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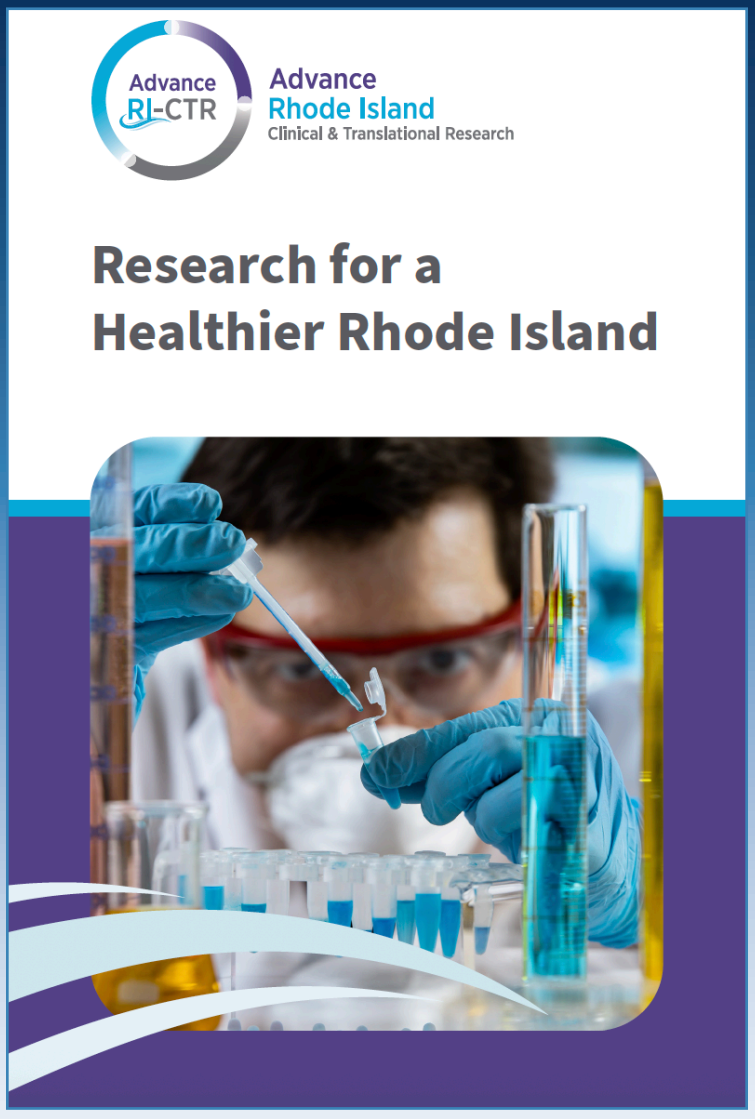

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GUEST EDITOR: SHARON ROUNDS, MD

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In celebration of Advance RI-CTR's 10th-year anniversary, a mosaic showcasing portraits of its investigators emphasized the translational collaboration of all the researchers involved.

IDeASymposium poster session

SPECIAL SECTION
Advance RI-CTR

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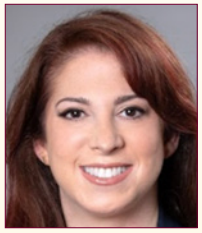
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Advance RI-CTR: Advancing a Decade of Discovery for Clinical & Translational Research in Rhode Island

SHARON ROUNDS, MD; EDWARD HAWROT, PhD; METHODIUS TUULI, MD, MPH, MBA; KERRI CONNOLLY, MPH; STEPHEN KOGUT, PhD, MBA; JUDY KIMBERLY, PhD; NADIA TSADO, MPH; PATRICIA COULTER

ABSTRACT

Advance Rhode Island Clinical and Translational Research (Advance RI-CTR) is a statewide consortium funded by the Institutional Development Award (IDeA) Program of the National Institute of General Medical Sciences. Over the past decade, it has strengthened Rhode Island's clinical and translational research ecosystem. Led by Brown University in partnership with Brown University Health, Care New England, the Providence VA Medical Center, and the University of Rhode Island, the consortium provides infrastructure, pilot funding, workforce development, and community-engaged resources aligned with state health priorities.

Guided by environmental assessment and sustained community input, Advance RI-CTR prioritizes chronic disease and aging, behavioral and mental health, and maternal and child health, with crosscutting emphases on substance use disorder, social determinants of health, and healthcare delivery. Through five integrated cores, the program supports investigators statewide.

Major accomplishments include establishing a practice-based research network, expanding informatics capacity, strengthening implementation science, enhancing workforce training, and increasing competitiveness for extramural funding. The program demonstrates strong return on investment and measurable statewide impact.

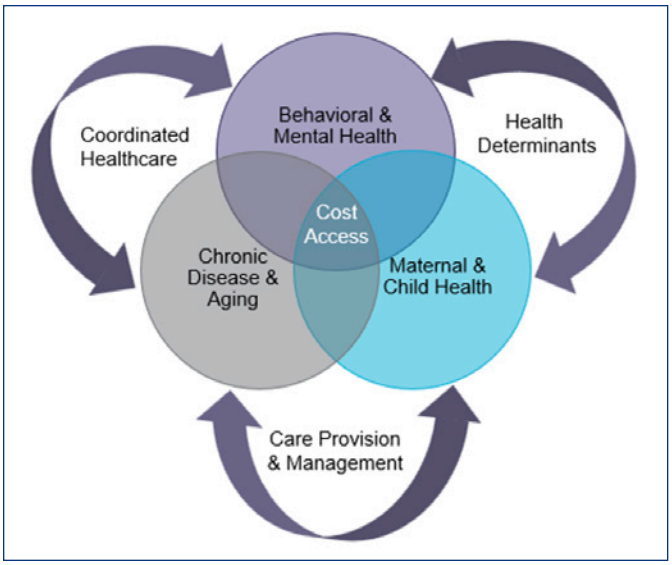
KEYWORDS: Clinical/translational research; research infrastructure; workforce development; community-engaged research; research funding

BACKGROUND

Advance Rhode Island Clinical and Translational Research (Advance RI-CTR) is in its 10th year of funding through the National Institute of General Medical Sciences (NIGMS) IDeA Program (U54GM115677). It has provided the resources, funding, and infrastructure to fuel a decade of discovery for clinical and translational research in Rhode Island. Advance RI-CTR is based at Brown University and is a consortium of research institutions in partnership with Brown University and the Warren Alpert Medical School, including Brown University Health (Brown Health), Care New England (CNE), the Providence VA Medical Center (PVAMC), and the University of Rhode Island (URI). Led by **JAMES PADBURY, MD**, and **EDWARD HAWROT, PhD**, initially, Advance RI-CTR was one of the first successful statewide partnerships of Rhode Island universities and health care institutions. The mission of Advance RI-CTR is to support Rhode Island investigators through funding, research resources and services, and professional development offerings, with the goal of fueling discoveries and collaborations that are responsive to the health priorities of the state's communities. Advance RI-CTR has submitted a renewal application that is currently under review at the National Institutes of Health (NIH) which would provide, if funded, another five years of support to expand our network of impact and increase services and opportunities for Rhode Island's clinical and translational research workforce.

Advance RI-CTR strategically prioritizes research projects that address Rhode Island's most pressing health needs. Identification of these priorities was informed by multiple inputs, including guidance from the Advance RI-CTR's Community Advisory and Action Board (a group convened to represent community perspectives across the state), along with Affordable Care Act-mandated Community Health Needs Assessments conducted by Advance RI-CTR's partner hospitals, and the Rhode Island Department of Health's strategic framework for reducing health disparities and achieving health equity.[1-8] Priority areas are also informed by the quality indicators reported in the Commonwealth Fund's Scorecard on State Health System Performance and the National Healthcare Quality and Disparities Reports from the Agency for Healthcare Research and Quality. Three distinct priority areas emerged: Chronic Disease & Aging (including cancer), Behavioral & Mental Health, and Maternal & Child Health.[9] Interdomain themes include addressing health determinants, healthcare coordination, and healthcare provision and management [**Figure 1**]. Important crosscutting areas not explicitly noted in the figure include disability and functional status, healthcare quality, infectious disease, palliative and end-of-life care, and substance use disorder. The services, resources, funding and professional development opportunities provided by Advance RI-CTR serve investigators to advance research that will directly improve health outcomes in these identified priority areas.

Figure 1. Advance RI-CTR Health Priority Areas



ORGANIZATIONAL STRUCTURE

Advance RI-CTR comprises five Cores responsible for the provision of services, training, seminars, consultations and funding awards, in addition to a centralized Administrative Core (AC). Each Core is led by distinguished faculty from each of Advance RI-CTR's partner institutions and staffed by a core manager reporting to the AC.

Community, Engagement and Outreach (CEO) Core

The CEO Core, led by **ALISON TOVAR, PhD**, and **JACLYN HUGHTO, PhD**, (Brown University School of Public Health); **JOSEPH DIAZ, MD**, (Care New England), and **MARGARET SALINGER, MD**, (Brown University Health), prepares investigators to launch research in community-based settings and implement best practices for community engaged research. The CEO Core offers expert faculty consultations and virtual and in-person training opportunities. In the past two years, the CEO Core has launched an innovative new offering for researchers: "Community Engaged Studios" (Studios). These Studios facilitate respectful conversation between a panel of community experts (e.g., people from the population that a researcher aims to serve or other stakeholders) and a research team planning, implementing, and/or disseminating information about a planned or in-progress study. The overall goal of the Studios is to facilitate the collaborative engagement of community experts and researchers to gather information that is meaningful to all stakeholders. Since its inception in 2024, the CEO Core has organized 10 Studios, and formal evaluative findings have shown a high degree of satisfaction and impact for both the researcher and for community participants [**Table 1**].

In addition to the Studio offerings, the CEO Core has established and provides administrative support for a Practice-Based Research Network (PBRN). The PBRN is a collaborative network of practicing clinicians who strive to formulate and answer clinical and organizational questions relevant to their practices and the communities they serve. By participation in the PBRN, practice organizations and providers can access resources from Advance RI-CTR, including vetted research proposals. These proposals align with the practices' and providers' goals and priorities, such as improving healthcare quality, fostering innovation, and achieving significant breakthroughs for patients, providers, and communities. Individual providers and practices have the flexibility to choose whether to participate in the proposed projects that have been proposed by external researchers or internally developed by the practices and/or providers. Currently, the PBRN includes 104 private, hospital-affiliated, or Federally Qualified Health Center practices. These practices represent over 400 providers and 300,000 patients, and eight studies are underway in this network [**Table 2**]. Moving forward, we aim to increase the number of research studies in the primary care practices of the PBRN.

Table 1. Community Engaged Studios

Investigator	Studio Title
Joanne Wilkinson	Patient Engagement for Diabetes Management in Latinx Communities
Gisela Jimenez-Colon	Transgenerational Trauma in Latinx Families: Impact on Parenting, Child Suicidality, and Access to Mental Health Services
Julia Shinnick	Intravesical Gentamicin to Prevent Recurrent UTIs
Ana Abrantes	Exercise as a Treatment for Depression
Liqi Shu	Efficacy of Portable EEG Systems in Identifying Large Vessel Occlusion Strokes in the Prehospital Setting
Michelle Wilson	Exploring the Lived Experience of Southeast Asians During the COVID-19 Pandemic
Joanne Wilkinson & Annmarie Moraitis	Transition Off Active Treatment
Alexis Gimovsky	Community Perceptions of a Shared Decision-Making Application for Labor and Delivery
Odinaka Anyanwu	Enhancing Birth Equity
Natalie Fenn	Novel Civic Engagement Intervention to Improve Mental Health Outcomes Among LGBTQ+ Adults

Biostatistics, Epidemiology and Research Design (BERD) Core

The Biostatistics, Epidemiology and Research Design (BERD) Core is led by **CHRISTOPHER SCHMID, PhD**; **MELISSA CLARK, PhD**, and **SHIRA DUNSIGER, PhD**, (Brown SPH), and **ROCHELLE ROSEN, PhD**, (Brown Health). This Core is responsible for providing easily accessible, multidisciplinary collaborative support for quantitative and qualitative research design, analysis, interpretation, and dissemination

Table 2. Practice-Based Research Network (PBRN) Studies

Investigator	Study Title	Clinic Name
Joanne Wilkinson	Patient Engagement in Diabetes Management in Urban Latinx Communities	CNEMG
Joseph Diaz & Charles Eaton	Association between Social Drivers and Cancer Screening Uptake	CNEMG & RICPCP
Linda E. Guzman & Hannah E. Frank	Enhancing Depression Screening for Spanish-Speaking Adults in Primary Care Settings: An Implementation Science Approach	IM – letter of intent with Clinica Esperanza
Charles B. Eaton	Diabetes Health Equity Data Pilot	Brown Physicians Incorporated, CNEMG, RIPCPC, PCHC
Louisa Thompson	Accelerating Digital Cognitive Screening for Alzheimer's Disease in the Primary Care Setting (Dig-Cog)	CNEMG
Jennifer Freeman	Team-Based Cognitive Behavioral Treatment (CBT) for Pediatric Anxiety in Primary Care	RIPCPC
Jamie Blalock	Contextual and Social Predictors of Perinatal Mental Health	Proposal in a RIPCPC
Joseph Diaz & Stacey Ranucci	CKD Screening and Monitoring	CNEMG

that can work seamlessly with and within existing health research structures. Expert faculty facilitate trainings in study design, epidemiology, biostatistics and qualitative and mixed methods to clinical and translational researchers and research staff, delivered in a variety of formats, both synchronous and asynchronous (both in-person and remote), using the latest educational methods and technologies. During the past five years, the BERD Core has completed over 900 consultations, contributing to over 80 reported research products (e.g., publications, presentations).

Biomedical Informatics, Bioinformatics, and Cyberinfrastructure Enhancement (BIBCE) Core

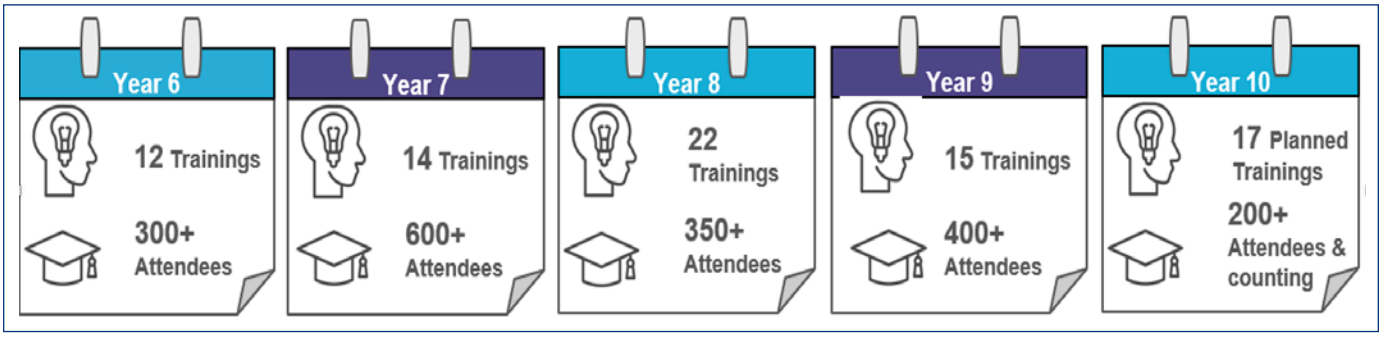
The Biomedical Informatics, Bioinformatics, and Cyberinfrastructure Enhancement (BIBCE) Core is led by **NEIL SARKAR, PhD**; **ELIZABETH CHEN, PhD**, and **RUBEN MARTINEZ, PhD**, of Brown University Division of Biology and Medicine (Brown BioMed). The BIBCE core is focused on the creation and maintenance of a sustainable and extensible informatics infrastructure to support: (1) expanded data sharing & analysis; (2) statewide cohort discovery; and (3) a more integrated and efficient approach to data collection and management. The BIBCE Core develops innovative data, software, and technology solutions in collaboration with clinical and translational researchers and provides state-of-the-art informatics training and engagement with clinical and translational research stakeholders. The BIBCE Core has operationalized a best-of-breed infrastructure, including Fast Healthcare Interoperability Resources (FHIR) and SMART-on-FHIR Apps, as well as Observational Health Data Sciences and Informatics (OHDSI) standards and tools (e.g., Observational Medical Outcomes Partnership (OMOP) Common Data Model) to maximize use of real-world electronic health records (EHR) data across institutions. The utilization and education in artificial intelligence (AI) approaches through enhanced literacy programs focused on responsible AI practices (including algorithmic bias assessment, model interpretability standards, and transparent reporting frameworks) has strengthened data governance protocols to enable secure, ethical sharing of EHR data across partner institutions while maintaining compliance with privacy regulations and institutional policies, all of which will help catalyze multi-institutional collaborative research across this rapidly evolving field.

The BIBCE Core also offers services in Implementation Science in collaboration with the Brown Research on Implementation and Dissemination to Guide Evidence Use (BRIDGE) Program. Implementation science aims to maximize the public health impact of interventions and reduce the research to practice gap by encouraging implementers and program creators to examine barriers and facilitators to a practice being used, pick strategies to work with facilitators and overcome barriers, and plan for sustainable implementation. The BIBCE Core provides consultations and trainings, including an annual Implementation Science (IS) Retreat focusing on the research-practice gap for physician scientists. The IS retreat featured a keynote speaker, panel discussion, four didactic breakout sessions, and a networking lunch. These events foster interinstitutional collaboration and a team science culture among the clinical and translational workforce.

Professional Development (PD) Core

The Professional Development (PD) Core, led by **METHODIUS TUULI, MD**, (CNE), and **AUDRA VAN WART, PhD**, (Brown BioMed), has provided funding mechanisms, cohort-based training, and programming to connect faculty, mentors, and teams across our network institutions. Key accomplishments during the last 10 years include 10 two-year Mentored Research Awards (MRAs), which led to 34 federal and non-federal research grant awards and six grant resubmission awards, resulting in five funded federal and non-federal awards. The PD Core also offers the year-long Advance-K scholar program to assist junior faculty in preparation of NIH K and VA Career Development Award applications. The Advance-K program has graduated 37 faculty

Figure 2. Phase II Trainings and Reach



scholars, 65% of whom submitted research, career-development grant applications (of which 46% were funded and 11% are currently in review) and >50 other research awards. Satisfaction with this program has been high, raising confidence among participants. The PD Core also offers a four-month Advance-R program for investigators planning to submit their first R type research awards. Advance-R has supported 11 scholars who submitted seven research grant applications (two funded to date). The PD Core provides research mentor training based on a nationally recognized program developed by the University of Wisconsin. About 300 Brown and URI faculty have completed this research mentor training and 40 also completed advanced training modules. Finally, the PD Core has provided a rich program of educational offerings, including a monthly CTR seminar series, good clinical practice training workshops, and entrepreneurship training [**Figure 2**].

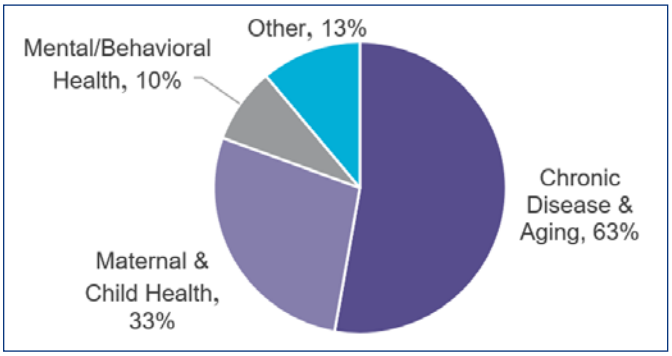
Pilot Projects Program (PPP) Core

The Pilot Projects Program (PPP) Core, led by **GAURAV CHOUDHARY, MD**, (PVAMC) and **TRACIE SHEA, PhD**, (Brown BioMed) has provided funding for junior investigators to perform clinical and translational research that addresses the major health needs of Rhode Island. These grants support the development of preliminary data required for extramural research funding. The need for this type of support was evident from a survey of Brown and URI investigators performed at the time of initial funding of Advance RI-CTR.[10] The PPP has fostered inter-institutional and interdisciplinary collaboration, mentoring by an established investigator, and support for project administration and professional development. Advance RI-CTR has awarded a total of 99 awards, approximately $10.5 million, in the last decade, bringing in over $132 million in subsequent research funding to Rhode Island.

The Advance RI-CTR Pilot Projects Program has supported a diverse portfolio of studies aligned with the state's top health priority areas. **Figure 3** presents funded pilot projects during Phase II of the CTR award (2021–2026) categorized by broad health priority areas. Although the Pilot Projects Core emphasizes research that addresses statewide health priorities, pilot awards are also made for scientifically meritorious research with high potential for impact outside these areas (grouped as "Other" in **Figure 3**).

Beyond supporting investigator development and generating preliminary data for larger interventional studies, these pilot projects have contributed to improved health and healthcare in Rhode Island. Their impact spans numerous domains, including the identification of novel biomarkers and screening modalities, advancements in neonatal and maternal care, cancer and chronic disease management, and improvements in mental health and population health. Collectively, research funded by Advance RI-CTR has served as a substantial catalyst for addressing the state's priority health needs, serving a role that has become even more important given the recent delays and decline in federal NIH support for early-stage research.

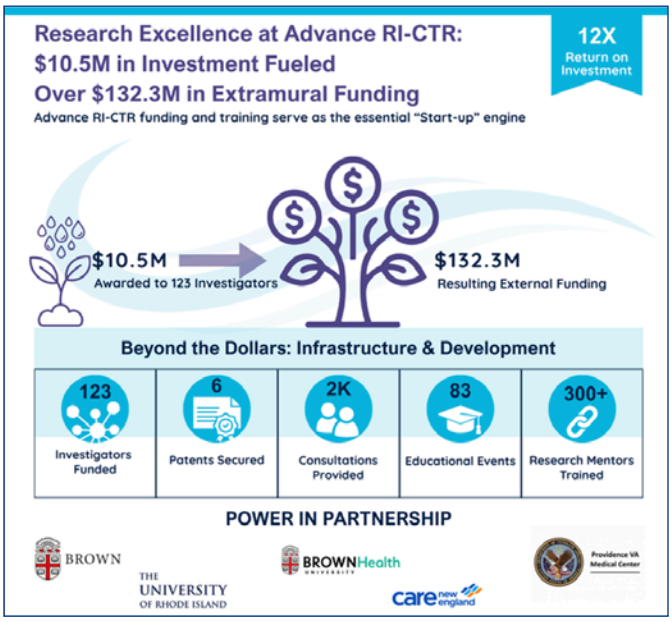
Figure 3. Advance RI-CTR Pilot Projects 2021–2026



RETURN ON INVESTMENT

Advance RI-CTR exemplifies the benefits of investing in clinical and translational research infrastructure and workforce development. One way of assessing this is by the monetary Return on Investment (ROI). In Phase I Advance RI-CTR was funded for five years in the amount of $19,513,469, and in Phase II for a total of $20,799,099, including supplemental research awards. Through this investment in the creation and expansion of Advance RI-CTR, over $10.5 million was awarded to RI investigators in start-up research funds, who

Figure 4. Advance RI-CTR Return on Investment



went on to generate $132,345,181 in extramural funding through government and private foundations. For every one dollar put into Advance RI-CTR, $12.00 has been generated as the return on investment, as shown in **Figure 4**.

Other important considerations with respect to Returns on Investment of research funding and infrastructure programs are the career development and self-efficacy of participating young scientists. The professional growth of researchers supported by Advance RI-CTR is periodically assessed through surveys and interviews, and is evaluated in terms of research outputs, such as subsequent grant funding, peer-reviewed publications, presentations at professional conferences, and patents awarded. Illustrative qualitative feedback from awardees includes comments such as:

> *"Seed funding really helped protect my time from having more clinical and administrative duties until I secured additional funding," and "I don't think I could have received IRB approval without their [Advance RI-CTR] help]".*[11]

The remaining articles in this edition of the *Rhode Island Medical Journal* further demonstrate these ROIs. The contributing authors were selected based on their success in using the data and experience obtained from Advance RI-CTR awards and services in obtaining extramural support for their subsequent research. It is noteworthy that the subjects of the research range from cell and small animal studies of osteoarthritis (**CHATHURAKA T. JAYASURIYA, PhD**), to implementation of best clinical practices (**DARIA SZKWARKO, DO**), to community-engaged research (**TAYLA VON ASH, ScD**, and **LAURA E. KORTHAUER, PhD**), to sophisticated statistical analytic techniques (**ASHLEY BUCHANAN, DrPH**).

The authors include a clinician (Dr. Szkwarko), psychologists (Drs. von Ash and Korthauer), a data scientist (Dr. Buchanan), and a bench scientist (Dr. Jayasuriya**).** They are employed by Brown University (Dr. von Ash), the University of Rhode Island (Dr. Buchanan), Care New England (Dr. Szkwarko), and Brown University Health (Dr. Korthauer). Thus, they illustrate the multi-institutional participation and contributions to Advance RI-CTR. The recipients of support from Advance RI-CTR have made major contributions towards elevating Rhode Island to the top tier of states receiving NIH research support in fiscal year 2024 when measured on a per capita (i.e., state population) basis.[12]

FUTURE DIRECTIONS

In the next phase of Advance RI-CTR, we propose to transition to a "Networked CTR" (CTR-N), as mandated by NIGMS. The purpose of the CTR-N program is to further enhance capacity to perform research on health challenges faced by the populations served by the CTR-N. It is increasingly evident that impactful and generalizable clinical and translational research requires larger populations than may be available in a single center. Furthermore, there is increasing interest in "real-world" data from deidentified electronic health records. Finally, the powerful tools provided by AI will be used to provide new insights and approaches. The Advance RI-CTR program will support statewide or multistate regional networks to expand existing infrastructure for clinical and translational research, and to coordinate clinical research activities across partnering IDeA states. To meet these objectives, Advance RI-CTR will restructure cores, tailor and enhance our consultations and training opportunities, and expand our research network. The leadership team has refined our Vision, Mission and Theme to address these goals. The vision is "To improve health outcomes for all RI communities" with the theme of "Collaborate to Innovate."

There will be several changes to the Core structure in Phase III**.** The BERD and BIBCE Cores will merge to create the Research Design, Compliance, and Data Management (RDCD) Core comprising four sub-cores: Health Informatics, Qualitative Data, Quantitative Data, and Implementation Science. Services and trainings will be expanded in this next phase to offer expert trainings and consultations to help investigators remain in compliance with all government, foundation, and industry regulations and produce high-quality clinical translational research.

The Professional Development Core will expand to include trainings for professional research coordinators to enhance Rhode Island's research workforce. At the present time Advance RI-CTR and Rhode Island Hospital participate in the NIH-funded IDeA State Consortium for a Clinical Research Resource Center (ISCORE-RC) with the goal to serve as a catalyst to increase the number of clinical studies in IDeA states. To achieve this mission, ISCORE-RC

leads a comprehensive training program for clinical research coordinators and a dedicated service core to build capacity for increased clinical study opportunities. In the next phase of funding, Advance RI-CTR will expand this program to other Rhode Island health system partners and to URI.

In the next phase of funding, the Health Research Core (formerly Pilot Projects Program) will significantly expand its award opportunities in both duration and funding amounts. These award types and amounts address current gaps identified in the funding landscape, specifically to: 1) offer protected time for clinician fellows and junior faculty to develop mentored research programs in conjunction with protected time for mentors to have dedicated time for mentoring activities; 2) longer funding periods for developmental projects to support the preparation of extramural applications; 3) support for community-engaged research using the PBRN; 4) support for multi-site collaborative research, with a milestone-driven award process; 5) engagement of community members and the Community Advisory and Action Board (CAAB) of the CEO Core in reviewing applications to maximize community impact, and; 6) use of an evaluation rubric that selects proposals in which merit and impact align with the health priorities of RI communities, the latter in collaboration with the Tracking and Evaluation (T&E) Team.

CONCLUSION

Advance RI-CTR has transformed clinical and translational research in Rhode Island through a wide-reaching network of partner institutions, community organizations, and institutional affiliates. Since initial NIH funding in 2016, Advance RI-CTR has developed innovative approaches to improve and strengthen clinical and translational research across the state. Building on these impactful achievements from Phases I and II, Advance RI-CTR is positioned to address newly identified barriers and launch Advance RI-CTR into a streamlined and even more connected CTR-N framework with increased capacity for collaborative and innovative research that effectively addresses current and future health needs within RI and beyond.

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Authors

Sharon Rounds, MD, Advance RI-CTR, Providence, RI.

Edward Hawrot, PhD, Advance RI-CTR, Providence, RI.

Methodius Tuuli, MD, MPH, MBA, Advance RI-CTR, Providence, RI.

Kerri Connolly, MPH, Advance RI-CTR, Providence, RI.

Stephen Kogut, PhD, MBA, Advance RI-CTR, Providence, RI.

Judy Kimberly, PhD, Advance RI-CTR, Providence, RI.

Nadia Tsado, MPH, Advance RI-CTR, Providence, RI.

Patricia Coulter, Advance RI-CTR, Providence, RI.

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Use of AI-assisted tools: Portions of this manuscript were edited and revised for clarity and style using AI-assisted writing tools, including ChatGPT (OpenAI; GPT-5.2). These tools were used solely for language editing and did not contribute to the substantive intellectual content. The authors take full responsibility for the content of the manuscript.

Correspondence

Sharon Rounds, MD

sharon_rounds@brown.edu

Augmentation of Meniscus Surgery with Cartilage Progenitor Cell Treatment May Stimulate Healing and Improve Repair Efficacy

CHATHURAKA T. JAYASURIYA, PhD

ABSTRACT

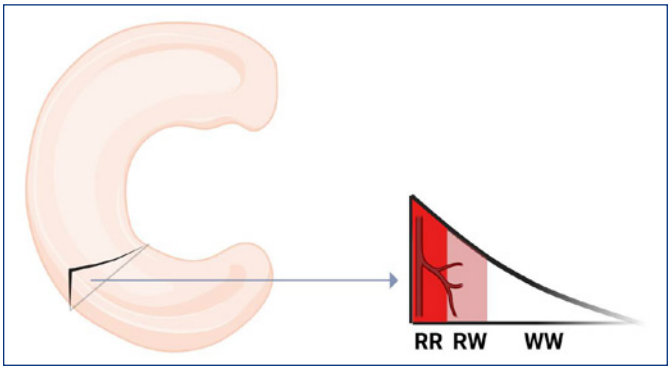
Meniscal tearing is one of the most common knee injuries. Meniscus tears seldom heal, making partial meniscectomy the primary surgical option for patients seeking quick relief. Unfortunately, removal of meniscal tissue impedes loadbearing in the knee, which can lead to accelerated post-traumatic osteoarthritis. It is hypothesized that implementing stem/progenitor cells in the treatment of orthopedic soft-tissue injuries may improve the rate of healing. This article discusses the progress made by our research group in the Department of Orthopedics at Brown University Health, with funding and logistical support from Advance RI-CTR, to develop a novel cell-based strategy for stimulating meniscal fibrocartilage healing. We detail the clinical need that fueled (and continues to fuel) our research efforts, our justification for cell selection, and our published studies that have tested the efficacy of this approach using both *in vitro* and *in vivo* models of meniscal injury.

KEYWORDS: meniscus; cartilage; osteoarthritis; stem cells

BACKGROUND

Tearing of the meniscus is one of the most common knee injuries seen by orthopedic surgeons today. It is also an injury that doesn't have an ideal clinical solution for long-term relief. The lateral and medial menisci are crescent-shaped fibrocartilage soft tissues that sit inside the knee joint, with the primary function being load absorption and displacement, which fundamentally protects the more rigid articular cartilage from being damaged during physical activity.[1,2] Meniscal tearing leads to about one million surgeries annually in the U.S. alone.[3] A 2025 study by Bergstein et al found that 94% of 2,053,884 million meniscus surgeries were meniscectomies—a procedure where entire portions of the torn meniscus is excised and removed to resolve chronic inflammation in an effort to stop further damage to the joint.[4] Unfortunately, even partial removal of meniscal tissue results in increased load placement on articular cartilage, thereby making it more vulnerable to injury and increasing the risk of post-traumatic osteoarthritis (PTOA).[5,6]

Figure 1. Illustrated diagram of the different zones of the knee meniscus. The cross-sectional diagram shows three different regions that constitute the meniscus, from left to right. The red-red (RR) zone is the thickest and most vascular region. The red-white (RW) zone has limited vascularity. The thinnest and most avascular region is the white-white (WW) zone, which does not heal on its own.



