuries are a leading cause of death among those 1–44 years old in the United States.¹ In Rhode Island (RI), a total of 267 firearm deaths occurred during 2019–2023, with approximately 60% of these deaths being suicides and approximately 37% being homicides.² Firearm-related deaths that are ruled accidental, undetermined, or by legal intervention (law enforcement officers acting in the line of duty) are also reported in RI, but in small numbers. Morbidity related to nonfatal firearm injuries is also important to consider, as those who survive an injury may experience long-term consequences. More than 70% of medically treated, nonfatal firearm injuries have been found to be related to assaults, while around 20% have been associated with accidental injuries.¹

In RI, hospital discharge data (HDD) and syndromic surveillance data from RI’s Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) are both sources of data for nonfatal firearm-related injuries from emergency departments (EDs); however, related visits are identified in different ways. From HDD, injuries are identified from diagnosis codes reported by the hospitals, while combinations of diagnosis codes and keyword terms in chief complaint text are used to identify visits from syndromic surveillance. Syndromic surveillance data are reported in near real-time, thus can be useful in identifying potential increases in firearm-related injuries or other health conditions more quickly than HDD.

This analysis focuses on nonfatal firearm injury trends and characteristics in RI using ED data from 2022–2024. The utility of syndromic surveillance data is evaluated by comparing firearm-injury trends and characteristics identified from ESSENCE to those observed in HDD during the same three-year period.

METHODS

Using 2022–2024 HDD, ED visits in RI related to firearm injuries were identified based on the presence of select International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes in any of the reported diagnoses or the external cause of injury fields. Visits were identified and classified by intent as summarized in **Table 1**.

Table 1. Summary of codes from the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) used to identify firearm-related injuries.

ICD-10-CM Code(s)*	Description
W32, W33, W34.00, W34.09, W34.10, W34.19	Accidental discharge or malfunction of firearm
X72, X73, X74.8, X74.9	Intentional self-harm by firearm
X93, X94, X95.8, X95.9	Assault by firearm
Y38.4	Terrorism involving firearms
Y22, Y23, Y24.8, Y24.9	Firearm discharge of undetermined intent
Y35.00–Y35.03, Y35.09	Legal intervention involving firearm discharge

*Only included if the 7th character of the code is A or missing to reflect initial encounter, active treatment.

To ensure visits were for the initial injury encounter, visits were only included where the seventh character of the ICD-10-CM code was either ‘A’ or missing. Deaths and visits from specialty hospitals were excluded from the analysis.

Firearm-related ED visits in RI during 2022–2024 were also identified in ESSENCE using the firearm injury version 2 syndrome definition developed by the Centers for Disease Control and Prevention (CDC).³ This syndrome definition includes the same diagnosis codes used for HDD; however, it also identifies firearm-related visits using keyword terms such as ‘gunshot wound’ or ‘GSW’. Visits related to accidental firearm injuries, intentional firearm injuries, and assault firearm injuries were also identified using the developed CDC syndrome definitions for these conditions.^{4–6} ESSENCE data were reported from the same facilities as HDD, and deaths were similarly excluded from analysis.

Data from HDD and ESSENCE were imported in SAS (version 9.4) for cleaning and analysis. Due to small numbers, 2022–2024 data were combined and summarized by month, based on visit date. Variables were created to classify visits by year (2022, 2023, 2024), sex (male, female), age group (<25, 25–34, 35–54, 55), race/ethnicity (Hispanic, White, not Hispanic, Black, not Hispanic, other not Hispanic), and injury intent (accidental, intentional, assault, other). Proportions were calculated for each characteristic and chi-square tests ($\alpha=0.05$) were performed to identify potential differences between ESSENCE and HDD.

RESULTS

During 2022–2024, a total of 272 ED visits related to firearm injuries were identified from ESSENCE compared to 295 from HDD. Similar trends were observed by visit month, with visits peaking during July, in both ESSENCE and HDD [Figure 1].

No significant differences in the proportions of firearm-related ED visits between ESSENCE and HDD were identified by year, sex, age group, and race/ethnicity (Table 2, p-values >0.05). Most visits were observed among males, individuals less than 25 years old, and Hispanic and Black, non-Hispanic individuals. While most injuries were classified as accidental in both ESSENCE and HDD, a statistically significant difference was observed by injury classification between these data sources (Table 2, p<0.0001).

DISCUSSION

This analysis found similar trends and characteristics of nonfatal firearm injuries using two sources of RI ED data. Overall firearm-related injury counts were similar by year and visit month when compared between RIDOH's syndromic surveillance system (ESSENCE) and HDD. Counts of firearm injuries were observed to be higher during warmer months and peaked in July, which is consistent with findings using data from other jurisdictions.⁷ Both data sources found the highest burden of injuries among males, younger individuals, and Hispanic and Black individuals, which is also consistent with observations nationally.¹

Given the similarities, the findings support the use of data from RI's ESSENCE syndromic surveillance system, as these data are reported in near real-time. While ED data from HDD are considered more of a 'gold standard' source, these data undergo further preparation and review and are typically delayed by approximately three months from the end of a calendar quarter.

A significantly different proportion of ED visits related to accidental firearm injuries was observed in ESSENCE (87%) compared to HDD (59%). Both percentages are higher than the national estimate of 20% for nonfatal accidental firearm injuries,¹ suggesting misclassification by intent in both datasets. Given that intentional firearm injuries are typically fatal, and accidental firearm deaths are not frequently observed in RI (<5 deaths during 2019–2023),² assault-related visits likely represent a larger proportion of nonfatal injuries. A higher proportion of assault-related injuries was observed in HDD, likely because diagnosis codes undergo additional review and are updated prior to submission. Thus, misclassification by intent likely occurred at a lower rate in HDD, but findings by intent are likely not reliable for either source of ED data. Misclassification of firearm injuries by intent has been noted in other studies. One study that reviewed available clinical notes found that 28% of assault-related firearm injuries were misclassified as accidents.⁸ In North Carolina,

Figure 1. Nonfatal firearm-related emergency department visits in Rhode Island by visit month, syndromic surveillance (ESSENCE) versus hospital discharge data (HDD), 2022–2024 combined.

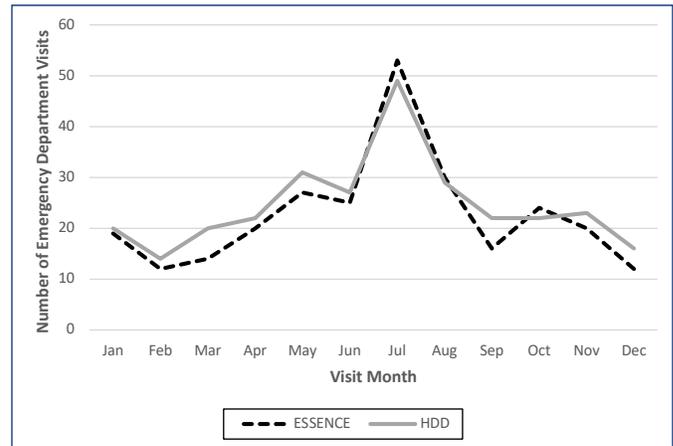


Table 2. Comparison of select characteristics of firearm-related emergency department visits identified via RIDOH's syndromic surveillance system (ESSENCE) and hospital discharge data (HDD), 2022–2024.

Visit Characteristic	ESSENCE N=272 n (%)	HDD N=295 n (%)	P-value*
Year			
2022	108 (39.7)	109 (39.6)	0.7454
2023	101 (37.1)	111 (37.6)	
2024	63 (23.2)	75 (25.4)	
Sex†			
Male	235 (86.4)	255 (86.4)	0.9236
Female	36 (13.2)	40 (13.6)	
Age Category†			
<25	96 (37.9)	109 (39.6)	0.9743
25-34	81 (32.0)	100 (33.9)	
35-54	59 (23.3)	67 (22.7)	
55+	17 (6.7)	19 (6.4)	
Race/Ethnicity†			
Hispanic	83 (30.5)	103 (34.9)	0.7850
White, Not Hispanic	71 (26.1)	72 (24.4)	
Black, Not Hispanic	98 (36.0)	102 (34.6)	
Other, Not Hispanic	16 (5.9)	17 (5.8)	
Injury Classification			
Accidental	236 (86.8)	174 (59.0)	<0.0001 [§]
Assault	9 (‡)	108 (36.6)	
Intentional	6 (‡)	7 (‡)	
Other	0 (‡)	6 (‡)	

*Chi-square test; α=0.05.

†Counts do not add up to totals due to missing data. Percent calculations are based on available data.

‡Percent not reported due to reliability concerns/small numerator.

§Accidental category compared to all other categories for this calculation.

another study found that the records of Emergency Medical Services (EMS) were better able to classify intent compared to available data from the ED.⁹ Given known challenges in classification, looking at overall firearm-injury trends, but not drawing conclusions based on intent, is recommended when using ED data. Further research using RI EMS data and other data sources should be conducted to identify more specific insights by intent.

Efforts should also be made by providers to improve intent coding, when possible. Past ICD-10-CM coding guidelines likely contributed to intent misclassification and the findings of this analysis, as they mentioned intent should be coded as accidental when the injury intent was unknown or unspecified.¹⁰ However, recent guidelines went into effect in October 2025 and provide updated recommendations around how firearm injuries should be coded.¹¹ Specifically, firearm injury intent is now listed as an exception that can be coded using medical documentation from other clinicians involved in the care of a patient, besides the patient's provider. By utilizing notes and clinical documentation available from other clinicians involved in a patient's care, coding may become more reliable over time and allow trends to be more thoroughly evaluated by intent.

Providers should also consider the importance of mental health screening and other health services, as people who survive firearm injuries may suffer long-term consequences. Research has found firearm injuries are associated with impacts on physical well-being, along with psychological, economic, and impact quality of life.¹² Beyond the patient, impacts can also extend to their families and at the community level, supporting the need for more research and access to real-time data sources, such as ESSENCE, to enhance prevention activities. In addition to injury intent misclassification, the main limitation of this analysis was the need to aggregate data across several years due to small sample sizes. Despite this limitation, this analysis was able to highlight similarities in nonfatal firearm-related injuries across different sources of ED data. Future analyses should include more recent data to explore any changing patterns in overall injuries and trends by intent, as recent coding guidance continues to be implemented.

References

- Centers for Disease Control and Prevention. Firearm Injury and Death Prevention. Fast Facts: Firearm Injury and Death. Updated July 5, 2024. <https://www.cdc.gov/firearm-violence/data-research/facts-stats/index.html>. Accessed February 25, 2026.
- Rhode Island Department of Health. Rhode Island Violent Death Reporting System. Internal surveillance data, 2019-2023. [Unpublished data]. Accessed February 23, 2026.
- Centers for Disease Control and Prevention. NSSP ESSENCE Syndrome Definition: CDC Firearm Injury v2. National Syndromic Surveillance Program; 2020. <https://knowledgerepository.syndromicsurveillance.org/cdc-firearm-injury-v2>. Accessed February 19, 2026.
- Centers for Disease Control and Prevention. NSSP ESSENCE Syndrome Definition: CDC Unintentional Firearm Injury v1. National Syndromic Surveillance Program; 2020. Accessed February 19, 2026.
- Centers for Disease Control and Prevention. NSSP ESSENCE Syndrome Definition: CDC Intentional Firearm Injury v1. National Syndromic Surveillance Program; 2020. Accessed February 19, 2026.
- Centers for Disease Control and Prevention. NSSP ESSENCE Syndrome Definition: CDC Assault Firearm Injury v1. National Syndromic Surveillance Program; 2020. Accessed February 19, 2026.
- Rowh A, Zwald M, Sumner S, George N, Sheppard M, Holland K. Patterns of US firearm injury emergency department visits by month, day, and time during 2018 to 2023. *Annals of internal medicine*. 2025 May;178(5):663-70. doi: 10.7326/annals-24-02874.
- Miller M, Azrael D, Yenduri R, Barber C, Bowen A, MacPhaul E, Mooney SJ, Zhou L, Goralnick E, Rowhani-Rahbar A. Assessment of the accuracy of firearm injury intent coding at 3 US hospitals. *JAMA Netw Open*. 2022; 5(12):e2246429. doi:10.1001/jamanetworkopen.2022.46429.
- Snyder NL, Ising A, Waller AE. EMS injury cause codes more accurate than emergency department visit ICD-10-CM codes for firearm injury intent in North Carolina. *PLoS One*. 2024;19(4):e0295348. doi: 10.1371/journal.pone.0295348.
- Centers for Medicare and Medicaid Services; National Center for Health Statistics. ICD-10-CM Official Guidelines for Coding and Reporting: FY 2025. US Department of Health and Human Services; 2024. <https://www.cms.gov/files/document/fy-2025-icd-10-cm-coding-guidelines.pdf>. Accessed February 20, 2026.
- Centers for Medicare and Medicaid Services; National Center for Health Statistics. ICD-10-CM Official Guidelines for Coding and Reporting: FY 2026. US Department of Health and Human Services; 2025. <https://www.cms.gov/files/document/fy-2026-icd-10-cm-coding-guidelines.pdf>. Accessed February 20, 2026.
- Giraldi DM, Swingler S, Kirk DS, Jacoby SF, Melendez-Torres GJ, Kaufman EJ, Humphreys DK. Understanding the broader impacts of non-fatal firearm violence trauma in the United States: a scoping review. *The Lancet Regional Health—Americas*. 2025;46. doi:10.1016/j.lana.2025.101091

Disclosure

This research was supported by cooperative agreement CDC-RFA-CE23-0007 awarded to the Rhode Island Department of Health by the Centers for Disease Control and Prevention (CDC). The contents are those of the author and do not necessarily represent the official views of CDC.

Author

Jonathan Barkley, MPH, Principal Public Health Epidemiologist, Center for Health Data and Analysis, Rhode Island Department of Health, Providence, RI.

Correspondence

Jonathan Barkley, MPH
Jonathan.Barkley@health.ri.gov



Rhode Island Monthly Vital Statistics Report

Provisional Occurrence Data from the Division of Vital Records

VITAL EVENTS	REPORTING PERIOD		
	AUGUST 2025	12 MONTHS ENDING WITH AUGUST 2025	
	Number	Number	Rates
Live Births	984	10,957	10.3*
Deaths	828	10,629	10.0*
Infant Deaths	4	51	4.7#
Neonatal Deaths	2	34	3.1#
Marriages	772	6,985	6.6*
Divorces	151	2,496	2.4*

* Rates per 1,000 estimated population

Rates per 1,000 live births

Underlying Cause of Death Category	REPORTING PERIOD			
	FEBRUARY 2025	12 MONTHS ENDING WITH FEBRUARY 2025		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	194	2,371	216.1	2,995.0
Malignant Neoplasms	176	2,180	198.7	3,912.5
Cerebrovascular Disease	41	458	41.7	547.0
Injuries (Accident/Suicide/Homicide)	69	855	77.9	9,669.5
COPD	54	482	43.9	502.0

(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 1,097,379 for 2020 (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.



Our priorities

RIMS focused on strengthening Rhode Island's healthcare system, protecting physicians' well-being, reducing administrative burdens, and improving access to care. Together with members, specialty societies, and partner organizations, we made significant progress on our top priorities.

The Rhode Island Prior Authorization Reform Act (SB 168/HB 5120)

Eliminates prior authorization for admissions, services, and procedures ordered by in-network primary care physicians in a three-year pilot.

Effective: October 1, 2025.

Status: Passed and signed

Sponsored by: Rep. Brandon Potter; Sen. Melissa Murray

Why join RIMS?

The Rhode Island Medical Society is your voice at the State House and in the community. In 2025, we secured wins on prior authorization, clinician wellness, and primary care funding—but this work depends on physician support. Without membership, RIMS cannot continue to advocate, educate, and protect the profession. Join or renew today—and consider getting involved in one of our committees. Together, we are stronger. The Rhode Island Medical Society is the only organization dedicated solely to advocating for physicians and their patients in our state.

In 2025, RIMS members helped

- Eliminate prior auth for PCP-ordered services (3-year Medicaid pilot)
- Secure fair Medicaid rates—up to 100% of Medicare starting Oct. 2025
- Protect physician wellness with the Clinician Wellness & Support Act

We're not stopping here

RIMS is fighting for the future of telemedicine, tackling workforce shortages, and reducing administrative burdens.

Wins for providers

RIMS worked to secure and support key budget investments.

Medicaid primary care rate increase

Up to 100% of medicare rates
Starting October 2025

Medicaid prior authorization pilot

Eliminates prior authorization for Medicaid for three years
Starting October 2025

Physician loan repayment funding

Includes \$200,000 in funding to recruit and retain clinicians

Health center funding

Sustained investments in FQHCs and community health

Health services funding assessment

\$30Mannually for primary care and other critical programs



The Rhode Island Clinician Wellness and Support Act (SB 695/HB 6036)

Recognizes RIMS' Physician Health Program in statute, strengthens confidentiality protections, and updates licensing language to encourage clinicians to seek care without fear.

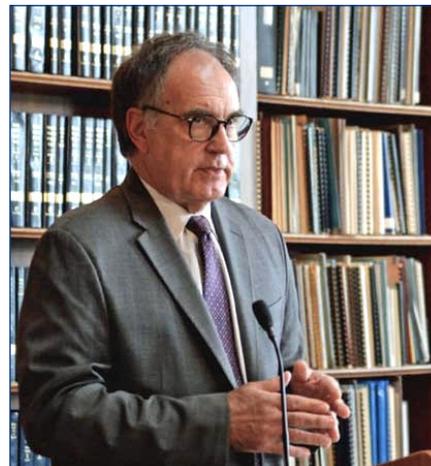
Status: Passed and signed

Sponsored by: Rep. John "Jay" Edwards; Sen. Bridget Valverde

"I'm Sorry" Bill (H6210/S66)

Although not yet enacted, RIMS made significant progress this session on legislation to allow physicians to express sympathy or apologize after an adverse outcome without it being used as evidence of liability. We met twice with the Rhode Island Association for Justice (trial lawyers) and reviewed their suggested language—which we ultimately could not support—laying important groundwork for next session.

Sponsored by: Rep. Teresa Tanzi; Sen. Pamela Lauria



Click to join

<https://rhodeislandmedicalsociety.wildapricot.org/Join-us/>

IT ALL STARTS HERE! JOIN OR RENEW IN 2026 **RHODE ISLAND MEDICAL SOCIETY**

The Rhode Island Medical Society is the statewide home for physician advocacy, education, wellness, and leadership. This past year, RIMS delivered meaningful wins for Rhode Island physicians, including:

- » **MAJOR PRIOR AUTHORIZATION REFORM**
- » **STRONGER CLINICIAN WELLNESS PROTECTIONS**
- » **MEDICAID RATES TO 100% OF MEDICARE**
- » **12 SPECIALTY SOCIETIES SUPPORTED AND 35+ EDUCATION PROGRAMS**
- » **CONFIDENTIAL SUPPORT THROUGH THE PHYSICIAN HEALTH PROGRAM**

Your membership strengthens our voice at the State House and supports the future of medicine in Rhode Island.

JOIN OR RENEW TODAY AT
rimericalsociety.org/membership

Questions about individual or group membership?
EMAIL **membership@rimered.org**



**YOUR VOICE.
YOUR PATIENTS.
YOUR PROFESSION.**





RIMS gratefully acknowledges the practices who participate in our discounted Group Membership Program



BROWN EMERGENCY MEDICINE
BROWN PHYSICIANS, INC.



BROWN MEDICINE
BROWN PHYSICIANS, INC.



BROWN SURGICAL ASSOCIATES
BROWN PHYSICIANS, INC.



CCAP
COMPREHENSIVE COMMUNITY ACTION PROGRAM
YOUR COMMUNITY'S HELPING HAND



east bay community action program
THE BRIDGE TO SELF-RELIANCE

**SKIN
PROS**



Thundermist!
HEALTH CENTER



University
Otolaryngology



Wood River
Health Services
The Heart of South County since 1976

For more information about group rates, please contact [Ali Walz](#), RIMS Director of Member Services

Determining Public Health Priorities in Rhode Island

PHILIP A. CHAN, MD, MS

Public health in Rhode Island and across the United States has evolved over the past decades in response to changing patterns of disease, demographic shifts, pandemics (eg, COVID-19) and development of novel interventions to address health. While significant progress has been made in controlling infectious diseases such as HIV/AIDS and vaccine-preventable diseases, the country faces other emerging and important public health challenges, as well as a resurgence of other infectious diseases due to misinformation and funding cuts. Furthermore, efforts are still needed to continue trends and successes in public health, such as those related to infant mortality, which has also been increasing across certain areas of the country.¹ Defining public health priorities in Rhode Island and across the United States is important to help guide strategic goals and allocation of resources. We review leading causes of morbidity and mortality in the United States and identify major public health priorities.

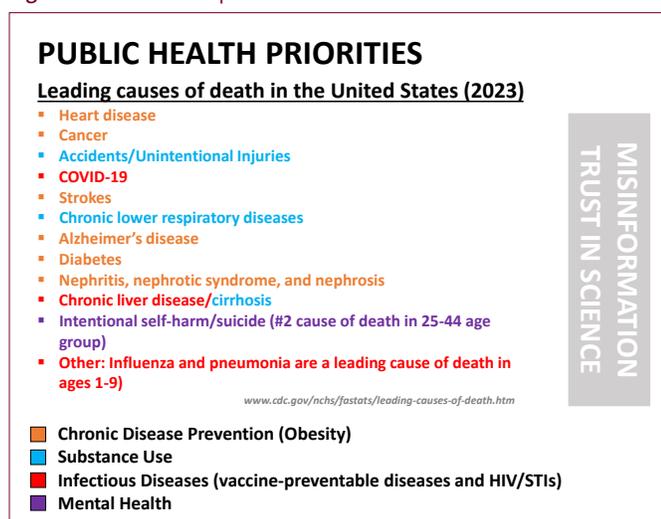
The Centers for Disease Control and Prevention conducts comprehensive surveillance on causes of death in the United States [Figure 1].² Identifying and understanding the leading causes of mortality can help guide public health priorities. In 2023, the overall top causes of death included: 1) heart disease; 2) cancer; 3) accidents and unintentional injuries (eg, drug overdoses); 4) COVID-19 infection; 5) strokes; 6) chronic lower respiratory disease (eg, chronic obstructive pulmonary disease [COPD]); 7) Alzheimer's disease; 8) diabetes; 9) renal disease such as nephritis, nephrotic syndrome,

and nephrosis; 10) chronic liver disease (eg, cirrhosis); and 11) intentional self-harm or suicide. Notably, leading causes of death in different age groups, and specifically younger populations are important to consider. For example, intentional self-harm, or suicide is the second leading cause of death in 25–44-year-olds; influenza and pneumonia are the leading causes of death in children 1–9 years old.

Also important to consider are trends over time. Similar to previous years, heart disease and cancer continue to be the top two leading causes of death.³ Diabetes moved down to the 8th leading cause of death during 2020–2022, but overall deaths due to diabetes have increased in number and rate since 2019. Intentional self-harm and suicide was the 10th leading cause of death in 2019 and prior years, but dropped to 11th because of COVID-19. Influenza and pneumonia were the 9th leading causes of death in 2019, but dropped from the top 10 in subsequent years. Mortality related to chronic liver disease and cirrhosis has increased in prior years. Historically, the majority of chronic liver disease was due to viral hepatitis, but effective vaccination has reduced mortality in the United States. However, alcohol-related liver disease and metabolic dysfunction-associated steatotic liver disease (MASLD), which is strongly associated with obesity, have both increased.⁴ Similarly, obesity, diabetes and hypertension are the main drivers of end-stage renal disease.⁵ Renal disease and chronic liver disease are also significant risk factors for cancer and heart disease.

Knowledge of the leading causes of death in other countries provides important context to understanding current public health successes in the United States (eg, what diseases are less of a concern in the United States due to successful public health interventions). At a global level, the top 10 leading causes of death according to the World Health Organization (WHO) include⁶: 1) ischemic heart disease; 2) COVID-19; 3) strokes; 4) COPD; 5) lower respiratory infections; 6) trachea, bronchus, and lung cancers; 7) Alzheimer's disease and other dementias; 8) diabetes; 9) renal disease; and 10) tuberculosis. Importantly, deaths from HIV/AIDS have decreased by 61%, moving from the 7th leading cause of death in 2000 to the 21st in 2021 (although HIV/AIDS remains the 10th leading cause of death in low-income countries). Chronic diseases now account for seven of the top 10 leading causes of death worldwide. There is significant variation depending on country and income level (eg, high-income versus low-income country). However, trends in leading causes of death and, specifically in higher-income countries, including the United States, remain consistent.

Figure 1. Public health priorities



Based on leading causes of death as well as other analysis, clear priorities emerge in terms of public health. Notably, chronic disease and specifically obesity and related conditions contribute to at least seven of the top 10 leading causes of death (ie, heart disease, cancer, strokes, Alzheimer's, diabetes, renal disease, and chronic liver disease). This is by far the most pressing public health concern based on morbidity and mortality. Unintentional fatal overdoses are a leading cause of death, and substance use in general is highly prevalent in the population (including alcohol and tobacco use). Infectious diseases, including vaccine-preventable diseases, also contribute to the leading causes of death (eg, COVID-19, influenza, chronic lower respiratory disease, and chronic liver disease). Building on the success of lower death rates from HIV/AIDS, prevention efforts used to achieve this success should be noted and continued. Finally, intentional self-harm and suicide are a leading cause of death, and mental health illness in general is highly prevalent in the population. In summary, addressing the major public health challenges related to obesity, substance use, infectious diseases, and mental health would address leading causes of morbidity and mortality in Rhode Island and across the United States.

In addition to the four priorities above, addressing health misinformation should also be considered a top public health priority. Misinformation, defined as health-related claims that are based on anecdotal evidence, false, or misleading, continues to undermine efforts to improve public health outcomes.^{7,8} For example, misinformation has led to low rates of vaccination in some communities, resulting in a resurgence of measles and other diseases.⁹ COVID-19 vaccination misinformation is rampant on social media, leading to lower rates of vaccination and concerns about the vaccines themselves.¹⁰ Misinformation and continued attacks on public health have also led to funding cuts and even violence against public health workers.¹¹ Addressing misinformation and promoting evidence-based interventions are needed to fully realize the potential of public health efforts.

Health equity and disparities in mortality are important to consider in terms of improving public health. For example, the all-cause mortality rate among African-American/Blacks is 24% higher than among White populations nationally, resulting in 74,402 excess African-American/Black deaths annually.¹² Addressing public health priorities also means achieving health equity and addressing social determinants of health. Effective interventions for achieving health equity could include interventions related to early childhood development, child poverty, job opportunities, and environmental conditions in disadvantaged communities.¹² Public health priorities in Rhode Island should focus on addressing obesity-related chronic disease, substance use, infectious diseases, mental health, and misinformation. These public health priorities overlap and are shaped by a complex dynamic of demographics, social determinants of health, health inequities, and evolving disease burdens.

An overall focus on achieving health equity is important to make progress in addressing these priorities. Coordination and action across government, healthcare, community organizations, and individuals is needed. By investing in these priorities, Rhode Island has the potential not only to improve life expectancy and quality of life, but also to create a more resilient healthcare and public health system for future and emerging threats to our health.