The loadbearing inner two-thirds of the meniscus consist of fibrochondrocytes that are well-dispersed and entrenched within a dense, collagen-rich extracellular matrix with little to no vasculature [**Figure 1**].[7] Meniscal tears in this region seldom heal, helping to explain why meniscectomy is the predominant intervention today. Finding ways to support meniscus healing stands to revolutionize the clinical landscape with respect to how meniscal tears are treated. For the past eight years, our group has been developing and optimizing a cell-based intervention to help stimulate meniscus healing following arthroscopic meniscal repair. Our central strategy is to repurpose mesenchymal progenitor cells originating from articular cartilage, which have a natural propensity for producing proteoglycans and type 2 collagen, to support matrix anabolism and reintegrative healing of the tear channel.

In 2017, we received pilot research support from the (then) newly formed and National Institutes of Health (NIH)-funded program, Rhode Island Clinical and Translational Research (Advance RI-CTR), to investigate whether (and how) cartilage progenitor cells (CPCs) can be used to stimulate meniscal healing. This article will detail the findings of the initial project and summarize the overall progress that our group at Brown University Health has made in translational, cell-based tissue engineering since its completion.

METHODS

CPC isolation and stabilization

Human CPC isolation and culture experiments are described in our original publications.[8,9] Briefly, human cartilage tissue was obtained with approval from the Rhode Island Hospital Institutional Review Board (IRB). Cells were separated from chondrocytes using differential adhesion to fibronectin. Cell lines were generated by introducing Large T-Antigen using pRetro-E2 SV40 infection.[8]

Explant culture meniscal injury model

Explant culture experiments are described in the original publication.[8] Briefly, menisci were collected from three-month-old Lewis rats, with approval from the Rhode Island Hospital Institutional Animal Care and Use Committee (IACUC). A radial tear was created in the anterior horn and treated with CPCs, bone marrow-derived stromal cells (BM-MSCs), or left untreated as a negative control. The menisci were cultured for four weeks. Menisci were imaged at different time points. Menisci were sectioned and stained with trichrome at the four-week mark.

In Vivo meniscal injury model

Studies in live rats are fully detailed in the original work.[9] Briefly, skeletally mature RNU athymic male rats were used in the study, with approval from the Rhode Island Hospital IRB. A 1.0 mm meniscal tear was surgically created using micro scissors, ensuring that the meniscus did not detach into two separate pieces. Cells were administered by intraarticular injection through the patellar tendon at Weeks 1 and 4, post-surgery. Repair efficacy was evaluated by sectioning the menisci, staining with Saf O/Fast green, and measuring the mean area of the open tear channels in each experimental group, seven weeks following treatment. Articular cartilage was also stained with Saf O/Fast green and Modified Mankin scoring was used to evaluate cartilage quality.

Statistical Analysis

Statistical analyses are detailed in our original publications.[8,9] To summarize, analysis was performed using a student's t-test, when comparing only two groups. When comparing more than two groups, a one-way analysis of variance (ANOVA) was used, followed by post-hoc analysis. For live rodent experiments, when examining the effects of the treatments on meniscus defects and Mankin scores, generalized linear models were used, as detailed in the original published work. P-values smaller or equal to 0.05 were considered statistically significant. Sample sizes were always greater than or equal to 3 and error bars represent ±1 standard deviation of the mean.

RESULTS

Progenitor cells native to articular cartilage exhibit phenotypic specificity for rebuilding inner meniscus tissue.

The tissue microenvironment of the inner meniscus is remarkably similar to that of articular cartilage. Much like the inner meniscus, articular cartilage has a dense tissue matrix that is rich in type II collagen and proteoglycans. These proteins form networks that contribute to the resilient mechanical properties of both tissues. Specifically, aggrecan is a proteoglycan that is abundant in both tissues and functionally important because it is negatively charged and attracts water molecules. Hyaluronic acid (HA) is another proteoglycan that aids in holding the Aggrecan core proteins together, while the type II collagen network prevents excessive expansion that comes with water retention, which helps to build the compressive tension within the extracellular matrix (ECM) that is the essential functional feature of these loadbearing tissues.

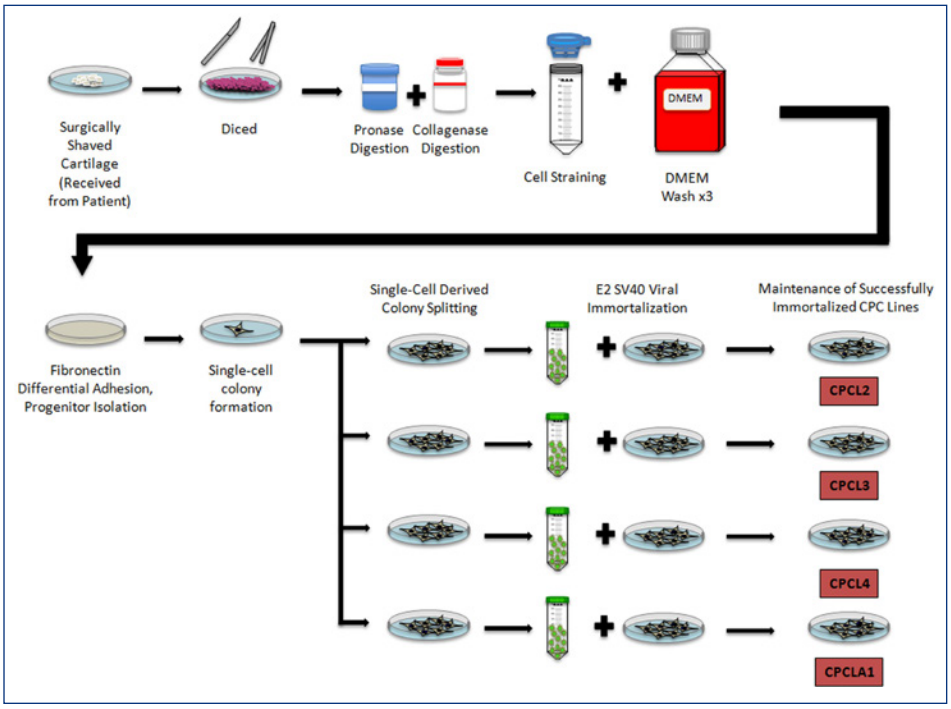
Another similarity is that unlike the elongated spindle-like fibrochondrocytes that are native to the outer third of the meniscus, cells in the inner meniscus are round and resemble chondrocytes—the resident adult cell population in articular cartilage. Hence, in our pursuit to identify a source of cells that are well-suited to help rebuild damaged inner meniscal tissue, we first considered utilizing chondrocytes. However, despite their well-reported capacity for producing an ideal ECM, rich in type II collagen and aggrecan, chondrocytes have several features that make them unideal for our needs. Chondrocytes are fully differentiated adult cells that, while immune-privileged compared to other mature cell populations,[10,11] no longer exhibit the extensive immunosuppressive capabilities characteristic of less committed cells like mesenchymal progenitor/stem cells.[12,13] This feature helps cells to evade a host recipient's immune system so that they can function properly while minimizing the chance of rejection and/or immune reaction. Fortunately, there is a satellite cell population within cartilage that fits this description. Cartilage-derived progenitor cells are a sparce population of mesenchymal progenitors that are native to articular cartilage.[14] They exhibit all the important key features we were looking for, including a high chondrogenic capacity for essential ECM protein synthesis, immunosuppressive capabilities, and high proliferative capacity (for *in vitro* expansion).[15,16]

Human cartilage progenitor cells stimulate mending of meniscal tears in *ex vivo* culture.

In our 2017 pilot study funded by Advance RI-CTR, the primary goal was to find a bioavailable source of CPCs and test their efficacy for stimulating meniscal healing, *ex vivo* and *in vivo*. We isolated these cells from cartilage using fibronectin adhesion. Compared to chondrocytes, CPCs exhibit high expression of CD49e (receptor for fibronectin), which makes enriching these cells relatively easy and cost effective, by

Figure 2. Illustrated diagram of procedure used to establish human cartilage progenitor cell lines. Healthy human cartilage was diced into small pieces and digested using pronase and collagenase. Released cells were washed and strained to remove clumps. Cells were seeded at low density and individual single-cell derived colonies were separated and stabilized using SV-40 mediated delivery of Large-T antigen.

[Figure 2 panels and legend are reprinted from *Jayasuriya et al. 2019. Human Cartilage-Derived Progenitors Resist Terminal Differentiation and Require CXCR4 Activation to Successfully Bridge Meniscus Tissue Tears. Stem Cells 37:102-114.* with permission from publisher.]



taking advantage of their high propensity for binding to fibronectin. Since CPCs are a rare, satellite cell population that make up less than 1% of cells within cartilage, we engineered stable CPC cell lines by introducing Large T Antigen [**Figure 2**].[8] We selected two of these engineered cell lines to validate that their differentiation potential, most importantly their chondrogenicity, was not impeded as a result of immortalization.[8]

Using an *ex vivo* meniscal injury model, we tested our hypothesis that CPC treatment can stimulate meniscal healing.[8] A radial tear was created in the white-white zone of rat menisci and treated with a fluorescently labeled CPC line in explant culture [**Supp. Figure 1**]. The control groups consisted of tears that were either left untreated or treated with fluorescently labeled bone marrow-derived stromal cells (BM-MSCs). Veritably, CPC treated meniscal tear channels exhibited complete filling by 20 days post treatment, whereas BM-MSC-treated menisci did not achieve this end. Histology analysis performed four weeks following CPC treatment demonstrated bridging at the tear channel [**Supp. Figure 2**]. [*Editor's note: Email author for supplementary figures 1,2*].

Human cartilage progenitor cells stimulate meniscal healing and delay onset of post-traumatic osteoarthritis in athymic rats.

Encouraged by these findings, we next tested whether CPC treatment could have the same effect in a live animal model of meniscus repair. We worked closely with Janine Molino, PhD, MS, of the Advance RI-CTR Biostatistics, Epidemiology, and Research Design (BERD) Core to design this study. We used a rat medial meniscus tear model to evaluate CPC-stimulated meniscus healing [**Figure 3**] in comparison to treatment with BM-MSCs [**Figure 4**] or treatment with saline/vehicle as a negative control [**Figure 5**]. A 1.5 mm longitudinal tear spanning the full thickness of the meniscus was created on the medial meniscus of 15-week-old skeletally mature rats. Fluorescently labeled human CPCs (1.6 million cells) were administered via intra-articular injection twice (at day 7 and at day 28 post-meniscal injury). There were two control groups: BM-MSC injected animals and vehicle (PBS) only injected animals. Rats were sacrificed and their medial menisci were evaluated using fluorescence imaging of the tear site seven weeks post-surgery. Localization and engraftment of injected cells (labeled fluorescent red) to the tear site was confirmed on tissue sections. Analyses showed that CPC-treated animals exhibited increased tear filling compared to the group treated with BM-MSCs [**Figure 6**].[9] These experiments suggested that CPC-treatment stimulates fibrocartilage healing in an animal model.

We also analyzed the articular surface of the medial knee compartment as a secondary outcome measure of success.[9] Animals treated with CPCs exhibited less cartilage damage in the medial compartment of the tibial plateau, which sits directly below the injured medial meniscus. The medial femoral condyles and medial tibial plateaus were sectioned and stained with Safranin-O/fast green. Mankin histopathology scores demonstrated that the CPC-treated group exhibited a significant improvement over the vehicle only treated saline control group, whereas the BM-MSC-treated group did not.

Figure 3. CPC-mediated healing of isolated medial meniscus tears in rats 46 days following treatment with CPCs. 3.2 million fluorescently labeled CPCs were injected into the joint capsule following meniscus injury. CPCs from the treatment are fluorescently labeled (red). Nuclei of all cells (both native meniscus cells and injected cells) are labeled with Dapi (blue). Yellow lines and arrows signify areas that remain open without healing, with yellow dotted lines inscribing the unfilled areas. Scale bar = 100μm

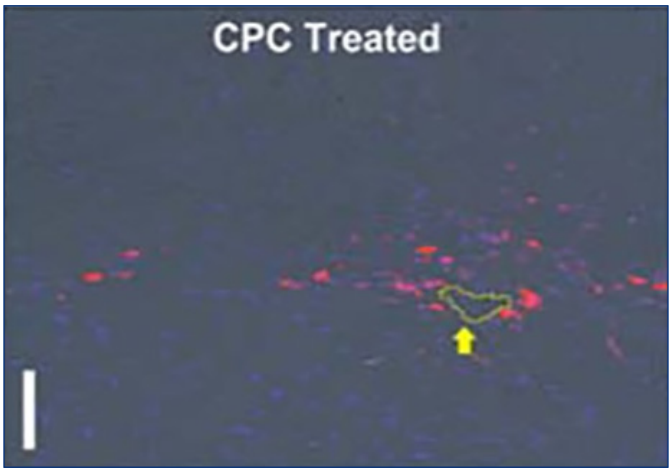


Figure 4. BM-MSC-mediated healing of isolated medial meniscus tears in rats 46 days following treatment with BM-MSCs. 3.2 million fluorescently labeled BM-MSCs were injected into the joint capsule following meniscus injury. This was used as a control group to compare against the CPC-treated group. BM-MSCs from the treatment are fluorescently labeled (red). Nuclei of all cells (both native meniscus cells and injected cells) are labeled with Dapi (blue). Yellow lines and arrows signify areas that remain open without healing, with yellow dotted lines inscribing the unfilled areas.

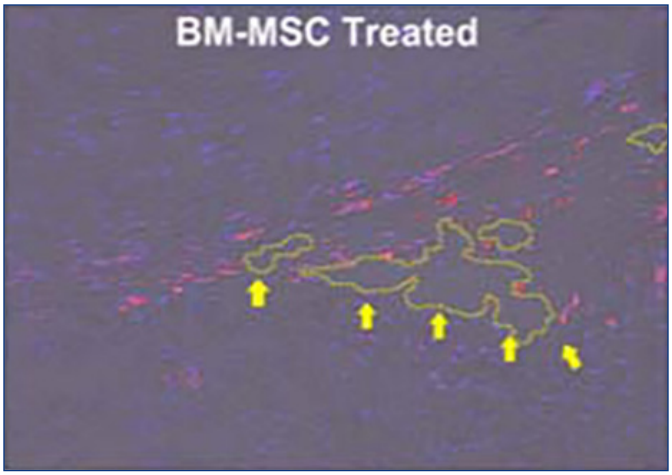


Figure 5. A medial meniscus tear in rats 46 days following treatment with no cells. This group was the negative control group. Nuclei of all native cells meniscus cells are labeled with Dapi (blue). Yellow lines and arrows signify areas that remain open without healing, with yellow dotted lines inscribing the unfilled areas.

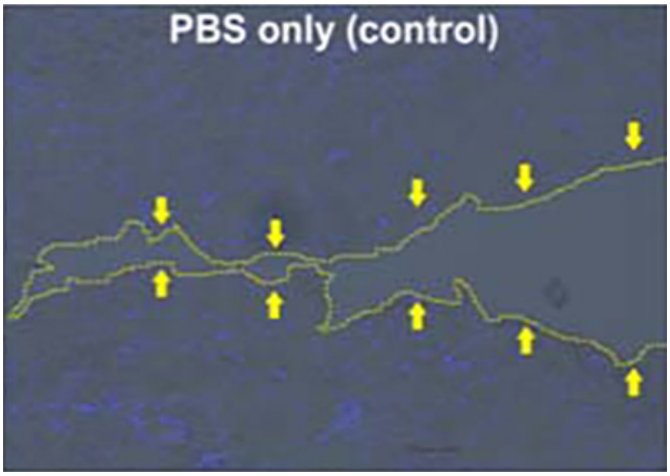
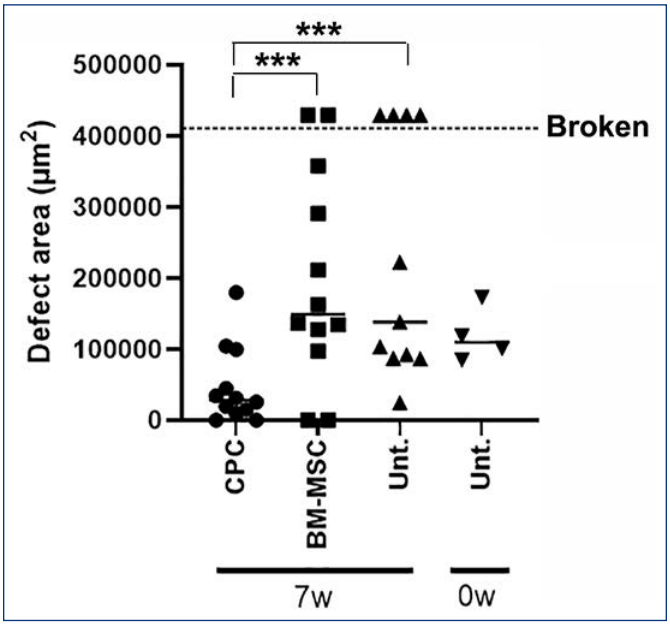


Figure 6. Open areas remaining within the meniscal tear channel was quantified by image analysis and compared across experimental groups. A 0-week control group was used to determine the open area of the meniscal tear before healing, or further tearing due to the *in vivo* environment, can take place. Data points above the dotted line indicates menisci that were broken in two at the time of harvest. N≥8 per group. ***, P≤0.005.

[Figure 5B and corresponding part of the legend are reprinted from *Desai et al. 2022. Stable human cartilage progenitor cell line stimulates healing of meniscal tears and attenuates post-traumatic osteoarthritis. Front Bioeng Biotechnol 10:970235.* with permission from publisher.]



DISCUSSION

Our goal is to develop a novel cell-based treatment to stimulate healing in the meniscus. The studies detailed in this article are the first to demonstrate the efficacy of administering CPCs as a means of accelerating meniscal healing. We have shown that CPCs can maintain a highly chondrogenic phenotype without the need for exogenous growth factors. We have shown that these cells can migrate to areas of fibrocartilage injury and accelerate the integration of tears, both in *ex vivo* culture and in live animals that have compromised immunity.

Since completing these studies, we have explored ways that CPC might be implemented to treat tears in fully immunocompetent live animals,[17] and to treat human meniscus tissue using an explant injury model.[18] We have also investigated the molecular mechanism(s) that constitute the anabolic and anti-catabolic effects of CPCs that may contribute to their propensity for musculoskeletal tissue repair,[19,20] as well as their potential to be further primed for chondrogenesis using commercially available small molecules.[21] Based on our findings, we expect that augmenting the standard clinical procedure of meniscus suture repair with adjuvant CPC therapy has practical potential for significantly improving repair efficacy in the near future.

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Author

Chathuraka T. Jayasuriya, PhD, Associate Professor of Orthopaedics, Department of Orthopaedics, Alpert Medical School of Brown University; Rhode Island Hospital, Providence, RI.

Disclosures

Dr. Jayasuriya is a co-founder of EnkaBio Inc. and holds equity in the company.

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Correspondence

Chathuraka T. Jayasuriya, PhD
Chathuraka_jayasuriya@brown.edu

An Open Pilot Trial of a Physical Activity (PA) Intervention Designed to Address Barriers Experienced by Hispanic and Black Mothers

TAYLA VON ASH, ScD; SUGANDHA K. GUPTA-LOUIS, PhD; BELINDA O'HAGAN, MA; MICHAEL ONU, BS; SHIRA DUNSIGER, PhD; ZOE MAXWELL, MPH; ASHLIE ALACRON, MPH; CANDACE S. BROWN, PhD; BESS H. MARCUS, PhD

ABSTRACT

INTRODUCTION: Mothers, especially those with marginalized identities, often struggle to meet physical activity (PA) guidelines. We examined feasibility, acceptability, and preliminary efficacy of Moms on the Move (MOMs), a community-based PA promotion intervention targeting Hispanic and Black mothers delivered in partnership with a youth sports organization in Providence, RI.

METHODS: Feasibility targets centered around enrollment (i.e., n≥30 participants), retention (i.e., ≥80% of participants through follow-up), and assessment (i.e., collection of PA data from ≥80% of participants at multiple timepoints), while acceptability targets centered around participant satisfaction (i.e., ≥80% of participants being satisfied with the intervention). For preliminary efficacy, we assessed weekly minutes of moderate-to- vigorous intensity PA (MVPA) via 7-Day PA Recall (PAR) at baseline, intervention end (8 weeks), and follow-up (12 weeks), and examined within-person changes in MVPA over time using paired T-tests. Stratified analysis was used to examine differences between participants who were already meeting the national guideline of ≥150 minutes of MVPA per week at baseline and those who were not.

RESULTS: We met recruitment (n=35) and retention (94%) targets but only collected PA data at multiple timepoints from 21 participants (64%). Most participants (94%) were satisfied with the intervention, all (100%) said they learned from the program, and all (100%) said they would recommend participation to a friend. Participants who were not meeting the MVPA guideline at baseline (n=12) reported an increase in MVPA at both intervention end (mean change: 110.27 minutes, Cohen's d: 0.89) and follow-up (mean change: 82.09 minutes, Cohen's d: 0.76).

CONCLUSIONS: Findings around recruitment, retention, and participant satisfaction were promising, though assessing MVPA via the PAR, which requires a semi-structured interview, proved challenging. Nonetheless, the findings, which also showed that insufficiently active mothers had significantly higher levels of MVPA at intervention end and follow-up, support testing MOMs in a fully powered, randomized controlled trial.

KEYWORDS: physical activity; youth sports; mothers; community-based; pilot

INTRODUCTION

It is unquestionable that mothers face unique health concerns. They experience health issues, including those specific to pregnancy and childbirth, even long after giving birth (e.g., dyspareunia and chronic postpartum pain[1]). In addition, mothers experience generalized health concerns that are contextualized by their social role. Mothers care for the needs of their families before caring for themselves.[2] By recognizing the complex nature of mothers' health within the context of their social role and environment, we can better understand how to implement interventions to improve health outcomes for mothers.

Physical activity (PA) is a modifiable lifestyle behavior that has numerous health benefits, including reducing the risk of obesity[3] and chronic disease.[4] In fact, meeting the national PA guidelines, which include ≥150 minutes of MVPA per week,[5] is associated with a 29% reduced risk of all-cause mortality.[6] However, mothers are less likely to engage in sufficient moderate-to-vigorous intensity PA (MVPA) to experience benefits compared to the general population,[5] and trends indicate PA among mothers is decreasing.[8,9] In response, research has focused on both understanding barriers and facilitators of PA among mothers, and developing interventions tailored to addressing these needs. Barriers to PA for mothers include lack of social support, lack of childcare, lack of time due to competing responsibilities, prioritization of children's needs, and guilt associated with exercise as an activity that takes away time from family obligations.[10-13] Successful PA interventions developed for mothers have focused on increasing social support (Juwono et al, 2020) by implementing group-based interventions.[14-16]

While such interventions hold promise for improving mother's PA, previous studies have had low representation of mothers from underserved and marginalized social groups. Increasing PA among mothers with multiple marginalized identities may benefit from an intersectional approach,[17] which acknowledges that individuals hold multiple social identities, embedded within interlocking systems of oppression and privilege, allowing for nuanced understanding of PA experiences and resources. Notably, Hispanic and Black women, and those with low socioeconomic status (SES) report especially low levels of PA,[18-21] contributing to increased risk for poor health outcomes.[22,23] In addition to PA barriers experienced by mothers generally, those with

marginalized identities often lack access to PA opportunities.[7,24,25] As PA interventions for marginalized populations tend to focus on women, without the specific tailoring to mothers, there is a significant need to address barriers experienced by low SES and/or Hispanic and Black mothers.

To date, few PA interventions have focused on addressing the needs of mothers with marginalized identities. In a systematic review of mothers' PA and related interventions,[7] merely three studies included samples with at least a fourth of the participants identifying as Hispanic and/or Black,[26-28] and only one of these included a focus on low-income mothers.[27] While all interventions included similar components (e.g., in person group PA sessions), only three of the interventions successfully increased PA among mothers.[27-29] Among these, just one study assessed PA maintenance post-intervention, reporting that PA increases were not maintained.[29] Notably, none of the studies used an intersectionality framework to address the multiple and intersecting identities of the mothers. Together, the interventions demonstrate modest and growing evidence in support for PA interventions addressing the unique needs of mothers with multiple marginalized identities.

The current study builds on our team's prior work demonstrating the feasibility and acceptability of partnering with youth sports organizations to deliver group-based PA sessions to mothers.[30] Specifically, we assess the feasibility, acceptability, and preliminary efficacy of the community-based Moms on the Move (MOMs) intervention, which was intentionally developed to address PA barriers experienced by Hispanic and Black mothers with low SES. To our knowledge, this is the first PA intervention for mothers that was designed using an intersectionality approach.[17] Our primary aim was to examine whether *a priori* targets for enrollment, retention, assessment completion, and participant satisfaction were met. We also examined changes in MVPA from baseline to intervention end, and one-month post-intervention to assess preliminary efficacy. In doing so, this study adds to a very limited literature of studies examining maintenance of PA intervention effects among mothers. It was funded by Advance Rhode Island Clinical and Translational Research (Advance RI-CTR), which is supported by Institutional Development Award Number U54GM115677 from the National Institute of General Medical Sciences of the National Institutes of Health. Advance RI-CTR also provided support through targeted consultations to strengthen the study design.

METHODS

Study Design

We conducted an eight-week, single-arm open pilot trial during the fall of 2023 football season to assess the preliminary efficacy of MOMs. We examined changes in self-reported MVPA from baseline to intervention end (at 8 weeks) and a month later (at 12 weeks) to assess maintenance. The intervention was delivered in partnership with a youth football and cheerleading organization in Providence, RI, that predominantly serves Hispanic and Black families. Procedures and materials for the study were approved by the Brown University Institutional Review Board, and the study was registered at www.clinicaltrials.gov (NCT05461742).

Participants

Participants were at least 18 years old, self-identified as female, were the mother or primary caregiver of a child who was on one of the partner organization's football teams or cheerleading squads, had email access, and spoke English. Eligibility was not restricted based on minutes of MVPA at baseline, but for safety reasons, participants were required to pass the Physical Activity Readiness Questionnaire.[31] Research assistants recruited participants by approaching parents and distributing flyers at the field where the organization was practicing. The president of the organization also shared the flyer with parents via social media and an app used to communicate with families. All participants provided written informed consent and received remuneration for completing assessments.

Intervention Description

The MOMs intervention consists of three components: in-person group PA sessions, goal setting with motivational interviewing, and tailored written materials. The theory-driven intervention was designed using the intersectionality framework,[32] social cognitive theory (SCT),[33] and the Transtheoretical Model (TTM).[34] The intersectionality framework[32] was used to ensure that PA barriers faced by Hispanic and Black mothers, due to their intersecting identities, were addressed by the intervention [**Table 1**]. For example, MOMs was administered during children's sports practices to address time and access barriers. By partnering with youth sports organizations whose mission is to promote exercise, and including a group PA component, the intervention also addressed social support barriers. Further, by holding the group PA sessions during practice, where children were supervised and mothers already traveled to and from, the intervention addressed childcare and transportation barriers, and alleviated guilt that mothers report when taking time away from family obligations. With respect to behavioral theory, MOMs targeted SCT and TTM constructs that influenced PA in our prior studies,[35-38] including PA social support, enjoyment, self-efficacy, outcome expectancies, and cognitive and behavioral strategies used to advance through the stages of change.

The previously published in-person component was designed using a staged approach with a community advisory board (CAB) of coaches and parents from the partner organization.[30,39] This ensured that the intervention was culturally relevant, feasible, and acceptable to the organization

Table 1. Intervention strategies to address physical activity barriers experienced by racial and ethnic minority mothers

Identity	Physical Activity Barrier	Strategy
Mother	Lack of time due to other responsibilities	Intervention occurs during children's sports practices; a time mothers have already blocked off
	Guilt from not prioritizing children	Participants can be active while present for their children's extracurriculars
	Lack of social support*	Group PA sessions create a community of mothers who are active together
	Lack of childcare*	Children under coach supervision; childcare available for additional children
Racial/ Ethnic Minority	Lack of culturally relevant interventions	Intervention is adapted for Hispanic & Black women; also offered in Spanish
	Lack of access to PA opportunities*	Intervention is provided free of charge in a safe and accessible space
	Lack of transportation*	Intervention is at a location where participants must already travel to and from

*Especially pronounced among individuals with low SES

and its families. One-hour group PA sessions, facilitated by an experienced personal trainer who was part of the partner organization, were scheduled three times per week during practice. Sessions were offered free of charge and participants could attend as desired. All PA equipment used was provided, including a yoga mat and workout bag with resistance bands, small weights, and a jump rope. Sessions included a five-minute warm-up, 50 minutes of circuit-style aerobic and strength-training activities with modifications to accommodate different fitness levels, and a five-minute cool down. Child supervision was available for participants who had additional children (e.g., five years and under) that were not practicing football or cheerleading.

The goal-setting and written materials' components, evidence-based approaches to teach behavioral skills, were especially included to promote PA maintenance. These components were adapted from prior successful women-targeted PA interventions conducted by our team.[35-37] Participants were invited to complete two, one-on-one goal-setting phone calls (~20 minutes) with a research assistant trained in motivational interviewing.[40] The first call was scheduled at baseline and the second midway through the intervention (four weeks). Participants learned about key behavior change techniques (such as goal-setting and self-monitoring) and established personal PA goals. The second call allowed participants to check their progress, set new goals, and discuss being active once the sessions end. For written materials, participants were emailed materials weekly throughout the intervention period. Materials included tip sheets on PA-related topics (e.g., useful facts about PA, health benefits, stretches) and motivation-matched PA manuals based on their responses to questionnaires at baseline and four weeks. Manuals emphasized behavioral strategies for increasing activity, including goal-setting, self-monitoring, problem-solving barriers, increasing social support, and planning rewards for meeting PA goals. These evidence-based materials have been shown to help Hispanic and Black women increase PA in our prior studies.[36-38, 41-43]

Measures

For feasibility, we examined whether *a priori* set targets for enrollment (i.e., n≥30 participants), retention (i.e., ≥80% of participants through 12 weeks), and assessment (i.e., collection of PA data from ≥80% of participants at multiple timepoints) were achieved. Thresholds were informed by existing literature on intervention pilot studies,[44,45] expected effect size in a fully powered randomized controlled trial given our team's prior studies promoting PA among racial and ethnic minority women,[38,41,46] and contextual factors specific to the study population and setting, including the number of families belonging to the organization.

For acceptability, we examined participants' responses to a consumer satisfaction questionnaire, also used by our team in prior studies.[38,47-49] This was completed at the end of the intervention via an online questionnaire. The intervention would be deemed acceptable if ≥80% of participants were satisfied with it, felt they learned something, and would recommend the program to a friend.

For preliminary efficacy, we assessed whether participants experienced changes in weekly minutes of MVPA. Weekly minutes of MVPA were self-reported using the 7-Day Physical Activity Recall (PAR)[50] at baseline, intervention end (8 weeks), and follow-up (12 weeks). The 7-Day PAR, conducted via a semi-structured interview, has been used across many PA studies and has consistently demonstrated acceptable reliability, internal consistency, and congruent validity with objective PA measures,[51-55] along with sensitivity to changes in MVPA.[56,57] Our team has extensive experience with administering the 7-Day PAR, which requires annual recertification. Participants were given the flexibility of completing 7-Day PARs in-person during practice or via phone. In assessing changes in MVPA during the study period, self-reported occupational PA was excluded.

Participant characteristics (i.e., age, number of children living at home, marital status, employment status, race/ethnicity, educational attainment, annual household income, and self-reported height and weight) were assessed via an online questionnaire at baseline.

Statistical Analysis

We descriptively analyzed feasibility targets, acceptability targets, and participant characteristics. Stratified analysis was used to examine differences in characteristics between participants who were already meeting the national MVPA guideline at baseline (i.e., self-reported ≥150 minutes per week) and those who were not. Fisher's exact tests were used to examine group differences for categorical variables, while T-tests were used to examine group differences for ordinal and continuous variables. To assess preliminary efficacy, we examined within-person changes in weekly minutes of MVPA over time. Specifically, we ran unadjusted paired T-tests to compare baseline MVPA to MVPA at intervention end (8 weeks) and follow-up (12 weeks), first for the full sample and then stratified by baseline MVPA (i.e., meeting the guideline vs. not). Change scores and effect sizes (i.e., Cohen's d) were calculated for significant findings. Analyses were run using StataSE statistical software and an alpha of 0.05 was used for significance.