References

1. Mississippi State Department of Health Declares Public Health Emergency on Infant Mortality [Internet]. [cited 2025 Sep 1]. Available from: msdh.ms.gov/page/23,30305,341.html
2. Ahmad FB, Cisewski JA, Anderson RN. Mortality in the United States - Provisional Data, 2023. *MMWR Morb Mortal Wkly Rep*. 2024 Aug 8;73(31):677–81.
3. Ahmad FB, Cisewski JA, Anderson RN. Leading Causes of Death in the US, 2019-2023. *JAMA*. 2024 Sep 24;332(12):957–8.
4. Appiah JK, Danso EA, Donneyong E. Rising Mortality From Chronic Liver Disease in Young US Adults: A Centers for Disease Control and Prevention Wide-Ranging Online Data for Epidemiologic Research (CDC WONDER)-Based Analysis. *Cureus*. 2025 May;17(5):e84659.
5. Grobman B, Bondarchuk CP, Mansur A, Lu CY. Trends and Disparities in Deaths from Kidney Disease Among Older Adults in the United States. *J Clin Med*. 2025 Jul 12;14(14):4950.
6. The Top 10 Causes of Death [Internet]. World Health Organization; 2024 [cited 2025 Sep 1]. Available from: www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death
7. Suarez-Lledo V, Alvarez-Galvez J. Prevalence of Health Misinformation on Social Media: Systematic Review. *J Med Internet Res*. 2021 Jan 20;23(1):e17187.
8. El Mikati IK, Hoteit R, Harb T, et al. Defining Misinformation and Related Terms in Health-Related Literature: Scoping Review. *J Med Internet Res*. 2023 Aug 9;25:e45731.
9. Colburn NE. Measles - Resurgence of an Old Foe. *Med Clin North Am*. 2025 May;109(3):683–94.
10. Loomba S, de Figueiredo A, Piatek SJ, de Graaf K, Larson HJ. Measuring the impact of COVID-19 vaccine misinformation on vaccination intent in the UK and USA. *Nat Hum Behav*. 2021 Mar;5(3):337–48.
11. Chan PA, Nunn AS. Grant Terminations in the US Threaten HIV Research and Future Progress. *JAMA*. 2025 Sep 16;334(11):949–950. doi: 10.1001/jama.2025.12688. PMID: 40839363.
12. Benjamins MR, Silva A, Saiyed NS, De Maio FG. Comparison of All-Cause Mortality Rates and Inequities Between Black and White Populations Across the 30 Most Populous US Cities. *JAMA Netw Open*. 2021 Jan 4;4(1):e2032086.

Author

Philip A. Chan, MD, MS, Rhode Island Public Health Institute, Providence, RI; Brown University Health, The Miriam Hospital, Providence, RI; Rhode Island Department of Health, Providence, RI.

Disclosures

Declarations: PAC was the sole contributor to this article.

Competing Interests: No conflicts of interest.

Funding Source: None.

Correspondence

Philip A. Chan, MD
Department of Medicine, Brown University
Providence, RI 02912
Philip.Chan@brown.edu

Fetal Surgery at Brown: The First 25 Years

FRANCOIS I. LUKS, MD, PhD; JULIE MONTEAGUDO, MD; DEBRA WATSON-SMITH, RN; STEPHEN R. CARR, MD

Nowadays, fetal surgery is a niche specialty that, for some, evokes the “final frontier”: operating on patients before they’re even born. It has captured the imagination of many, thanks to regular coverage in the media¹ and countless appearances in television’s medical shows. Operations *in utero* are now offered in a growing number of tertiary and quaternary medical centers, albeit for a still-limited number of indications. Three decades ago, however, it was considered experimental. There were only two comprehensive fetal surgery centers in North America—at the University of California San Francisco, where fetal surgery was “born,” and a relatively new program at the Children’s Hospital of Philadelphia (CHOP). Two other specialists, in Milwaukee, Wisconsin and Tampa, Florida, offered fetal endoscopic treatment for a single indication, twin-to-twin transfusion syndrome (TTTS).

Fetal surgery is only the tip of the iceberg called fetal medicine. For every pregnant woman who undergoes an operation on her fetus, there are innumerable patients who need close prenatal monitoring, advanced fetal diagnosis, modified birthing plans, and even non-invasive maternal-fetal treatment. At Brown, all these aspects of maternal-fetal care had been present for a long time, and countless neonatal and pediatric specialists were expert in the management of congenital conditions. When, in the late 1990s, fetal surgery was being considered, the first priority was to create a coherent, unified approach to the diagnosis and management of fetal conditions: the concept of Multidisciplinary Antenatal Diagnosis and Management (MADAM) was born in 1997. Its twice-a-month conferences were mirrored after the model of a tumor board, and its many goals included multispecialty discussions of complex cases, mutual evidence-based education on the rapid advances in fetal care, establishment of perinatal treatment protocols, and an ethics/sounding board for new forms of fetal therapy—including fetal surgery.

The expertise required for the technical aspects of fetal surgery was already present at Brown and its affiliated institutions, Women & Infants, Hasbro Children’s and Rhode Island hospitals. There already existed robust research in fetal physiology and fetal surgery²⁻⁴; Hasbro Children’s was at the forefront of minimally invasive surgery (laparoscopy) in infants and neonates^{5,6}; the Neonatal Intensive Care Unit was the second-largest in New England and its neonatologists nationally renowned^{7,8}; and the Divisions of

Maternal-Fetal Medicine and Pediatric Cardiology were known for their expertise in ultrasound diagnosis, fetal echocardiography and ultrasound-guided invasive therapy.^{9,10} Following consultation with the very few existing fetal surgery centers worldwide, a protocol was drafted and critiqued by the MADAM board, which ultimately approved it; and clearance was obtained from the Institutional Review Board (IRB) at both hospitals and the chiefs of surgery and obstetrics & gynecology. In the spring of 2000, the first two patients with severe TTTS underwent endoscopic fetal surgery—a single-port technique aimed at laser ablation of all communicating placental vessels responsible for the unbalanced transfusion of blood from one fetus to its identical twin.¹¹

This was a first in New England, and it made the local and regional news. (That same year, the International Fetal Medicine and Surgery Society (IFMSS) met in Nantucket, hosted by the CHOP team. Guests from around the globe who checked into their hotel room were treated to the local news, on a loop—including Rhode Island’s first fetal operations.)

Endoscopic laser treatment is the only therapy that addresses the root problem of TTTS—to interrupt the unbalanced transfusion from donor to the recipient twin. Unfortunately, the intervention does not make the fetuses better, it just prevents them from getting worse, and poses risks to fetus and mother. Survival of at least one twin was only 70%, due to a combination of preterm (pre-viability) labor and postoperative intrauterine demise of already very compromised fetuses—still far better than the near-100% mortality of both twins in advanced cases that did not undergo intervention. As this was a new field, there was plenty of opportunity to discover hitherto unknown aspects of the condition,¹²⁻¹⁵ develop new diagnostic modalities,¹⁶ and perfect surgical techniques.¹⁷⁻¹⁹ For the first few years, the number of patients we had operated on was dwarfed by the number of abstracts, papers and scientific presentations from our Fetal Treatment Program. Since its inception, our program has published more than 100 peer-reviewed articles and produced more than 250 abstracts, presentations, and book chapters, on topics ranging from the epigenetic changes in TTTS²⁰ and the *in vivo* determination of hemoglobin concentrations in donor and recipient vessels,²¹ to short- and long-term outcome of TTTS.²² Among the novel techniques

established by our program, the description of placental vascular anastomoses after laser surgery has resonated the most.²³ In a 2025 study on the 25 most paradigm-shifting articles in fetal surgery in the world literature, our 2004 study was ranked number 1, with a higher disruption factor than the next five studies combined.²⁴

In 2004, the results of the first randomized controlled study were published, showing a significant survival advantage of endoscopic laser ablation of placental vessels over serial amnioreduction.²⁵ This international study comprised more than 30 fetal centers in six countries, although patients randomized to surgery were treated at one of only three centers: Leuven (Belgium), Paris (France) and Providence, RI (the only North American center in the study).

That same year, we were invited to participate in a National Institutes of Health (NIH)-sponsored workshop on the future of fetal medicine.²⁶ Of the 20 participants, only four represented fetal surgery centers; we had argued successfully that, while the presence of the largest such programs was essential, representation from smaller, regional centers was important to develop a national policy on access to advanced fetal care. (The contributions from the Brown Fetal Treatment Program may or may not have had lasting effects, but the term “MADAM conference” entered the vernacular.)

One of the consequences of the NIH workshop on fetal medicine was the creation of the North American Fetal Therapy Network (NAFTNet) in 2005, comprising 15 fetal treatment centers in the United States and Canada (not all of them fetal surgery centers).^{27,28} The Brown Fetal Treatment Program was one of the founding members of NAFTNet—a network that now, in its 20th year, comprises more than 50 centers worldwide. When, in 2015, the Fetal Therapy Nurse Network (FTNN) was created as an off-shoot of NAFTNet, our fetal nurse coordinator was one of the original members, too. At the time, the Rhode Island program was still the only such initiative in New England; it would take another few years for the Yale program to start, and another decade-and-a-half before Boston began to offer fetal surgery as well. Consequently, more than 85% of our patients were referred in from adjoining states (all of New England), and as far away as New York, New Jersey, Georgia, Louisiana, Florida, Minnesota and North Dakota. Ours was a model of cooperation, not only between specialty services and departments, but between two hospitals and the medical school. To emphasize this combined approach and stress collaboration over rivalry, the hospitals joined forces in a renamed Fetal Treatment Program of New England, and both have continued to proudly promote the program as a joint effort. That example of collaboration was prominently displayed when the program hosted the annual IFMSS meeting in the summer of 2014, in what remains the largest such conference in the society’s 43-year history.

Fetal surgery for TTTS was the tip of that proverbial iceberg, but the program has touted many other fetal firsts over the decade, including:

- The first EX-utero/Intrapartum (“EXIT”) procedure, in 2005, for a giant cervical tumor that would have made it impossible for the newborn baby to breathe on her own; a team of highly specialized nurses, respiratory therapists and physicians from five different specialties at both hospitals partially delivered the infant, keeping it on placental support while a surgical airway was obtained.
- The first, and so far only case of identical quadruplets treated for feto-fetal transfusion syndrome.²⁹
- The first Food and Drug Administration (FDA)-sanctioned Investigational Device Exemption (IDE) for a detachable balloon inserted in the trachea of fetuses with severe congenital diaphragmatic hernia and extreme pulmonary hypoplasia, a technique shown experimentally to cause accelerated lung growth.³⁰
- One of the youngest-ever sets of conjoined twins to be separated, mere weeks after a premature delivery—in large part because of the collaborative prenatal planning of our team, including a novel method of early gestation visualization.³¹
- And in 2018, following the results of the Management of Myelomeningocele Study (MOMS),³² the first open fetal surgery in New England to repair a spina bifida *in utero*.³³

Research and clinical excellence have been two driving forces of the fetal treatment program at Brown. As the MADAM experience showed us, education was another major consideration. Educating the next generation of fetal medicine specialists was felt to be equally important. Thus, in 2003, we started to offer a unique opportunity: a course in fetal medicine to medical students at what was then the Brown University Medical School, and to undergraduate students in the Program in Liberal Medicine Education (PLME). In a survey of the first four classes (2003–2007), students credited the course with helping them understand embryology and human development (87%), the link between basic science and clinical medicine (70%), the role of ethics in medicine (90%), and the importance of a multidisciplinary approach to medicine (93%).²⁵ Twenty years later, the course is still being taught.

Fetal surgery as a field of medicine is no longer considered experimental, but it remains a niche specialty that requires the highest degree of expertise, coordination and engagement. The Fetal Treatment Program of New England is no longer the only such initiative in the region, but it is the oldest. Many of our former fetal patients are now old enough to drive; some have voted twice in presidential elections, gone to college and started families of their own. A generation later, our program continues to thrive, and younger fetal specialists have joined the ranks of the “old guard.”

Even as the healthcare landscape in Rhode Island and the region undergo major changes, mothers, their fetuses, and their families continue to benefit from a talented and experienced team that exemplifies collaboration across specialties and hospitals. The program itself continues to be at the forefront of innovation—in *utero* repair of fetal spina bifida using robotic surgery is now in a preclinical phase,³⁵ offering the promise of highly precise interventions on the fetus with minimal pain, discomfort and risk to mothers. Today, the Fetal Treatment Program of New England continues to offer fetal surgery to patients in our community and beyond. It serves as a model for fledgling programs around the country and gladly shares its 25-year experience; and it continues to advance the field of fetal medicine for all.

References

1. Miller GW. Fetal surgery gives baby brighter future. The Providence Journal. Providence, RI; 2019.
2. Papadakis K, Luks FI, De Paepe ME, Piasecki GJ, Wesselhoeft CW, Jr. Fetal lung growth after tracheal ligation is not solely a pressure phenomenon. *J Pediatr Surg*. 1997;32(2):347-351.
3. Papadakis K, De Paepe ME, Tackett LD, Piasecki GJ, Luks FI. Temporary tracheal occlusion causes catch-up lung maturation in a fetal model of diaphragmatic hernia. *J Pediatr Surg*. 1998;33(7):1030-1037.
4. De Paepe ME, Papadakis K, Johnson BD, Luks FI. Fate of the type II pneumocyte following tracheal occlusion in utero: a time-course study in fetal sheep. *Virchows Arch*. 1998;432(1):7-16.
5. Lessin MS, Luks FI. Laparoscopic appendectomy and duodenocolonic dissociation (LADD) procedure for malrotation. *Pediatr Surg Int*. 1998;13(2-3):184-185.
6. Tomicic JT, Luks FI, Shalon L, Tracy TF. Laparoscopic gastrotomy in infants and children. *Eur J Pediatr Surg*. 2002;12(2):107-110.
7. Rubin LP, Kifor O, Hua J, Brown EM, Torday JS. Parathyroid hormone (PTH) and PTH-related protein stimulate surfactant phospholipid synthesis in rat fetal lung, apparently by a mesenchymal-epithelial mechanism. *Biochim Biophys Acta*. 1994;1223(1):91-100.
8. Padbury JF, McGonnigal B, Tseng YT, Nguyen TT, Stabila JP. Cloning and sequence analysis of the rat norepinephrine transporter promoter. *Brain Res Mol Brain Res*. 2000;83(1-2):128-132.
9. Canick JA, Carr SR. Screening for birth defects: integrating laboratory evaluation, genetic counseling and clinical intervention. *Med Health R I*. 1998;81(4):122-126.
10. Carr SR, Gilchrist JM, Abuelo DN, Clark D. Treatment of antenatal myasthenia gravis. *Obstet Gynecol*. 1991;78(3 Pt 2):485-489.
11. Bussey JG, Luks F, Carr SR, Plevyak M, Tracy TF, Jr. Minimal-access fetal surgery for twin-to-twin transfusion syndrome. *Surg Endosc*. 2004;18(1):83-86.
12. De Paepe ME, Stopa E, Huang C, Hansen K, Luks FI. Renal tubular apoptosis in twin-to-twin transfusion syndrome. *Pediatr Dev Pathol*. 2003;6(3):215-225.
13. Carr SR, Luks F, Tracy T, Plevyak M. Antenatal Necrotic Injury in Severe Twin-to-Twin Transfusion Syndrome. A Case and Review. *Fetal Diagn Ther*. 2004;19(4):370-372.
14. Poch M, De Koninck P, Luks FI, Carr SR, De Paepe ME. Net vascular cross-sectional area correlates with twin-to-twin transfusion. *International Fetal Medicine and Surgery Society Annual Meeting*. 2004.
15. Luks FI, Carr SR, Plevyak M, et al. Limited prognostic value of a staging system for twin-to-twin transfusion syndrome. *Fetal Diagn Ther*. 2004;19(3):301-304.
16. Luks FI, Carr SR, Ponte B, Rogg JM, Tracy TF, Jr. Preoperative planning with magnetic resonance imaging and computerized volume rendering in twin-to-twin transfusion syndrome. *Am J Obstet Gynecol*. 2001;185(1):216-219.
17. Lombardo ML, Watson-Smith DJ, Muratore CS, Carr SR, O'Brien BM, Luks FI. Laser ablation of placental vessels in twin-to-twin transfusion syndrome: a paradigm for endoscopic fetal surgery. *J Laparoendosc Adv Surg Tech*. 2011;21(9):869-872.
18. Ahmed S, Luks FI, O'Brien BM, Muratore CS, Carr SR. Influence of experience, case load, and stage distribution on outcome of endoscopic laser surgery for TTTS—a review. *Prenat Diagn*. 2009;30(4):314-319.
19. Duron VD, Watson-Smith D, Benzuly SE, et al. Maternal and fetal safety of fluid-restrictive general anesthesia for endoscopic fetal surgery in monochorionic twin gestations. *J Clin Anesth*. 2014;26(3):184-190.
20. Marsit CJ, Koestler DC, Watson-Smith D, Boney CM, Padbury JF, Luks F. Developmental genes targeted for epigenetic variation between twin-twin transfusion syndrome children. *Clin Epigenetics*. 2013;5(1):18. doi: 10.1186/1868-7083-5-18.
21. Curran S, McMurdy JW, Carr SR, et al. Reflectance spectrometry for real-time hemoglobin determination of placental vessels during endoscopic laser surgery for twin-to-twin transfusion syndrome. *J Pediatr Surg*. 2010;45(1):59-64.
22. Kowitz B, Tucker R, Watson-Smith D, et al. Long-term morbidity after fetal endoscopic surgery for severe twin-to-twin transfusion syndrome. *J Pediatr Surg*. 2012;47(1):51-56.
23. De Paepe ME, Friedman RM, Poch M, Hansen K, Carr SR, Luks FI. Placental findings after laser ablation of communicating vessels in twin-to-twin transfusion syndrome. *Pediatr Dev Pathol*. 2004;7(2):159-165.
24. Vaughn CR, Han XY, White M, Becerra AZ, Chon AH, Sun RC. Return of the Disruption Score: Fetal Surgery in the Spotlight (1975-2021). *J Pediatr Surg*. 2025;60(7):162338. doi: 10.1016/j.jpedsurg.2025.162338. Epub 2025 Apr 24.
25. Senat MV, Deprest J, Boulvain M, Paupe A, Winer N, Ville Y. Endoscopic laser surgery versus serial amnioreduction for severe twin-to-twin transfusion syndrome. *N Engl J Med*. 2004;351(2):136-144.
26. Chescheir NC, Socol M. The National Institutes of Health Workshop on Fetal Treatment: needs assessment and future directions. *Obstet Gynecol*. 2005;106(4):828-833.
27. Johnson MP. The North American Fetal Therapy Network (NAFTNet): a new approach to collaborative research in fetal diagnosis and therapy. *Semin Fetal Neonatal Med*. 2010 Feb;15(1):52-7. doi: 10.1016/j.siny.2009.05.006. Epub 2009 Jun 24.
28. Luks FI, Johnson A, Polzin WJ, North American Fetal Therapy N. Innovation in maternal-fetal therapy: a position statement from the North American Fetal Therapy Network. *Obstet Gynecol*. 2015;125(3):649-652.
29. O'Brien BM, Feltovich HM, Carr SR, Luks FI. Feto-fetal transfusion syndrome in monochorionic quadruplets. *Obstet Gynecol*. 2010;115(2 Pt 2):470-472.
30. Liao SL, Luks FI, Piasecki GJ, Wild YK, Papadakis K, De Paepe ME. Late-gestation tracheal occlusion in the fetal lamb causes rapid lung growth with type II cell preservation. *J Surg Res*. 2000;92(1):64-70.
31. Luks FI, Monteagudo J, Collins S, et al. Surface rendering of cross-sectional imaging and medical illustration for perinatal planning in conjoined twins. *Fetal Diagn Ther*. 2025;52:254-261.
32. Adzick NS, Thom EA, Spong CY, et al; MOMS Investigators. A Randomized Trial of Prenatal versus Postnatal Repair of Myelomeningocele. *N Engl J Med*. 2011;364(11):993-1004.

33. Snegovskikh D, Svokos K, Souza D, et al. An Open Fetal Myelomeningocele Repair With Incorporation of a Skin Allograft. *J Obstet Gynaecol Can.* 2020;42(2):177-178.
34. Luks FI, Carr SR, Caldamone AA, Feit LR. Teaching fetal medicine to the next generation of physicians. *International Fetal Medicine and Surgery Society (IFMSS).* Aruba, 2007.
35. Monteagudo J, Giorgi M, Luhrs A, et al. Robotic-assisted fetal myelomeningocele repair: Feasibility and technique refinement using a surgical model. *International Fetal Medicine and Surgery Society (IFMSS).* Napa, CA, 2025.

Authors

Francois I. Luks, MD, PhD, Professor of Surgery, Pediatrics, and Obstetrics & Gynecology, Alpert Medical School of Brown University; Pediatric Surgeon-in-Chief, Hasbro Children's, Brown University Health, Providence, RI.

Julie Monteagudo, MD, Assistant Professor of Surgery and Pediatrics, Alpert Medical School of Brown University; Pediatric Surgeon, Hasbro Children's, Brown University Health, Providence, RI.

Debra Watson-Smith, RN, Fetal Treatment Program Nurse Manager, Fetal Treatment Program of New England, Brown University Health and Care New England, Providence, RI.

Stephen R. Carr, MD, Professor of Obstetrics & Gynecology, Alpert Medical School of Brown University; Maternal-Fetal Medicine Specialist, Department of Obstetrics & Gynecology, Care New England, Providence, RI.

Disclosures

None.

Disclaimer: The views expressed herein are those of the authors and do not necessarily reflect the views of the Alpert Medical School of Brown University, Brown University Health, or Care New England.

Ethical approval: Not applicable for this article.

Correspondence

Francois I. Luks, MD, PhD
 Hasbro Children's
 593 Eddy Street, Suite HCH 120
 Providence, RI 02903
 Francois_Luks@brown.edu

Rhode Island Pioneers of Public Health: Edwin M. Snow, MD, and Charles V. Chapin, MD

MARY KORR

Brown University graduates **EDWIN M. SNOW, MD**, (1820–1888), and **CHARLES V. CHAPIN, MD**, (1856–1941), were public health pioneers of their eras. From the Civil War to World War II, they were at the forefront of the medical, public health and scientific landscape, in Rhode Island and nationwide.

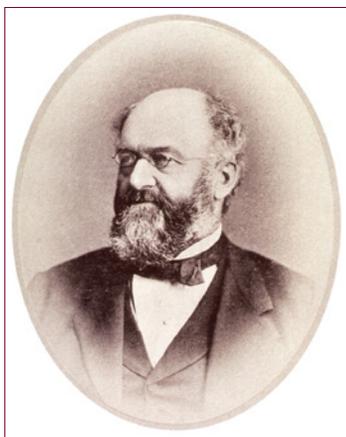
Dr. Snow

Dr. Snow, a native of Vermont, came to Rhode Island to study at Brown University, graduating in 1845. He returned to the state after earning his medical degree from the College of Physicians and Surgeons in New York City, and began his career as a physician at the Providence Dispensary in 1851.

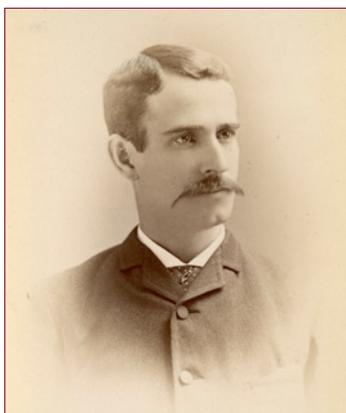
During a cholera outbreak in 1854, he investigated its relation to local sanitary conditions, and in a presentation to the Providence Medical Association in 1855, and a subsequent letter to the City of Providence, on the statistics and causes of the Asiatic cholera, he described the Moshassuck River in Providence, an industrial waste dumping ground, as “filthy as any common sewer; the stench arising from it at times pervades the whole neighborhood and at any time, dogs, cats and hogs may be seen in the water in every stage of decomposition.” He concluded the resulting 9/10ths of the 159 deaths were preventable, citing water-borne causes at the location near the canal and the convergence of two rivers.

As a result of his investigations, Dr. Snow was instrumental in organizing the city’s Department of Health, and was named Providence’s first superintendent of health in 1856. One of his first tasks was to set up a smallpox vaccination program. In his 28-year tenure, he signed over 34,000 vaccination certificates for school children.

In 1857, in a report to the Mayor of Providence and the Board of Aldermen, Dr. Snow recommended a municipal water supply, a system of sewers and a waste treatment facility, a housing law,



Dr. Edwin M. Snow served as Providence’s first superintendent of health. [NATIONAL LIBRARY OF MEDICINE]



Dr. Charles V. Chapin in 1885, when he taught as a professor of physiology at Brown University. [BROWN UNIVERSITY]

and the elimination of privies to prevent the spread of cholera, dysentery and typhoid fever. The city would eventually adopt his plans, though not as quickly as Dr. Snow would have liked.

American Public Health Association

Dr. Snow was also one of the founders of the American Public Health Association (1872) and served as its fourth president. In 1877 (the year before Rhode Island established a state Board of Health), he addressed the national association’s annual conference, and stressed the key role Boards of Health led in “the organized and systematic investigation of the numerous causes of disease and death that exist in every community in every state.”

Dr. Snow died in 1888, at the age of 68. In an obituary in the *Transactions of the Rhode Island Medical Society*, an early precursor to the *Rhode Island Medical Journal* (RIMJ), he was described as “not merely a physician, he was a man of science as well. He believed it his duty to investigate for himself as far as possible the basis of theory and practice. He got his ideas from facts [and his] scientific attainments were equally by his perseverance and public spirit.”

Dr. Chapin

Charles Value Chapin was born in Providence on Jan. 17, 1856, the son of Dr. Joshua Bicknell Chapin and Louise Value Chapin. Educated in the city’s public schools, he attended college at Brown University, graduating in 1876, and where he later taught physiology. He earned his medical degree at the Bellevue Hospital Medical College in New York City, in 1879, and returned to the city of his birth.

Several years later, in 1884, at the young age of 28, he was appointed

Dr. Charles V. Chapin sat for his portrait at age 70. He served as Providence’s second superintendent of health from 1884 until 1932. [NATIONAL LIBRARY OF MEDICINE]





Photo shows corn growing in field outside Providence City Hospital, which opened in 1910. [PROVIDENCE PUBLIC LIBRARY DIGITAL COLLECTIONS]

Providence's second superintendent of health, upon the resignation of Dr. Snow, and served in that capacity for almost five decades.

In 1910, Dr. Chapin published his seminal work, *The Sources and Modes of Infection*, which became a public health classic and secured his preeminence in the nascent field of epidemiology. Largely through his efforts, the Providence City Hospital (later renamed the Charles V. Chapin Hospital) opened that year for the treatment of patients with communicable diseases. Here Dr. Chapin instituted the aseptic surgical techniques which he had observed at the Pasteur Hospital in Paris.

He also called for the establishment of sick baby clinics, the implementation of bacterial standards for the milk supply, dental dispensaries for children, a medical service for the care of the sick poor in their homes, and increased wards for tuberculosis patients.



lectured widely on his work advocating for child labor reform. This led to the passage of the Keating-Owen Child Labor Act of 1916, a federal law that restricted child labor.