RESULTS

We recruited 35 participants in less than a month, exceeding the target of ≥30 participants. Only two participants withdrew from the study, resulting in a retention rate of 94%, also exceeding the target of ≥80%. However, while 7-Day

Table 2. Participant characteristics

	Study sample (n=21)	Those already meeting MVPA guideline at baseline with multiple 7-Day PARs (n=9)	Those not meeting MVPA guideline at baseline with multiple 7-Day PARs (n=12)	P-value for group comparison
Age in years	37.18 (5.00)	35.00 (4.95)	39.00 (4.65)	0.201
Missing (n)	10	4	6	
Number of children living in home	1.93 (1.22)	1.50 (0.55)	2.22 (1.48)	0.278
Missing (n)	6	3	3	
Marital status				0.554
Married or living with partner	3 (20%)	1 (14%)	2 (25%)	
Single	12 (80%)	6 (86%)	6 (75%)	
Missing (n)	6	2	4	
Employment status				0.591
Unemployed	6 (38%)	2 (29%)	4 (44%)	
Part-time	4 (25%)	2 (29%)	2 (22%)	
Full-time	6 (38%)	3 (43%)	3 (33%)	
Missing (n)	5	2	3	
Race/ethnicity				1.000
Non-Hispanic White	1 (6%)	0 (0%)	1 (11%)	
Hispanic	6 (38%)	3 (43%)	3 (33%)	
Black	5 (31%)	2 (29%)	3 (33%)	
American Indian/Alaskan Native	1 (6%)	1 (14%)	0 (0%)	
Multiracial	3 (19%)	1 (14%)	2 (22%)	
Missing (n)	5	2	3	
Educational attainment				0.181
<12 years	1 (6%)	0 (0%)	1 (11%)	
High school	4 (25%)	3 (43%)	1 (11%)	
Vocational/technical school	1(6%)	1 (14%)	0 (0%)	
Some college	4 (25%)	2 (29%)	2 (22%)	
College graduate	4 (25%)	1 (14%)	3 (33%)	
Post-graduate studies	2 (13%)	0 (0%)	2 (22%)	
Missing (n)	5	2	3	
Annual household income				0.591
<$30k	6 (38%)	2 (29%)	4 (44%)	
$30k<50k	4 (25%)	2 (29%)	2 (22%)	
≥$50k	6 (38%)	3 (43%)	3 (33%)	
Missing (n)	5	2	3	
Body mass index				0.733
<18.5	0 (0%)	0 (0%)	0 (0%)	
18.5–24.9	0 (0%)	0 (0%)	0 (0%)	
25–29.9	3 (21%)	1 (17%)	2 (25%)	
≥30	11 (79%)	5 (83%)	6 (75%)	
Missing (n)	7	3	4	

P-value is for Fisher's exact test for categorical variables and T-tests for continuous and ordinal variables

PAR data was collected for all participants at baseline, MVPA data was only collected for 21 participants (64%) at multiple timepoints, which did not meet the target of >80% of the sample. Among participants in the analytical sample (n=21), 57% self-reported <150 minutes of weekly MVPA at baseline. On average, participants were 37.2 years old (SD: 5.0) and had 1.9 children (SD: 1.2). While not an inclusion criterion, all participants were classified as either overweight or obese (i.e., had a BMI ≥25); however, self-reported height or weight information was missing for seven participants. The racial/ethnic composition of the sample was 38% Hispanic, 31% non-Hispanic Black, 19% multiracial, 6% American Indian/Alaskan Native, and 6% non-Hispanic White. Most (80%) of the sample were single mothers, with 38% unemployed, 25% working part-time, and 38% working full-time. The sample was diverse with respect to socioeconomic status [**Table 2**]. No significant differences in participant characteristics were found between those meeting the MVPA guideline at baseline and those not.

Sixteen participants completed the consumer satisfaction survey [**Table 3**]. Most participants (94%) were satisfied with the intervention. Specifically, 75% of participants were very satisfied with the intervention and 19% were satisfied; 6% were a little satisfied and 0% were not satisfied. All participants (100%) reported that they learned something about exercising from participating in the program and that they would recommend the program to a friend; thus, acceptability targets were met. All participants also found the PA sessions pleasing (75% very pleasing) and most found them beneficial (56% very beneficial). When asked how motivated they felt to continue to exercise after the program, 75% felt motivated or very motivated.

Participants in the analytical sample reported engaging in an average of 106.5 (SD: 131.0) minutes of MVPA/week at baseline, 136.4 (SD: 120.9) minutes of MVPA at intervention end (8 weeks), and 103.4 (SD: 100.9) minutes of MVPA at follow-up (12 weeks); changes in MVPA over time for the full sample were not statistically significant [**Table 4**]. From stratified analyses, participants who were not meeting the guideline at baseline reported significantly more MVPA at both intervention end (mean change: 110.27 minutes, Cohen's d: 0.89) and follow-up (mean change: 82.09 minutes, Cohen's d: 0.76) compared to baseline. Conversely, participants who were meeting the guideline at baseline reported significantly less MVPA at follow-up compared to baseline (mean change: –116.75 minutes, Cohen's d: –1.26).

Table 3. Participant satisfaction with the intervention

	Study sample (n=16)	Those already meeting MVPA guideline at baseline (n=8)	Those not meeting MVPA guideline at baseline (n=8)	P-value for group comparison
How satisfied were you with the program overall?				0.693
I was not satisfied	0 (0%)	0 (0%)	0 (0%)	
I was a little satisfied	1 (6%)	0 (0%)	1 (13%)	
I was satisfied	3 (19%)	2 (25%)	1 (13%)	
I was very satisfied	12 (75%)	6 (75%)	6 (75%)	
How pleasing did you find the physical activity sessions?				0.278
They were not pleasing at all	0 (0%)	0 (0%)	0 (0%)	
A little pleasing	0 (0%)	0 (0%)	0 (0%)	
They were pleasing	4 (25%)	1 (13%)	3 (38%)	
They were very pleasing	12 (75%)	7 (88%)	5 (63%)	
How beneficial did you find the physical activity sessions?				0.273
Not beneficial at all	1 (6%)	0 (0%)	1 (13%)	
A little beneficial	1 (6%)	1 (13%)	0 (0%)	
They were beneficial	5 (31%)	1 (13%)	4 (50%)	
Very beneficial	9 (56%)	6 (75%)	3 (38%)	
Do you think that you learned something about exercising from participating in this program?				1.000
Yes	16 (100%)	8 (100%)	8 (100%)	
No	0 (0%)	0 (0%)	0 (0%)	
Would you recommend the program to a friend?				1.000
Yes	16 (100%)	8 (100%)	8 (100%)	
No	0 (0%)	0 (0%)	0 (0%)	
How motivated do you feel to continue exercising after the program?				0.646
I do not feel motivated	1 (6%)	0 (0%)	1 (12%)	
I feel a little motivated	3 (19%)	1 (13%)	2 (25%)	
I feel motivated	4 (25%)	3 (38%)	1 (13%)	
I feel very motivated	8 (50%)	4 (50%)	4 (50%)	

n (%); p-value is for Fisher's exact test for categorical variables and T-tests for continuous and ordinal variables

Table 4. Self-reported weekly minutes of MVPA at baseline, 8 weeks, and 12 weeks

	Baseline mean (SD) [95% CI]	8 weeks mean (SD) [95% CI]	P-value for baseline to 8 weeks comparison (n)	12 weeks mean (SD) [95% CI]	P-value for baseline to 12 weeks comparison (n)
Analytical sample	106.48 (131.01) [46.84, 166.11]	136.40 (120.94) [79.80, 193.00]	0.461 (n=20)	103.42 (100.91) [54.78, 152.06]	0.961 (n=19)
Those already meeting MVPA guideline at baseline	219.33 (127.11) [121.63, 317.04]	142.56 (133.52) [38.13, 246.99]	0.111 (n=9)	105.63 (91.24) [29.35, 181.90]	0.010* (n=7)
Those not meeting MVPA guideline at baseline	21.83 (34.89) [-0.34, 44.00]	131.36 (113.84) [54.88, 207.85]	0.014* (n=11)	101.82 (111.79) [26.72, 176.92]	0.031* (n=12)

SD: standard deviation; CI: confidence interval; *: $p < 0.05$

DISCUSSION

Feasibility and acceptability findings around recruitment, retention, and participant satisfaction were very promising. However, missing data for PA at intervention end and follow-up was abundant. Notably, we assessed PA via the 7-Day PAR, which requires a semi-structured interview. Given the relatively short study period (e.g., intervention end and follow-up being only four weeks apart), we limited the completion window for PARs to two weeks at each timepoint; in addition, getting in contact with participants to schedule and conduct PARs within such a limited timeframe was difficult. As such, we strongly recommend that future studies with similar constraints consider alternate measures of PA such as self-reported survey measures and accelerometry.

Preliminary efficacy findings, particularly for mothers who are not meeting PA guidelines, were also promising. These findings and the high participants' satisfaction are likely the result of MOMs being designed specifically to address PA barriers experienced by high-risk mothers. The growing use of the intersectionality framework in PA research is evident from a recent systematic scoping review[58]; however, it is worth noting that 41 of the 45 studies were qualitative, none were interventions, and only one study[59] included motherhood as a relevant identity. Findings from the latter, combined with the present study, underscore the importance of social and community support, and addressing access, affordability, childcare, and mom guilt when designing PA interventions for this population.

Our team previously pilot-tested the in-person component of MOMs and similarly observed increases in MVPA among participants not meeting the MVPA guideline at baseline.[30] However, in the previous six-week pilot, increases were significant midway through the intervention (three weeks), but not at intervention end (six weeks). A notable difference between the two pilots, aside from intervention length (6 weeks vs. 8 weeks), is that while all PA equipment was supplied for the initial pilot, aside from yoga mats (which were gifts to the participants), the equipment stayed on site at the practice field and was later donated to the sports organization. By providing participants with their own PA equipment to keep in the present pilot, we facilitated opportunities for participants to complete workouts outside of the scheduled PA sessions, which may have contributed to the significant increases in MVPA found among those who were insufficiently active at baseline, especially when assessing the maintenance of the intervention effect at 12 weeks, a month after the PA sessions has ended.

Expanding on the initial pilot, this pilot also included goal-setting with motivational interviewing and tailored written materials. Goal-setting and motivational interviewing are widely used strategies in successful PA interventions, supporting both the initiation and maintenance of MVPA over time.[60-62] Written materials offer a low-cost way to easily disseminate important PA-related information, with research demonstrating the positive effect tailored materials specifically can have.[35-38,63] These additional intervention components also likely contributed to the significant increases in MVPA found among those who were insufficiently active at baseline, though future, larger studies could examine the individual and potential synergistic effects of the different MOMs intervention components.

Taken together, findings from this pilot study support testing MOMs in a fully powered randomized controlled trial (RCT), though it is important to note this study has significant limitations. The single-arm open pilot trial design with no control group precludes causal claims. As we cannot attribute the observed changes in MVPA to the intervention, caution is warranted when interpreting the preliminary efficacy findings. Notably, that we observed a decrease in MVPA among sufficiently active participants, makes regression to the mean a possible explanation for the findings. That said, given that the baseline assessment occurred during August and the follow-up assessment occurred during November, the observed decreased in MVPA among sufficiently active participants is also consistent with well-documented PA seasonality effects.[64] A fully powered RCT would address this key limitation. That those who were already meeting the MVPA guideline at baseline did not experience an increase in MVPA is not perceived as a limitation, as sufficiently active individuals are generally excluded from PA promotion interventions. We did not exclude active individuals because

it was important to the CAB that the program was offered to the entire community and did not create an impression that it was only for mothers who were not physically fit. Also, that those who were active at baseline reported significantly less MVPA at follow-up supports their inclusion in future studies. A final limitation of the present study was the use of the 7-Day PAR. Not only did this measure likely contribute to the large amount of missing PA data at intervention end and follow-up, but the PAR is also subject to social desirability and recall bias. Thus, future studies should aim to also include alternate and more objective measures of MVPA (e.g., accelerometry).

Despite limitations, this study contributes to the nascent literature on PA interventions for mothers by demonstrating how an intersectionality approach helps more fully address PA barriers and through assessment of the maintenance of intervention effects.

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Authors

Tayla von Ash, ScD, Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence, RI.

Sugandha K. Gupta-Louis, PhD, Department of Psychology, Ferkauf Graduate School of Psychology, Yeshiva University, Bronx, NY.

Belinda O'Hagan, MA, Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence, RI.

Michael Onu, BS, Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence, RI.

Shira Dunsiger, PhD, Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence, RI.

Zoe Maxwell, MPH, Weight Control and Diabetes Research Center, Brown University, Providence, RI.

Ashlie Alacron, MPH, Weight Control and Diabetes Research Center, Brown University, Providence, RI.

Candace S. Brown, PhD, Department of Epidemiology and Community Health, University of North Carolina, Charlotte, NC .

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

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Correspondence

Tayla von Ash, ScD
Department of Behavioral and Social Sciences
Brown University School of Public Health
121 S. Main St. Providence, RI 02903
401-863-6192
tayla_ash@brown.edu

Adaptation of a Multidomain Behavioral Intervention for Dementia Prevention in Hispanic/Latino Adults: Protocol to Guide an Evidence-Based Cultural Adaptation

ANGELICA Y. DE LA ROCA, BA; JACOB A. LAFO, PhD; ROCHELLE K. ROSEN, PhD; JENNIFER E. DAVIS, PhD; IDANIA ARIAS, BA; LAURA E. KORTHAUER, PhD

ABSTRACT

OBJECTIVE: Alzheimer's disease and related dementias (ADRD) pose a growing public health challenge, with 45% of cases attributable to 14 modifiable risk factors. Midlife represents a critical window for prevention. Hispanic/Latino adults face disproportionate ADRD risk, compounded by health inequities such as limited healthcare access and higher prevalence of cardiovascular and metabolic conditions. In Rhode Island, where 17.6% of residents identify as Hispanic/Latino, culturally tailored interventions are urgently needed. This study aims to inform the cultural adaptation of the TEACH intervention (Tailored Education for Aging and Cognitive Health), an evidence-based, multidomain behavioral intervention designed to reduce ADRD risk through lifestyle modification, to ensure its cultural relevance for Hispanic/Latino adults.

DESIGN AND METHODS: The research team will follow the Cultural Adaptation Process (CAP) model to guide the adaptation of the TEACH intervention, emphasizing linguistic and cultural relevance for Hispanic/Latino adults in southern New England by incorporating the views and perspectives of key stakeholders. We will conduct semi-structured qualitative interviews with bilingual stakeholders (N=6-8) and Hispanic/Latino adults aged 40-69 (N=10-12) recruited from clinical and community settings. Interviews will explore brain health beliefs, perceived intervention needs, barriers, and cultural values. Qualitative data will be analyzed using framework matrix and applied thematic analysis approaches to identify adaptation priorities across language, content, and delivery.

RESULTS: This project was funded in September 2023. Data collection began in 2024, and analysis is projected to be completed in 2026.

CONCLUSIONS: Findings will guide cultural adaptation of the TEACH intervention using the CAP model. This work addresses a critical gap in ADRD prevention for U.S. Hispanic/Latino populations and lays the foundation for a future randomized controlled trial to evaluate efficacy of the adapted intervention.

KEYWORDS: Alzheimer's disease and related dementias; dementia prevention; cultural adaptation; Hispanic/Latino; Latinx; behavioral intervention

INTRODUCTION

Alzheimer's disease and related dementias (ADRD) are a growing health concern, with major implications for individuals, families, and healthcare systems. A recent report from the Lancet Commission on Dementia Prevention identified 14 modifiable risk factors that account for 45% of dementia cases worldwide.[1] Modifying risk factors such as low physical activity, increased stress, and social isolation in middle age and early older adulthood could prevent or delay the onset of ADRD. Neuropathologies start to accumulate 10-15 years before the onset of symptoms, making middle age a critical window for ADRD intervention.[2,3]

This early intervention period is particularly important for populations such as Hispanic/Latino Americans who are at elevated risk for developing AD and constitute a rapidly growing segment of the U.S. population. Hispanic/Latinos in the U.S. are 1.5 times more likely than non-Hispanic Whites to develop Alzheimer's disease and related dementias (ADRD) and 12% of older adults in the Hispanic/Latino population are diagnosed with Alzheimer's disease.[4,5] Between 2022 and 2023, Hispanic individuals accounted for nearly 71% of total U.S. population growth, contributing the majority of the overall population gain.[6] Hispanic/Latinos of any race now make up approximately one-fifth of the U.S. population, the largest group after non-Hispanic Whites. This rapid growth emphasizes the public health relevance of ADRD disease prevention efforts in Hispanic/Latino communities.

ADRD rates differ across Hispanic/Latino subgroups, which is thought to be due to migratory, cultural, and socioeconomic differences, among other factors. For example, ADRD rates are disproportionately higher among individuals of Caribbean Latino subgroups (e.g., Puerto Rican, Dominican, and Cuban) compared to non-Hispanic White adults and Latino individuals from Central American or Mexican origin.[7] This is particularly salient for intervention efforts in Rhode Island, where the majority of Latino residents are of Dominican (4.9% of the total RI population)

and Puerto Rican (3.8%) origin. This subgroup-specific risk profile makes culturally and linguistically responsive intervention strategies especially critical for effective engagement.

Elevated ADRD risk in Hispanic/Latino older adults is, in part, related to individual health risk factors, such as higher rates of overweight/obesity,[8] cardiovascular disease,[9] diabetes,[10] and hypertension,[9] compared to non-Hispanic Whites. However, these are associated with and compounded by societal barriers, including economic disparities, higher rates of un- or under-insurance, lower access to medical resources, cultural and linguistic barriers, and discrimination.[11] These health inequities are particularly acute in Rhode Island, where in 2022, 21% of the Hispanic/Latino population was uninsured, 23.7% reported having no doctor, and 17.6% reported being unable to afford medical care.[12] Therefore, there is a strong need for scalable, culturally appropriate, lifestyle medicine interventions to reduce risk for ADRD.

Multi-domain interventions targeting lifestyle factors have been shown to reduce ADRD risk in older adults in U.S. and international studies.[13] For example, the U.S. POINTER study randomized 2,111 older adults at elevated risk for ADRD to a structured lifestyle intervention, including physical activity, dietary recommendations, cognitive challenge, social engagement, and cardiovascular health monitoring, compared to a lower-intensity self-guided intervention. The study found that the structured, multidomain, behavioral intervention showed greater cognitive benefits over two years compared to the self-guided intervention, providing evidence for the efficacy of this approach. However, only 5.9% of participants enrolled in the U.S. POINTER trial identified as Hispanic/Latino despite representing 19.5% of the total U.S. population.[9] Because these interventions are often designed for English-speaking, non-Hispanic White populations, they may not be culturally appropriate or address the barriers faced by Hispanic/Latino individuals.[4] This raises concern about the generalizability of these findings to this growing population.

The goal of this study is to lay the groundwork for a cultural adaptation of a multidomain behavioral intervention, Tailored Education for Aging and Cognitive Health (TEACH). The existing TEACH intervention was designed using principles from the science of behavior change to motivate long-term maintenance of target health behaviors to prevent or delay the onset of ADRD. TEACH has been delivered to English-speaking middle-aged adults in an eight-week, video conference-based format, which makes it briefer and potentially more scalable than the two-year, in-person group sessions in the U.S. POINTER trial. The intervention provides education about modifiable risk factors for ADRD, along with a structured framework for goal setting and problem solving for long-term behavior change. One of the core elements of the TEACH intervention is using the Health Belief Model to educate participants about health belief factors, including perceived threat of disease, perceived benefits, and self-efficacy.[15] Participants undergo a comprehensive assessment of modifiable ADRD risk factors and intrapersonal health beliefs. They receive a profile showing their scores on seven intrapersonal health belief factors, including future-time perspective, self-efficacy, reward sensitivity, response inhibition, executive control, consideration of future consequences, and ability to defer gratification. By integrating personalized education about these intrapersonal health beliefs with targeted information about modifiable ADRD risk factors, TEACH gives individuals a tailored framework for initiating and sustaining health behavior changes relevant to their own ADRD risk.

Research shows that culturally adapted treatments are more effective than their non-adapted versions, particularly when they incorporate adapted language and culturally relevant values.[14] We therefore will adapt TEACH for Hispanic/Latino adults living in southern New England, many of whom are from Caribbean and Central American heritage groups. This study will use the Cultural Adaptation Process (CAP) model to culturally adapt the TEACH intervention for Rhode Island Hispanic/Latino adults. The CAP model is an evidence-based framework for adapting interventions to better fit target populations, using Bronfenbrenner's Ecological Validity Model to guide adaptation along eight relevant dimensions.[16] The model emphasizes collaboration between researchers, community stakeholders, cultural experts, and community members to ensure that adaptation is relevant. The CAP model has three primary phases. The first phase, which is the focus of this study, involves identifying the need for adaptation, reviewing relevant empirical and cultural literature, and involving stakeholders from the community to evaluate cultural fit and barriers. The second phase focuses on modifying intervention content and delivery through surface (e.g., language translation) and deep (e.g., incorporating cultural beliefs and social norms that influence behavior) structure adaptations. Finally, the third stage involves pilot testing the adapted intervention, evaluating the feasibility, and refining the intervention based on the feedback and outcome data.

METHODS

Stakeholder Interviews

We will conduct individual, semi-structured, qualitative interviews with key multilingual and multicultural stakeholders, including community leaders, healthcare providers who serve predominantly Hispanic/Latino patients in Rhode Island, and Hispanic/Latino adults who are potential end users of the intervention (2-3 per stakeholder group). Stakeholders will be purposively selected based on their professional roles, community engagement, and experience with working with Hispanic/Latino adults.

Interviews will be conducted in either English or Spanish based on stakeholder preference and will last 30–45 minutes.

All interviews will be digitally audio-recorded and transcribed. Spanish language interviews will be transcribed in Spanish and translated into English for analysis by the wider study team, though Spanish-speaking study team members will ensure that cultural and linguistic nuance is maintained when interpreting findings.

A semi-structured interview guide has been developed to draw out stakeholders' perspectives on brain health, ADRD, and the cultural adaptation of TEACH. This was informed by the CAP model, which uses the Ecological Validity Model to identify eight dimensions across which an intervention may need to be adapted [**Table 1**].[16] Interview questions focused on two primary areas: the perceived need for a brain health intervention and developing a culturally adapted version of TEACH. Regarding perceived need for brain health interventions, stakeholders will be asked about common cultural beliefs related to brain health and aging within their local community (e.g., whether dementia is perceived as preventable, where community members receive information about ADRD). We will specifically elicit information about awareness of modifiable risk factors for ADRD. Intervention development questions will address potential barriers within the stakeholders' local community (e.g., time constraints, trust of healthcare establishments, access to technology), elements that would enhance the effectiveness of the intervention, and culturally relevant values or practices that should be incorporated into the program (e.g., *familismo*, a Hispanic/Latino cultural value emphasizing family closeness and wellbeing; specific Spanish words or phrases that may promote understanding of core intervention targets, and relevant community norms). Stakeholders will also be asked to identify qualities that are perceived as important to promote acceptability of the intervention (e.g., intervention being led by a healthcare provider versus community health worker, importance of bilingual and/or bicultural interventionist, intervention setting).

Table 1. Dimensions of cultural adaptation from Ecological Validity Model, which is embedded in the Cultural Adaptation Process Model

Dimensions	TEACH Adaptation
Language	Professional Spanish translation; refinement of language by working group
	Evaluate appropriateness for those with lower literacy skills
Persons	Consider cultural context and traditions for different Latino origin groups
	Intervention delivery by bilingual/bicultural providers
Metaphors	Incorporate *dichos* (sayings or proverbs) and specific language participants use to describe health
Content	Incorporate cultural knowledge about values, traditions, and customs
Concepts	Evaluate health belief descriptions to ensure they are culturally appropriate
	Adapt intervention concepts (e.g., diet or physical activity recommendations) to align with cultural context
Goals	Ensure goal-setting framework aligns with positive cultural values
Methods	Consider logistics of intervention delivery (e.g., preferences for in-person vs online format, location)
	Develop measure of intervention fidelity
Context	Incorporate social determinants of health and structural barriers to behavior change into the intervention

Individual Qualitative Interviews

To prepare for adaptation of intervention content, we will conduct 10–12 individual qualitative interviews with Spanish speaking participants recruited from the Rhode Island Hospital Neuropsychology Program and through community organizations and events (e.g., libraries and community centers). We will enroll participants aged 40–69, as this is the target age for the TEACH intervention. We will purposively sample to ensure representation from multiple countries of origin reflective of Rhode Island's Hispanic/Latino demographics (e.g., Dominican Republic, Puerto Rico, Guatemala, Mexico). Individual interviews were preferred over focus groups because of the potential to collect in-depth personal perspectives on health beliefs and behavior change for topics that may be sensitive or abstract. During interviews, participants will be presented with descriptions of seven health belief constructs that have been identified as mediators or moderators of health behavior change: future time perspective,[17] consideration of future health consequences,[18] delay discounting,[19] deferment of gratification,[20] response inhibition,[21] executive control,[22] and self-efficacy.[23] Participants will be asked to reflect on the acceptability, appropriateness, applicability, and perceived relevance of each construct to their own health behaviors and perceived risk for ADRD.

A phenomenographic approach will guide the interview process. Phenomenography is a well-established qualitative method used to examine how individuals understand and experience certain concepts within educational and healthcare settings.[24,25] This approach focuses on two aspects of learning: the referential aspect (the meaning individuals give to a concept) and the structural aspect (how the concept relates to their own experience). For example, interview questions will address appropriateness of intervention concepts (e.g., "In your own words, what does self-efficacy mean?") and applicability (e.g., "Does self-efficacy feel relevant to your own health, in relation to your risk for dementia?"). Interviews will be conducted both in person and remotely to increase accessibility. All interviews will be audio-recorded, transcribed, and translated into English for analysis.

Qualitative Analysis

In consultation with the Advance RI-CTR Biostatistics,

Epidemiology, and Research Design (BERD) core, we created an analysis plan for qualitative data. To rapidly integrate stakeholder perspectives into the planned intervention adaptation, we will use a framework matrix approach.[26] A framework will be developed based on codes and summaries of participants' comments will be abstracted from the qualitative agenda. Relevant quotes will also be collected and entered into a matrix summaries. Two team members will review the matrix and summarize key codes for completeness and accuracy.

To ensure a rich understanding of participants' experiences, we will use an applied thematic analysis approach for the individual qualitative interviews. A codebook of both deductive and inductive codes will be created. Deductive codes will be developed based on the study aims and theoretical frameworks guiding the research, including health belief concepts and cultural adaptation domains. Inductive codes will be generated from participants' responses and feedback to capture themes. Code summaries will be written, reviewed and discussed with the study team. Data will be managed and coded using NVivo software.

DISCUSSION, IMPACT, AND FUTURE DIRECTIONS

The goal of this study is to adapt a personalized, multidomain, behavioral intervention for primary prevention of ADRD in middle-aged Hispanic/Latino adults in Rhode Island and neighboring areas. While international studies such as the Latin American Initiative for Lifestyle Intervention to Prevent Cognitive Decline (LatAm-FINGERS) are currently underway, there are no known multidomain behavioral interventions for dementia prevention adapted for a U.S. Hispanic/Latino population.[27] This is a critical gap, given the growing U.S. Hispanic/Latino population and disproportionately higher prevalence of modifiable risk factors that increase dementia risk.

Following completion of data collection, we will review qualitative data from stakeholders and potential end users of the intervention. While the relevant empirical and cultural literature points to a need for culturally adapted interventions for Hispanic/Latino adults at risk for ADRD, the CAP model asks that we consider whether the community has an identified need for intervention adaptation and how stakeholders evaluate cultural fit and potential barriers. These data will directly address these considerations and will inform the next phase of the CAP model, which is to modify intervention content at both the surface level (translation of intervention materials into Spanish) and deep level (incorporating important cultural beliefs or community norms). Because the intrapersonal health belief constructs are conceptually abstract, we specifically elicit words and phrases from participants that can be used to describe these concepts effectively. The goal is to not only translate intervention material into Spanish, but to ensure its cultural relevance and appropriateness for our local community, considering language dialects, acculturation status, common idioms, and cultural norms.

There is a robust literature in implementation science examining contextual determinants of implementation outcomes.[28] Patient perspectives, clinician characteristics, organizational and health care systems, and broader sociocultural context all affect the adoption, effectiveness, and maintenance of interventions. These factors are especially important to consider when adapting an intervention to a different population or cultural context, as the core intervention elements and mechanisms of action may differ across settings. We therefore view the present study as a preliminary step in the adaptation of the TEACH intervention. Considering the perspectives of stakeholders, including community members and prospective end users of the intervention, will provide data about the perceived need of a health behavior intervention, core intervention characteristics, appropriateness of the methods, and implementation determinants.

In conclusion, this study will directly prepare our team to conduct a community-informed linguistic and cultural adaptation of the TEACH intervention, with a long-term goal of designing a randomized controlled trial to examine the efficacy of TEACH versus basic health education in U.S. Hispanic/Latino. This has the potential to address health disparities and reduce risk of ADRD through long-term maintenance of target behaviors to promote brain health.

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Authors

Angelica Y. De La Roca, BA, Department of Psychiatry, Brown University Health, Providence, RI.

Jacob A. Lafo, PhD, Department of Psychiatry, Brown University Health; Department of Psychiatry and Human Behavior, The Warren Alpert Medical School of Brown University, Providence, RI.

Rochelle K. Rosen, PhD, Center for Behavioral & Preventive Medicine, The Miriam Hospital, Providence, RI; School of Public Health, Brown University, Providence, RI.

Jennifer E. Davis, PhD, Department of Psychiatry, Brown University Health; Department of Psychiatry and Human Behavior, The Warren Alpert Medical School of Brown University, Providence, RI.

Idania Arias, BA, Department of Psychiatry, Brown University Health, Providence, RI.

Laura E. Korthauer, PhD, Department of Psychiatry, Brown University Health; Department of Psychiatry and Human Behavior, The Warren Alpert Medical School of Brown University, Providence, RI.

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Ethical Approval: This study was reviewed and approved by the Institutional Review Board (IRB) at Brown University Health. Data will be managed in accordance with institutional and ethical guidelines to ensure participant confidentiality.

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Correspondence

Laura Korthauer, PhD
Neuropsychology Program
1 Hoppin St. Suite 301
Providence, RI 02903
laura_korthauer@brown.edu

The Impact of an Advance RI-CTR Award on Tuberculosis Infection Management in Rhode Island

DARIA SZKWARKO, DO, MPH; STEVEN KIM, MD; ROBERTA GOLDMAN, PhD; E. JANE CARTER, MD

ABSTRACT

OBJECTIVES: To evaluate the impact of a Rhode Island (RI) Latent Tuberculosis Infection (TB Infection) Extension of Community Healthcare Outcomes (ECHO) telementoring program on primary care clinicians' self-reported learning and performance.

METHODS: Utilizing an exploratory, sequential, mixed-methods design, we first conducted 24 qualitative interviews with RI primary care clinicians and nurses to identify TB infection management gaps. These findings informed the curriculum for a six-session RI TB Infection ECHO course launched in 2021. Participant learning and performance were evaluated using pre- and post-course-structured questionnaires and follow-up qualitative interviews.

RESULTS: Qualitative analysis revealed that participating clinicians felt comfortable with TB infection screening but lacked confidence in treatment initiation and selection. Following the ECHO course, participants demonstrated significant increases in self-reported confidence across the majority of TB infection practice areas ($P<0.05$). Notably, 75% of post-survey respondents reported making specific practice changes, such as adopting shorter treatment regimens and improving newer test interpretation.

CONCLUSIONS: The mentored research award was instrumental in the establishment of the first Project ECHO hub at The Warren Alpert Medical School of Brown University. By achieving Level 5 (Performance) on Moore's Educational Framework through documented practice change, the program demonstrated that telementoring can effectively democratize specialized TB infection knowledge. This framework has since scaled to a regional TB infection ECHO program.