(Left) Backyard, Spruce Street, Providence, RI. Lewis Hine, Child Welfare Exhibit 1912–1913. [LIBRARY OF CONGRESS]



Housing conditions, Elm St., Pawtucket, RI. Lewis Hine, Child Welfare Exhibit 1912–1913. [LIBRARY OF CONGRESS]



Backyard and privies in terribly filthy condition, 76–78 Borden St., Providence, RI. Lewis Hine, Child Welfare Exhibit 1912–1913. [LIBRARY OF CONGRESS]

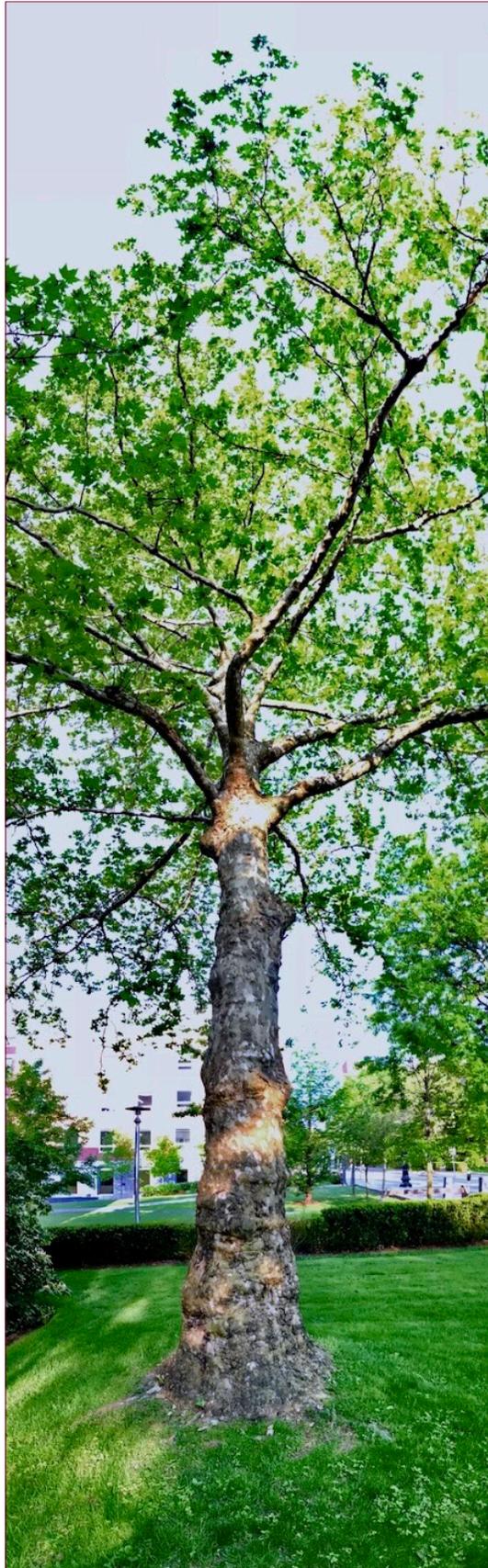
Schools of Public Health open

At the same time, the need for the expansion of public health programs became evident nationwide, and in 1916 Johns Hopkins University organized the first degree-granting School of Hygiene and Public Health. This was followed by the Harvard-MIT School for Health Officers, where Dr. Chapin lectured, from 1913–1922. The latter affiliation dissolved and the Harvard School of Hygiene and Public Health opened; here Dr. Chapin lectured from 1923–1935.

He became recognized as revolutionary for applying stringent scientific methodology to public health matters. According to the *American Journal of Public Health* in March 1941, “Dr. Chapin’s annual reports of the health department of the City of Providence are documents of unique value. These reports show the mind of Chapin at work: scrupulous care in collection of information, painstaking tabulations and segregations of data, penetrating questions as to their meaning or lack of meaning, with conclusions reached only when it is evident that they must inevitably be reached.”

In Dr. Chapin’s contribution to a volume commemorating the 50th anniversary of the founding of the American Hospital Association, *A Half Century of Public Health*, in 1921, he wrote: “Figures do not measure the terror of epidemics nor the tears of a mother at her baby’s grave, nor the sorrow of the widow whose helpmate has been snatched away in the prime of life. To have prevented these not once but a million times justifies our half century of public health work.”

During Dr. Chapin’s administration the death rate in Providence dropped 30 percent and infant mortality was reduced by 50 percent. Considered the “Dean of City Health Officials,” he served as president of the American Public Health Association in 1927 and the first president



of the American Epidemiological Society. He was awarded the Public Welfare Medal from the National Academy of Sciences in 1928.

Dr. Chapin passed away in 1941 at the age of 85, survived by his wife, Anna Balch Chapin, and predeceased a year earlier by his only child, Howard. The late **SEEBERT J. GOLDOWSKY, MD**, longtime editor-in-chief of RIMJ, reflected on Dr. Chapin in the August 1979 issue: “His credo is best expressed in his words: ‘Science can never be a closed book. It is like a tree, ever growing, ever reaching new heights. Occasionally the lesser branches, no longer giving nourishment to the tree, slough off. We should not be ashamed to change our methods, rather we should be ashamed never to do so. We should try new things, but should show common sense about it.’”

Like the Tree of Hippocrates on the Brown campus, the legacies of these two public health pioneers stand tall and strong, their roots spreading outward and the scientific shoots evolving and reaching new heights. ❖

Author

Mary Korr, *Rhode Island Medical Journal* Managing Editor, 2013–2026.

A seedling of the platanus tree that Hippocrates taught under on the Greek island of Kos was given to Dean **Stanley M. Aronson, MD**, upon the founding of the Brown Medical School in 1972. The Tree of Hippocrates, also known as the Aronson Tree, was planted in front of Arnold Lab on the Brown campus and stands there today.

NRMP releases results of the 2026 Main Residency Match for more than 38,000 future residents

WASHINGTON, DC — The National Resident Matching Program® (NRMP®) announced the results on March 20th of the 2026 Main Residency Match®, the largest in the organization's history, with over 53,000 applicants registered and more than 44,000 residency positions offered in over 6,800 program tracks across the United States. The 2026 Main Residency Match demonstrated continued strength in residency placement, with more than 93 percent of positions filled nationwide.

"Every year, we look forward to sharing Main Residency Match outcomes and celebrating the hard work and achievements of thousands of students and graduates from across the country and the world," said NRMP President and CEO **DONNA L. LAMB, DHSc, MBA, BSN**. "Match Day represents an extraordinary moment for future physicians, and we are proud to see the Main Residency Match welcoming more positions and securing more training opportunities for applicants as they take the next step in their medical careers and begin practicing in communities across the nation."

APPLICANT DATA AND TRENDS

Of the 53,373 applicants registered, 48,050 certified a rank order list ("active applicants"), representing an increase of 842 applicants (1.8 percent) over last year. Among active applicants, 38,354 matched to a post graduate year-1 ("PGY-1") position, an increase of 687 (1.8 percent) from 2025. Across both PGY-1 and PGY-2, the Match filled a total of 41,482 positions.

- U.S. MD seniors continue to represent the largest applicant group in 2026 with 20,934 active applicants, an increase of 566 from last year. Once again, U.S. MD seniors achieved a PGY-1 match rate of 93.5 percent, a rate that has held constant since the 2024 Match.
- U.S. DO seniors achieved their highest PGY-1 match rate on record. There were 8,503 active applicants, an increase of 111 over last year, with a PGY-1 match rate of 93.2 percent, an increase of 0.6 percent from 2025.
- U.S. citizen international medical graduates (IMGs) accounted for 4,210 active applicants in 2026, a decrease of 377 from 2025, while the PGY-1 match rate rose to 70 percent, the highest on record. The PGY-1 match rate for U.S. IMGs has trended upward since 2022, even as the number of active U.S. IMG applicants has declined over the same period.
- Non-U.S. citizen IMGs accounted for 11,944 active applicants, an increase of 479 from 2025, while the PGY-1 match rate declined to 56.4 percent, the lowest level observed in five years.

146 Brown medical students celebrate Match Day

PROVIDENCE [BROWN UNIVERSITY] — Medical students from Brown University's Class of 2026 who will earn their MDs in May gathered with their families and friends at the annual Match Day celebration held on March 20th.

With about 800 people scheduled to attend, the Warren Alpert Medical School celebration was held for the first time at Brown's Olney-Margolies Athletic Center. The crowd clinked champagne glasses in a toast shortly before noon, when 146 fourth-year medical students opened their red envelopes and learned where their residency training will begin.

Before the big moment, Dean of Medicine and Biological Sciences **MUKESH K. JAIN, MD**, recognized the students' hard work and saluted the families, friends and faculty who supported them through their studies. He also acknowledged the adversity students faced following the tragic Dec. 13, 2025, shooting on campus, and how it shook many community members.

"In the midst of grief, uncertainty and loss, you showed up," Dr. Jain said. "You showed up for your patients, you showed up for each other, and you carried yourself with compassion, steadiness and courage. Resilience matters—it says something important about who you are, and it has shaped you into the kind of doctors the world needs."

Twenty-two students in this year's class matched to residency programs in Rhode Island, and 56 will train in the primary care specialties of family medicine, pediatrics or internal medicine.

View the Match list here: <https://medical.brown.edu/md-2026-match-list> ❖

PROGRAM DATA AND TRENDS

The 2026 Main Residency Match included a total of 6,809 certified program tracks, an increase of 183 from the previous year. Of the 44,344 training positions offered, 93.5 percent (41,482) filled when the matching algorithm was processed.

Primary Care Specialties Maintain Strong Participation

Each year, the NRMP examines the outcomes of primary care specialties, including Internal Medicine, Internal Medicine-Pediatrics, Pediatrics, and Family Medicine. Primary care specialties continue to represent the largest share of positions in the Main Residency Match, with 20,712 positions offered this year, an increase of 412. Collectively, the specialties achieved a 92.1 percent fill rate, a decrease of 1.4 percent from 2025.

- **Internal Medicine** offered 11,632 categorical and primary positions—280 more than in 2025—and filled 11,078 positions, resulting in a 95.2 percent fill rate, a 1.6 percentage point decrease from last year.

- **Internal Medicine-Pediatrics** offered 404 positions—six more than in 2025—and achieved a 100 percent fill rate, a 0.8 percentage point increase from prior year.
- **Pediatrics** offered 3,185 positions this year—eight fewer than in 2025—and filled 3,006 positions, resulting in a 94.4 percent fill rate, a 0.9 percentage point decrease from last year.
- **Family Medicine** offered 5,491 positions in 2026—an increase of 134 from 2025—but the fill rate declined from 85.0 percent to 83.6 percent, leaving 899 positions unfilled; despite this decrease, the total number of applicants matching into the specialty increased compared with the prior year.

OTHER TRENDS OF INTEREST

Fluctuation in Emergency Medicine

In 2026, Emergency Medicine offered 3,198 positions, an increase of 130 positions compared with 2025, and achieved a fill rate of 95.6 percent. While the fill rate declined by 2.3

percentage points relative to the prior year, a total of 3,058 applicants matched into Emergency Medicine in 2026, representing a 1.8 percent increase in matched applicants. Following declines observed in the 2022 and 2023 Main Residency Match years during the COVID19 pandemic, fill rates in Emergency Medicine have been higher in subsequent Match cycles.

Strength in Psychiatry

Psychiatry offered 2,516 positions with a fill rate of 97.4 percent. The specialty added 30 programs, increasing available positions by 128 in the 2026 Main Residency Match. A total of 2,451 positions were filled, representing an increase of 71 filled positions compared with 2025; however, 65 positions remained unfilled, up from eight the prior year. Over the past five years, match rates for U.S. DO seniors and nonU.S. IMGs in Psychiatry have shown a steady upward trend, while match rates for U.S. MD seniors have varied over the same period. ❖

Clinical trial results support use of weekly extended-release buprenorphine for treatment of opioid use disorder during pregnancy

BETHESDA, MD — In a clinical trial supported by the National Institutes of Health (NIH), a research team found that administering weekly injectable extended-release buprenorphine for treatment of opioid use disorder (OUD) during pregnancy led to higher rates of abstinence from illicit opioids than buprenorphine given daily under the tongue (sublingual), one of the standard methods of treatment. Additionally, serious adverse events were less common in those receiving extended-release treatment. The findings, which

support the use of this formulation of buprenorphine for treating OUD during pregnancy, were published in *JAMA Internal Medicine*.¹

In the multicenter trial, 140 pregnant adults were randomized to receive either injectable extended-release or sublingual buprenorphine (with or without naloxone). The trial, supported by the NIDA Clinical Trials Network as part of the NIH Helping to End Addiction Long-term® Initiative (NIH HEAL Initiative®), was the first randomized trial testing extended-release buprenorphine for OUD in pregnancy and postpartum.

The researchers found that rates of illicit opioid abstinence during pregnancy, as measured by urine drug screens, were significantly higher for those receiving weekly extended-release buprenorphine and were non-inferior postpartum compared to participants receiving sublingual buprenorphine. While the percentage of participants experiencing non-serious maternal adverse events did not differ between the types of treatments, they were more commonly rated as medication-related in the extended-release group

during pregnancy. Serious maternal adverse events were less common in the extended-release group throughout the trial. NOWS outcomes did not differ between the treatment groups.

“We knew that injectable extended-release buprenorphine leads to superior rates of illicit opioid abstinence in non-pregnant adults, but there had been no completed randomized clinical trial testing its use during pregnancy,” said principal investigator and lead author **JOHN WINHUSEN, PhD**, professor of Psychiatry and Behavioral Neuroscience at the University of Cincinnati College of Medicine. “It is exciting to share the results of this trial, which have immediate clinical application: this longer-acting medication can safely and more effectively support treatment and recovery in pregnant patients.” v

Reference

1. TJ Winhusen, et al. Extended-release versus Sublingual Buprenorphine in Pregnancy through 12-months Postpartum. *JAMA Internal Medicine*. DOI: 10.1001/jamainternmed.2026.0057



Researchers develop AI tool to predict patients at risk of intimate partner violence

BETHESDA, MD — A team of researchers funded by the National Institutes of Health (NIH) have developed an artificial intelligence (AI) tool that provides decision support to clinicians by predicting if patients are at risk of intimate partner violence (IPV). Using data routinely collected during medical visits, the team trained a machine-learning model, a type of AI, that was highly accurate in detecting IPV among patients in a study.

IPV refers to abuse from current or former partners that results in serious effects, such as potentially life-threatening injuries, chronic pain and mental health disorders. It affects millions of people in the United States—both men and women—at some point in their lives. However, many cases go undetected, because patients can be hesitant to disclose abusive relationships due to safety concerns, fear and stigma.