KEYWORDS: Tuberculosis infection; Project ECHO

BACKGROUND

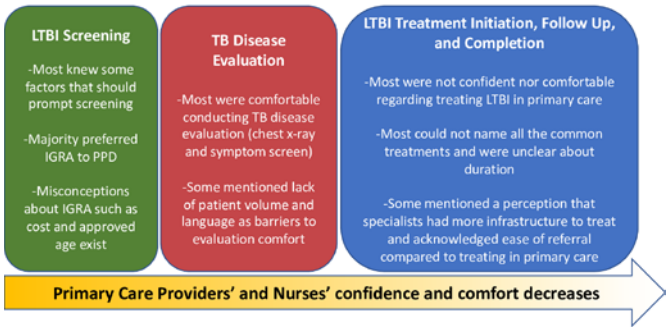
In Rhode Island (RI), there are currently an estimated 44,000 people with latent tuberculosis infection (LTBI).[1] If untreated, 5% to 10% of individuals with TB infection will develop TB disease, which is the major contributor to transmission of TB in the United States.[2,3] While this progression can be averted with TB infection treatment, decreasing progression to TB disease by 80%, only about 30% of individuals with TB infection have successfully completed treatment.[4,5]

Historically, TB infection and TB disease have been treated within specialty clinics. In RI, the RISE clinic in partnership with the RI Department of Health is traditionally staffed by academic-based specialty departments (infectious disease specialists or pulmonologists) caring for patients with both TB infection or TB disease. One of the reasons TB infection management was centralized within specialty clinics related to insurance coverage—TB infection screening only became a Grade B recommendation by the US Preventive Services Task Force (USPSTF) in 2016, opening a path for primary care coverage for TB infection screening and treatment.[6,7] However, barriers such as transport, time, language, and finances continue to contribute to individuals with TB infection being unable to access specialty care for TB infection treatment.[8,9]

Democratizing specialized care into primary care clinics that are easier to access is a potential solution to improving TB infection treatment outcomes in the United States. For example, a Massachusetts TB infection educational initiative led to increased self-reported confidence among clinicians across multiple TB infection management steps.[10] This educational initiative utilized an innovative telementoring model (Project ECHO–Expansion of Community Healthcare Outcomes) that incorporates a hub-and-spoke framework.[11,12] A hub team of specialists connects virtually via Zoom with primary care team members to create a learning community in which specialized knowledge is taught to individuals who are trusted clinicians for the patients they serve. The Massachusetts (MA) Introductory TB infection ECHO was the first TB ECHO in the United States to focus on TB infection training for primary care team members to manage TB infection.

The model had never been replicated before and it was not known whether primary care clinicians in RI had the same knowledge gaps in TB infection management. With support from Advance Rhode Island Clinical and Translational Research (Advance RI-CTR), an exploratory sequential pragmatic study was conducted. The first aim was to conduct a qualitative study to further explore primary care team

Figure 1. Primary care providers' and nurses' knowledge, attitudes, skills regarding LTBI Management—Major themes throughout the care cascade



members' knowledge, attitudes, and skills (KAS) regarding TB infection management. The results from this aim have been published, and demonstrated that primary care team members expressed more knowledge and comfort with TB infection testing, and less knowledge and comfort with TB infection treatment [**Figure 1**].[13] Afterwards, the study team updated the design of the RI TB infection ECHO program and evaluated the impact of this program on RI primary care team members' learning and performance. The purpose of this paper is to share results from this post-course study.

DEVELOPING A RI TB INFECTION ECHO HUB AND PROGRAM

We found that the existing MA TB Infection ECHO curriculum adequately addressed the knowledge gaps identified by RI primary care team members. The qualitative interviews reiterated the fact that primary care team members feel less comfortable with treatment selection. Therefore, we replicated the MA TB Infection ECHO curriculum in RI and ensured inclusion of cases related to treatment to see if we would get similar quantitative results. In order to run an ECHO course, an ECHO hub had to be created at Brown. In collaboration with leadership at The Warren Alpert Medical School, legal documents were signed with the University of New Mexico (the founding institution of Project ECHO) to become an official ECHO hub. Once that infrastructure was developed, members of the study team met with TB experts at the RI Department of Health and the RISE clinic to finalize the curriculum, discuss recruitment, create a website and obtain CME accreditation.[14] A launch session followed by a six-session RI TB Infection ECHO course took place in 2021.

QUANTITATIVE EVALUATION OF RI TB INFECTION ECHO COURSE PARTICIPANTS' LEARNING AND PERFORMANCE

The curriculum and session attendance can be found in **Table 1**. Structured questionnaires were distributed electronically for continuing medical education evaluation purposes. We asked participants whether they changed their practice as a result of the TB Infection ECHO course. Seventy-five percent of post-survey respondents stated that they changed their practice. The percentage of post-survey respondents who reported they would make a practice change and ratings of session quality are also found in **Table 1**. When considering continuing medical education activities, the Moore's Educational Framework suggests that practice change that can impact patient care is one of the highest achievements (aside from community impact).[15] That our ECHO led to 75% of participants stating practice change is noteworthy.

Twelve individuals completed the pre-survey, and eight completed the post-survey. Despite lower than anticipated enrollment, the ability to assess participant confidence and performance was not impacted. When comparing pre- and post-survey responses, there were significant increases in self-reported confidence across the majority of latent TB infection practice areas [**Figure 2**].

Given the lower than anticipated survey completion, qualitative interviews were conducted with ECHO participants to further explore the quantitative findings. Four interviews were conducted, and data analysis was completed. **Table 2** includes the final topics and illustrative quotes. Participants consistently indicated practice change. For example, participants mentioned being able to interpret interferon gamma

Table 1. RI TBI ECHO Curriculum, session attendance, participants' intention to make practice change, and participants' rating of session quality

	Name of session	Number of attendees	Attended 2+ sessions (%)	Would make practice changes (%)	Rated session quality "Very Good to Excellent" (%)
Session 1	TB Infection Background and Risk Assessment	n=26	88%; n=23 (Launch Meeting)	41%; 7/17	100%; 17/17
Session 2	TB Infection Diagnosis, Testing Options, and Testing Nuances	n=18	94%; n=17	64%; 9/14	94%; 13/14
Session 3	Ruling Out TB Disease, TB Infection Treatment Options	n=18	94%; n=17	58%; 7/12	100%; 12/12
Session 4	TB Infection Treatment Considerations, Monitoring, and Side Effects	n=20	100% n=20	45%; 5/11	91%; 10/11
Session 5	TB Infection in Children, Special Considerations	n=18	89%; n=16	36%; 4/11	91%; 10/11
Session 6	LTBI Advanced Considerations	n=16	100%; n=16	89%; 8/9	100%; 9/9

Figure 2. ECHO Participants' Self-Reported Confidence in various TBI practice areas before and after the ECHO

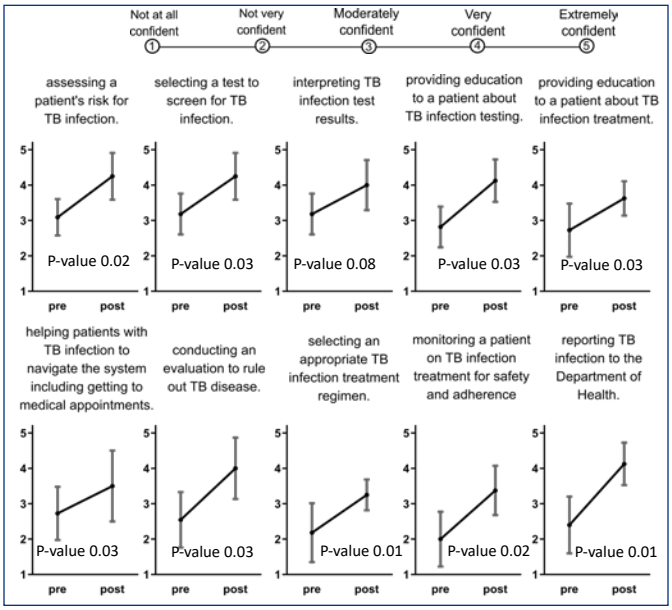


Table 2. Summary of topics and select quotes from post-TBI ECHO course qualitative interviews

Topics	Sample Quotes
Improvement in test interpretation	"I can now interpret IGRA results which I really couldn't do before..."
Practice change in LTBI treatment	"I changed to rifampin from INH and B6 which is much better for my population. And you know, the smile on their [the patient's] face when it's only four months instead of nine months is pretty good" "Well you know I think I would be more inclined to take on treatment on my own and not send the person out..."
Improvement in patient counseling	"I can now better explain LTBI to my patients. I have a better understanding of it now. It's not only the course—I mean the course sort of pushed me to do more reading, get into the studies and such like that, so the course was a motivator do that."

release assay (IGRA) results. The IGRA test requires only one venous blood draw compared to the older tuberculin skin test, which required two patient visits for placement and interpretation. Participants also mentioned changing to rifampin, a shorter course regimen. Both of these practice changes decrease the number of patient appointments.

IMPACT OF AN ADVANCE RI-CTR MENTORED RESEARCH AWARD ON TB INFECTION EDUCATION

The study supported by the Advance RI-CTR Mentored Research Award to investigate the impact of the implementation of a TBI ECHO program in RI ended in 2022. Since the course replicated the Massachusetts course and showed comparable impact on primary care team member self-reported confidence, individuals from other states began reaching out asking if the course could be replicated in other states. TB education in the United States is supported by the Centers for Disease Control and Prevention (CDC), and is decentralized across four regions through the funding of regional Centers of Excellence. RI and MA are included in the Northeast region covered by the Global TB Institute (GTBI) at Rutgers University.[16] Members from both MA and RI TB Infection ECHO hub teams met with the GTBI to discuss the possibility of creating a regional TB Infection ECHO program.

Through The Warren Alpert Medical School of Brown University ECHO hub that was developed with support from the Advance RI-CTR Mentored Research Award, and with funding support from GTBI and the Pittsfield Anti-TB Association, a regional TB Infection ECHO course has taken place over four iterations (2021, 2022, 2024, 2025). The hub has also supported other ECHO courses such as a Telemedicine for Educators ECHO, a Hepatitis C ECHO, and a Perinatal Opioid Use Disorder ECHO.[11]

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Authors

Daria Szkwarko, DO, MPH, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Steven Kim, MD, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Roberta Goldman, PhD, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

E. Jane Carter, MD, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

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Correspondence

Daria Szkwarko, DO, MPH
szkwarkd@gmail.com

Study Design, Methods, and Modeling in Networks to Inform HIV Interventions and Policy in Marginalized Populations

ASHLEY BUCHANAN, DrPH, MS; CLAIRE PEARSALL, MPH; STEPHEN KOGUT, PhD, MBA, RPH; JEFFREY BRATBERG, PharmD, FAPHA; JOSEPH HOGAN, PhD; SAMUEL R. FRIEDMAN, PhD; NATALLIA KATENKA, PhD

ABSTRACT

The Networks and Causal Inference for Public Health Research (NCIPHER) Lab at the University of Rhode Island (URI) was established in 2018, with an initial pilot project supported by Advance Rhode Island Clinical Translational Research (RI-CTR), to develop methodological and computational approaches for evaluating interventions in real-world settings where individuals are connected in ways that impact their health. Leveraging bioinformatics and high-performance computing resources through Advance RI-CTR, we integrate empirical and simulation methods to estimate causal intervention effects (i.e., change in an outcome caused by a specific intervention) beyond treated individuals, including spillover through social and healthcare networks and clusters. Our work demonstrates that accounting for spillover improves understanding of the effectiveness of HIV and opioid use disorder (OUD) interventions. In the Transmission Reduction Intervention Project Athens, Greece, participants not exposed themselves to community alerts about HIV risk, with 50% of their immediate contacts exposed, reported three fewer unsafe injection behaviors (per 100 participants), compared to those who had 20% of their contacts exposed (95% CI: –7, 0). We also found 26 fewer reports (per 100 persons) at six months under individual treatment with medication for opioid use disorder with 60% of other individuals in the network treated, compared to no treatment with 20% of others treated (95% CI: -38, –13). Understanding effects in networks can improve translation from intervention delivery to population-level impact, supporting evidence-based policy.

KEYWORDS: Agent-based models; HIV/AIDS; interference; spillover; marginalized populations; substance use

BACKGROUND

Many public health interventions aimed at addressing the syndemics of HIV and overdoses likely not only affect the treated, but also others in the treated individuals' networks. This is known as *spillover*, a systematic, often unintended treatment effect on individuals who were not treated themselves. This is especially important for the marginalized and stigmatized populations with lower access and uptake of health interventions who are disproportionately impacted by these syndemics.[1] There are large disparities in healthcare and outcomes of individuals living with HIV, including men who have sex with men (MSM), and people who inject drugs (PWID).[2-4] Measuring and quantifying spillover can improve disease outcomes by expanding the reach of interventions beyond traditional research and clinical settings, informing intervention policy development, and mitigating infectious diseases.[5,6]

Studying causal mechanisms allows us to understand the processes by which HIV-related outcomes occur.[7] Causal mechanisms include biological, behavioral, or social processes through which an intervention affects health outcomes. Causal inference quantifies what would happen under different interventions and determines whether observed differences in health outcomes are caused by specific interventions. Readers may be familiar with confounding bias, in which a third variable distorts the relationship between an exposure and outcome, and we aim to isolate the effect of an exposure by removing confounding either by design or analysis. Causal inference using a potential outcomes framework can assess causal effects from both randomized and observational study data. In the setting of no interference/spillover, each individual's (potential) outcome is indexed by their own exposure; however, with spillover, each person's outcome is indexed by their own exposure and the exposure of others.[6] Heuristically, we can estimate spillover by comparing outcomes among individuals with similar characteristics and exposure histories but differing exposure patterns among their contacts.[6] By summarizing contacts' treatments through exposure mapping (e.g., the number or proportion treated in the group) and appropriately weighting or modeling the data, we can assess how modifying the intervention for network contacts changes the average outcomes, even for untreated individuals.

Although spillover has been traditionally studied for therapies like vaccines, other interventions may cause meaningful spillover, such as treatment as prevention (TasP) and pre-exposure prophylaxis (PrEP) for HIV, medication for opioid use disorder (MOUD), and naloxone for opioid overdose rescue. Standard evaluation methods may underestimate the benefits of these interventions by overlooking these effects, so we must account for them in the design, analysis, and modeling of public interventions. For example, PrEP

provides a 90% reduction in HIV acquisition in randomized trials among participants with high medication adherence.[8] However, if we evaluate the exposure as receipt of PrEP on preventing HIV acquisition only among treated individuals, we will miss the additional spillover benefit due to a reduction in onward transmission to their partners and possibly partners' partners. The Networks and Causal Inference for Public Health Research (NCIPHER) lab (co-Directors: Buchanan and Katenka) seeks to understand how interventions affect groups of people impacted by these syndemics, rather than individuals, recognizing that people are socially connected in complex and meaningful ways that can be leveraged to improve public health.

Marginalized populations continue to face a disproportionately high burden of HIV, including PWID and MSM. In 2022, the Centers for Disease Control and Prevention found that PWID accounted for 10% of all people living with HIV in the US.[9] PWID face HIV-transmission risk due to sexual and injection-related behaviors and often have limited access to harm reduction services, further constrained by stigma, incarceration, housing instability, and socioeconomic challenges.[10-12] In the PWID population, the majority inject unregulated opioids, and many of those individuals are also diagnosed with HIV.[13,14] Although three FDA-approved medications, including buprenorphine, methadone, and naltrexone, are available for treating OUD, major treatment gaps persist, with fewer than 20% of individuals with OUD receiving MOUD in 2022.[14-21] Because PWID are members of social, drug-use, and sexual networks,[22] increased MOUD uptake may protect both treated individuals and their contacts, including via medication sharing or the diffusion of harm-reduction information,[6,23-30] and reducing HIV injection-related risk behaviors of others in the network.[16-22,31]

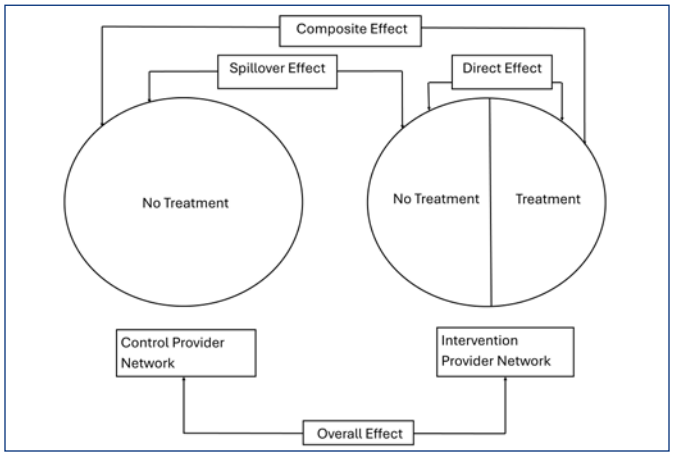
Young Black MSM (BMSM) face substantial barriers to optimal use of HIV-prevention modalities, including PrEP, due to factors such as misinformation, mistrust, and co-occurring substance use disorders that elevate HIV-transmission risk.[32-36] Between 2008 and 2014, HIV incidence increased among young BMSM in the United States while declining in other groups.[37] Network-based interventions show promise for addressing these disparities.[3,38-40] For example, The Transmission Reduction Intervention Project (TRIP) in Athens, Greece, and Chicago, IL, successfully used network recruitment to identify recently infected individuals and link them to care,[41,42] and PrEP Chicago demonstrated that peer-based network interventions can increase PrEP uptake among young BMSM.[36,43] Yet, how to most efficiently leverage networks to maximize spillover effects of peer-change agents, treatment as prevention (TasP), and PrEP remains unclear. Because many traditional trials and cohorts ignore underlying network structure, they risk bias from network dependence.[44] Developing methods to account for this dependence and statistically valid approaches to appropriately assess spillover are therefore essential for a wide range of study designs and research questions.

REVIEW OF ADVANCE RI-CTR SUPPORT

The NCIPHER lab was launched with support from an initial pilot project by the Advance Rhode Island Clinical Translational Research (RI-CTR) in 2018 that improved statistical methodology for quantifying spillover (disseminated) effects using administrative health claims databases. In this pilot project and subsequent federally funded research, our team has leveraged bioinformatics and computing resources from the Advance RI-CTR service cores. We have also gained access to important health databases to advance our research and impact, including the Rhode Island All-Payer Claims Database and the National COVID Cohort Collaborative. Through the Advance RI-CTR network, NICPHER lab members at URI access the service cores, which offer consultative services from experienced investigators skilled in key areas such as epidemiologic methods and qualitative research.

Our work in the Advance RI-CTR pilot project provided new insights into how interventions may be leveraged to more effectively and efficiently advance OUD prevention and treatment among patients receiving medical care across the United States. Patients are part of provider-based networks (based on medical claims data) and may exert social influence on others' treatment behaviors through shared clinical environments, overlapping provider relationships, and geographic proximity. These dynamics have the potential to shape collective norms surrounding opioid use and OUD treatment. In this framework, patients who are prescribed MOUD are considered index patients, and individuals who are not prescribed MOUD, but who share a provider-based network with an index patient, are defined as network members [(**Figure 1**]. The *individual* (direct) effect refers to the impact of MOUD on the index patients themselves, while the *spillover* (indirect or disseminated) effect represents the impact of these treatments on network members who share a connection (in this case, the same healthcare provider) with an index patient.[45]

Figure 1. Schematic diagram of the subsets of data used for each estimator (direct, spillover, composite and overall) based on a format provided in.[59] A provider network is a group of patients who share the same provider for their medication for opioid use disorder claims.



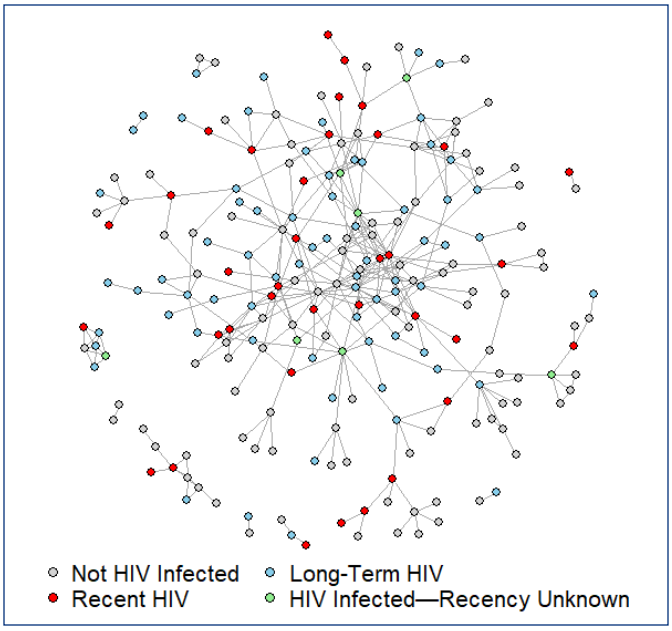
PUBLICATIONS AND FINDINGS

We summarized the primary findings from the Advance RI-CTR pilot project and subsequent key findings during the National Institute on Drug Abuse (NIDA) Avenir Award. NIDA's Avenir Awards focus on innovation and potentially transformative research from early-stage investigators, and our award was the first given nationally to a biostatistician. We examined the impact of timely initiation of buprenorphine/naloxone following an OUD diagnosis in a large cohort of insured adults using Optum's Clinformatics® Data Mart from 2010 to 2018 (n=8,388).[46] Prior to assessing spillover, we quantified the health outcomes and healthcare costs associated with timely MOUD initiation. We classified patients who started treatment within 30 days of diagnosis as early initiators and compared them to late initiators (those initiating later within one year). We employed generalized linear models to compare outcomes between groups, adjusting for baseline covariates and using multiple imputation to address missing data. After adjustment for baseline covariates, early initiation was associated with a 42% lower rate of opioid overdose (adjusted rate ratio [aRR] = 0.58, 95% CI: 0.52–0.64), a 51% lower rate of opioid overdose–related emergency department visits (aRR = 0.49, 95% CI: 0.44–0.55), and a 31% reduction in total healthcare costs (adjusted cost ratio = 0.69, 95% CI: 0.66–0.72) during the year after diagnosis compared with late initiation. Early initiation was associated with lower overdose risk, fewer ED visits, and lower healthcare costs among insured adults with OUD.

We proposed a novel application of causal inference methods for spillover in retrospective studies using administrative claims data, which can be employed to emulate a target trial when randomized trial data is not available. Extending this framework to an idealized two-stage randomized trial, an evaluation of direct and spillover effects within provider-based networks is possible. We developed an approach to build a provider network among individuals based on their primary MOUD providers using MOUD prescription claims and National Provider Identifiers, then assessed the proportion of patients in a provider network who were prescribed MOUD (i.e., coverage). Using generalized estimating equations with covariate adjustment, we constructed estimators for both individual and disseminated effects tailored to retrospective observational study designs in claims data. There were 2,273 patients in 722 provider networks, and 64% had a MOUD prescription.[45] We found modest evidence of direct and spillover effects in this setting. For the estimated spillover effect, we would expect 3 fewer overdoses per 100 people (95% CI: –5, –1) in untreated patients within high-coverage clusters compared to within low-coverage clusters. The direct effect was protective with an estimated 3 fewer cases per 100 people (95% CI: –6, –0) receiving treatment (vs no treatment) within 33% coverage clusters.

From 2018 to 2023, our team worked on the Avenir project funded by the NIDA. We evaluated the spillover of interventions and treatments using both secondary data analyses of existing datasets and simulation approaches, requiring the development of novel study designs and inferential and modeling methods in networks. We developed and implemented a novel methodology to evaluate spillover among networks of people who use drugs. Our work was largely motivated by TRIP in Athens, Greece, which successfully recruited and intervened in this population by identifying and engaging injection and sexual networks of recently-infected PWID through contact tracing [**Figure 2**]. We developed and evaluated approaches to quantify spillover in a network-based study with a non-randomized intervention.[47] These methods were used to evaluate spillover of HIV interventions, including community alerts, MOUD, and antiretroviral treatment (ART). Most estimates of the risk differences for community alerts reduced HIV-risk behavior, including spillover from sexual and drug use partners.[47] We estimated spillover effects of the alert intervention coverage on risk behavior, with 3 fewer reports per 100 participants under 50% versus 20% coverage (95% CI: –7, 0). We also employed causal inference methods to evaluate the spillover effects of MOUD and ART on subsequent HIV-risk behaviors with the spillover set defined by network communities or neighbors. Although the magnitude of these effects was sometimes sensitive to the community detection method, we found significant and protective effects of MOUD on HIV-risk behaviors and the estimated total effect was more robust to the community detection method used to define the interference set. For example, we expect 26 fewer reports

Figure 2. The TRIP network by HIV status. This network originally consisted of 10 connected components, and a community detection algorithm was used to further divide it into 20 components.[49] Individuals (nodes) are shaded by their HIV-infection status at baseline.



per 100 persons (95% CI = –38, –13) at the 6-month visit under MOUD in communities with 60% coverage, compared to under no MOUD in communities with 20% coverage.[31] However, our team did not observe any significant spillover effects of ART in TRIP Athens.[48]

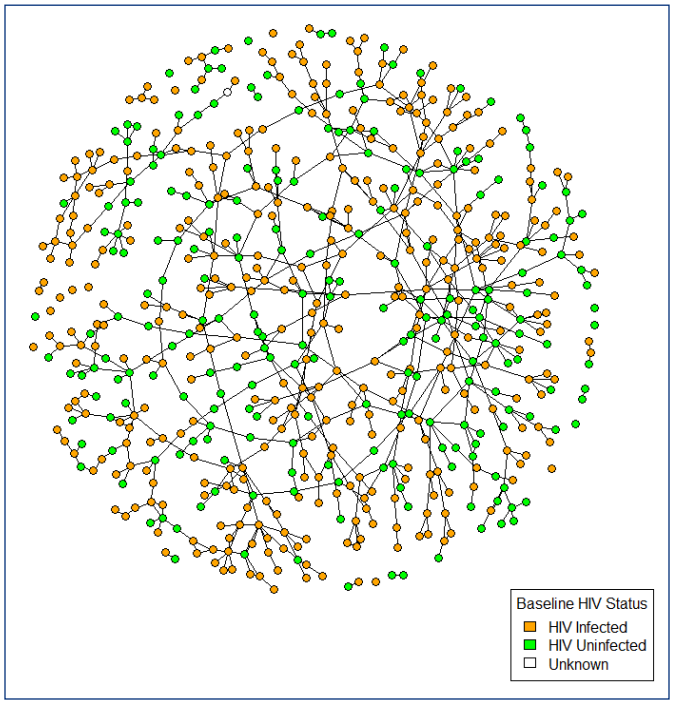
We developed an agent-based model (ABMs; computational models to study the impact of the individual's actions on the disease processes in the population) using a novel trial emulation framework to quantify spillover effects of pre-exposure prophylaxis (PrEP) among a sexual network of MSM in Atlanta, GA.[50-52] The estimated composite (total: direct and spillover) effect was an 85% reduction in the cumulative incidence of HIV, comparing agents on PrEP within intervention components to agents within control components (RR = 0.15, 95% SI = 0.11, 0.20).[50] As coverage levels increased, the spillover effect of PrEP was larger in magnitude, while the direct effect attenuated towards the null. Other publicly available resources included R programs to implement the new methodology for networks through Github[53] and a curated TRIP Athens data set.[54]

Significance and Future Work

Our current R01 project funded by NIDA will develop and apply new methods to evaluate HIV interventions using both secondary data analyses and simulation approaches. This project will inform intervention-coverage levels considering spillover and will be used to determine the types of individuals who could benefit the most from interventions with spillover. This project will provide new insights into spillover in the following network studies of MSM in Chicago, Illinois: uConnect [**Figure 3**], PrEP Chicago, and the Neighborhood and Networks Cohort Study.[4,36,55] We developed new methods to quantify spillover in a network setting with a variance estimator that better accounts for the network structure. We now need new approaches to address missing data and network dependence when assessing spillover, ensuring valid analyses in the more realistic data settings. We will develop a framework using agent-based models to evaluate the spillover of PrEP change agent interventions and PrEP delivery focused on those with substance use. Our team is also advancing methods for more flexible estimation approaches in networks that rely less on strong modeling assumptions, including targeted learning.[56] Targeted learning first learns patterns in the data, then adjusts those estimates to quantify a specific causal effect.[57,58] These methods make minimal and realistic assumptions about data distributions and are therefore a critical improvement for generating meaningful knowledge from real-world data.

Our research will provide new insights into spillover to reduce the spread and morbidity of HIV and other infectious diseases, often complicated by a high burden of substance use in marginalized populations. Estimated spillover effects in public health are modest at times, but can have a substantial population-level impact across connected individuals.

Figure 3. The uConnect study network with respondent-driven sample (RDS), social and sex partner ties, by baseline HIV status. Entity resolution was conducted to identify unobserved ties and individuals appearing in the network multiple times.[55] Individuals (nodes) are shaded by their baseline HIV-infection status.



Accounting for spillover is needed for valid inference to avoid bias and spillover remains largely unknown in many settings, especially in HIV prevention and treatment, where networks play a major role in disease transmission yet are often unmeasured. These advancements in methods and study design resources can be used to design and evaluate interventions for reducing HIV- risk behavior, increasing engagement in HIV-prevention measures, and strengthening HIV treatment among marginalized populations. These methods will also be applicable to studies of other infectious diseases, including sexually transmitted infections, hepatitis C, tuberculosis, and SARS-CoV-2, and are an important contribution to intervention research methodology. Although network structures may differ across contexts, the methods developed in our motivating settings may apply to a wide range of network types. Collectively, these findings illustrate how network causal inference methods can improve translation from intervention development to community impact, supporting evidence-based policy and demonstrating the translational value of Advance RI-CTR-supported infrastructure.

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Authors

Ashley Buchanan, DrPH, MS, Department of Pharmacy Practice and Clinical Research, College of Pharmacy, The University of Rhode Island.

Claire Pearsall, MPH, Department of Pharmacy Practice and Clinical Research, College of Pharmacy, The University of Rhode Island.

Stephen Kogut, PhD, MBA, RPh, Department of Pharmacy Practice and Clinical Research, College of Pharmacy, The University of Rhode Island.

Jeffrey Bratberg, PharmD, FAPhA, Department of Pharmacy Practice and Clinical Research, College of Pharmacy, The University of Rhode Island.

Joseph Hogan, PhD, Department of Biostatistics, Brown University School of Public Health.

Samuel R. Friedman, PhD, Department of Population Health at NYU Grossman School of Medicine, New York University.

Natallia Katenka, PhD, Department of Computer Science and Statistics, College of Arts and Sciences, The University of Rhode Island.

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Correspondence

Ashley Buchanan
buchanan@uri.edu

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Isolated Extreme Thrombocytosis as the Presenting Feature of Chronic Myeloid Leukemia—An Unusual Phenotype Treated With Plateletpheresis

KAVYA BALUSU, MBBS; ABDULLAH ORAKZAI, MD; FARHAN IMRAN, MD

ABSTRACT

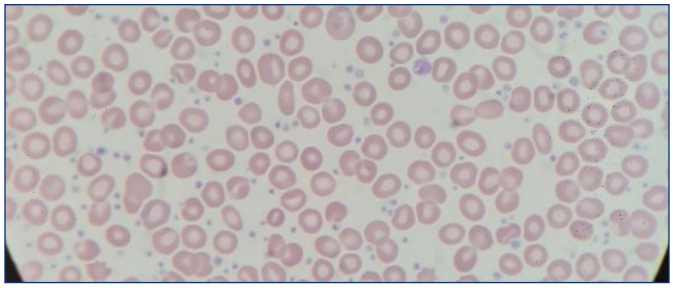
Chronic myeloid leukemia (CML) can rarely present with extreme thrombocytosis as the initial manifestation, a phenotype that can mimic essential thrombocythemia, leading to delayed diagnosis. We describe the case of a 54-year-old woman who was evaluated by outpatient hematology for isolated thrombocytosis with normal iron studies and leukocyte counts. Molecular testing confirmed BCR::ABL1 fusion, consistent with chronic phase CML. She was started on hydroxyurea, but her platelet count continued to rise, requiring hospitalization for close monitoring, where she was initiated on dasatinib, a tyrosine kinase inhibitor (TKI). As her platelets peaked above 4,000 × 10^9/L (Reference Range [RR]: 150–450 × 10^9/L), given the high risk of both thrombotic and bleeding complications, she underwent plateletpheresis, which effectively reduced counts before TKI therapy could achieve disease control. This case highlights the importance of considering the diagnosis of CML in patients with isolated thrombocytosis, particularly in women, and emphasizes the role of plateletpheresis as a potential preventive bridge until TKI therapy takes effect.

KEYWORDS: Chronic Myeloid Leukemia; Isolated Extreme Thrombocytosis; Plateletpheresis; Tyrosine Kinase Inhibitor

CASE PRESENTATION

A 54-year-old woman was referred to hematology clinic for persistent thrombocytosis. She had a long-standing history of fatigue, easy bruising, and intermittent pruritis involving her ears and anal area. One month prior, laboratory testing revealed a hemoglobin of 12.6 g/dl (RR: 11.5–16 g/dl), white blood cell (WBC) count of 9.7 x 10^9/L (RR: 4–10.8 x 10^9/L) with normal differential counts, and a platelet count of 2,707 x 10^9/L. Repeat testing demonstrated persistent and progressive thrombocytosis at 2,833 x 10^9/L, a mild leucocytosis of 11.4 x 10^9/L with neutrophilia of 8.8 x 10^9/L (RR: 1.5–7.7 x 10^9/L), eosinophilia of 0.7 x 10^9/L (RR: 0–0.5 x 10^9/L), and basophilia of 1 x 10^9/L (RR: 0–0.2 x 10^9/L). Iron studies were normal with ferritin of 101 ng/ml (RR: 30–252 ng/ml) and serum creatinine of 0.71 mg/dl (RR: 0.51–0.95 mg/dl). Overall, this was concerning for a myeloproliferative process rather than reactive thrombocytosis.

Figure 1. Peripheral blood smear on 100x showing numerous platelets with giant platelets.



Peripheral blood was sent for JAK2 V617F and calreticulin (CALR) mutation analysis, as well as for fluorescence in situ hybridization (FISH) testing of the BCR::ABL1 gene rearrangement. Work-up returned positive for the BCR/ABL fusion and she was diagnosed with chronic phase of CML. She was started on hydroxyurea 1000 mg daily for cytoreduction, and allopurinol 300 mg daily for prevention of tumor lysis syndrome (TLS). However, two days later, her platelets progressively rose to 3,073 x 10^9/L with elevated LDH of 362 U/L (RR: 120–246 U/L) and potassium of 6.3 mmol/L (RR: 3.5–5.1 mmol/L) for which she presented to the emergency department (ED) for further evaluation.

Fortunately, whole blood potassium in the ED was 3.8 mEq/L (RR: 3.2–4.7 mEq/L) which was consistent with pseudohyperkalemia in the setting of thrombocytosis. A peripheral smear revealed numerous platelets with giant platelets [**Figure 1**]. She was admitted for cytoreduction. A von Willebrand panel was sent to rule out acquired von Willebrand disease.

She was continued on hydroxyurea at 1000 mg daily, allopurinol 300 mg daily and started on tyrosine kinase inhibitor (TKI), dasatinib at 100 mg daily on day 2 of hospitalization, in addition to aspirin 81 mg daily after the von Willebrand panel returned normal (von Willebrand antigen 106% [RR: 42–176%]; Ristocetin cofactor 64% [RR: 40–163%]; Factor VIII activity 62.2% [RR: 50–150%]). Despite this, her platelets continued to climb, and hydroxyurea was increased to 1000 mg twice daily on day 3 of hospitalization. Her platelets went up to 4175 x 10^9/L on day 4 and given high risk for stroke and myocardial infarction from severe thrombocytosis, she

Table 1. Trend in laboratory values with treatment received during hospitalization

Day of hospitalization	Hemoglobin (g/dl)	Platelet count (x 10^9/L)	WBC count (x 10^9/L)	Treatment
1	11.4	3073	10	Received hydroxyurea 1000 mg daily
2	11.4	2819	9.8	Started dasatinib 100 mg daily and aspirin 81 mg daily
3	12.3	3439	11.5	Increased hydroxyurea to 1000 mg twice daily
4	12.7	4175	12.7	Received plateletpheresis
5	13.6	1033	13	Discharged home on dasatinib 100 mg daily, hydroxyurea 1000 mg twice daily, aspirin 81 mg daily

underwent plateletpheresis. Her platelet counts improved to 1033 x 10^9/L on day 5, when she was discharged home. See **Table 1** for trend in labs during hospitalization.

Due to anemia and leukopenia, hydroxyurea was stopped two weeks after discharge. The initial quantitative reverse transcriptase polymerase chain reaction (RT-PCR) testing for BCR/ABL1 returned positive for both p210 (34.5% of total ABL1) and p190 (0.01% of total ABL1) mRNA transcripts. She additionally developed thrombocytopenia one month later, for which dasatinib was briefly paused for a month, only to be resumed for uptrending platelet counts. Four months later, repeat quantitative RT-PCR testing for p210 was lower at 17.9% of total ABL1. The patient reported feeling better overall with resumption of her day-to-day activities.

DISCUSSION

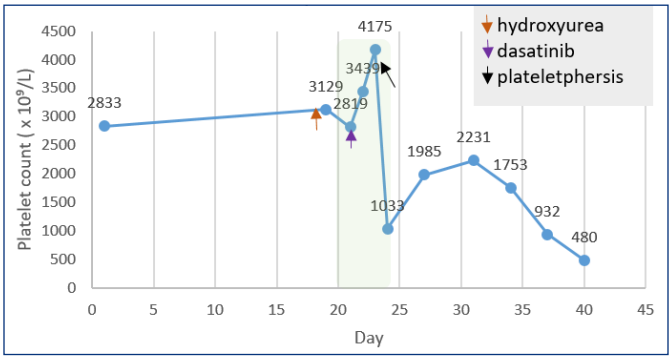
Myeloproliferative neoplasms (MPNs) are clonal hematologic malignancies marked by the increased production of terminally differentiated myeloid cells, including leukocytes, erythrocytes, and platelets.[1] They include the Philadelphia chromosome-positive chronic myeloid leukemia (CML), and the Philadelphia chromosome-negative MPNs, which include polycythemia vera (PV), essential thrombocythemia (ET), primary myelofibrosis (PMF) and a prefibrotic myelofibrosis (pre-PMF).[1] Chronic myeloid leukemia (CML) is a myeloproliferative neoplasm with an estimated annual incidence of approximately two cases per 100,000 population.[2] The hallmark of CML is the Philadelphia chromosome, resulting from a balanced translocation that fuses Abelson murine leukemia (ABL1) gene on chromosome 9 with the breakpoint cluster region (BCR) gene on chromosome 22, producing the BCR::ABL1 oncoprotein.[2] This constitutively active tyrosine kinase drives the proliferation of mutated pluripotent hematopoietic stem cells (HSCs), with gradual displacement of the normal HSCs.[3]

Over 95% of CML cases present with the typical phenotype of leukocytosis dominated by granulocytes, myeloid immaturity with absent or few blasts, frequent basophilia, mild anemia, and normal to mildly increased platelet counts.[4] However, rare but striking phenotypes of BCR::ABL1-positive CML exist, one of which is BCR::ABL1-positive thrombocythemia.[4] BCR::ABL1-positive thrombocythemia is a phenotypic variant of CML, in which thrombocytosis can precede overt signs of CML,[4] and can mimic essential thrombocythemia (ET), which is a Philadelphia chromosome-negative MPN. Therefore, work-up for suspected ET should include testing for common driver mutations such as JAK2, CALR, and MPL, in addition to PCR analysis for BCR::ABL1, in order to distinguish ET from this phenotypic variant of CML, as it has different treatment implications. The National Comprehensive Cancer Network (NCCN) recommends FISH or RT-PCR testing of peripheral blood for BCR-ABL if available for all patients with suspected myeloproliferative neoplasms.[5] CML should be considered in females presenting with isolated thrombocytosis, as this phenotype has been reported to occur more frequently in women,[4] as in our patient.

The frontline management of BCR::ABL1-positive thrombocythemia currently follows the standard of care for CML, namely treatment with tyrosine kinase inhibitors (TKIs). In a systematic review by Findakly D et al, 20 cases of CML presenting with extreme thrombocytosis were identified up to the year of 2020, with mean age at diagnosis of 40.5 years and 65% of them being females.[6] Treatment often included hydroxyurea and TKI therapy. Five adult patients developed thrombotic complications including stroke, myocardial infarction, pulmonary embolism and/or miscarriages, and two of them underwent plateletpheresis.[6] More recently, Jia MX et al, in 2025, reported a patient presenting with chest pain who was started on imatinib and underwent seven sessions of plateletpheresis, yet platelet counts remained elevated and symptoms persisted. The condition ultimately resolved with the addition of interferon-α.[7]

We describe the case of a 54-year-old female with CML presenting as isolated and extreme thrombocytosis. This case highlights the importance of adhering to NCCN recommendations of BCR/ABL testing in all patients with suspected myelopriliferative neoplasms, despite the possibility of a low diagnostic yield, given the significant differences in treatment implications. She was initially sent to the ED for hyperkalemia out of an abundance of caution due to concern for tumor lysis syndrome, which in retrospect can be explained by pseudohyperkalemia in the setting of thrombocytosis. Her progressive thrombocytosis during hospitalization was concerning for potential thrombotic complications and hence received prophylactic plateletpheresis. She was also at risk of bleeding complications due

Figure 2. Trend in platelet count since presentation to hematology clinic. The brown arrow indicates initiation of hydroxyurea, and the purple arrow indicates initiation of dasatinib. The black arrow marks the timing of plateletpheresis. The shaded green area represents the duration of hospitalization. Hydroxyurea was stopped and dasatinib continued on day 40.



to the possibility of acquired von Willebrand disease as a consequence of thrombocytosis; however, the von Willebrand panel returned normal. To our knowledge, this is the first reported case in which plateletpheresis was performed as a preventive intervention prior to the development of thrombotic complications, serving as a bridge until a therapeutic response to tyrosine kinase inhibitor (TKI) therapy could be achieved (See **Figure 2** for trend in platelet counts with treatment). Currently, no well- established guidelines exist for the management of extreme thrombocytosis in CML.[7] Given its association with increased risk of thromboembolic events, management remains challenging.[7]

In conclusion, this case highlights the importance of including CML in the differential diagnosis for isolated thrombocytosis and the role of additional interventions when standard treatment fails to control counts. Isolated thrombocytosis in a female patient warrants testing for CML in addition to ET, PV, PMF as unusual phenotypes are known to be reported**.** Plateletpheresis maybe be used as an emergent bridge before response to TKI takes into effect to prevent thrombotic complications from extreme thrombocytosis**.** Further studies are needed to standardize treatment strategies, and elucidating the underlying molecular mechanisms can be helpful in guiding further therapeutic options.

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Authors

Kavya Balusu, MBBS, Internal Medicine Resident, Rochester General Hospital, Rochester, New York.

Abdullah Orakzai, MD, Hematology and Oncology Fellow, Rochester General Hospital, Rochester, New York.

Farhan Imran, MD, Attending Physician, Hematology and Oncology, Rochester General Hospital, Rochester, New York.

Disclosures

None

Correspondence

Kavya Balusu, MBBS
1425 Portland Avenue, Rochester, NY, 14621
kavyabalusu1998@gmail.com

Severe Babesiosis and Disseminated Lyme Presenting as Worsening Cognitive Dysfunction in a Geriatric Patient: Special Considerations for Older Adults

AMELIE FOUMENA NKODO, MD, MS; JOSHUA BENNETT, MD, PhD; THOMAS PALLADINO, MD; JASON M. ALIOTTA, MD

ABSTRACT

In this article, we present the case of a 78-year-old man with a history of coronary artery disease status post-coronary artery bypass grafting and mild cognitive impairment (previously treated with donepezil and memantine) who was transferred for consideration of exchange transfusion in the setting of high-grade babesiosis parasitemia complicated by disseminated Lyme disease, acute kidney injury, and acute hemolytic anemia. Using this case, we highlight an atypical presentation of the growing burden of tickborne disease in older adults. We review the epidemiology of Lyme disease and babesiosis in aging populations, outline the diagnostic criteria and management considerations for disseminated Lyme disease and severe babesiosis, and discuss clinical factors unique to older patients, including delayed recognition, baseline cognitive impairment, and increased risk of severe complications. This report adds to the expanding literature emphasizing the distinctive presentation and management challenges of increasingly prevalent tickborne infections in older adults.

KEYWORDS: geriatrics; Lyme disease; babesiosis

BACKGROUND

Tickborne illness is a common diagnosis in New England during the summer months, and increasingly throughout the year, and in other areas of the United States.[1,2] This phenomenon has occurred across populations, including older adults. According to the CDC, from 2016 to 2019 the average incidence of Lyme diagnosis in adults >65 years of age was 123.5 diagnoses/100,000 person-years,[3] or 0.81–4.69% of total cases between 2010 to 2023.[4] Cases of babesiosis are also on the rise in this population with an increase in annual number of cases from 4 per 100,000 to 9 per 100,000 between 2006 and 2017.[5] Importantly, health services research suggests that older adults experience worse outcomes despite adequate treatment, due to incomplete response and complications such as dementia.[6,7] Early identification and diagnosis are essential to prevent long-term sequelae in this population.

Disseminated Lyme infection can spread to both the central (CNS) and peripheral nervous systems. It is estimated that 12.5% of Lyme borreliosis progresses to Lyme neuroborreliosis, most commonly in the form of peripheral nerve involvement such as facial palsy and radiculoneuropathy.[8] The most common CNS presentation is meningitis. Lyme infection presenting as a dementia-like syndrome is atypical; however, it has been documented in several case reports and small studies in geriatric patients.[9-12] Of note, babesiosis is not associated with nervous system infection; though it is associated with neurologic complications primarily due to renal failure which can be severe and even fatal.[13,14] Therefore, patients found to have a babesiosis infection presenting with a dementia-like syndrome are likely to benefit from empiric initiation of antibiotics for concurrent Lyme infection, as co-infection is common in endemic areas such as in Rhode Island where over 20% of Ixodes scapularis ticks harbor either Lyme, babesiosis or anaplasma.[15]

The Infectious Diseases Society of America (IDSA) provides specific recommendations for the diagnosis and management of Lyme neuroborreliosis and severe babesiosis. To assess for Lyme neuroborreliosis, the IDSA recommends against cerebrospinal fluid testing.[16] Rather, they support serum antibody testing for patients presenting with one or more of the following signs/symptoms: meningitis, painful radiculoneuritis, mononeuropathy multiplex, acute cranial neuropathies, and/or evidence of CNS inflammation in patients with plausible exposure to B. burgdorferi ticks. Babesiosis infection is diagnosed with antibody testing followed by confirmatory polymerase chain reaction testing. In both cases, first-line treatment relies on antibiotics: oral doxycycline for uncomplicated Lyme, and atovaquone plus azithromycin for babesiosis. CNS involvement requires antibiotics with better penetration in the CNS; for Lyme this requires IV cefotaxime or ceftriaxone.

In the case of severe babesiosis, treatment also includes exchange transfusions of red blood cells to quickly reduce the high-grade parasitemia. Based on data from transfusion-transmitted infections, babesia parasites can survive in blood components for up to 35 days, and the number of viable parasites required to cause an acute infection in immunocompetent mice between 10–100 parasites.[17] At the time this case report was written, there were no randomized controlled trials on the use of exchange transfusion for this indication. Therefore, recommendations are limited and based on case reports with varying clinical presentations and efficacy.[18]

CASE PRESENTATION

A 78-year-old male with a past medical history of coronary artery disease status post-coronary artery bypass graft, carotid stenosis, type 2 diabetes mellitus, and mild cognitive impairment (previously on donepezil and memantine) presented with two weeks of worsening confusion, gait instability and scleral icterus. The patient was found by his sons at home and described as "acting drunk" due to his difficulty with executive function. He was last seen by his children two months prior to presentation, at which time the patient was already demonstrating signs of confusion and postural instability, which they had attributed to age-related changes. Per the patient's wife, he had been acutely decompensating the week prior to presentation and was at risk for falls at home. The patient was described as active for his age, and at baseline he was independent with activities of daily living (ADLs) and instrumental activities of daily living (IADLs). It was reported by the patient's children that he spent a significant amount of time maintaining the trees on his large rural property in Rhode Island during the summer months. The family was unsure about his medical history and noted progressive memory changes for several years, primarily affecting recall but was alert and oriented to person, place, time, and situation.

On presentation, the patient was hemodynamically stable. Physical examination was notable for prominent scleral icterus. He was oriented to self only (normal: oriented to person, place, and time) and exhibited redirectable confusion. The remainder of the examination was unremarkable. Initial laboratory evaluation revealed thrombocytopenia with a platelet count of 61 × 10^9/L (normal: 150–400 × 10^9/L) and acute kidney injury with a creatinine of 7.12 mg/dL (normal: 0.6–1.3 mg/dL; baseline unknown). Liver chemistries demonstrated transaminitis, with aspartate aminotransferase (AST) 283 U/L (normal: 10–40 U/L) and alanine aminotransferase (ALT) 109 U/L (normal: 7–56 U/L), while alkaline phosphatase was within normal limits (normal: 44–147 U/L). Findings were consistent with hemolytic anemia, including hemoglobin 7.6 g/dL (normal: 13.5–17.5 g/dL in men), direct bilirubin 1.4 mg/dL (normal: 0.0–0.3 mg/dL), haptoglobin <8 mg/dL (normal: 30–200 mg/dL), and lactate dehydrogenase (LDH) unable to be assessed due to repeated sample hemolysis (normal: 140–280 U/L). Acute phase reactants were markedly elevated, with ferritin 13,698 µg/L (normal: 24–336 µg/L in men) and fibrinogen 523 mg/dL (normal: 200–400 mg/dL). Peripheral blood smear demonstrated a parasitemia burden of 27% (normal: 0%). Lyme serologies were positive, with a Lyme antibody index of 3.7 (typically positive >1.0) and confirmatory Western blot demonstrating IgM reactivity at 23 kD, 39 kD, and 41 kD bands. Imaging studies included a chest radiograph showing minimal left basilar airspace disease. Right upper-quadrant ultrasound revealed splenomegaly measuring 18.7 cm (normal adult spleen length: ≤13 cm). Renal ultrasound showed no evidence of hydronephrosis or obstructive uropathy. Electrocardiogram demonstrated normal sinus rhythm at a rate of 70 beats per minute (normal: 60–100 bpm), evidence of a prior inferior infarct, and no atrioventricular conduction abnormalities.

Based on these findings, the patient was diagnosed with severe babesiosis and concurrent disseminated Lyme infection with possible CNS involvement. The patient was transferred to the medical intensive care unit for consideration of exchange transfusion and was started on atovaquone and azithromycin for babesiosis, doxycycline for disseminated Lyme, as well as ceftriaxone for Lyme CNS coverage. Infectious disease and nephrology were consulted for further management recommendations. Discussion regarding exchange transfusion was confounded by the limited data addressing benefit for this indication, particularly in patients of advanced age and in those without a history of immunocompromise or asplenia. Furthermore, although this patient's cognition was worse than baseline, it was felt that his mental status was largely attributable due to a constellation of underlying dementia, critical illness, and uremia. Based on recommendations from the infectious disease team, lumbar puncture and brain imaging were deferred, and the patient was treated with azithromycin, atovaquone, and doxycycline. The patient's parasite load responded rapidly with an initial decrease in parasitemia from 27% to 7.8% after two days, then to <1% after seven days of treatment. Exchange transfusion was ultimately deferred due to the rapid improvement in his parasite load to below 10% with antibiotics. He required one simple red-cell transfusion early in his hospitalization for a hemoglobin level of 6.5 g/dL. The patient's encephalopathy improved, although he remained confused throughout his hospital stay. Despite a persistently elevated creatinine that peaked at 9.52 mg/dL, urine sediment showed evidence of acute tubular necrosis, so renal replacement therapy was deferred, and his creatinine eventually improved to 3.29 mg/dL at discharge. His transaminitis was resolved by the time of discharge with antibiotic therapy alone. He was discharged on atovaquone and azithromycin for 10 days, and doxycycline for a total of 14 days.

At his outpatient follow-up with the infectious disease clinic five days post-discharge, his peripheral blood smear was negative for parasites, creatinine was 1.64 mg/dL, hemoglobin was 7.4 g/dL, and liver function tests remained normal. His antibiotic course was therefore not extended at this time. During this visit, the patient denied fatigue, headaches, chest pain, abdominal pain, or loss of appetite. Notably, the patient was only oriented to self, unable to accurately state the date without prompting, and unable to recall the skilled nursing facility to which he was discharged. Unfortunately, further follow-up was not available at the time of submission of this case report.

DISCUSSION

This case contributes to the growing literature describing atypical presentations of tickborne illness in older adults, particularly when manifesting as new or worsening cognitive dysfunction. In this patient, evaluation was delayed because early symptoms were attributed to preexisting cognitive impairment. As a result, he did not seek care until his infections had disseminated, with an associated high parasitemia burden. These circumstances highlight the need for targeted education of older adults and their caregivers regarding the less typical manifestations of tick-borne disease—especially during peak transmission months in endemic regions. Cognitive decline, gait disturbance, or acute confusion in the summer should prompt consideration of infectious etiologies, even in patients with baseline impairment. Although this patient's laboratory markers demonstrated microbiologic resolution of both babesiosis and Lyme disease, his cognition had not returned to baseline at short-term follow-up, and the duration and reversibility of his deficits remain uncertain. Current IDSA guidelines recommend against routine testing for tickborne illnesses in older adults presenting solely with chronic or progressive cognitive decline in the absence of other objective clinical features. However, this recommendation underscores an important clinical distinction: while routine screening is not supported, clinicians should maintain a high index of suspicion when cognitive changes are acute, subacute, or accompanied by systemic or neurologic findings suggestive of infection.

Ultimately, the goal of treatment is to rapidly reduce parasite burden and prevent long-term sequelae. Although exchange transfusion is an option to achieve this goal, there is no high-quality evidence for its use in the management of severe babesiosis, particularly in older adults. The IDSA notes that exchange transfusion may be suitable for patients with high-grade parasitemia (>10%), or those who have at least one of the following: severe hemolytic anemia; severe pulmonary, renal, or hepatic manifestations. However, the IDSA characterizes this as a weak recommendation based on low-quality evidence.[15] More evidence is needed to better identify which patients would benefit from exchange transfusion compared to first-line and second-line antimicrobial treatment.[14] Despite high-grade parasitemia with hemolytic anemia requiring simple transfusion, as well as renal and hepatic involvement, this patient improved in all these domains with antibiotics alone. Therefore, exchange transfusion should be considered with caution and use of antibiotics should be prioritized for the management of tickborne illnesses. Clinical decision-making, with guidance from our pharmacy and infectious disease colleagues, should emphasize prompt antibiotic initiation for Lyme infections.

The growing number of case reports describing similar clinical presentations underscores the need to provide hospitalists with practical guidance on the management of disseminated Lyme disease and babesiosis in the aging population. Several published cases have documented cognitive changes associated with Lyme infection, most commonly characterized by a subacute onset of impairment frequently accompanied by gait disturbances.[9] In many instances, cognitive function improved substantially following appropriate antibiotic therapy.[7,12] However, the clinical picture is often complicated by coexisting chronic cognitive impairment and superimposed acute delirium, making diagnosis and management more challenging.[11] Moreover, important uncertainties remain regarding the mechanisms underlying persistent cognitive dysfunction despite adequate antimicrobial treatment.[8] Given these complexities, older adults experiencing cognitive changes related to tickborne infections will likely require extended interdisciplinary outpatient follow-up, including collaboration among infectious disease specialists, geriatricians, and, in some cases, neurologists. Early recognition of infectious etiologies in older patients presenting with cognitive decline is critical to optimizing outcomes and preventing potentially reversible impairment.

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Authors

Amelie Foumena Nkodo, MD, MS, Department of Internal Medicine, Brown University Health, Providence, RI.
Joshua Bennett, MD, PhD, Department of Internal Medicine, Brown University Health, Providence, RI.
Thomas Palladino, MD, Department of Internal Medicine, Brown University Health, Providence, RI.
Jason M. Aliotta, MD, Department of Internal Medicine, Brown University Health, Providence, RI.

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The authors have no conflicts of interest to disclose.

Correspondence

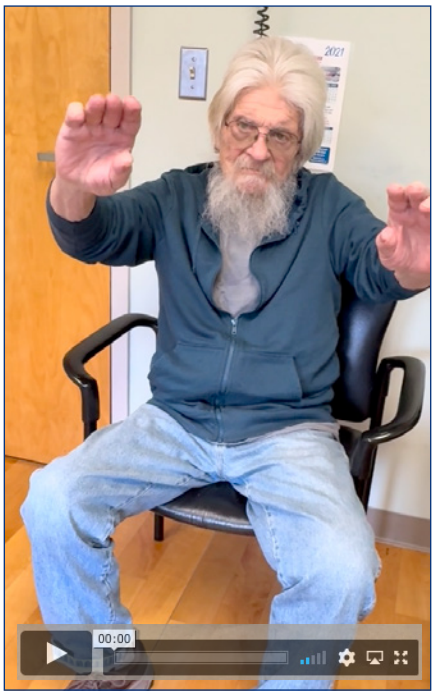
Amelie Foumena Nkodo, MD, MS
593 Eddy Street, Suite 0100, Providence, RI 02903
Ankodo@brownhealth.org

Delayed Onset of Neurological Symptoms in Carbon Monoxide Poisoning

MERVE KOZAK, MD; JOSEPH H. FRIEDMAN, MD

A 75-year-old old man with a history of progressive gait problems due to severe knee arthritis and a family history of Parkinson's disease (PD) presented to the clinic five months after carbon monoxide (CO) poisoning. He had been working alone at his glassblower studio for about 80 minutes when his wife found him stuporous and called 911. Upon arrival to the hospital, his temperature was 92°F. The carboxyhemoglobin (COHb) level was 22.5% within four hours of arriving. During this time he was minimally verbal. He was immediately given oxygen by mask and transported to a hospital where hyperbaric oxygen (HBO) therapy was administered about 10 hours after being found. He received one treatment of HBO for 90 minutes at 2.5 atmospheres absolute (ATA), with 10-minute breaks, for a total treatment time of 140 minutes. Brain MRI showed global atrophy, a left frontal white matter infarct, and an old, right basal ganglia infarct, with computed tomography angiogram and carotid ultrasound unrevealing.

Click images to view videos on Vimeo



Video 1. https://vimeo.com/1191560659 [0.27]

Video 2. https://vimeo.com/1191560657 [0.536]

In the following two weeks, his gait and mental status improved, approaching baseline, but was followed by deterioration of both cognition and gait, which progressed for about four months, after which he again showed mild improvement.

In the clinic, he was alert but offered no spontaneous speech, although naming, clock drawing, handwriting, speech, and memory were normal. He exhibited marked bradykinesia and rigidity. Deep tendon and Babinski reflexes were absent. He had a stooped posture, a widened base, very small stride and needed support [**Videos 1, 2]** to walk.

Despite the lack of brain MRI abnormalities, this patient suffered delayed neurological sequelae (DNS) of CO poisoning. DNS after CO poisoning occurs in 15–40% of patients,[1] with a biphasic clinical course, where patients show a period of recovery followed by neurological symptoms typically developing two to 40 days after the exposure (sometimes even later).[2] Mild symptoms of CO toxicity include headaches, nausea, and lightheadedness, whilst severe symptoms include neurological deficits or coma.[3] Cardiac ischemia may also occur with severe toxicity.[4] Permanent movement disorders such as parkinsonism, as seen here, are not uncommon.

Predictors of DNS include loss of consciousness (LOC), low Glasgow Coma Scale, COHb >25%, long exposure , and increased serum troponin.[2] Current guidelines suggest immediate administration of normobaric oxygen.[5] HBO is indicated for patients with severe symptoms such as LOC, any neurological deficits, or signs of cardiac ischemia. COHb >25% in adults without severe symptoms may also qualify for HBO. Pediatric and pregnant patients are at increased risk and have looser criteria for HBO.[5] Standard protocol includes administration of three sessions within the first 24 hours, followed by reevaluation and further daily sessions if required.[5] Best results from HBO are when it is administered within six hours of exposure.

An alternative to HBO when it is not available is oxygen delivered with high flow nasal cannula (30 liters/min or more). This reduces the half-life of COHb to 50 minutes and may show reduce the risk of DNS. The length of treatment with this method is not known, but would likely be 24 hours or longer to match HBO.[6]

The efficacy of HBO therapy for long-term cognitive impairment is debated, but all authorities recommend early administration. Recognition of possible delayed neurological symptoms after initial improvement must be considered when providing a prognosis.

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Authors

Merve Kozak, MD, Koc University, Istanbul, Turkey.

Joseph H. Friedman, MD, Butler Hospital; Dept, of Neurology, Warren Alpert Medical School of Brown University, Providence, RI.

Disclosure

The patient has signed a consent form to have this Video published.

Correspondence

joseph_friedman@brown.edu

Mervekozak.MD@gmail.com

Developing an Automated Text Message Program in the Emergency Department

MEYLAKH BARSHAY, MD'26; JARED S. ANDERSON, MD

ABSTRACT

BACKGROUND: Patients in emergency departments (EDs) often face barriers to care, including complex operations, long waits, and limited communication from care teams. These factors contribute to dissatisfaction and may increase rates of leaving before treatment is complete. Automated text messaging (SMS) may improve transparency by providing real-time updates and answering common patient questions about comfort and visit milestones. This pilot study evaluated the feasibility of implementing a fully automated SMS program and describes key aspects of its design and implementation.

METHODS: SMS content and triggering logic were developed through informal patient interviews and iterative input from a multidisciplinary team, including physicians, nurses, registration staff, and patient experience administrators. Messages were mapped to electronic health record (EHR) events and triggered automatically without staff intervention. Following deployment, a convenience sample of English-speaking, adult patients at a single urban academic ED were offered enrollment over a 15-month period. Enrolled patients received an optional, anonymous post-visit survey. Data on enrollment and survey results were summarized descriptively.

RESULTS: Thirteen automated messages were implemented. Between July 2023 and October 2024, 4,100 of 42,915 eligible patients enrolled (9.6%). Among enrollees, 185 completed the post-visit survey (4.5%). Of respondents, 89.7% reported wanting text messages during their ED visit. The most frequently selected desired topic was "updates on what tests/procedures are still pending" (65.4%).

CONCLUSIONS: A fully automated ED SMS communication program was technically feasible and was viewed favorably by survey respondents. Future work should evaluate strategies to increase enrollment and engagement, assess implementation in other settings, and examine the impact of automated messaging on patient experience.

KEYWORDS: Informatics; Text Messaging; Patient Communication; Emergency Department; Quality Improvement

INTRODUCTION

The emergency department (ED) is the primary site of unplanned acute medical care and a major site for healthcare delivery, providing up to half of all medical care.[1] In 2021, there were nearly 140 million visits to EDs, for an average of nearly 43 visits per 100 people.[2] Poor patient experience in the ED, however, can reduce quality of care, increase the rate of patients leaving before treatment is complete (LBTC), and even increase the likelihood of lawsuits.[3] Nationally, in 2021, approximately 6.5% of encounters ended with patients LBTC, including leaving without being seen (LWBS), elopements, and leaving against medical advice.[4] Academic medical centers, which are frequently higher volume EDs, have longer average lengths of stay and higher rates of LBTC.[5] Nationally, LWBS rates have worsened year over year, doubling from 1.1% to 2.1% between 2017 to 2021.[6] At baseline at the study site, which is a tertiary academic medical center, LWBS rates are higher than the national average and have climbed as high as 11% in 2024.

Conventional wisdom and prior literature have identified care timeliness as a key driver of ED patient experience, making wait time an attractive target of ED process improvement projects.[7,8] Unfortunately, wait times are constrained by complex external factors such as hospital boarding and crowding, along with ED staffing shortages. It remains urgent to improve patients' experience by creative new means, such as enhancing patient communication and education.

Apart from patient wait times, ED flow models have grown increasingly complicated. Patients often may have unclear expectations for their visit or may not feel prioritized by care providers. Existing sources of transparency, such as patients' electronic health portals, frequently require account creation, credential knowledge, and access to a web browser window. Furthermore, these charts are primarily designed for outpatient contexts and typically present only resulted labs and imaging, while providing limited insight into the active clinical workflow or patient care journey. To date, there has been limited exploration of leveraging technology (specifically automated SMS) in the ED, despite a broad literature base suggesting that SMS can be effective in healthcare settings.[9-16] These studies in healthcare contexts outside of the ED have demonstrated the potential of text messaging to improve outcomes in healthcare and the perception of SMS

as a reliable form of communication.[17,18] One major study of SMS automated from the electronic health record (EHR) in the ED also identified a desire by patients for more frequent updates in the ED, along with finding that implementing ED SMS could impact patient satisfaction.[19]

We hypothesized that automated text messages linked to EHR workflow events could provide a feasible and intuitive method to communicate with patients without requiring additional staffing or operational resources. In this report, we describe the development and implementation of an automated text message service in a single urban ED at a Level 1 trauma center in New England. We present initial feasibility data, including patient enrollment, along with limited patient-reported acceptability data on interest in messages and preferred message content.

METHODS

Study Setting and Design

This study evaluated a pilot implementation of an automated ED text-messaging program with prospectively collected operational and patient survey data that were then analyzed with descriptive methods. The study took place at a busy, urban, academic ED with ~89,000 annual patient visits and a baseline rate of LWBS of 10.7% prior to the launch of the project (Rhode Island Hospital, Providence, RI). The ED contains a split-flow model with multiple care areas targeted toward different estimated levels of patient acuity.

Patient Enrollment and Inclusion

Adult patients were offered enrollment in the text messaging program by ED registration staff on arrival to the ambulatory waiting area. As the pilot program was only offered in English, staff were instructed to offer enrollment only to patients with a listed preferred language of English. Patients were enrolled during all shifts. Enrollment was entirely voluntary, and ED staff were encouraged but not required to offer enrollment.