In their study, the research team led by researchers from Harvard Medical School introduced three AI models for IPV detection in healthcare settings, comparing their performance in predicting it.

“This clinical decision support tool could make a significant impact on prediction and prevention of intimate partner violence,” said **QI DUAN, PhD**, director of the Division of Health Informatics Technologies at NIH’s National Institute of Biomedical Imaging and Bioengineering (NIBIB). “Given the prevalence of cases, the tool could be a game-changing asset to public health.”

Many cases of IPV go unrecognized, leading to missed opportunities for timely intervention, according to the study authors. They report that current screening tools capture only a fraction of cases, while clinical and imaging records provide valuable information in detecting IPV risk. Notably, radiologists have an advantage in recognizing the signs of IPV, including the frequency of certain patterns of physical trauma.

The researchers used several years of hospital data from nearly 850 affected female patients and 5,200 unaffected age- and demographics-matched control patients. Because the collection of relevant clinical data varies across healthcare settings, the team designed two distinct AI models, one trained on structured patient data, in table form, and another trained on unstructured patient data from medical notes, including radiology reports. Further, they developed a multimodal model that is a fusion of both structured and unstructured data.

All the models achieved a high performance in the study. However, the multimodal fusion model performed accurately 88% of the time. Both the tabular model and the fusion model

can detect IPV risk on average more than three years before patients enroll at hospital-based domestic abuse intervention centers. While the tabular model achieved slightly earlier recognition of IPV risk, the fusion model was able to detect more IPV cases in advance.

The fusion model achieved more stable performance than relying on either modality alone. The scientists explained that the different modalities are processed separately and only merged at the prediction stage. They found that the tabular framework is particularly relevant in healthcare, where there are variations across different hospitals in data availability and in the recording of unstructured data.

The researchers emphasized that the use of AI tools such as their machine learning models could assist healthcare providers in having timely conversations with patients about IPV and connecting those patients with appropriate support resources. Such AI tools are not intended for making definitive diagnoses.

“For decades, our healthcare system has depended largely on patient self-disclosure to identify intimate partner violence, leaving many cases unrecognized and unsupported,” said **BHATI KHURANA, MD**, senior author of the study and an emergency radiologist at Mass General Brigham and associate professor of radiology at Harvard Medical School. “Our work represents a fundamental shift from reactive disclosure to proactive risk recognition within routine clinical care. By analyzing patterns already present in healthcare data, this approach supports healthcare clinicians in initiating earlier, safer and more informed conversations with patients.”

According to the researchers, when used in a patient-centered manner, this tool can serve as a key component of a proactive approach to IPV intervention, enabling timely and effective support and ultimately leading to improved long-term health outcomes for at-risk patients. The team developed guidance at the project website to help clinicians thoughtfully approach conversations with patients.

“The goal is never to force disclosure, but to help clinicians communicate with patients in a supportive way and to connect them with resources and support,” Dr. Khurana said. The research team plans to use AI models to develop a decision-support tool embedded in electronic medical record systems to provide real-time IPV risk evaluations in clinical settings.

This research was co-funded by NIBIB grant R01EB032384 and the NIH Office of the Director. ❖

Federal judge blocks immunization schedule changes, stays ACIP member appointments

WASHINGTON, DC (AMERICAN PUBLIC HEALTH ASSOCIATION) — A coalition of leading medical professional societies and public health organizations recently announced in March that the U.S. District Court for the District of Massachusetts has issued a preliminary injunction to stay Secretary Kennedy's appointments to the Advisory Committee on Immunization Practices (ACIP) of the Centers for Disease Control (CDC), as the appointments were likely made in violation of the Federal Advisory Committee Act (FACA). Judge Brian Murphy also stayed all votes taken by the now-stayed ACIP.

The injunction further stays the heavily revised vaccine schedule issued by the U.S. Department of Health and Human Services (HHS) on January 5th, overturns the May 2025 Secretarial Directive on COVID-19 vaccine recommendations, and reverses the downgraded Hepatitis B vaccine recommendations made at the December 2025 ACIP meeting.

PLAINTIFFS

The American Academy of Pediatrics, American Public Health Association, American College of Physicians, Infectious Diseases Society of America, Society for Maternal-Fetal Medicine, Massachusetts Chapter of the American Academy of Pediatrics, Massachusetts Public Health Alliance, and Jane Does 1, 2 and 3—requested the court issue an injunction after HHS announced significant changes to the national pediatric immunization schedule in January.

The underlying lawsuit, *AAP et al v Kennedy et al*, challenges recent directives and actions by HHS that plaintiffs intend to prove circumvented longstanding, evidence-based procedures traditionally used to develop national vaccine guidance. These actions undermine public health, disrupt clinical practice, and erode confidence in immunization policy.

The Court has already ruled that the larger case may proceed and has denied the government's motion to dismiss.

PLAINTIFF STATEMENTS

Andrew P. Racine, MD, PhD, FAAP, President, American Academy of Pediatrics

"Today's ruling is an historic and welcomed outcome for children, families, pediatricians and communities across the United States. For many years the American Academy of Pediatrics, in collaboration with partners in the federal government, recommended a schedule of immunizations to promote children's health and development. Today's ruling marks an important step toward restoring scientific decision-making that is at the heart of that partnership. Protecting the health and safety of America's children is what prompted the AAP to petition the court for this decision from the outset and that goal will remain our guiding principle."

Georges C. Benjamin, MD, CEO, American Public Health Association

"This injunction underscores the need for using science in public health decision-making and using a process that engages qualified experts when it comes to recommending interventions that impact human health. Trust occurs when we engage the public in a transparent process, not one where decisions are made behind closed doors by unqualified individuals and presented in a disingenuous way."

Ronald G. Nahass, MD, MHCM, FIDSA, President, Infectious Diseases Society of America

"Today's court ruling is an important step toward protecting Americans' access to life-saving vaccines. Infectious diseases doctors remain hopeful that adherence to a scientifically valid process in determining vaccine policy ultimately will be restored. Secretary Kennedy has caused needless confusion and distrust in vaccine guidance and unless stopped, his actions will continue to result in preventable disease outbreaks."

Jason M. Goldman, MD, MACP, President, American College of Physicians

"Today's ruling is a win for public health and reaffirms that national vaccine policy should be guided by rigorous, evidence-based science, not politics.

Vaccines are critical to maintaining public health and recommendations about their use must be based on the best available data. Scientific consensus and overwhelming evidence demonstrate that vaccines are safe and effective. We are encouraged by today's injunction and hope that it will mean a return to a transparent and evidence-driven process that safeguards the health of all communities and the best interests of our patients."

Carlene Pavlos, Executive Director, Massachusetts Public Health Alliance

"The Massachusetts Public Health Alliance is grateful for the judge's careful consideration of the issues at stake and his decision to issue a preliminary injunction to pause the implementation of a childhood vaccination schedule that could undermine years of progress in saving our nation's children from illness, suffering, and even death. We are equally grateful for his decision to enjoin the illegally constituted Advisory Committee on Immunization Practices from meeting until this case can be resolved. However, this is not the end. The continuing assaults by the federal administration on vaccine policy and infrastructure have not abated since we and our sister plaintiffs originally filed this complaint and there is no reason to believe they will stop as we move forward. But we are all in this because we know that people's health and lives are at risk and we are committed to promoting public health and we will continue to fight over the long road ahead."

Brenda Anders Pring, President, Massachusetts Chapter of the American Academy of Pediatrics

"The MCAAP applauds Judge Murphy's quick decision, giving Massachusetts pediatricians the opportunity to celebrate rare good news for child and adolescent health. We will continue to stand up for our patients by practicing science-based medicine to counteract this administration's relentless efforts to undermine vaccines and vaccine policy."

For more information, visit www.apha.org.

RIDOH reports statewide increase in non-fatal drug overdoses

PROVIDENCE — The Rhode Island Department of Health (RIDOH) reported an increase in non-fatal drug overdoses between March 10, 2026, and March 16, 2026. During this time, there were 55 reports of people receiving care at emergency departments for suspected drug overdoses. In 2026, Rhode Island has had an average of 41 non-fatal overdoses a week.

RIDOH's Overdose Spike Alert System (OSAS) tracks weekly non-fatal drug overdose activity across Rhode Island. Through the system, RIDOH has weekly overdose thresholds set for 11 regions throughout the state and the state as a whole. The 55 overdoses met the 55-overdose threshold for the state. Additionally, Region 1 (Burrillville, Foster, Glocester, and Scituate) exceeded its threshold for suspected non-fatal drug overdoses for

this same week, and for the prior week.

When a region or the state exceeds its weekly threshold, RIDOH alerts municipal leaders, public safety and healthcare professionals, community organizations, and other stakeholders. This allows them to make additional resources available to Rhode Islanders who are more vulnerable, and to be more prepared to respond. Rhode Island's last statewide alert was in 2023.

Overdose fatalities in Rhode Island decreased by approximately 33% during the first eight months of 2025, compared to the first eight months of 2024. However, hundreds of people still die every year in Rhode Island as a result of drug overdoses.

Overdose prevention work in Rhode Island is led by the Governor's Overdose Task Force, a coalition of professionals

and community members. The Task Force has a strategic plan to end the overdose crisis—changing lives by ensuring racial equity, uplifting community voices, using data to drive change, and building connections to care. The Task Force is committed to addressing the root causes of overdose, including the socioeconomic factors that influence health.

Fentanyl continues to be present in the drug supply. It has been detected in stimulants like cocaine and crack cocaine as well as counterfeit pills. Stimulants could be contaminated with fentanyl and put people who use stimulants at risk of an opioid overdose, especially those who do not regularly consume opioids and have a lower opioid tolerance. ❖

Saint Anne's Hospital launches innovative partnership with Somerset Fire Department to improve sepsis outcomes

FALL RIVER, MA — Saint Anne's Hospital, a member of Brown University Health, has launched a new program with the Somerset Fire Department designed to improve outcomes for patients experiencing sepsis before they even reach the hospital. Through this new collaboration, emergency responders are now able to begin administering IV antibiotics in the field, allowing life-saving treatment to start minutes earlier than traditional hospital-based care. This is the first collaboration of its kind in Bristol County.

The initiative is grounded in emerging research on early sepsis intervention. A published study evaluating protocol fidelity for prehospital antibiotic administration found a 15% reduction in mortality among septic patients who received antibiotics at first contact with emergency medical services. Screening for sepsis happens upon EMS arrival. If the patient meets the clinical criteria, they receive life-saving intervention immediately by Somerset EMS.

Saint Anne's emergency services leaders **IAN DENNEN, MSN, RN**, and **ANDREW OLD, MD**, spearheaded comprehensive training with Somerset paramedics which included instruction on:

- New high-tech medication infusion pumps
- Advanced lactate monitoring meters
- Enhanced protocols for pre-hospital antibiotic administration

"This partnership represents a major step forward in how we care for patients with sepsis," said Dennen, director of Emergency Services at Saint Anne's Hospital. "By equipping our EMS partners with the tools and training to act immediately, we are extending the hospital's capabilities into the field and giving patients a critical head start in treatment."

"Partnering on this initiative has been an exciting step forward for our team. Advanced training and new technology give our paramedics the ability to start critical sepsis treatment right in the field. Knowing we can deliver antibiotics sooner and potentially save more lives strengthens our commitment to providing the highest level of care to our community," said **ZACK ECCLES**, paramedic and firefighter at Somerset Fire and Rescue. ❖



[BROWN UNIVERSITY HEALTH]

Centurion Foundation completes acquisition of Roger Williams Medical Center, Our Lady of Fatima Hospital

New 501(c)3 non-profit organization, CharterCARE Health of Rhode Island (CHRI), created

PROVIDENCE — The Centurion Foundation has completed the acquisition of Roger Williams Medical Center, Our Lady of Fatima Hospital, and several related assets from the bankrupt Prospect Medical Holdings following several years of regulatory review and complex financial structuring. The acquisition was financed with \$101 million in private bonds raised through Bank of America under the sponsorship of the Rhode Island Health and Education Building Corporation (RIHBEC), with critical assistance from Governor **DAN MCKEE**, House Speaker **JOSEPH SHEKARCHI**, and Senate President **VAL LAWSON** through the creation of an \$18 million supplemental reserve fund requested by investors.



As part of the sale transaction, a new 501(c)3 non-profit organization, CharterCARE Health of Rhode Island (CHRI), has been created to provide local governance and management. The CHRI Board and advisory boards for both hospitals have a majority membership of local physicians and community leaders. CHRI will comply with more than 80 conditions of regulatory approval, as mandated by the Rhode Island Attorney General and the Department of Health, including retaining a national consulting firm, SOLIC Capital Advisors, to provide operational and financial management guidance to the board.

CharterCARE Health has an annual operating budget of \$330 million, employs 2,400 health professionals, and has an affiliated medical staff comprised of more than 600 primary care and specialty providers. This includes CharterCARE Medical Associates, a large multi-specialty network owned by CHRI that operates more than 20 practice locations across the state.

Centurion Foundation CEO **BEN MINGLE**, stated, "It has been an arduous journey to secure the future of these essential hospitals, their employees and physicians, and the patients who rely on them. This moment would not have been possible without the state's approval and strong backing from Governor



McKee, Speaker Shekarchi, Senate President Lawson, Attorney General Neronha, and members of the General Assembly. Our journey is far from over, but our acquisition is a new beginning for these valued institutions, one that is free from private equity influence and that is a strong foundation to continue a tradition of health care excellence and community focus."

CHRI's independent board of directors includes Ben Mingle, chairman, and members **GREGORY GROVE**, **MARIA LEONARD**, **JEFFREY LIEBMAN**, **LOUIS MARIOREZZI, MD**, **GERALD MARSOCCI, MD**, **J. SUE PAINTER**, **EDWIN SANTOS**, and **VIJAY SUDHEENDRA, MD**.

Both hospitals also have their own community advisory boards, including patients, to provide feedback and guidance to the full CharterCARE board.