Intervention Development and Deployment

First, one author (M.B.) performed qualitative interviews with ED patients to identify the communication gaps that could potentially be addressed by text messages. Ten patients across a range of acuity levels were interviewed. These early interviews suggested that patients who were higher acuity often could not benefit from text messages, either secondary to clinical condition or secondary to a lower level of technical literacy. In our ED, these higher acuity patients skewed older, consistent with prior literature, and either did not have phones or did not feel comfortable using them.[20,21] Additionally, as a byproduct of their acuity, these patients tended to have more frequent touchpoints with clinical staff and were less likely to have questions about their care.

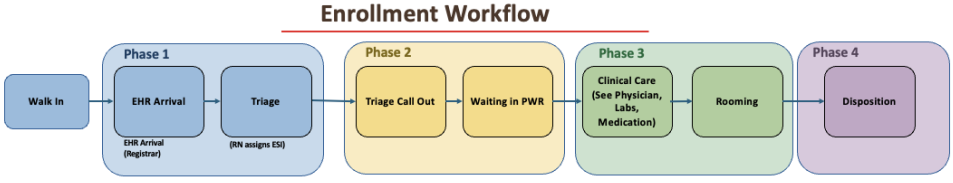
For patients who were triaged as lower acuity, however, interviews suggested that a meaningful source of frustration was a lack of care transparency. These patients faced longer wait times, had their phones with them, and felt comfortable using them. Patient feedback coalesced around thematic areas of confusion, including uncertainty around why some patients were called into rooms before others, lack of clarity of what steps remained in their care journey, and limited familiarity with or recollection of systems such as the MyChart patient portal (Epic Systems, Verona, Wisconsin) that would allow them to see their test results. Patients who participated in these early interviews indicated an interest in being enrolled in such a service. As a final step before initiating development of the SMS service, cell phone signal penetration was assessed throughout the ED, both using provider devices and through patient interviews.

To integrate interview findings into clinical workflows, a simplified process map of the ED operational workflow for the target, lower-acuity patient population was produced [**Figure 1**]. Leveraging initial patient feedback as well as provider clinical experience, a set of intervention points for sending SMS were determined and preliminary text content was written as a launching point for discussion.

Following this, a multidisciplinary working group of stakeholders was convened. This included staff from patient registration, nursing management, patient experience administrators, information technology (IT), and physicians. Early conversations focused on which team was best suited to enroll patients into the SMS program and at what point in the care workflow. Many EDs, including the study site, have transitioned to 'bedside' ED registration to improve patient flow, but this created a point of friction with the SMS program. The team determined SMS would be most useful at the point of arrival and would have less impact if the program only activated at the time of full registration, often hours after arrival. We modified an existing patient arrival workflow by asking staff to enroll patients at the time of arrival before the full registration process. Registration staff were trained and provided with supportive documentation to enable successful enrollment of patients for the pilot.

The group developed and prioritized a suite of SMS messages [**Figure 1**]. The design of each message included both the text language as well as the operational events, such as provider orders, that would serve as programmatic triggers. The language and trigger of each message was vetted by the multidisciplinary working group to minimize risk of unintended operational consequences, legal risks, or patient misunderstanding. All operational messages were designed to be fully automated, requiring no change to any staff workflows. Given the security profile of SMS, all text messages were written without any inclusion of protected health information (PHI), including names, test results, or room numbers. Given the limited scope of the pilot, all messages were written in English, with the expectation that pending pilot assessment, messages would be translated. Members of

Figure 1. This figure illustrates a simplified patient arrival and SMS program enrollment workflow, along with the specific messages received by patients. Each text message has been assigned a numerical identifier which marks where in the workflow the message is sent. The message content excludes a message header identifying the ED as the sender of the messages.



Arrival & Triage Messages

Phase	Trigger	Message Content
Phase 1	Enrollment in SMS Pilot	Thank you for visiting the Emergency Department. Throughout your stay, you may receive updates on the status of your care. Do not reply to this number.
	Enrollment in SMS Pilot	Our goal is to make sure that you are well informed during your visit. For more information about what to expect during your visit, please visit this page: {ED Overview Link}
Phase 2	After the 1st triage call out	We tried to call your name to be seen by a healthcare team member but were not able to find you. Please return to the Emergency Department.
	No logged vitals for 4 hours	Update: Thank you for waiting. As a standard safety precaution, we would like to recheck your vital signs. Please return to the round desk.
Phase 3	Regular diet order placed	Your care team has cleared you to eat and drink if you wish.
	NPO order placed	Due to your treatment plan, please refrain from eating or drinking unless a member of the care team instructs you otherwise.
	ED room assignment	You have been assigned a treatment space. Having support can be important for healing. Please see our visitation policy here: {ED Visitation Policy Link} & ask your care team if visitors can join you.
Phase 4	Discharge disposition selected	Your care team will come in shortly to discuss your discharge and answer any of your questions.
	Discharge from ED or admission	Thank you for enrolling in our text message program. We value your feedback and want to continue to improve this service. Please take 1-2 minutes to fill out an anonymous survey about text messages during your Emergency Department visit. {REDCap Survey Link}
	Admit from ED (bed request)	You have been admitted to the hospital and are awaiting a room assignment. If possible, please send valuables home. Speak with your team if you need assistance.
	Inpatient room assignment	You now have a room assignment for your hospital admission. If your friends or family have questions, our general patient information line is 401-444-5421.

EHR, Electronic Health Record. ESI, Emergency Severity Index. NPO, nothing by mouth. PWR, public waiting room.

both IT and clinical informatics worked to translate these documented message requirements into a technical design that was implementable from within the electronic health record (EHR). Messages were then grouped into tranches that were scheduled to be iteratively released to reduce the risk of EHR system failures or operational disruptions. These messages were paired with the production of infographics and FAQs' materials that were uploaded to the hospital website, to provide patient-facing context and explanations of both ED operations and the text message pilot.

Patient Survey Collection

Enrolled patients who received at least one message after the initial introductory text were invited to provide voluntary, anonymous feedback through a survey, which was also delivered via text message. Survey data were collected and managed using REDCap electronic data capture tools hosted at the study site.[22,23] Survey topics included soliciting general positive or negative interest in ED text messages, questions about preferred message content, and areas for unstructured qualitative feedback. Patients who reported either a positive or negative interest in receiving text messages as part of ED visits were further asked to provide categorical feedback explaining their responses. A copy of the survey questions can be seen in ***Supplemental Table S1***. [*Editor's note: Email corresponding authors for supplemental table, figure.*]

RESULTS

Patients Enrolled

From July 2023 through October 2024 (15 months), just over 4,100 patients were enrolled in the program [**Figure 2**] out of 42,915 eligible patients (9.6%, ***Supplemental Figure S1***).

Patient Survey Results

Of the 4100 patients enrolled in the program, 186 patients consented to their feedback on the service being used, although only 185 provided feedback through the survey (4.5%). Of

Figure 2. Monthly counts of patient enrollment in the text-messaging pilot from July 2023 through October 2024

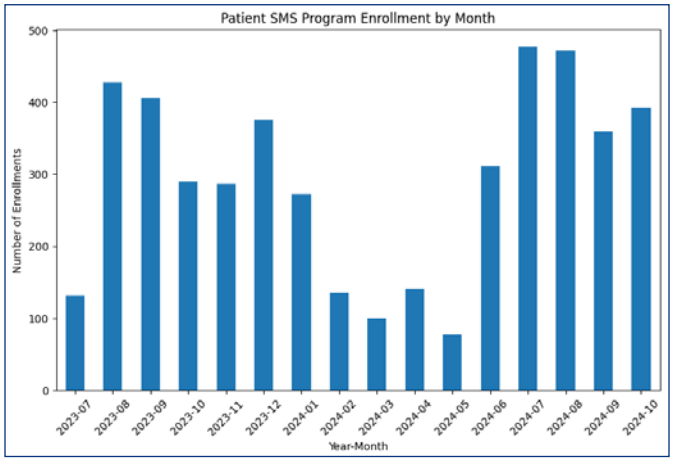


Figure 3. Anonymous survey results from patients who expressed a disinterest in receiving text messages. Patients were able to select one or more reasons. Counts are shown from each pre-defined category.

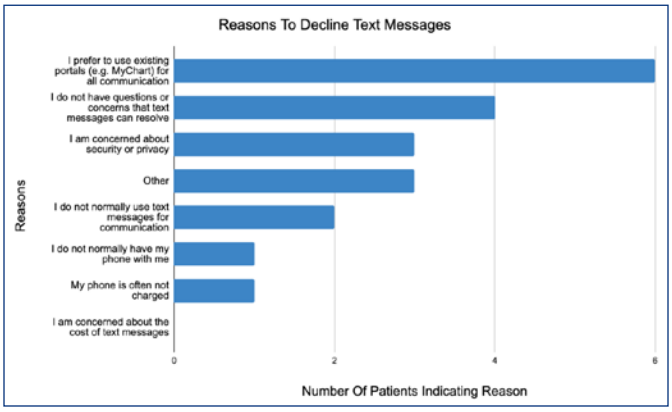


Figure 4. Anonymous survey results regarding patient text message content preferences. Patients were offered a list of potential text message content and were able to select as many text messages as they would find valuable. Counts of each category are shown.

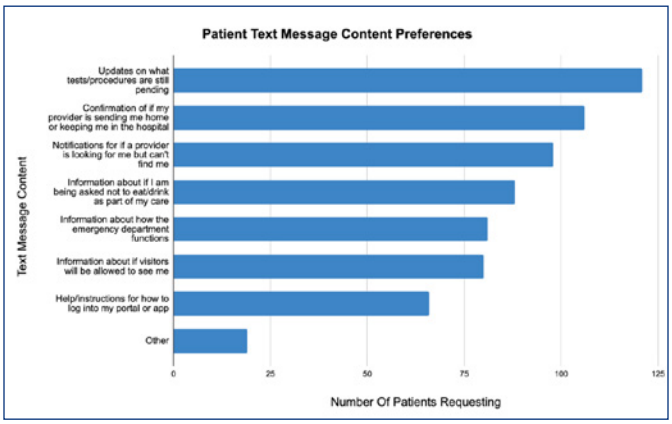


Table 1. Qualitative Feedback From Survey Respondents

This table shows a sample of verbatim, positive and negative, feedback about the initial SMS program. Responses unrelated to the SMS program or that include a single word, are not shown.

"Your text messages are more consistent than the nurse I had."
"I think it's a great thing to have to inform patients on the level of care that you're offering and sometimes you can get crazy in here so the more information you can give the patients to better thank you for everything."
"Very informative and on time...texting is a great idea."
"Every text I received in the ED was either too late or I was told was irrelevant by staff. It seems little more than a confusing waste of money. It does not even effectively serve the purpose of keeping the patient placated until services can be offered, if anything it has the opposite effect."

This table shows a sample of verbatim, positive and negative, feedback about the initial SMS program. Responses unrelated to the SMS program or that include a single word, are not shown.

the 185, 166 (89.7%) said they would want to receive informational text messages as part of an ED visit. Nineteen patients indicated they would not want to receive messages [**Figure 3**].

For those patients who expressed interest in receiving SMS, **Figure 4** displays what message content they felt was most valuable.

There were 33 (17.8%) of survey respondents who provided further unstructured feedback, with a sample of both positive and negative sentiment responses shown in **Table 1**.

DISCUSSION

Primary Findings

This project demonstrated the technical feasibility of leveraging automated, EHR-triggered SMS technology in a high-volume tertiary ED. It summarized initial patient survey data, noting high acceptability of the technology for respondents, and gathered additional information about the types of information respondents wish to receive via automated messages. It provides a framework and project management approach to develop similar services in other hospital settings.

Comparison with Prior Literature

Our study adds to existing literature in several key ways. First, to the authors' knowledge, it represents the first surveyed feedback offered by patients on an ED SMS program. Secondly, we introduced several innovative messages directed at specific patient demands, such as informing them of their current dietary status and giving them a visual overview of a complex, split-flow ED visit. Finally, this report offers multiple granular details on the design and launch of a program that may be of interest to peer institutions considering implementing SMS. The survey response rate of 4.5% of enrolled patients was comparable to other digital health surveys, showing single digit response rates from 1.2–8.1%.[24-26]

Lessons Learned

This pilot was not without initial challenges. An initial launch of the program included a technical bug that required a temporary shutdown in the service while the bug was resolved. Separately, front-line registration staff indicated that during times of peak ED crowding, patients declined the service more frequently due to general frustration with crowding and wait times. Driven by this patient feedback, other demands on registration staff time, and the novelty of the service, some members of the registration staff were less likely to offer patients the SMS service than others. Limitations in reporting during the early phase of launch made it difficult to detect this silent 'buyout' by registration staff, which occurred early in 2024. It became critical to measure if patients were being disproportionately enrolled during

certain shifts or by staff members to target staff education and devise further operational improvements. Analytics for the SMS program were not easy to develop due to the design of the module within the EHR. Once reporting was available, it became a potent tool for driving further change management, program development, and increasing enrollment. Finally, this program was launched in the middle of multiple organizational changes, including an operational overhaul of the ED, turnover of IS staff, and updates to the EHR infrastructure itself. Key to the success of the program was developing both messages and a roll-out plan and timeline that was robust to delays and operational changes, which required prioritizing and developing logical tranches of new message releases.

Limitations

This pilot study had multiple limitations. The study utilized a convenience sample approach in which enrollment was offered at the discretion of ED staff. Therefore, the study does not capture information on patients who were either not offered messages or who may have declined an offer to receive ED text messages. There may be significant differences in these populations that could bias the results. The overall enrollment rate of 9.6% was low, and the study was not designed to determine what proportion of this enrollment was due to poor registration staff compliance in offering messages versus the level of patient demand for messages. There is not sufficient literature to determine what would be an optimal or target-enrollment rate for ED patients. Some patients will inevitably have less access to digital health technologies due to iniquities in mobile phone ownership, mobile plans, and whether technology is charged or present with the patient. Second, the voluntary survey component had a 4.5% response rate, introducing the possibility of non-response bias. Survey responses, therefore, should be interpreted as exploratory feedback rather than representative of the full ED population. Next, the pilot was designed primarily to assess the technical and operational feasibility of messaging rather than its impact on clinical operations or overall patient experience. Therefore, the study can draw no conclusions on the impact of the program on LBTC, LWBS or patient experience scores. The design of the study included only English-speaking patients presenting to the ambulatory waiting area, and patient demographic data and language data were not collected. Therefore, generalizability at this time is limited and the equity of program uptake cannot be measured.

Future Directions

Our future directions intend to address these gaps through a multi-pronged strategy. First, we intend to translate the messages into non-English languages routinely spoken by our patient population (Spanish, Portuguese). Secondly, as we transition from pilot to larger scale deployment, we plan to reconvene the multidisciplinary group that helped with its design to revisit what operational changes may result in increased patient participation, better staff compliance in offering messages to patient, and a better understanding of what new messages may prove most valuable. With consistent staff uptake in offering enrollment, it may be more possible to identify what percentage of ED patients truly wish to receive automated messages. Finally, we aim to conduct a more rigorous evaluation of the impact of SMS both directly on patient satisfaction, as well as on operational metrics such as "left without being seen" rates.

CONCLUSIONS

This manuscript serves as a proof of concept for the use of text messages in the ED and offers some initial validation signals. Our team intends to expand the offering to other EDs inside of the hospital network to better understand the impact of setting on program success. Other institutions should consider implementing and studying text-based communication programs to improve the ED patient experience.

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Authors

Meylakh Barshay, MD'26, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Jared S. Anderson, MD, Department of Emergency Medicine, Rhode Island Hospital, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

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Correspondence

Meylakh Barshay, MD'26
meilakhbarshay@gmail.com

Jared S. Anderson, MD
JAnderson10@brownhealth.org

Impact of Acute, Major Infrastructure Failure on Emergency Medical Service Transport Times in Rhode Island

ELISE M. SOLAZZO; SAI GOPAL JARABANA, MS; JANETTE BAIRD, PhD; SIRAJ AMANULLAH, MD, MPH; KENNETH WILLIAMS, MD; EMILY J. SHEARER, MD, MPP, MSc

ABSTRACT

OBJECTIVES: Pre-hospital emergency care depends on reliable infrastructure. On December 11, 2023, the westbound span of the Washington Bridge connecting eastern and western Rhode Island (RI) closed emergently due to structural issues. This study examines the impact of sudden infrastructure failure on Emergency Medical Services (EMS) transport in RI.

METHODS: This retrospective observational study used a Rhode Island Department of Health dataset of 911 EMS calls from December 11, 2023 to December 11, 2024. Response-to-scene time, scene-to-destination time, and hospital destination for six months preceding bridge closure, the four days of full closure, and six months after the closure were compared, with additional comparison for the municipalities most likely to use this bridge (the "East Bay").

RESULTS: 911-call volume and distribution did not significantly change. Statewide mean response-to-scene times increased from 4.64 min (SD 3.16) pre-closure to 4.88 min (SD 3.14) ($p<.001$) following full closure, while scene-to-destination times decreased from 10.57 min (SD 6.84) to 10.04 min (SD 6.64) ($p<.001$). No significant statewide differences were observed during the full-closure period. The East Bay, however, saw significantly increased scene-to-destination times during full closure and post-closure (17.00 min, SE=6.59; and 15.97 min, SE=7.04, compared to 14.97 min, SE=6.75 pre-closure, $p<.001$). Response-to-scene times in the East Bay did not significantly change. East Bay EMS decreased the use of general adult hospitals requiring travel over this bridge without significant difference in transport to specialty hospitals.

CONCLUSIONS: This study demonstrates that major infrastructure failures significantly affect ambulance transport times and destination patterns, highlighting the need to understand infrastructure vulnerability in emergency planning.

KEYWORDS: disasters; Emergency Medical Services; infrastructure failure; response time; transport time

INTRODUCTION

America's infrastructure is aging. According to the 2021 American Society of Civil Engineers Report Card, the United States (US) faces a 10-year deficit in infrastructure investment of over $2.5 trillion.[1] The American Road & Transportation Builders Association reports that 1 in 3 US bridges are in need of repair or replacement.[2] The effects of aging and under-investment on US infrastructure are only compounded by global climate change.[3] As ambulances are dependent on roadways and local infrastructure to safely transport patients to Emergency Departments (EDs) for definitive care, infrastructure failure can pose significant challenges to EMS systems across the US. Disaster events that render infrastructure unusable, such as flooding, can have a complex and far-reaching impact on the delivery of EMS care, with consequences extending well beyond the areas directly serviced by affected roadways.[4] Prior studies of hyperacute infrastructure failures, such as the I-35W bridge collapse in Missouri in 2007, have demonstrated issues with EMS patient tracking and communication, but have not examined longer-term impacts on transport times and destination patterns.[5]

EMS response and transport times can have a significant impact on patient morbidity and mortality.[6-8] Time from dispatch to EMS arrival on scene likely has the greatest impact on patient outcomes.[9] Prior analysis shows that EMS response times are highly influenced by transportation infrastructure and local traffic variability.[10] EMS also face significant challenges with traffic congestion, particularly on interstates and national highways.[11] These effects may be especially pronounced in socioeconomically vulnerable areas.[12]

In Rhode Island (RI), on December 11, 2023, an inspection revealed that the westbound span of the Washington Bridge servicing Interstate-195 was critically structurally unsound. This resulted in an emergent, sudden closure of the main thoroughfare connecting eastern RI and the Massachusetts coast to Providence and the rest of the State. This created lasting traffic disruptions across the Providence metropolitan area, effectively severing the state's eastern portion. For the four days of full closure, all civilian traffic over the Washington Bridge completely halted, though ambulances were allowed to cross the bridge heading westbound one at a time. This process required the driver to contact their

dispatch as an intermediary to gain approval to cross the bridge, but could begin over the radio immediately upon leaving the scene to expedite the bridge crossing. Of note, the State's only adult trauma/comprehensive stroke center and children's hospital are on the western side of the Washington Bridge.

This study aimed to assess the impact of this sudden infrastructure failure on EMS operations. Specifically, the objective of the study was to compare the impact of this infrastructure failure on EMS operations before and after the bridge closure on time-to-scene, time-to-destination, and hospital destinations in Rhode Island. In addition, this study examined how this emergent bridge closure impacted EMS operations in the East Bay towns most impacted by this closure.

METHODS

Study Design and Parameters

This is a retrospective observational study using a Rhode Island Department of Health dataset via BioSpatial (© ImageTrend, Durham, NC), recording all 911 EMS calls from 6/11/23–6/11/24 run by RI-based EMS. Response-to-scene times, scene-to-destination times, and choice of hospital destination were analyzed. This project was IRB-approved by the Rhode Island Department of Health (IRB #2025-02).

Data Analysis

Data were analyzed using independent t-tests with winsorization to address outliers. We categorized calls by date: pre-closure ((June 11, 2023 to December 10, 2023), acute-phase closure (December 11, 2023 to December 14, 2023), and post-closure ((December 15, 2023 to June 11, 2024). A subgroup analysis and additional analysis of hospital destination choice was then conducted for the East Bay towns most directly dependent on the Washington Bridge: East Providence, Riverside, Barrington, Bristol, and Warren.

The data were analyzed using R (version 4.4.1) within RStudio. Ambulance transports were classified into three periods based on the date of service: pre-closure (June 11, 2023 to December 10, 2023), full-closure (December 11, 2023 to December 14, 2023), and post-closure (December 15, 2023 to June 11, 2024). For transport-time variables, response-to-scene and scene-to-destination times values were set to a minimum of one minute to address implausibly low entries. To minimize the influence of outliers, values above the 99th percentile for each time variable were winsorized by replacing them with the 99th percentile value.

Descriptive statistics for EMS transport times were calculated and are reported as means with standard deviations (SD), as well as medians and interquartile ranges (IQR), for each closure period and relevant subgroups. To evaluate differences in EMS transport times across the three closure periods, we first conducted an analysis of variance. When a significant overall difference was observed, a pairwise two-sample t-test with Bonferroni correction was conducted to identify which specific closure periods differed.

Given that the Washington Bridge primarily serves East Bay communities, connecting them to downtown Providence (where local specialty hospitals are located), a subgroup analysis was conducted on EMS transports originating from East Providence, Riverside, Barrington, Bristol, and Warren. Within this subgroup, summary statistics for transport times were calculated, and independent two-sample t-tests were used to compare pre-closure and post-closure periods. Hospital destinations were summarized as frequencies and percentages for each period. Changes in hospital-utilization patterns were assessed using chi-square tests, with Fisher's exact test applied when expected counts were small.

Secondary analyses focused on EMS transports to specialty centers, specifically a Level 1 trauma center/comprehensive stroke center and a children's hospital. Summary statistics for transport times and destination proportions were calculated, and independent two-sample t-tests were used to compare pre-closure and post-closure periods.

RESULTS

Over the year-long study period, 125,817 EMS transports were analyzed across three periods: 72,296 (57.46%) pre-closure, 1,382 (1.10%) during the full closure, and 52,139 (41.44%) post-closure. During the full closure, statewide response-to-scene and scene-to-destination times were not significantly different from pre-closure: response-to-scene time of 4.71 minutes (SD 2.99) vs 4.64 minutes (SD 3.16) and scene-to-destination of 10.77 minutes (SD 6.78) vs 10.57 minutes (SD 6.84). Comparing the pre-closure period to the post-closure period, statewide mean response-to-scene times significantly increased from 4.64 minutes (SD 3.16) to 4.88 minutes (SD 3.14) (p<.001), while scene-to-destination times significant decreased from 10.57 minutes (SD 6.84) to 10.04 minutes (SD 6.64) (p<.001) [**Table 1**].

For the East Bay subset, 10,346 transports were analyzed: 6,475 (62.58%) pre-closure, 159 (1.54%) during full closure, and 3,712 (35.88%) post-closure. The East Bay saw significantly increased scene-to-destination times during the full closure and post-closure compared to pre-closure (17.00 minutes, SD 6.59 and 15.97 minutes, SD 7.04; compared to 14.97 minutes, SD 6.75 p<.001) [**Figure 1**]. Response-to-scene times in the East Bay did not significantly change [**Table 2**].

East Bay EMS decreased the use of general adult hospitals requiring travel over the affected bridge. However, transport to specialized hospitals remained the same; there was no significant difference in transport to the area's only adult Level 1/comprehensive stroke center, or to the area children's hospital (p = .63 and .19) [**Table 3**].

Table 1. EMS Transports Across RI Before, During, and After the Washington Bridge Closure, in Minutes

Outcome	Pre-Closure (N = 72,296)		Full Closure (N = 1,382)		Post-Closure (N = 52,139)	
Response-to-Scene	Mean: 4.64	SD: 3.16	Mean: 4.71	SD: 2.99	Mean: 4.87	SD: 3.14
	Median: 4.0	IQR: 2.3, 6.2	Median: 4.1	IQR: 2.6, 6.1	Median: 4.2	IQR: 2.7, 6.4
	Min: 1.0	Max: 63.2	Min: 1.0	Max: 19.7	Min: 1	Max: 51.6
Scene-to-Destination	Mean: 10.57	SD: 6.83	Mean: 10.77	SD: 6.78	Mean: 10.04	SD: 6.64
	Median: 9.0	IQR: 5.6, 13.9	Median: 9.3	IQR: 5.9, 14.0	Median: 8.5	IQR: 5.3, 12.9
	Min: 1	Max: 138.6	Min: 1	Max: 38.8	Min: 1	Max: 68.0

Figure 1. Bridge Closure, Full-closure, Post-closure

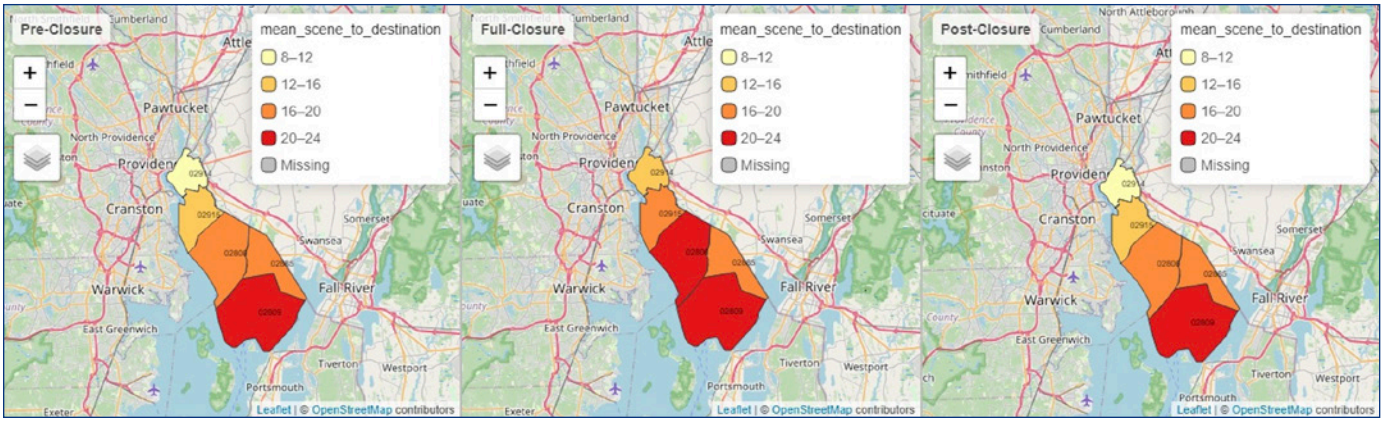

Table 2. EMS Transports in the East Bay Before, During, and After the Washington Bridge Closure, in Minutes

Outcome	Pre-Closure (N = 6,475)		Full Closure (N = 159)		Post Closure (N = 3,712)	
Response-to-Scene	Mean: 4.54	SD: 3.10	Mean: 4.88	SD: 2.80	Mean: 4.59	SD: 3.09
	Median: 4.00	IQR: 2.60, 5.60	Median: 4.50	IQR: 2.90, 6.30	Median: 3.95	IQR: 2.70, 5.60
	Min: 1	Max: 63.20	Min: 1	Max: 14.70	Min: 1	Max: 40.30
Scene-to-Destination	Mean: 14.97	SD: 6.75	Mean: 17.00	SD: 6.59	Mean: 15.97	SD: 7.04
	Median: 14.30	IQR: 9.90, 19.80	Median: 17.00	IQR: 11.40, 21.60	Median: 15.20	IQR: 10.30, 21.00
	Min: 1	Max: 36.60	Min: 1	Max: 34.90	Min: 1	Max: 41.90

Table 3. East Bay Destination Choices, N = 10,346 transports

Hospital	Pre-Closure N (%)	Full Closure N (%)	Post-Closure N (%)	p-value (Pre Vs Post)
L1TC / Comprehensive Stroke Center *	2800 (43.24%)	65 (40.88%)	1587 (42.75%)	0.77
Children's Hospital *	295 (4.56%)	5 (3.14%)	191 (5.15%)	0.28
General Adult Hospital A*	1787 (27.60%)	38 (23.90%)	901 (24.27%)	<0.001
General Adult Hospital B	745 (11.51%)	30 (18.87%)	495 (13.34%)	<0.001
General Adult Hospital C	226 (3.49%)	8 (4.98%)	185 (5.03%)	<0.001
General Adult Hospital D	288 (4.45%)	3 (1.89%)	143 (3.85%)	0.13
General Adult Hospital E	158 (2.44%)	6 (3.77%)	110 (2.96%)	0.15

* = requires use of the affected bridge

DISCUSSION

Despite the critical nature of the Washington Bridge connecting the two sides of Rhode Island, the results of this study suggest that the effect of infrastructure failures on EMS transport time may not be as far-reaching as initially expected. Given the ability of EMS to route to alternative general hospitals, the results suggest infrastructure failures are likely to be most consequential for patients requiring transport to a specialty center for specific care.

In contrast to the East Bay-specific results, the statewide changes in response-to-scene and scene-to-destination times before and after bridge closure, while statistically significant, are unlikely to be clinically significant for the vast majority of EMS patients. A 2025 study found that only 6% of EMS activations involved a time-critical prehospital intervention, and 12% involved a time-critical ED intervention.[13] The literature varies significantly on the protective effects of various response times. Several studies note a potential protective effect of response times under 4-to-5 minutes; however, this is likely economically infeasible, and other studies show questionable patient benefit in response times between 5 and 10 minutes for even critically ill patients.[13–15] The net statewide decrease in EMS transportation time before and after bridge closure was a surprising finding of this study, though potential confounders such as types of EMS calls and statewide traffic patterns were not explored. This could be due to EMS agencies deciding to transport patients to closer hospitals when appropriate (e.g., the patient was not clearly in need of specialty services). Most notably, there was no change in EMS response-to-scene or scene-to-destination times during the acute phase of the bridge closure, when all civilian traffic from the East Bay and southern Massachusetts was diverted through residential neighborhoods and any other roads available. An additional possible confounder is the new work-from-home flexibilities for many workers, allowing many Rhode Islanders to choose to work from home to avoid the delays caused by this bridge failure. This may have resulted in a significant traffic burden reduction throughout the State.

The effects of infrastructure failure, though localized, are persistent. Notably, the magnitude of increase in scene-to-destination times was larger in the six months following the full bridge closure than it was during the acute phase of the bridge closure. This is despite the Rhode Island Department of Transportation (RIDOT) successfully rerouting four lanes of traffic in each direction into two lanes of traffic in each direction using exclusively the eastbound bridge span and continuing to add lanes over the following months. This may be an effect of RIDOT's treatment during the acute phase of the bridge closure, wherein one ambulance at a time was allowed to pass over the defunct westbound bridge span.

Perhaps most importantly, the study results show that the bridge closure resulted in significantly different hospital destination patterns for general adult patients in the East Bay. Under normal circumstances, transport times are only one factor involved in deciding where EMS takes patients. One US-based study indicates that roughly one-third of all EMS transports bypassed the nearest ED in favor of another facility.[16] When possible, EMS systems are likely to respond to infrastructure failures by transporting patients to alternate hospitals. This shift in transportation patterns could impose a significant burden on the receiving facilities; EMS patients, on average, are older, have more comorbidities, have higher triage scores, use more ED resources, and have longer lengths of ED stay than ED patients arriving by other means.[17]

Transports to the regional children's hospital and area trauma/comprehensive stroke center did not change during the study period, which is both logical and consistent with previous literature. Previous research suggests that less than half of pediatric patients are transported to the closest facility, transporting instead to the patients' and/or family's choice of hospital or hospital with specialty services.[18] Similar work on trauma patients indicates that only about one-fifth of these patients were transported to the closest facility, instead being transported to the patient's preferred destination or to a hospital with specialty services.[19] The results of this study show that EMS agencies did not reroute patients requiring specialty services. While this is an encouraging finding for quality of patient care, it also means these patients were likely most impacted by increased scene-to-destination times from the infrastructure failure.