Liebman will lead the CHRI management team as chief executive officer and will work closely with the Department of Health, other regulators, and reimbursement sources, including Medicare and Medicaid. "CharterCARE hospitals have remained busy throughout this sale process, validating their importance to the health care delivery system, and providing exceptional care with high-quality and patient satisfaction ratings. This is a tribute to our dedicated and compassionate employees who have remained laser-focused on patient care. We will now begin to implement a comprehensive strategic and operational plan, which has been endorsed by state officials and investors, that will enhance operations and financial performance, as well as help to expand access to select programs and services," he said.

In a joint statement from CHRI medical staff presidents, **PETER PIZZARELLO, JR., MD**, at Our Lady of Fatima Hospital and **BRAIDY SHAMBAUGH, DO**, at Roger Williams Medical Center, they stated, "We are gratified that CHRI is now out from under private equity ownership and able to place medical quality and patient care ahead of corporate profits. We are proud to be affiliated with CHRI, and we look forward to ensuring that physicians' voices and perspectives are always heard at the board and management tables."

CHRI will implement a broad-based communication campaign to inform all Rhode Islanders of this exciting development. Visit Chartercarehealth.org to learn more. ❖

Senate unveils 2026 health care legislation

STATE HOUSE — Continuing the Senate's efforts to stabilize and strengthen Rhode Island's health care system, Senate President **VALARIE J. LAWSON** and Senate Health & Human Services Committee Chairwoman **MELISSA MURRAY** recently unveiled a 17-bill package of legislation centered on supporting Rhode Islanders in crisis, protecting patients and providers, and strengthening the state's health workforce. The bills being highlighted in 2026 include:

Supporting Rhode Islanders in crisis

Codify 988, BH Link: This legislation (2026-S 3058, Senate Health & Human Services Committee Chair Melissa Murray) would amend statute to codify the 988 and BH Link programs in state law, while additionally requiring the state to fully fund both programs in the event the current federal funding lapses. 988 currently runs as a 24/7 crisis helpline that was established under the federal National Suicide Hotline Designation Act of 2022. BH Link operates the 988 line as well as a walk-in center for those in crisis needing in-person support. Over 90% of 988 calls are resolved through phone support alone, drastically reducing the need for emergency department visits.

Codify Children's Mobile Response and Stabilization Services (MRSS) in state law and expand coverage: This legislation (2026-S 3066, Senate President Valarie Lawson) would amend statute to codify the MRSS program in state law, making it a permanent part of Rhode Island's mental health infrastructure. These mobile services provide trained behavioral health clinicians in the community, in response to behavioral health crisis calls. MRSS clinicians are better able than local emergency medical services to de-escalate crises and provide the crisis counseling and follow-up needed to keep youth out of emergency rooms, resulting in better patient outcomes for youth in crisis and reducing the strain on overburdened emergency departments. Between

October 2024 and October 2025, providers fielded 849 MRSS cases, and 80% of cases were successfully stabilized in the community and connected to ongoing behavioral health care. The legislation would provide for the program's coverage by Medicaid and appropriate \$900,000 in Fiscal Year 2027, increasing to \$1 million in Fiscal Year 2028, to provide coverage for services to the uninsured and underinsured.

Set commercial insurance reimbursement rate floor for MRSS: This legislation (2026-S 3065, Senator Alana DiMario) would build on a 2025 law, also sponsored by Senator DiMario, that required commercial insurers to cover MRSS services. It would address the current low reimbursement rates for these services by adding a reimbursement rate floor for insurers to pay MRSS providers.

Create artificial intelligence safety guidelines related to suicidal ideation and mental health treatment: The first bill (2026-S 2195, Senator Lori Urso) would regulate AI companion models and chatbots to prohibit the operation of any companions unless the provider has a protocol for addressing possible suicidal ideation, self-harm, other physical harm, or financial harm. It also provides requirements for warning notifications, and for enforcement by the Attorney General. The second bill (2026-S 2197, Senator Lori Urso) would prohibit the use of AI companion models to assist in providing supplementary support in therapy or psychotherapy services where the client's therapeutic session is recorded or transcribed unless the patient or the patient's parent, guardian or other legally authorized representative is informed and consents to the use. Individuals and corporations would be prohibited from providing therapy or psychotherapy services, including through the use of internet-based artificial intelligence, to anyone unless they are a licensed professional.

Protecting Patients and Providers

Establish new oversight of pharmacy benefit managers, or PBMs: The first bill (2026-S 3059, Senator Robert Britto) would amend statute to set accountability and transparency requirements for PBMs and establish new rules for their interactions with pharmacies. The second bill (2026-S 3060, Senator Peter Apollonio) would establish a process for PBMs to obtain individual certificates of authority from the Department of Business Regulation in order to operate in Rhode Island. The third bill (2026-S 2563, Senator Linda Ujifusa), the Prescription Drug Savings and Transparency Act of 2026, would direct the Auditor General to conduct a study of the performance and cost-effectiveness of the state's current prescription drug management for the Medicaid Program, including the utilization of PBMs by Medicaid managed care organizations, with a report of findings and recommendations issued to the General Assembly no later than March 31, 2027.

Address prior authorization requirements for post-acute care and the Behaviorally Complex Care Program: The first bill (2026-S 3061, Senator Brian Thompson) would require that beginning Jan. 1, 2027, insurers cover a minimum of seven days of post-acute care without a prior authorization requirement. The second proposal (2026-S 3056, Senator Melissa Murray) would direct the Executive Office of Health & Human Services to facilitate nursing homes and other long-term care facilities receiving an enhanced Medicaid per-diem rate for complex behavioral health patients.

Update statutes to ensure childhood and adult vaccination schedules are set by the RI Department of Health: This legislation (2026-S 2379, Senator Linda Ujifusa) would update the law to emphasize that the vaccination schedule set by RIDOH can be followed as determined by the Health Director as necessary to protect

public health, and would require all insurers and the state's Medicaid program to cover all immunizations provided under RIDOH's guidelines, without any cost sharing, starting on Jan. 1, 2027. This bill was heard in the Senate Committee on Health & Human Services on Feb. 26, 2026.

Allow medical professionals to express sympathy to patients and families without risk of legal reprisal: This legislation (2026-S 2054, Senator Pamela Lauria), which was also passed by the Senate in 2024 and 2025, provides that any statement of apology or concern by a health care provider to a patient, a patient's relative, or representative is inadmissible as evidence of liability or admission of fault by the health care provider in any legal or arbitration action against a health care provider or facility. Rhode Island would join 39 other states with similar provisions.

Create study commission on medical malpractice: This legislation (2026-S 3063, Senator Mark McKenney) would create a 13-member special legislative commission to study the impact of medical malpractice claims on health care providers and costs, with a report of its findings to be issued no later than Oct. 1, 2027.

MARIAH STUMP, MD, MPH, president-elect of the Rhode Island Medical Society, said, "Primary care is the foundation of a strong healthcare system, yet physicians

across Rhode Island are struggling with workforce shortages, administrative burdens, and growing liability pressures. As a primary care physician, I see how these challenges affect patients' ability to access care. The Senate's healthcare package takes important steps to strengthen the physician workforce, reduce unnecessary barriers like prior authorization, address aspects of the medical liability system, and establish a Primary Care Commission to help guide long-term solutions for our state."

Strengthening the health care workforce

Invest in loan repayment and scholarship programs for primary care providers: The first bill (2026-S 3062, Senate President Pro Tempore Hanna Gallo) would amend the current Health Professional Loan Repayment Program to create a loan repayment program for primary care providers. Eligible physicians, physician assistants or nurse practitioners could receive two years of loan repayment assistance. The second bill (2026 S-2101, Senator Pamela Lauria) would establish a scholarship program for students willing to commit to work as a primary care provider in Rhode Island. Eligible applicants would need to be studying and enrolled in a medical school, nursing school, or a physician assistant program.

Secure initial funding for the creation of a medical school at the University of Rhode Island: This proposal (2026-S 3064, Senator V. Susan Sosnowski) would commit initial resources needed for the creation of a medical school at the University of Rhode Island, as recommended earlier this year by a special legislative commission.

Establish a primary care commission to support workforce retention and explore graduate medical education, or GME, programs: This legislation (2026-S 3057, Senator Pamela Lauria) seeks to fulfill another of the recommendations made in the final report of the special legislative commission charged with studying the creation of a medical school at the University of Rhode Island.

"Creating a medical school at URI is the natural next step in building a comprehensive, public health education ecosystem in Rhode Island," said **EUGENIO FERNANDEZ, JR., PharmD, MBA, MPH**. "URI already has the foundation in place, with nationally recognized programs in pharmacy, nursing, and health sciences, along with research initiatives focused on improving health outcomes across the state. A medical school would complement these existing interdisciplinary health programs. Combined with strengthening loan repayment programs, establishing a medical school at URI will help Rhode Island build the health care workforce it needs." ❖

Brain computer interface enables rapid communication for two people with paralysis

BOSTON (MASS GENERAL BRIGHAM) — Loss of communication can be among the most devastating symptoms for patients with paralysis. A new study by investigators from Mass General Brigham Neuroscience Institute and Brown University describes an investigational implantable brain computer interface (iBCI) typing neuroprosthesis that can restore communication with speed and accuracy. The tool, which utilizes the QWERTY keyboard and attempted finger movements, performed well in two BrainGate clinical trial participants—one with amyotrophic lateral sclerosis (ALS) and the other with a cervical spinal cord injury. Their results are published in *Nature Neuroscience*.

“For many people with paralysis, when losing use of both the hands and the muscles of speech, communication can become difficult or impossible. Often, people with severe speech and motor impairments end up relying on things like eye-gaze technology—spelling words out one letter at a time by using an eye movement tracking system. Those systems take far too long for many users,” said senior author **DANIEL RUBIN, MD, PhD**, a critical care neurologist with the Center for Neurotechnology and Neurorecovery at Mass General Brigham Neuroscience Institute. “Patients often find this and other types of Augmentative and Alternative Communication systems frustrating to use. BCIs are on track to become an important new alternative to what’s currently offered.”

“Since 2004, our BrainGate team has been advancing and testing the feasibility and efficacy of implantable brain computer interfaces to restore communication and independence for people with paralysis,” said co-author **LEIGH HOCHBERG, MD, PhD**, leader of the BrainGate clinical trial and director of the Center for



An implantable device researched by Mass General Brigham investigators and colleagues allows communication through rapid typing for a person with ALS and a person with a spinal cord injury. [MASS GENERAL BRIGHAM]

Neurotechnology and Neurorecovery at Mass General Brigham Neuroscience Institute [and a professor of engineering and brain science at Brown University]. “The BrainGate consortium demonstrates the strength of academic and university-based researchers working together, thinking about what’s possible, and then advancing the frontiers of restorative neurotechnology. And by doing so, we make it that much easier for industry to create the final form of implantable medical devices for our patients,” he said.

The new BrainGate iBCI typing neuroprosthesis starts with microelectrode sensors placed in the motor cortex, a part of the brain that controls movement. Next, a QWERTY keyboard is displayed in front of the participant, with each letter mapped onto fingers and finger positions—up, down, or curled. As the participant intuitively attempts these finger movements, the electrodes sense the brain’s electrical activity, then send a signal to a computer system that can translate the neural activity into letters. This

output is then processed through a final predictive language model to ensure a cohesive, accurate communication result.

Two clinical trial participants, one with advanced ALS and the other with a spinal cord injury, used this new iBCI typing neuroprosthesis to communicate rapidly and accurately. The participants calibrated their devices with as few as 30 sentences; one participant was able to reach a top typing speed of 110 characters or 22 words per minute, with a word error rate of 1.6%. That’s on par with able-bodied typing accuracy. What’s more, both participants used the device from the comfort of their own place of residence, demonstrating the potential for translation and at-home use in the future. ❖

Paper cited: Jude JJ, et al. “Restoring rapid natural bimanual typing with a neuroprosthesis after paralysis” *Nature Neuroscience*. DOI: 10.1038/s41593-026-02218-y

Gov. McKee signs executive order to make HealthSource RI coverage more affordable

CENTRAL FALLS — Gov. **DAN MCKEE** was joined in March by HealthSource RI (HSRI) leaders, community health partners, and health insurance navigators at Blackstone Valley Community Health Care to highlight his Affordability for All efforts to make health insurance more affordable for HSRI customers.

He signed an Executive Order that will bring in an additional \$12 million in federal tax credits to Rhode Island to reduce health insurance premiums for HSRI customers earning between 200% and 400% of the federal poverty level. This would reduce premiums for most individual customers in that earning bracket by \$500 annually; a family of four should see a reduction of approximately \$1,600 annually.

The Executive Order directs the Office of the Health Insurance Commissioner not only to use regulatory tools to lower costs, but also to boost transparency by creating a health care price dashboard and by creating the first in-depth analysis of state benefit mandates since 2014.

The Governor also highlighted his FY27 budget proposal to provide \$9.5 million in financial relief to HSRI's most vulnerable customers, which is part of his Affordability for All agenda. By backfilling the recently expired enhanced federal subsidies, Rhode Island can help keep coverage for around 20,000 HSRI customers who make no more than 200% of the federal poverty level. For example, a 44-year-old customer making \$31,000

a year would see a \$51 monthly bill under this proposal, as opposed to his current \$170 monthly bill.

"The combined impact of the Rhode Island Marketplace Affordability Program proposed in the budget, and the Executive Order announced today would benefit more than 80% of HealthSource RI customers and help preserve our hard-fought low uninsured rate, lending stability to the healthcare system," said **LINDSAY LANG**, director of HealthSource RI. "I thank Governor McKee for his forward thinking on this issue, to find state solutions that work for our marketplace and the tens of thousands of Rhode Islanders who rely on it for health insurance."

"Lack of insurance leads to delayed care, which causes needless suffering and paradoxically increased costs," said **CRISTINA PACHECO, MD**, chief executive officer for BVCHC. "We wholeheartedly support the Governor's efforts today to improve Rhode Islander's access to health care."