Limitations

This study examined data from only one state, which must be addressed when considering generalizability. Data were unable to be obtained from neighboring Massachusetts towns comprising parts of the Providence metropolitan area, which the Washington bridge closure would have also impacted. Consequently, the analysis may underestimate the full regional impact of the closure. As these Massachusetts town also use the bridge and must use the highway for longer stretches than East Bay communities, it could be theorized that the impact of the Washington Bridge closure on EMS transports in the Providence metropolitan area would be more pronounced had the authors been able to access this data. Additionally, these Massachusetts towns can access alternative general hospitals more easily (especially those in the city of Fall River) and have elected instead to transport to a Level II trauma center with primary stroke capabilities and limited pediatric services that is approximately 30 miles east of the Washington Bridge. Zip-code level data for GIS analysis were also used, which may obscure more granular details of the impact of bridge closure. No qualitative component to this study was conducted, and thus this study cannot fully determine the factors impacting EMS clinician choice of destination hospital. Finally, there were

no publicly available data to determine the overall traffic burden during the study period, limiting direct correlation between traffic congestion and transportation times.

CONCLUSIONS

This study demonstrates that major infrastructure failures have persistent negative impacts on ambulance transport times for months, though in a relatively geographically limited pattern. Importantly, destination patterns for adult patients not requiring specialty services significantly changed as a result of this infrastructure failure, with EMS transporting fewer patients to general adult hospitals that required use of the affected bridge during transit. There was no change in destination patterns to hospitals with specialty services, such as trauma/comprehensive stroke services or the area's pediatric hospital. EDs and EMS agencies should consider these effects when assessing readiness, as these may have lasting impacts on ambulance transportation and utilization patterns as well as ED-patient burden.

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Authors

Elise M. Solazzo, Medical Student, The Icahn School of Medicine at Mount Sinai, New York, New York.

Sai Gopal Jarabana, MS, Data Scientist, Department of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Janette Baird, PhD, Associate Professor of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Siraj Amanullah, MD, MPH, Professor of Emergency Medicine, Pediatrics, and Health Services Policy & Practice, Alpert Medical School of Brown University, Providence, Rhode Island.

Kenneth Williams, MD, Professor of Emergency Medicine and EMS Division Director, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

Emily J. Shearer, MD, MPP, MSc, Assistant Professor of Emergency Medicine, The Warren Alpert Medical School of Brown University, Providence, Rhode Island.

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Correspondence

Elise M. Solazzo

elisesolazzo@gmail.com

Interpreter Use in an Academic Pediatric Hospital

ELIZABETH STONE, MD; SHUBA KAMATH, MD, MPH; ALLISON HEINLY, MD; JOSHUA RAY TANZER, PhD; MIRANDA TRIEDMAN; DELMA-JEAN WATTS, MD

ABSTRACT

A lack of proper medical interpretation has been shown to worsen quality of care, patient outcomes, and patient satisfaction. This study aimed to describe how faculty and residents communicate with patients who prefer a language other than English across inpatient and outpatient settings at an academic children's hospital, as well as describe the barriers to interpretation. A survey of pediatric faculty and residents was conducted to assess interpreter use and barriers to use within this hospital. Seventy faculty and 21 residents responded. Providers and trainees across a variety of settings reported high positive attitudes toward interpreters and high use of interpreters to perform most job tasks. Most providers in all groups (75–95%) reported interpreter availability as a barrier. These findings highlight the need for increased access to interpreters in all settings to ensure proper communication with patients and families.

KEYWORDS: Pediatrics; interpreters; barriers; healthcare accessibility

BACKGROUND

An increasing number of people, around 21.5%, speak a language other than English in the United States.[1] Studies have shown that lack of access to proper interpretation is a barrier to accessing pediatric care, with effects including, but not limited to, increased non-urgent hospital and emergency department (ED) visits, longer hospital stays, as well as feelings of burden, stigma and discrimination for families.[2-5] When proper interpretation is used, families experience higher quality of care, improved outcomes and higher patient satisfaction.[6,7] There is also a legal obligation for healthcare providers who receive any federal funding to ensure access to proper interpretation for all patients.[8]

Interpretation technology, including live interpretation via phone and video, has improved, leading to an increase in interpreter usage.[9] Despite this increase, proper sources of interpretation are still not used often enough regardless of known legal or ethical obligation.[9,10] Healthcare workers have cited many barriers to use of proper interpretation, including time, access, improper training and attitudes such as "getting by" without interpreters.[11,12]

Although studies have looked at interpreter use among healthcare providers, less is known about how interpreter use may change based on role and setting. Our objectives were to describe how different healthcare worker groups communicate with patients who prefer a language other than English across inpatient and outpatient settings. Additionally, we sought to identify barriers to using interpretation and how these barriers may differ between groups and across settings. We hypothesized that there are differences in patterns of interpreter use and barriers to proper interpreter use across provider level and different hospital settings, with particular interest in comparing residents and faculty. Specifically, our focus was comparing residents and faculty in terms of improper service use.

METHODS

Setting

Academic children's hospital in New England with multiple settings including an intensive care unit (ICU), emergency department (ED), inpatient unit, primary care clinic, and subspecialty clinics. It is the primary source of pediatric care for the state as well as parts of surrounding New England states; 22.4% of the state's population speaks a language other than English.[13]

Sample

Pediatric faculty, residents and nurses who work in the children's hospital system. There are 80 residents in the categorical pediatrics, medicine-pediatrics and triple-board (pediatrics, general psychiatry and child psychiatry) programs, along with around 130 faculty and 335 nursing staff. The study included all pediatric faculty, residents, and nursing staff affiliated with the children's hospital. Fellows, as well as anyone who only works outside of the hospital and affiliated outpatient clinics, were excluded.

Survey

An email was sent to listservs, including pediatric faculty, residents and nursing staff. Staff were asked to complete an anonymous electronic survey delivered via REDCap, a secure web application.[14,15] Participants were asked about their role (nurse, resident, faculty), level of training, and the hospital settings where they primarily work (ICU, ED,

inpatient unit, subspecialty clinics, primary care). They were also asked questions about interpreter use and barriers in their primary work setting (residents were asked to complete these questions for each setting because they spend time in all locations), as well as physician burnout. Questions were adapted from the COLQ-B survey and a validated standalone burnout measure.[16,17]

Data Analysis

Prior to analysis, raw scores were converted into Z scores. For each question, the individual score from 1 to 5 was subtracted from the average of the question and divided by the standard deviation. This was done to improve interpretability, changing the scoring to represent how far above or below the overall average each individual response was scaled to the variation in scores. Because responses were self-reported, it is difficult to validate the direct interpretation of the scaling (e.g., scores of 1 representing "never" may not actually be true). Preprocessing data to represent differences above and below the average can help to ensure proper interpretation as a relative comparison in attitudes, and enabled the validity analysis performed.[1,2]

Generalized, linear, mixed-effects modeling was used to estimate average endorsement and infer differences between residents and faculty. Random effects modeled the associations between responses to each individual question by the same individual. Additionally, each resident provided three responses, rating interpreter use in each clinical setting. To address this, random effects by individuals were included to model the associations between average response levels by setting for residents.

The use of random effects afforded two benefits. First, it enabled a validity analysis, to provide information about whether or not attitudes about interpreter use were unique to each form of communication, or represented an underlying trait of using proper or improper service usage. While we wanted to examine conceptual groups of interpreter service usage (i.e., proper and improper, across specific behaviors), it was unclear whether or not this was justifiable, or if individual behaviors were more relevant than the patterns across subgroups of behaviors. Examining the results of the random effects provided information on whether or not this was justifiable. Specifically, we modeled associations as a factor analytic model, which provide loadings as output. Interpretation of loadings represent common associations between an individual item and all other items, providing information on internal structure validity assessing whether or not each question represents aspects on an underlying attitude about interpreter services usage. Secondly, the random effects analytically incorporate information about the individual, addressing what would otherwise violate the assumption of independence when providing multiple ratings.

Descriptive data were reported as means and 95% confidence intervals based on 400 bootstrap resamples to empirically estimate the distributions. Data on interpreter service usage were also reported in terms of averages and 95% confidence intervals, in this case as implied by the regression model. Inferences were based on linear combinations of model coefficients representing differences in group averages. While multiple comparisons were made, the focus was on the difference in number of improper interpreter services participants reported between residents and faculty members in different settings. Taking this comparison as our primary hypothesis helped mitigate the risk of type one error inflation due to repeat testing. Additional comparisons were examined to provide context, but were not viewed as the primary hypothesis.

RESULTS

Sample Characteristics

The survey was sent to 192 faculty, 80 residents, and 335 nurses; 70 faculty and 21 residents responded, for a response rate of 36.4% and 26.3% respectively. Nursing responses were excluded due to the low number of responses (5). Response rates for nurses and for faculty by setting were unable to be calculated because the exact number of nurses on email lists and setting type for faculty on the lists are not known. **Table 1** provides descriptive statistics.

Table 1. Sample Characteristics

	Faculty			Residents (n = 21)
	Outpatient (n = 38)	Inpatient (n = 20)	Emergency Department (n = 13)	
Female Gender N (%)	26 (71)	15 (75)	9 (69)	17 (81)
Bilingual N (%)	7 (18)	4 (20)	3 (23)	4 (19)
Trained on Using Interpreters N (%)	27 (71)	12 (60)	6 (46)	15 (71)
PGY Level (Residents) PGY 1 PGY 2 PGY 3 PGY 4+	N/A	N/A	N/A	 5 (24) 7 (33) 9 (43) 0
Years Post-Training (Faculty) Mean (SD)	17 (11)	11 (8)	12 (9)	N/A

Interpreter Use

Table 2 shows mean scores for questions regarding types of interpreter use for all respondents. Respondents reported using an interpreter via video most frequently (mean 3.99 out of 5). **Table 3** shows mean scores for questions asked (i.e., attitudes, barriers, need, and use of interpreters) comparing

between residents and each faculty subgroup (outpatient, inpatient, ED). Overall, respondents across all settings reported using interpreters to perform most job tasks (mean >4 out of 5 for most job tasks). However, reported use of interpreters for engaging in small talk was low across all settings. Respondents endorsed positive attitudes about interpreters across all settings (mean >3 out of 4). Also across all settings, respondents endorsed availability of interpreters as a major barrier to interpreter use: 85% [74, 95] in outpatient settings, 85% [66, 100] in inpatient settings, 75% [50, 100] in the ED, and 95% [89, 100] among residents.

Table 2. Proper and Improper Interpreter Use by All Respondents

Means of Communication	Mean (1 = Never, 5 = Always)
Proper Interpreter Use	
In-person interpreter	2.84
Interpreter via telephone	2.90
Interpreter via video technology	3.99
Improper Interpreter Use	
An adult family member/close relative translates	2.21
A child translates (ex. the patient or a sibling)	1.51
An additional staff member translates	2.00

Validity Analysis

Table 4 provides raw average responses to each question, as well as the loadings which represent the common association between response to one question and all other questions by the same individual. Loadings for improper services were all negative and significant (all improper services loadings, $p < 0.05$), suggesting across specific actions, respondents who reported using one improper service tended to report using all improper services. The loadings were positive and significant for questions about telephone and video ($p = 0.0019$), but the loading for in-person interpreters was smaller, negative, and nonsignificant ($p = 0.1850$). This may reflect how in person interpreters are less available than phone or video interpreters. There was a nonsignificant association between greater need for interpreter services and reported use of other interpreter service (loading = 0.08, $p = 0.5982$). There was

Table 3. Interpreter Utilization, Attitudes, and Barriers

Mean [95% CI]	Outpatient Faculty	Inpatient Faculty	ED Faculty	Residents
Job Tasks (1 = Never, 5 = Always)				
Collect medical history	4.4 [4.1, 4.7]	4.5 [4.1, 4.9]	4.5 [4.1, 4.8]	4.6 [4.4, 4.8]
Provide updates to family about care plan	4.4 [4.1, 4.6]	4.8 [4.5, 4.9]	3.9 [3.7, 4.2]	4.3 [4, 4.6]
Explain diagnosis and treatment plans	4.5 [4.2, 4.7]	4.8 [4.5, 4.9]	4.5 [4.1, 4.9]	4.6 [4.3, 4.8]
Provide discharge instructions and return precautions	4.4 [4, 4.6]	4.6 [4.2, 4.9]	4.3 [3.9, 4.6]	4.3 [4, 4.7]
Provide patient/parent education	4.5 [4.2, 4.7]	4.5 [4, 4.8]	4.1 [3.8, 4.4]	4.4 [4.1, 4.7]
Have supportive conversations	4.2 [3.9, 4.4]	4.4 [4, 4.8]	3.8 [3.5, 4.2]	4.1 [3.7, 4.5]
Small talk	3.2 [2.7, 3.6]	2.8 [2.2, 3.3]	2.5 [2.2, 3]	2.9 [2.6, 3.3]
Attitudes About Interpreters (1 = Not at All, 4 = To a High Degree)				
Interpreters increase involvement in care	3.9 [3.8, 4]	4 [4.0, 4.0]	4 [4.0, 4.0]	4 [4.0, 4.0]
Interpreters improve safety	3.9 [3.8, 4]	4 [4.0, 4.0]	4 [4.0, 4.0]	3.9 [3.8, 4]
Interpreters improve patient/provider relationship	3.8 [3.6, 3.9]	3.9 [3.7, 4]	4 [4.0, 4.0]	3.9 [3.7, 4]
Barriers				
Interpreter availability (%)	85 [74, 95]	84 [66, 100]	75 [50, 100]	95 [89, 100]
It takes too long to find an interpreter (%)	45 [29, 60]	55 [32, 78]	69 [42, 91]	70 [54, 84]
Visit takes too long with an interpreter (%)	38 [25, 53]	16 [0, 36]	8 [0, 21]	25 [12, 42]
I am not sure how to use the interpreter service (%)	0 [0, 0]	0 [0, 0]	0 [0, 0]	3 [0, 9]
Family declined (%)	55 [40, 68]	50 [25, 75]	83 [64, 100]	73 [60, 86]
Frequency of Patients with LEP (1=Never, 4=Often)				
How often do you care for patients/families who have LEP in this setting?	3.7 [3.5, 3.8]	3.8 [3.5, 4]	3.9 [3.7, 4.0]	3.8 [3.7, 3.9]
Types of Interpreter Use (1=Never, 5=Always)				
Use in-person interpreter	3.0 [2.7, 3.4]	2.5 [2.2, 2.8]	3.6 [3.2, 3.9]	2.7 [2.5, 3]
Telephone	3.0 [2.7, 3.3]	2.8 [2.3, 3.3]	2.2 [1.8, 2.5]	3.1 [2.9, 3.4]
Video technology	3.9 [3.7, 4.1]	4.2 [3.8, 4.5]	3.8 [3.6, 4.1]	4.1 [3.9, 4.2]

Table 4. Validity Analysis Results

M	LL	UL	Loading	Question
General				
3.77	3.62	3.88	0.08	How often do you care for patients/families who have a preferred language other than English in this setting? (1 = never, 4 = often)
Proper Services				
2.84	2.51	3.18	–0.20	In person interpreter (1 = never, 5 = always)
2.90	2.56	3.23	0.21	Interpreter via telephone (1 = never, 5 = always)
3.99	3.68	4.26	0.37	Interpreter via video technology (1 = never, 5 = always)
Improper Services				
2.21	1.92	2.54	–0.38	An adult family member/close relative translates (1 = never, 5 = always)
1.51	1.31	1.76	–0.53	A child translates (ex. The patient or a sibling; 1 = never, 5 = always)
2.00	1.72	2.31	–0.25	An additional staff member translates (1 = never, 5 = always)
Unclear				
1.77	1.53	2.06	0.04	I speak my patient's language (other than English; 1 = never, 5 = always)
2.46	2.15	2.79	0.29	I use written materials in the language in question (1 = never, 5 = always)
2.00	1.73	2.31	0.21	I use web–based translation tools on the computer or phone (ex. Google translate, app for translation; 1 = never, 5 = always)
Barriers				
89%	83%	94%	0.34	Availability of interpreters
60%	52%	69%	0.20	It takes too long to find an interpreter
26%	19%	34%	0.12	Visit takes too long with an interpreter
2%	0%	5%	–0.35	I am not sure how to use the interpreter service
64%	56%	72%	–0.13	Family declined interpreter

also minimal association between speaking the patient's language and use of other interpreter service (loading = 0.04, p = 0.8162). Reported use of written materials and web-based materials was associated with greater reported use of proper interpreter services usage (p = 0.0394). Among barriers, loadings did not demonstrate evidence of much meaningful concordance between barriers (i.e., p >0.05 testing the null hypothesis of no association between barriers). This suggests barriers were more unique to individuals, rather than showing a pattern where some people experience many barriers and others experience few barriers, which could represent a systematic problem with access.

Comparison between Settings and Providers

Table 5 provides estimated, scaled, reported use by respondent type and setting. Residents and faculty differed significantly when reporting use of improper services in an outpatient setting (p = 0.0156; **Figure 1**). Faculty in outpatient settings reported below average use of improper services (M = –0.35, 95% CI [–0.56, –0.14]), whereas residents in outpatient settings reported slightly above average use of improper services (M = 0.11 95% CI [–0.19, 0.41]). Additionally, a similar pattern was demonstrated in outpatient settings for the number of reported barriers (faculty: M = –0.12 95% CI [–0.28, 0.03]; residents: M =0.11 95% CI [–0.10, 0.32]) but this was not significant (p = 0.0822).

Figure 1. Ratings of Improper Services by Setting

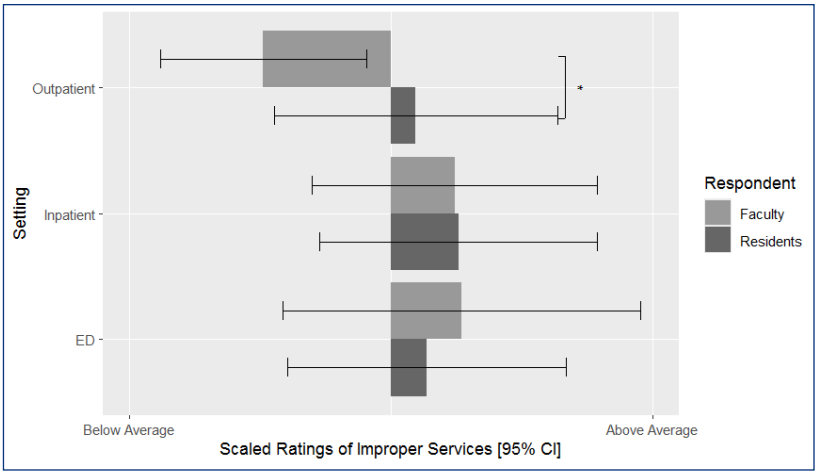

Table 5. Comparison between Settings and Providers

Measure	Faculty Mean [95% CI]	Residents Mean [95% CI]	Difference	t (80)	p
Outpatient Settings					
Proper Services	–0.10 [–0.28, 0.08]	0.07 [–0.18, 0.32]	0.17	1.05	0.2969
Improper Services	–0.35 [–0.56, –0.14]	0.11 [–0.19, 0.41]	0.46	2.47	0.0156
Speak Patient Language	–0.16 [–0.46, 0.13]	0.02 [–0.38, 0.43]	0.19	0.72	0.4736
Written Materials	–0.21 [–0.51, 0.10]	–0.15 [–0.58, 0.27]	0.05	0.19	0.8498
Web-Based Translation	–0.55 [–0.85, –0.25]	–0.20 [–0.62, 0.21]	0.35	1.32	0.1906
Barriers	–0.12 [–0.28, 0.03]	0.11 [–0.10, 0.32]	0.23	1.76	0.0822
Inpatient Settings					
Proper Services	–0.05 [–0.31, 0.20]	0.18 [–0.07, 0.43]	0.23	1.30	0.1973
Improper Services	0.27 [–0.02, 0.57]	0.22 [–0.07, 0.50]	0.05	0.26	0.7955
Speak Patient Language	–0.08 [–0.48, 0.33]	0.12 [–0.28, 0.52]	0.20	0.68	0.4985
Written Materials	–0.11 [–0.53, 0.31]	0.19 [–0.22, 0.60]	0.30	0.99	0.3252
Web-Based Translation	–0.02 [–0.43, 0.40]	0.38 [–0.02, 0.79]	0.40	1.34	0.1840
Barriers	–0.11 [–0.33, 0.10]	0.11 [–0.10, 0.32]	0.22	1.46	0.1482
ED					
Proper Services	–0.07 [–0.39, 0.24]	0.03 [–0.22, 0.28]	0.10	0.50	0.6184
Improper Services	0.17 [–0.20, 0.54]	–0.06 [–0.34, 0.23]	0.22	0.94	0.3500
Speak Patient Language	0.16 [–0.36, 0.67]	0.13 [–0.27, 0.53]	0.03	0.08	0.9364
Written Materials	0.16 [–0.37, 0.70]	0.34 [–0.08, 0.75]	0.22	0.51	0.6115
Web-Based Translation	0.58 [0.05, 1.11]	0.48 [0.07, 0.88]	0.10	0.31	0.7574
Barriers	–0.06 [–0.33, 0.20]	0.15 [–0.06, 0.36]	0.22	1.22	0.2260

DISCUSSION

In this study, we assessed interpreter use among residents and faculty in a pediatric academic hospital, across different hospital settings. Overall, we found that both experienced providers and trainees across multiple settings in a pediatric academic hospital understand the importance of proper interpretation in medical settings, as evidenced by high ratings for the benefits of interpreter use in multiple aspects of patient care. However, they continue to face barriers such as availability. Together, these findings suggest that increased provider training alone is not enough, and instead there is a need for increased access to interpreters in all settings to ensure proper communication with patients and families who speak languages other than English.

On average, providers reported using interpreters via video more often than other means of communication. This is consistent with studies that have documented providers' preference for video over phone interpretation.[18,19] In one study comparing video and phone interpreter use in a pediatric ED, video use was associated with significantly increased professional interpretation for physicians and nurse practitioners.[20] Parents who received video interpretation also reported fewer lapses in interpreter use compared to phone.[21] Caregivers have also reported greater satisfaction with face to face interpretation, including in person and video interpreters, when compared to telephone interpreters.[22]

We also examined the need for interpreters and barriers to using interpreters within these groups. Although we found minor differences in reported training, interpreter use, and barriers, most results were similar across settings and provider level, indicating that improvements in availability of interpreters and addressing common barriers are needed system-wide. This need to improve availability and decrease barriers is consistent with the literature, which describes low rates of professional interpreter use by residents treating patients who are hospitalized.[23] One study examining interpreter use among residents in New Orleans found that interpreter use declined through a patient's hospitalization due to reported barriers of time, availability, and knowledge of interpreter services.[24] As there is limited research directly comparing resident and attending use of interpreters, this helps support the idea that interventions to increase interpreter use must be implemented across the board and not solely as an educational intervention for trainees.

Finally, we found that residents in the outpatient setting were statistically more likely to report improper means of communication than attendings in the outpatient setting. On

closer review, this seems to be driven by less use of improper means by attendings in the outpatient setting rather than more use by residents in the outpatient clinics as compared to when residents are in other settings. These findings are consistent with the hypothesis that residents face more barriers to proper interpreter service use, but it was unexpected that the only setting where this difference was demonstrated was in the outpatient setting. One explanation may be that outpatient attendings are in their familiar environment where they know what is available; for example, how to find a video device or call an interpreter. Residents, on the other hand, are spread across multiple settings and traditionally spend less time in outpatient settings.

NEXT STEPS

Further work is needed to investigate potential differences across outpatient settings, comparing primary vs. specialty clinics and hospital-based vs. off-site clinics. Prior research suggests that interpreter use in outpatient settings is low (40%)[25] and that, compared with English-speaking patients, non-English-speaking patients report inferior care experiences while inpatient.[26] However, there is little research comparing differences in interpreter use across different settings.

Identifying specific barriers to interpreter use by setting and provider level can help tailor strategies to improve interpreter use and ultimately improve care. A multidisciplinary quality improvement project in one pediatric ICU was found to be effective at increasing interpreter rate as well as time interpreting on phone and video.[27] Researchers employed a series of targeted interventions, including standardizing technology and device access, provider education, and creating accountability for interpreter use by providers, which shows that there is generally no single cause for lack of interpreter use in medical settings.

Our finding that providers rate interpreter use as less important for "small talk" warrants additional investigation. Small talk or social talk is often an important aspect of the medical encounter. In one ED-based study, 22% of provider talk fell into the category of relationship building, which included social talk, jokes, and laughter.[28] In a pediatric outpatient study, Wassmer et al found that 3% of provider talk was in the category of social talk, 4% for parents and 19% for child talk.[29] Nurses in particular may rely on small talk.[30] Although efficiency is important, providers' inability to use small talk to build rapport with their patients and families may affect provider-patient relationships and, ultimately, trust and adherence to care plans. An exploratory analysis of small talk in interpreted encounters in a hospital showed that small talk helps both patients and providers in similar ways as those reported in visits without an interpreter; namely, supporting interpersonal relationship-building, establishing trust and achieving healthcare goals.[31]

Language concordance between provider and patient can limit the barrier to social talk. However, Daggett et al found that mean trust scores were similar for providers who spoke the patient language and professionally trained interpreters, showing that trust and relationship-building need not be compromised if there is language discordance.[32] Further research is needed to identify how to incorporate small talk into interpreted visits in a way that improves rapport while preserving efficiency.

Additionally, it is important to examine why patients or their families decline interpreters. Reasons may include concerns about confidentiality when the interpreter lives in the community, long wait times for interpreter services, stigma surrounding needing an interpreter, or discussion of sensitive topics.[33] A deeper understanding and awareness of these reasons may better support providers in offering different options for interpreter services.

Finally, future research should include other healthcare provider groups such as nurses, medical assistants and secretaries. In a study examining interpreter use among hospitalized patients, Schenker et al reported a significantly lower rate of professional interpreter use in nurse encounters when compared with interpreter use in physician encounters.[34] Our attempt to include nurses in our study was unsuccessful as evidenced by the low rate of survey completion. Further work is needed to engage all team members in research to understand unique barriers these groups may face in providing proper interpretation.

Limitations

There are several limitations to this study, including small sample size, single institution, self- report, and lack of distinction between specialty and primary care for outpatient settings. Because the exact number of nurses on email lists and setting type for faculty on the lists are not known, response rates for nurses and for faculty by setting were unable to be calculated. The study only included providers and did not include patient perspectives, which are important to further understand barriers, patient preferences, and reasons for declining an interpreter.

CONCLUSION

In conclusion, this study found that residents and attendings understand the importance of proper interpretation in medical settings but continue to face barriers to using interpreters. These findings highlight the importance of proper interpreter use across all encounters with patients, from residents to attendings, in both outpatient and inpatient settings. Future research is needed to further identify and address these barriers when caring for patients who speak a language other than English.

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Authors

Elizabeth Stone, MD, is a pediatrician at Brown University Health Waterman Pediatrics in East Providence, RI. She was a pediatric resident at Hasbro Children's Hospital at the time this research was conducted.

Shuba Kamath, MD, MPH, is an attending pediatrician at Hasbro Children's and an associate professor in the Department of Pediatrics at The Warren Alpert Medical School of Brown University in Providence, RI.

Allison Heinly, MD, is an attending pediatrician at Hasbro Children's and an associate professor in the Department of Pediatrics at The Warren Alpert Medical School of Brown University in Providence, RI.

Joshua Ray Tanzer, PhD, is a biostatistician at Brown University Health BERDI in Providence, RI.

Miranda Triedman is a medical student at The Warren Alpert Medical School of Brown University in Providence, RI.

Delma-Jean Watts, MD, is an attending pediatrician at Hasbro Children's and an associate professor in the Department of Pediatrics at The Warren Alpert Medical School of Brown University in Providence, RI.

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Correspondence

Delma-Jean Watts, MD
593 Eddy Street, Lower Level
Providence, RI 02903
401-444-4471
Fax 401-444-5437
delma-jean_watts@brown.edu

Improving Health Equity Training with an Integrated Simulation-Based Curriculum

CASSANDRA MACKEY, MD; SIMI JANDU, MD, MEd; JAZMIN HAMPTON, MD, DrPH, MPH; JAMES FIDROCKI, MD; JENNIFER CAREY, MD

ABSTRACT

INTRODUCTION: Socioeconomic and environmental factors play a significant role in shaping an individual's overall health. Despite longstanding recommendations to integrate cultural competency and multidisciplinary training, health equity remains underemphasized in US medical schools. The Emergency Medicine (EM) clerkship is ideal to address this gap, given the diverse Emergency Department (ED) patient population.

METHODS: A health equity curriculum was integrated into clerkship simulations. Using the AAMC Core Entrustable Professional Activities (EPA), a score was assigned between 1–4 based on a scaled evaluation of students' ability to incorporate responses appropriate to age, gender, race, religion, disabilities, and/or sexual orientation into patient encounters. Beginning and end-of-rotation simulation were compared pre- and post-implementation using t-tests. Students were surveyed regarding experiences at the end of the rotation.

RESULTS: Mean scores were similar pre-implementation (2.48 vs 2.46; not significant). Post-implementation mean scores increased from 2.5 to 3.3 ($p<0.01$). Baseline scores were similar pre- and post-implementation, while end-of-rotation scores improved ($p<0.01$). Fifty-six students participated in the health equity curriculum; evaluations were sent to all students with an 87.5% response rate; 83.7% agreed or strongly agreed it helped build knowledge, 85.7% agreed or strongly agreed it improved patient care skills, and 89.8% agreed or strongly agreed that topics were relevant to future clinical practice.

CONCLUSION: Incorporating a focused health equity curriculum into EM clerkship simulations is feasible, impactful, well-received by students, and improved EPA scores. The curriculum equips learners with tools that can be applied to real-world patient care, which may enhance the physician-patient experience.

KEYWORDS: Health Equity; Simulation; Emergency Medicine; Clerkship; Undergraduate Medical Education

INTRODUCTION

Healthcare disparities persist in the United States despite decades of recommendations from national organizations for medical school curricula to prepare students to recognize and address bias and deliver culturally and structurally competent, equitable care.[1-4] Despite accounting for 50% of an individual's overall health, socioeconomic and environmental factors are often not prioritized or absent in medical school's core curricula.[5] Patients of racial and ethnic minorities report experiencing biases when seeking medical care. Evidence shows that perceived biases negatively impact clinical encounters, reducing patients' trust in their physician and decreasing the likelihood that they will follow treatment recommendations, leading to worse health outcomes.[6-10]

Neglecting health equity training in medical education prevents the next generation of physicians from gaining the knowledge and tools they need to address factors that drive health disparities. This gap in students' knowledge can negatively influence patients' health and perpetuate disparities.[11] Educational approaches and curricular integration vary widely; a scoping review showed heterogeneity in the content, structure, and duration of social determinants of health (SDOH) curricula and found that students preferred interactive, experiential learning over traditional classroom-based methods.[12] Across the country, few Emergency Medicine (EM) clerkships report focused training in SDOH in their core curricula.[13] Yet, the Emergency Department (ED) is a safety net for many patients, and EM physicians often care for community members with limited to no other health care access.[14] The importance of health equity training in EM is outlined by studies showing differences in implicit race bias. One study found discrepancies in the administration of opioid analgesics in ED management of pain, with non-Hispanic White patients receiving higher doses than other racial and ethnic groups.[15] These pro-White implicit biases even permeate to treatment of life-threatening conditions; studies looking at acute coronary syndromes in patients diagnosed with STEMI found that a non-White race was associated with increased likelihood of not undergoing percutaneous coronary intervention (PCI).[16,17]

There is evidence supporting the use of simulation to teach, diversity, equity and inclusion (DEI) concepts within

EM residency programs.[18] To our knowledge, no published literature to date describes an EM clerkship curriculum that uses simulated clinical encounters with structured debriefing to develop learner skills in identifying and addressing health inequities. To address gaps in this area, we developed and implemented a simulation-based curriculum that provides targeted education and hands-on practice in delivering care that is diverse, equitable, inclusive, and patient-centered. Simulation is a widely used training method across undergraduate and graduate medical education that provides a safe, realistic environment for learners to build knowledge, skills, and attitudes, and effectively enhances learner competence and confidence.[19]

METHODS

Study Design and Curriculum

EM physicians trained in simulation, education, and health equity used the Kern's 6-step approach to curriculum development. The existing simulation curriculum for the course was reviewed and modified to meet the following objectives: (1) teach students to understand the multidisciplinary nature of health equity, (2) demonstrate patient-centered interview skills, (3) identify barriers to health delivery in the clinical setting (including biases), (4) advocate for patients experiencing health inequalities, and (5) understand how SDOH impact clinical encounters in the ED. We identified areas in the current curriculum that could be modified and updated the cases to include: medication non-adherence due to financial barriers, patient accompanied by a same-sex partner, high-fidelity mannequin with a dark skin tone, and trained medical interpreters for non-English speaking patients. Students received formative feedback during the debriefing sessions from course faculty, simulated patients, and medical interpreters. All students participated in the weekly simulations pre- and post-implementation of the new curriculum; the course was modified to incorporate the SDOH as denoted above. The learning occurred during the simulation and the debrief, which was guided by simulation-trained faculty, with the added benefit of the trained standardized patients and interpreters providing real-time feedback.