"In January, Blackstone Valley Community Health Care saw 1,400 patients who lost health insurance coverage through HSRI. This significantly impacts our financial health and ability to continue to serve all our patients," said **CRAIG MCANAUGH**, chief financial officer for Blackstone Valley Community Health Care.

To read the Governor's full FY27 budget proposal and learn more about his Affordability for All agenda, [click here](#). ❖

Appointments



Mark J. Cunningham, MD, named chief of cardiac surgery at RIH

PROVIDENCE — Rhode Island Hospital has named **MARK J. CUNNINGHAM, MD**, chief of cardiac surgery. Dr. Cunningham also holds the Karl E. Karlson, MD, and Gloria A. Karlson Professorship in Surgery at The Warren

Alpert Medical School of Brown University. He succeeds **FRANK W. SELLKE, MD**, who has retired from the role.

Dr. Cunningham joins Brown Health from Brigham and Women's Hospital, where he served as interim chief of cardiac surgery and was a faculty member at Harvard Medical School. A nationally recognized cardiovascular surgeon, he specializes in mechanical circulatory support, valve surgery, transcatheter aortic valve replacement (TAVR), and complex aortic surgery, including transcatheter endovascular aortic repair. Over his career, he has performed more than 500 heart transplants, led over 60 clinical trials, and advanced minimally invasive and robotic techniques that reduce recovery time and complications for patients. Before entering medicine, Dr. Cunningham worked as an aeronautical engineer at NASA's Langley Research Center, an experience that continues to influence his innovative approach to surgical care and research.

"We are thrilled to welcome Dr. Cunningham to Rhode Island Hospital," said **AURORA PRYOR, MD**, surgeon-in-chief of Rhode Island Hospital and The Miriam Hospital and chair of the Department of Surgery at The Warren Alpert Medical School of Brown University. "His unique combination of engineering expertise, surgical excellence, and leadership will further elevate our cardiovascular surgery program." ❖



Erin Yale named president, chief operating officer of Women & Infants

PROVIDENCE — Care New England recently announced the appointment of **ERIN YALE** as president and chief operating officer of Women & Infants Hospital, effective April 13, 2026.

She joins Women & Infants from Beth Israel Deaconess Hospital–Plymouth, where she has served as chief operating officer since 2024. During her tenure, she strengthened financial and operational performance across diverse service areas, co-led the launch of Epic, and advanced the hospital's strategic alignment with BI Lahey Health.

Previously, Yale held progressive leadership roles during a decade at Children's Wisconsin, a leading pediatric academic health system. There, she led large, multidisciplinary clinical service lines—including surgical, diagnostic, and therapeutic services—while guiding major capital expansion initiatives, regulatory achievements, and operational transformation efforts.

"Erin's career reflects deep expertise in service-line development, physician partnership, system integration, and performance improvement, as well as a steadfast commitment to clinical excellence, innovation, and collaboration," said President and CEO of Care New England (CNE), **MICHAEL WAGNER, MD**. "We look forward to her leadership in building upon Women & Infants' legacy as the region's premiere provider of women's and newborn care, while expanding access, strengthening outcomes, and advancing academic medicine and research across Rhode Island and beyond."

Yale will focus on advancing clinical and operational excellence while driving strategic growth in women and children's health across the region. In close collaboration with system and community partners, she will also advance innovative strategies that reinforce the hospital's national prominence in clinical care, research, and academic medicine while deepening WIH's impact throughout the southern New England region.

"I am excited to join Women & Infants Hospital, one of the nation's leading academic medical centers solely focused on women's health at such an exciting moment in its history," said Yale. "I look forward to working alongside our exceptional physicians, nurses, researchers, and community partners—including our longstanding collaboration with Brown University—to build on the hospital's national leadership in clinical care, research, and academic medicine, and to ensure that every patient and family we serve experiences the highest quality care."

She is graduate of Tufts University with a bachelor of science in psychology, and a master's in management and healthcare from The Heller School for Social Policy and Management at Brandeis University. ❖

Appointments



Lilia Holt, MBA, named interim president at the Rhode Island Life Science Hub

PROVIDENCE — **LILIA HOLT, MBA**, has been named the interim president at the Rhode Island Life Science Hub (RILSH), following the resignation of **MARK TURCO, MD**, in March. With more than a decade

of experience in financial services, economic development, and program coordination, she previously served as vice president of strategic initiatives at RILSH and vice president of business development at the Rhode Island Commerce Corporation.

According to a statement on the Hub's website, since its launch in June 2023, Holt has played a central leadership role in strategically advancing and scaling Rhode Island's life sciences ecosystem in alignment with statewide economic development priorities. She has built and strengthened strategic partnerships across government, academic institutions, healthcare systems, and industry to advance scientific translation, clinical collaboration, and business expansion. She was instrumental in the development of Ocean State Labs, the state's first life science incubator, and has led business attraction efforts to bring new life science companies and high-quality jobs to Rhode Island, including the expansion of Organogenesis. She continues to design and implement programs to catalyze company growth milestones and strengthen workforce development initiatives statewide.

Holt holds an MBA from Simmons University and a BA in sociology and psychology from Suffolk University. A native Rhode Islander, she is a graduate of Classical High School in Providence. ❖



Gov. McKee nominates William Tsonos to chair Rhode Island Life Science Hub

PROVIDENCE — Gov. Dan McKee nominated **WILLIAM TSONOS** to serve as the chair of the Rhode Island Life Science Hub on March 16th.

Tsonos has more than 30 years of banking experience and currently serves as the president of Beacon Bank (formerly BankRI), where he manages \$3.5 billion in assets and more than 200 employees. He previously worked as BankRI's director of commercial banking and oversaw the bank's commercial loan portfolio, commercial deposits, cash management department, as well as the Business Banking sales and underwriting teams.

In May 2024, Tsonos was nominated by Gov. McKee to serve on the Rhode Island Commerce Corporation's Board of Directors, where he currently serves. He is also an active member of the Woonsocket Investment Committee and the treasurer of The Miriam Hospital Foundation. Tsonos is a Bryant University graduate with a degree in business administration.

"It is a pleasure to be nominated and continue to serve Rhode Island as the chair of the Life Science Hub," said Tsonos. "I look forward to working with fellow board members, the Hub's staff, and Gov. McKee to continue to bring well-paying jobs to the State."

Tsonos' name will be submitted to the Rhode Island Senate for advice and consent. ❖

Recognition

Three Brown University Health hospitals named to *Newsweek's* World's Best Hospitals 2026 list

PROVIDENCE — *Newsweek* has named Rhode Island Hospital, Newport Hospital, and Saint Anne's Hospital to its World's Best Hospitals 2026 list. The rankings were released on March 5, 2026.

For the eighth consecutive year, *Newsweek* partnered with Statista to develop the World's Best Hospitals ranking. The 2026 evaluation includes hospitals across 32 countries. Countries were selected using multiple comparability criteria, including population size, life expectancy, standard of living, hospital density, and the availability of reliable data.

Each hospital was evaluated and assigned a score based on four primary data sources:

1. Recommendations from medical experts—including physicians, hospital leaders, and other health care professionals
2. Hospital quality metrics
3. Existing patient experience data
4. Statista's Patient-Reported Outcome Measures Implementation Survey

"This recognition from *Newsweek* highlights the strength of our entire health system and the dedication of our caregivers," said **SARAH FROST**, Brown University Health chief of hospital operations and president of Rhode Island Hospital and Hasbro Children's. "Our mission is to provide world-class care close to home, and we are proud that our hospitals continue to be recognized for the quality, innovation, and compassion they deliver every day." ❖

Sen. Reed celebrates U.S. Navy nurse's 105th birthday

EAST PROVIDENCE — Eighty years after the official end of World War II, it is easy for some to forget the sacrifices of unsung heroes who made valuable contributions to the war effort and helped the U.S. achieve victory. For U.S. Sen. **JACK REED**, there is an urgency to honor members of the 'Greatest Generation' and ensure they know how much people today appreciate their service.

Recently, Sen. Reed dropped by Anchor Bay at East Providence to salute **LILLIAN "CHRIS" NAUTA, RN**, one of the few female members of America's nearly depleted corps of World War II nurses. Sen. Reed said he was also there to help uplift the voices of Nauta's fellow World War II veterans and ensure their stories are widely shared and will never be forgotten.

He helped celebrate Nauta's 105th birthday, highlighted her devoted service as a U.S. Navy nurse during World War II, and urged Congress to pass a bipartisan bill to collectively award Nauta and her fellow World War II U.S. Army and Navy nurses a Congressional Gold Medal, one of our nation's highest honors.

During World War II, there were more than 10,000 women serving in the Navy Nurse Corps across 12 hospital ships, 40 naval hospitals, 176 dispensaries, and medical evacuation planes.

Born in Rhode Island, Nauta was just 18 years old when World War II began. She proudly served as a Lieutenant Junior Grade as a Navy nurse during the war, and her service was marked by the highest standards of professionalism and devotion to duty. Stationed at a Navy hospital facility in Massachusetts, she helped care for service members who were injured and returning home.

She met her husband, Russell Nauta, a fellow Navy service member, while she was serving in the Nurse Corps. They married and put down roots in New London, Connecticut, to raise their son, Russell J. Nauta, who would later be inspired by his mother's service and go on to become an acclaimed teaching surgeon. After the war, she continued serving as a nurse in private practices throughout New England for many years. ❖



Lillian "Chris" Nauta, RN, was honored recently at her 105th birthday celebration, attended by family, friends, and U.S. Sen. Jack Reed. [OFFICE OF SEN. JACK REED]

Recognition

South County Health Home Health recognized by *U.S. News & World Report's* Best Home Health Agency

WAKEFIELD — South County Health Home Health has been recognized among the best home health agencies in the nation in the inaugural *U.S. News & World Report* Best Home Health Agencies rankings, earning a “High-Performing” designation for quality and patient outcomes.

The recognition highlights agencies that deliver exceptional, measurable results for patients recovering at home. According to *U.S. News*, high-performing agencies:

- Began care on time for 99% of patients, outperforming the national average of 94%
- Demonstrated stronger patient improvement in mobility and daily independence
- Helped more patients safely manage medications

The inaugural *U.S. News* Best Home Health evaluation assessed more than 12,000 Medicare-certified home health agencies across the United States based on clinical quality measures and patient experience data sourced from the Centers for Medicare & Medicaid Services, offering patients and families trusted insights into post-acute care options. ❖

VNA Home Health & Hospice ranked nationally as Best Home Health Agency by *U.S. News & World Report*

WARWICK — The *U.S. News & World Report* has ranked VNA Home Health & Hospice (formerly VNA of Care New England) as a Best Home Health and High Performing Agency.

In its inaugural review, *U.S. News* evaluated 12,157 Home Health Agencies across the country. It determined the ratings based on rigorous, unbiased analysis published by the Centers for Medicare & Medicaid Services (CMS). It assessed both the quality of care and patient experience through sixteen measures. Only 10% of those rated met the standard of being named *U.S. News* Best.

“Home health and hospice care are essential to meeting patients where they are, whether they are recovering from surgery or illness, managing a chronic condition, or facing the end of life,” said **JANE PIKE-BENTON**, president and COO, VNA Home Health & Hospice. “Our team of visiting nurses, therapists, and other clinicians brings skilled healthcare and compassionate support directly to patients. Our mission is to help patients maintain dignity, independence, and quality of life wherever they call home. We are also there to support families during some of their most vulnerable moments, so they don’t feel like they are navigating their healthcare journeys alone. We are honored to be recognized by *U.S. News* for the work we do every day.” ❖

U.S. News & World Report names UOI’s East Bay Surgery Center among nation’s Best Ambulatory Surgery Centers for Orthopedics & Spine

PROVIDENCE — University Orthopedics announced that for the second consecutive year *U.S. News & World Report* has named the East Bay Surgery Center (EBSC) as one of the best ambulatory surgery centers (ASCs) in the country.

The report evaluated more than 6,200 centers across four specialty areas: Colonoscopy & Endoscopy, Orthopedics & Spine, Ophthalmology, and Urology. EBSC is one of only three Rhode Island ASCs among the 934 facilities rated as high-performing, and the only one in the state to repeat the honor. Of the more than 1,500 orthopedic and spine ASCs assessed, EBSC was one of just 233 recognized as high-performing.

Located on the second floor of UOI’s flagship Kettle Point location in East Providence, the East Bay Surgery Center made history in 2018 as the first facility in Rhode Island to offer same-day orthopedic procedures and concierge-type home care. Since then, patients have successfully undergone thousands of procedures, including fracture treatments, shoulder arthroscopy, rotator cuff repairs, and total hip and knee replacements.

“This continued recognition from *U.S. News & World Report* for the second consecutive year is a testament to the exceptional and unwavering dedication and expertise of our entire care team,” said University Orthopedics President **EDWARD AKELMAN, MD**. “From our surgeons and nurses at the East Bay Surgery Center to the CNAs and therapists who support patients through recovery at home, this honor reflects a truly collaborative, patient-centered approach to care.”

The report found that EBSC outperformed similar surgical centers, with lower-than-average rates of unplanned hospital admissions and adverse outcomes, as well as shorter-than-expected lengths of stay—reflecting efficient procedures and positive patient recovery experiences.

The ASCs were given designations of “high performing,” “average,” or “below average.” According to its methodology report *U.S. News & World Report* based its findings on Medicare data from 2022–2024. Criteria included how successfully the center avoided complications, emergency room visits, unplanned hospitalizations, and other undesirable outcomes. ❖

Recognition



Rhode Island State House illuminated teal green in honor of Miriam's 100th anniversary

PROVIDENCE — In recognition of The Miriam Hospital's 100th anniversary, the Rhode Island State House was illuminated in teal green in March. The illumination was a tribute not only for the communities the hospital serves, but also recognizes the team of 2800 professionals for their care, compassion and dedication.

The hospital is preparing for the future with a \$125 million construction and renovation project that will transform the hospital's campus, elevate the care provided and carry the mission of service forward for future generations. ❖