Subjects

Fourth-year students at UMass Chan Medical School enrolled in a required four-week EM clerkship during the study period were included in the study. All participants were blinded to the study.

Curriculum Assessment

Outcomes measured were based on the Kirkpatrick's educational model levels: 1 (degree to which participants find the training favorable, engaging, and relevant), 2 (degree to which participants acquire the intended knowledge, skills, attitude, confidence, and commitment based on their participation in the training), and 3 (degree to which participants' behaviors change as a result of the training).[20]

Part 1. Assessment of Learners in Simulated Scenarios

Learners were assessed using the AAMC Core Entrustable Professional Activities (EPAs) for Entering Residency with the Physician Competency Reference Set (PCRS).[21] EPA 1 and PCRS Professionalism (P) 5 were used to evaluate if students' ability to "demonstrate patient-centered interview skills and their ability to incorporate responses appropriate to age, gender, culture, race, religion, disabilities, and/or sexual orientation".[21] There are four levels of achievement of learner behaviors, and teams were assigned a value of 1–4 based on their corresponding behaviors. Higher scores reflected greater demonstration of desired skills and behaviors, with level 1 representing behaviors requiring corrective response, and with level 4 indicating expected behaviors for an entrustable learner for entering residency.

Video review

Simulations were recorded and independently reviewed after the completion of the course by two education faculty, the clerkship director and simulation director. Each one was assigned a score for EPA1, P5 between 1-4 based on the categories for developing behaviors for published for effective communication, response to verbal and nonverbal cues, appropriate interactions surrounding age, gender, race, religion, disability, sexual orientation, and honoring autonomy. Scenarios from the beginning and end of the rotation were reviewed both pre- and post-curriculum implementation. Scores from the beginning versus end of the rotation were compared for the pre-implementation and post-implementation cohorts. T-test were used for comparisons using the statistical package SPSS v 29.0.2.0.

Part 2. Post-course Evaluations

Post-course evaluations were sent anonymously via REDCap using a unique link at the conclusion of the simulation curriculum, with a reminder sent one week later for non-responders. The survey asked students about their experiences with the health equity simulation curriculum and included both Likert scale and open-ended questions. Descriptive statistics were applied to the Likert scale responses along with thematic review for open-ended questions. For open-ended questions, two reviewers independently examined and categorized responses into codes to identify themes.

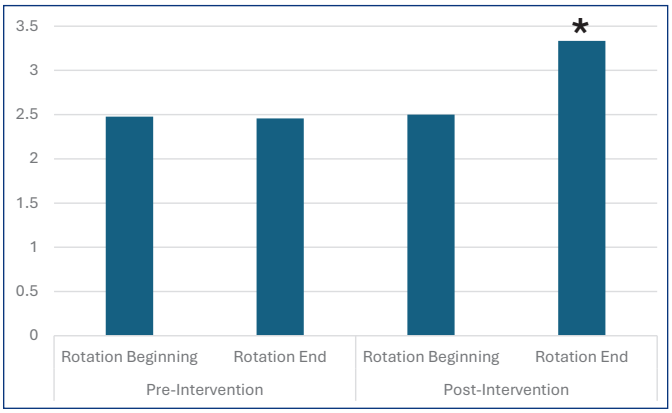
This study was reviewed by our institutional review board and determined to be exempt from full review.

RESULTS

Learner Assessment

Figure 1 shows pre- and post-implementation scores at the beginning of the rotation and end of the rotation. The pre-implementation of the curriculum, the mean score was 2.48 out of 4 at the beginning of the rotation versus 2.46 out of 4 at the end of the rotation, which was not statistically significant. During blocks when the curriculum was delivered, there was a significant difference in the scores with a mean of 2.5 out of 4 at the beginning of the rotation, which increased to 3.3 out of 4 by the end of the rotation (P<0.01). There was no significant difference between scores for the beginning of the rotation comparing pre- versus post-implementation. A difference was seen in scores at the end of the rotation when comparing pre-implementation versus post-implementation (P<0.01).

Figure 1. Simulation EPA Pre- and Post-intervention Scores



Post-course evaluations

Fifty-six students enrolled in the clerkship during the study period. 49 students (87.5%) submitted the post-course evaluation. Among respondents, 83.7% agreed or strongly agreed that the curriculum helped build their knowledge in health equity; 85.7% agreed or strongly agreed that it helped improve patient care skills related to health equity topics; 83% reported that it introduced new material in health equity topics; 89.8% agreed or strongly agreed that topics were relevant to their future clinical practice; 79.6% agreed or strongly agreed that prepared for handling different topics in health equity in the clinical environment.Our review of the open-ended survey question identified two major themes surrounding SDOH and communication. Representative comments for these themes are highlighted in **Table 1**.

Table 1. Participant Responses to Health Equity Curriculum

Theme	Representative Comments
Social Determinants of Health	"Brought up good points about the idea of "non-compliant" patients and how we need to change language and think more about the socioeconomic determinants of health that might prevent patients from being able to take care of their health."
	"It will definitely make me think about social determinants of health in all patients."
	"Discussion of cost of medications."
Communication	"I learned better ways of communicating with patients in equitable ways."
	"I learned about talking to patients about their health outcomes with more of an open-minded view than just the textbook answer of you say this to this patient."
	"I really enjoyed having a sim with an interpreter - it was helpful to hear from an interpreter on what we can do better as physicians."
	"Taught me how to effectively utilize an interpreter with non-English speaking patients. Taught me to never assume the identity/relationship of whoever is accompanying the patient."

DISCUSSION

Simulation is a widely used educational tool for practicing difficult and life-threatening clinical scenarios. Exposure to more complex social themes through simulation allows students to understand how navigating social scenarios an important part of effective clinical decision-making. By introducing a broader range of topics, such as LGBTQ+ health, language barriers, and limited economic resources, students had a safe space to explore their personal reactions to social differences, an important step in eliminating bias and improving patient care.

We found that adding this curriculum improved the student's EPA behaviors. There were similar baseline performances comparing pre- and post-curriculum implementation scores at the beginning of the rotation. Among blocks during the pre-implementation period, there were no significant changes from the beginning to the end of the rotation, while in contrast, during blocks when the curriculum was delivered, scores increased significantly from the beginning to the end of the rotation. This suggests that the curriculum was associated with improved performance in EPA1, P5.

Results from student evaluations demonstrated that incorporating health equity topics in simulation was effective and well-received. Across evaluation domains, the strongest endorsement was for relevance to future clinical practice (89.8%), while preparedness for handling health equity topics in the clinical environment was slightly lower (79.6%), suggesting an opportunity for further improvement

in practical application. Students were satisfied with the diverse standardized patients they encountered during the simulation scenarios, and they reported that they acquired more knowledge about health equity that is relevant to their patient care. The addition of trained standardized patients and interpreters also allowed students to obtain real-time feedback on clinical interactions, including communication. Even though students had experience using medical interpreters during clinical encounters in the hospital setting, students reported that the scenarios with non-English speaking patients and feedback from the patient and the interpreters was particularly valuable. Overall, these findings indicate a positive perceived impact on students' knowledge, skills, and readiness to address health equity in patient care.

While we implemented several topics in health equity, there are numerous other topics that could be included as well in the future. Studying clinical impacts on patient perceptions is beyond the scope of this study; future studies can examine whether improved learner skills translate into measurable patient care outcomes. Next steps include refining the health equity simulation curriculum based on data and student feedback for upcoming clerkship blocks and adding additional cases to encompass broader topics in health equity.

Healthcare equity and consideration of SDOH are critical components of patient-centered care and medical education. While their importance is widely recognized, incorporation can be challenging and often minimized. It is feasible to incorporate a health equity emphasized curriculum into EM clerkship simulations. We believe this study demonstrates such a curriculum can provide learners with important tools needed in their careers during real life patient encounters and will lead to improved engagement as well as patient experience.

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Authors

Cassandra Mackey, MD, Assistant Professor, University of Massachusetts Chan Medical School, Department of Emergency Medicine, Worcester, MA.

Simi Jandu, MD, MEd, Assistant Professor, University of Massachusetts Chan Medical School, Department of Emergency Medicine, Worcester, MA.

Jazmin Hampton, MD, DrPH, MPH, University of Massachusetts Chan Medical School, Department of Emergency Medicine, Worcester, MA.

James Fidrocki, MD, Assistant Professor, University of Massachusetts Chan Medical School, Department of Emergency Medicine, Worcester, MA.

Jennifer Carey, MD, Associate Professor, University of Massachusetts Chan Medical School, Department of Emergency Medicine, Worcester, MA.

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Correspondence

Jennifer Carey, MD

jennifer.carey@umassmemorial.org

New HIV Diagnoses Among Hispanic/Latino Men Who Have Sex with Men, 2010–2024, Rhode Island

MEGHAN MACASKILL, MPH, MS; THEODORE MARAK, MPH; THOMAS BERTRAND, MPH; PHILIP A. CHAN, MD, MS; SUZANNE BORNSCHEIN, MD, MPH

BACKGROUND

Gay, bisexual, and other men who have sex with men (GBMSM) are disproportionately impacted by HIV in the United States. In 2022, an estimated 71% of new HIV infections were among GBMSM in the United States.[1] In Rhode Island, similar trends in GBMSM persist. Between 2020–2024 in Rhode Island, the rates of newly diagnosed cases of HIV among GBMSM have been substantially higher than among heterosexual men.[2] In 2024, the rate of HIV infection among GBMSM was 70 times higher than the rate of HIV infection among men who didn't report sex with men.[2]

Black/African American and Hispanic/Latino people are disproportionately impacted by HIV in the United States as well. In 2022, Hispanic/Latino people represented 20% of the United States population yet accounted for 33% of HIV diagnoses during the same year.[3,4] In Rhode Island, between 2020–2024, the rate of newly diagnosed HIV among the Hispanic/Latino population has steadily increased.[2] In 2024, the rate of newly diagnosed HIV among Hispanic/Latino was double the rate in 2020 and 6.7 times higher than the rate among the non-Hispanic White population.[2]

These racial and ethnic disparities are observed when we stratify race and ethnicity by HIV risk as well. Of the 26,750 estimated GBMSM diagnosed with HIV in the United States in 2022, 36% were Hispanic/Latino followed by 34% Black/African American, and 24% White.[1] Between 2018-2022, it is estimated that HIV infections decreased 10% overall among GBMSM, with considerable declines among Black/African American GBMSM (16%) and White GBMSM (20%), while HIV diagnoses among Hispanic/Latino GBMSM remained stable.[1] This paper aims to assess surveillance trends in Hispanic/Latino GBMSM diagnosed with HIV while living in Rhode Island and to provide a comprehensive snapshot of demographic data of this population.

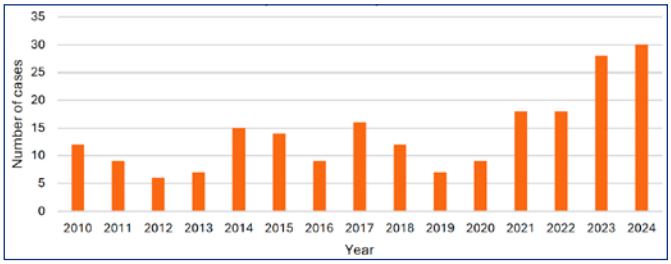
METHODS

Data reported to the Rhode Island Department of Health (RIDOH) for individuals diagnosed with HIV infection from 2010-2024 were analyzed. Confidential surveillance data was collected from various sources in Rhode Island, including reported HIV infections from medical providers and public and private laboratories. The surveillance data collected was entered into the National Enhanced HIV/AIDS Reporting System (eHARS) for routine monitoring and data analysis. Individuals were included in this analysis if they met the following inclusion criteria: 1) they were diagnosed with HIV in Rhode Island between 2010-2024, 2) their ethnicity was Hispanic and their transmission risk was GBMSM. In this analysis the GBMSM risk includes males who have had sexual contact with other males, and males who have had sexual contact with both males and females. People living with HIV who had both GBMSM and injection drug use risks were excluded from this analysis. Descriptive characteristics including age, country of birth, and residence at HIV diagnosis were examined. Data with counts <5 were redacted due to RIDOH's small numbers policy which prohibits counts of <5 to be published. All analyses were performed using SAS (version 9.4).

RESULTS

Between January 2010–December 2024, 210 (18.3%) of the 1,150 individuals that were diagnosed with HIV in Rhode Island were Hispanic/Latino GBMSM. As seen in **Figure 1**, between 2010-2019 the average number of Hispanic/Latino GBMSM diagnosed with HIV in Rhode Island was approximately 11 per year, followed by a noticeable increase in 2021, with 18 Hispanic/Latino GBMSM diagnosed. In 2022-2024, the annual counts of newly diagnosed Hispanic/Latino GBMSM continued to rise, exhibiting an upward trend and resulting in a 173% increase in cases by 2024 compared to the 10-year average from 2010–2019.

Figure 1. Number of Newly Diagnosed Cases of HIV Among Hispanic/Latino GBMSM, Rhode Island, 2010–2024; x-axis: year; y-axis: number of cases



During this 15-year timeframe, the median number of newly diagnosed cases of HIV was 70 per year. Due to lack of population estimates for Hispanic/Latino GBMSM in Rhode Island, rate data can't be calculated to assess the burden of HIV on this population. However, we can assess the percent of newly diagnosed cases of HIV who are Hispanic/Latino GBMSM to better understand if the observed increase in Hispanic/Latino GBMSM cases is proportional to an overall increase in cases in Rhode Island. **Figure 2** shows that between 2010–2024, Hispanic/Latino GBMSM accounted for an increasing percentage of all new HIV diagnoses in Rhode Island. While there is an upward trend observed between 2019–2024, it is in 2021 when the percentage of newly diagnosed Hispanic/Latino GBMSM begins to surpass previous years. This increasing trend continued to grow between 2022–2024.

Since Rhode Island's HIV surveillance data provides evidence for an increase in the number of newly diagnosed cases of HIV among Hispanic/Latino GBMSM in recent years, the remaining analysis aims to describe the Hispanic/Latino GBMSM population being diagnosed between 2020-2024. By age group, case counts of HIV diagnosis in Hispanic/Latino GBMSM varied substantially. As shown in **Figure 3**, newly diagnosed cases of HIV in Hispanic/Latino GBMSM in the 35–44, 45–54, and 55–64 age groups remained 5 or less cases per year during this five-year period. The majority of Hispanic/Latino GBMSM diagnosed with HIV were in the 15–24 and 25–34 age groups, with a clear upward trend in the 25–34 age group between 2020–2024. In 2024, there were 2.6 times as many Hispanic/Latino GBMSM aged 25–34 diagnosed with HIV as there were in 2020. The average age of HIV diagnosis in Hispanic/Latino GBMSM between 2020–2024 was 29.9 years old. **Figure 4** illustrates that the distribution of place of birth of 103 Hispanic/Latino GBMSM diagnosed with HIV infection during 2020–2024 was 44.6% born in the US and 50.5% born outside of the US. Among cities and towns with more than 15 reported HIV diagnoses from 2020-2024, Pawtucket, Woonsocket, and Providence had the highest percentages of HIV diagnoses among Hispanic/Latino GBMSM as detailed in **Table 1**. Ninety-seven percent of Hispanic/Latino GBMSM diagnosed with HIV between 2020–2024 resided in Providence County at the time of diagnosis. Hispanic/Latino GBMSM accounted for 28.2% of all persons diagnosed with HIV in Providence County between 2020–2024.

Figure 2. Percentage of Newly Diagnosed Cases of HIV that are Hispanic/Latino GBMSM, Rhode Island, 2010–2024; x-axis: year; y-axis: number of cases

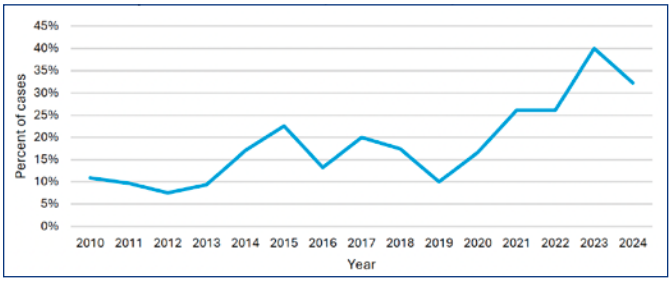


Figure 3. Number of Newly Diagnosed Cases of HIV Among Hispanic/Latino GBMSM, by Age, Rhode Island, 2020–2024; x-axis: year; y-axis: number of cases

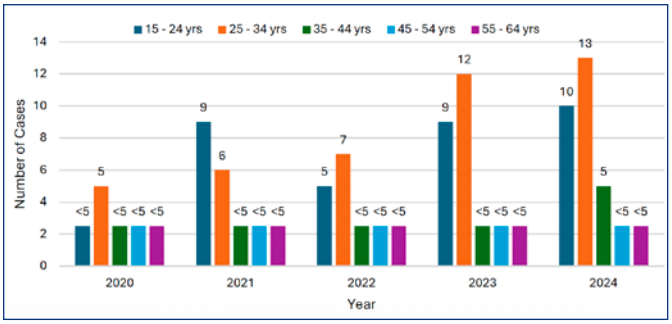


Figure 4. Place of Birth for Newly Diagnosed Cases of HIV Among Hispanic/Latino GBMSM, Rhode Island, 2020–2024

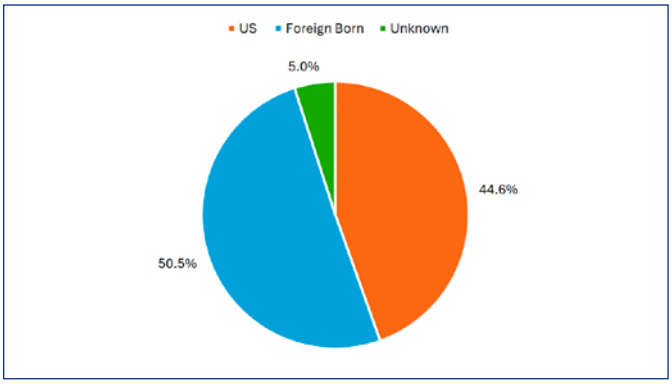


Table 1. Rhode Island cities/towns with the highest percentage of HIV diagnoses among Hispanic/Latino GBMSM, 2020–2024

	HIV Diagnoses Among Hispanic/Latino GBMSM (N)	HIV Diagnoses Among Hispanic/Latino GBMSM as Percent of Total HIV Diagnoses in City/Town (%)
Rhode Island Total	103	29.0%
Top Cities/Towns[1]		
Providence	44	32.8%
Pawtucket	14	35.0%
Cranston	10	28.6%
Woonsocket	8	33.3%
North Providence	8	29.4%

Among cities and towns with more than 15 total HIV diagnoses from 2020–2024.

DISCUSSION

Rhode Island observed a 34% increase in new HIV diagnoses in 2024, the first significant increase of new diagnoses in the past 15 years. Various epidemiological approaches were used at the time to determine if we were witnessing this increase because of ongoing rapid transmission or improved identification of longstanding infection. This identified a need for more rigorous analysis of subpopulations. Population reports on specific subpopulations impacted by HIV in Rhode Island are critical to deepening our understanding of local health disparities. While health departments often publish annual surveillance reports that include trends in HIV surveillance, they tend to report on more generalized surveillance data. This analysis identifies a growing trend in the number of Hispanic/Latino GBMSM being diagnosed with HIV in Rhode Island. Detailed review of demographic data reveals that Hispanic/Latino GBMSM being diagnosed with HIV are primarily between the ages of 15–34, reside in Providence County, and consist of both US-born and foreign-born individuals. The Massachusetts Department of Public Health (DPH) reports similar trends, noting the proportion of individuals diagnosed with HIV in Hispanic/Latinx GBMSM between 2014–2023 increased from 28% to 40%, while the proportion who identified as White (non-Hispanic) decreased from 47% to 33%.[5] Additionally, Massachusetts DPH found that 57% of Hispanic/Latinx GBMSM diagnosed with HIV infection between 2021–2023 in MA were non-US born,[5] which closely mirrors the place of birth breakdown in Rhode Island among Hispanic/Latino GBMSM newly diagnosed with HIV. These population reports provide evidence that there is a need for targeted public health interventions and equitable resource allocation to serve this community.

RIDOH currently implements a multifaceted HIV prevention approach that prioritizes community testing, PrEP promotion, and engagement in care for Hispanic/Latino GBMSM living with HIV. Communication campaigns in English and Spanish have been prioritized to include social media and ads in non-traditional settings reaching Hispanic/Latino populations. The HIV rapid-testing form used by RIDOH's community agencies was translated into Spanish, and additional local clinics where Spanish services are available were identified in 2024. RIDOH also recognized a need for welcoming clinicians who understand how to prescribe PrEP, provide non-stigmatizing care, and could help navigate financial or insurance obstacles. This led to the launch of RIDOH's PrEP Champions Network,[6] which can be found on our website in English and Spanish. RIDOH focused on recruiting culturally competent clinical partners and promotional efforts aimed at reaching this population and other at-risk groups with low PrEP uptake. Additionally, RIDOH has bilingual staff who offer partner services to all newly diagnosed people living with HIV and their partners, and has supplied Hispanic GBMSM with free condoms and rapid HIV test kits for them to distribute to members of their social networks.

One limitation of this analysis is that there was no available population estimates for Hispanic/Latino GBMSM living in Rhode Island. As a result, rates couldn't be calculated and used in comparing disease burden.

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Authors

Meghan MacAskill, MPH, MS, HIV Surveillance Manager, Center for HIV, Hepatitis, STD, and TB Epidemiology, RIDOH.

Theodore Marak, MPH, Surveillance and Field Services Lead, Center for HIV, Hepatitis, STD, and TB Epidemiology, RIDOH.

Thomas Bertrand, MPH, Chief, Center for HIV, Hepatitis, STD, and TB Epidemiology, RIDOH.

Philip A. Chan, MD, MS, Consultant Medical Director, Center for HIV, Hepatitis, STD, and TB Epidemiology, RIDOH.

Suzanne Bornschein, MD, MPH, Medical Director, Center for HIV, Hepatitis, STD, and TB Epidemiology, RIDOH.

Correspondence

Meghan MacAskill, MPH, MS
HIV Surveillance Manager
Rhode Island Department of Health
Meghan.MacAskill@health.ri.gov

Rhode Island Monthly Vital Statistics Report
Provisional Occurrence Data from the Division of Vital Records

VITAL EVENTS	REPORTING PERIOD		
	NOVEMBER 2025	12 MONTHS ENDING WITH NOVEMBER 2025	
	Number	Number	Rates
Live Births	809	10,804	10.2*
Deaths	911	10,625	10.0*
Infant Deaths	3	51	4.7#
Neonatal Deaths	3	36	3.3#
Marriages	428	6,814	6.4*
Divorces	177	2,520	2.4*

* Rates per 1,000 estimated population
# Rates per 1,000 live births

Underlying Cause of Death Category	REPORTING PERIOD			
	MAY 2025	12 MONTHS ENDING WITH MAY 2025		
	Number (a)	Number (a)	Rates (b)	YPLL (c)
Diseases of the Heart	192	2,345	213.7	2,842.5
Malignant Neoplasms	186	2,176	198.3	4,157.5
Cerebrovascular Disease	41	486	44.3	467.5
Injuries (Accident/Suicide/Homicide)	77	843	76.8	9,593.5
COPD	36	474	43.2	514.5

(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.

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.

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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

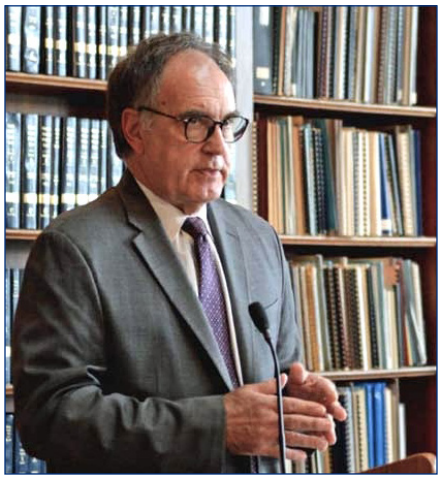
Includes $200,000 in funding to recruit and retain clinicians

Health center funding

Sustained investments in FQHCs and community health

Health services funding assessment

$30Mannually for primary care and other critical programs



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

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

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- **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**

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1776: Medical Care During the Revolutionary War

MARY KORR
RIMJ MANAGING EDITOR

The July 1976 issue of the *Rhode Island Medical Journal*[1] [**Figure 1**] celebrated America's Bicentennial, and presented articles on American medicine during the Revolutionary War. This month, in celebration of America's Semiquincentennial, the 250th anniversary of the signing of the Declaration of Independence, the 1976 issue is a trove of Rhode Island's medical history in 1776.

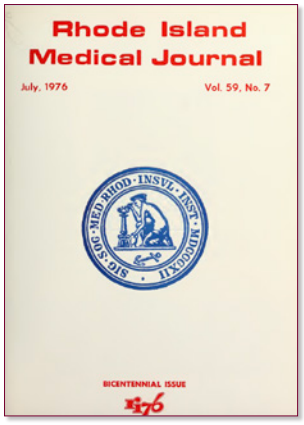


Figure 1. Cover of July 1976 RIMJ Bicentennial issue

CHARLES E. MILLARD, MD, presented the Fiske Fund dissertation 1976 in the issue, titled "Rhode Island Medicine in the Revolution." He wrote, "the Revolution brought to the soils of Rhode Island the armies of Great Britain, France, and Germany and the Continental Army, and to our coasts and seashores the navies of Great Britain and France and the Continental Navy."

He wrote that diseases that caused the most morbidity were diarrhea, dysentery, pneumonia, malaria, smallpox, typhus, and battle injuries, but at the time, "the cause and nature of no single disease was known. The medical men could pull teeth, set a fracture of a horse or man, excise a tumor, evacuate an abscess, probe and remove a ball."

However, Dr. Millard noted, smallpox, which had devastated so many troops of the Continental Army, had been handled sensibly by Rhode Island physicians. **DR. JONATHAN EASTON** of Newport inoculated three persons for smallpox in 1772, those being the first cases treated in Rhode Island. During the war, **ISAAC SENTER, MD**, inoculated a regiment in May 1776.

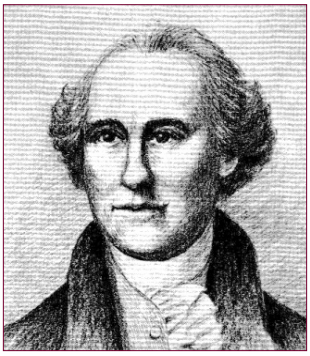
The article stated the only precision instrument was the watch used to check the pulse. There were no stethoscopes, no thermometers, no clinical laboratories. The American Revolution Institute contains images of the medical instruments used [**Figures 2,3**] in that time period.[2]

Figure 2. Leather case for the surgical kit owned by Dr. Justus Storrs (1756–1818), a surgeon's mate in the Connecticut Continental Line during the Revolutionary War. The red leather folding case has pockets inside for thirteen instruments, with a separate small leather case with pockets inside for four additional instruments.[2]

Medical training

The training of most medical officers was minimal in the 13 colonies. Dr. Millard wrote that of the 1,200 practitioners who served in the Continental Army as physicians, only 100 were doctors of medicine who had attended any university.

Charles E. Millard, MD



Isaac Senter, MD

Another article printed in the Bicentennial issue, from the AMA, titled "Highlights of 200 Years of Medicine,"[1] stated that there were 3,500 "legitimate medical practitioners in the thirteen colonies." Of these, less than 400 "possessed medical degrees. Most had been trained under the apprentice system." Surgery, the article noted, consisted mostly of the

amputation of injured arms and legs. "Many of the patients died of infection and loss of blood."

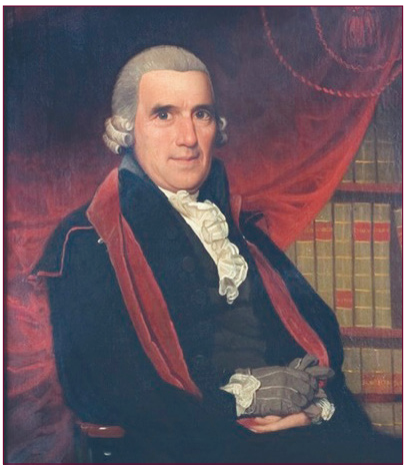
Dr. Millard wrote that the medical officers of the Continental Army were divided into two classes: the hospital physicians and regimental physicians and their "mates," or assistants. The hospital physicians were appointed by the Army surgeon-in-chief and were of a class "distinctly superior" to the regimental doctors. Their chief function was to accompany Army divisions and establish hospitals where there were large camps and military operations.

Figure 3. Five instruments of the surgical kit.[2]

Young RI physicians

Dr. Millard acknowledged the roles of Rhode Island physicians during the Revolution, and noted their young ages. "Consider that at the outbreak of the War in 1776 the age of the most prominent senior physician of this group, **DR. AMOS THROOP**, was 38, and the other distinguished surgeon of the day was 35-year-old **DR. JONATHAN ARNOLD**. **DR. PETER TURNER** was 24; both **SOLOMON DROWNE** and **ISAAC SENTER**, 22; **PARDON BOWEN**, 18; **LEVI WHEATON**, 14, and **STEPHEN GANO** and **STEPHEN RANDALL**, both 13!"

He wrote that Dr. Throop was the first president of the Rhode Island Medical Society, who "treated patients at an improvised barracks at Rhode Island College (now Brown)." He also extolled the contributions of **CALEB FISKE, MD,** whom he described as a "lineal descendant of Roger Williams who served as a surgeon in the army of the Revolution in General Sullivan's expedition against the British at Portsmouth."



Dr. Amos Throop

Dr. Solomon Drowne

Patriots

Dr. Millard concluded his article by paying homage to the Revolutionary physicians:

"Another important and decisive factor must have been the deep-seated patriotism which activated these medical men. These patriotic physicians were daily exposed to virulent germs and much greater danger than members of the fighting forces to whom they ministered. **DR. JAMES TILTON** aptly described this when he wrote: 'My brethren of the faculty will probably think it an important fact that more surgeons died in the American service than officers of the line; a strong evidence that infection is more dangerous than the weapons of war.'

"The conviction of these physicians that their independence was worth any sacrifice, hardship, or suffering is best exemplified in the diary of **DR. ISAAC SENTER**… 'the trials and tribulations suffered by these noble Americans could only be endured by those who firmly believed in Patrick Henry's oft quoted phrase, 'Give Me Liberty or Give Me Death.' "

This Spotlight feature is but a glimpse into the history of medicine in 1776 compilation published by RIMJ 50 years ago. The issue is especially relevant as America celebrates its 250th anniversary this month, nationwide and here in Rhode Island, whether it be at the WaterFire celebration or at the legacy Bristol Fourth of July Parade. Happy 250th Birthday America! ❖

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2027 State budget bill enacted

STATE HOUSE — After passage by the General Assembly in June, Gov. **DANIEL J. McKEE** signed the 2027 state budget bill (2026-H 7127Aaa), a balanced $15.2 billion plan that provides economic relief for Rhode Islanders, strengthens support for education and the state's hospitals and healthcare providers, and establishes new government reform efforts without any broad-based tax or fee increases.

The following items pertain to healthcare:

- Medicaid rates will be increased to fully implement the recommendations in the Office of Health Insurance Commissioner's (OHIC) September 2025 rate review in 2027. The governor had proposed spreading the increases over the next two years and capping rates at the Medicare rate, but implementing the $115 million in increased support completely in one year will better position the state financially for future years.
- Legislators have added $15 million over what the governor proposed for uncompensated care to the state's hospitals.
- The budget includes $22 million to help Rhode Islanders who either lost federal subsidies or became ineligible for Medicaid as a result of President Trump's H.R.1 to access affordable health insurance through Health Source RI.
- The budget allocates $1.6 million for the Newport Hospital Birthing Center to support continued operations.
- As part of a continuing effort to address the state primary care provider shortage, the budget includes $5 million in 2027 for startup costs for the proposed new medical school of the University Rhode Island.

Said Senate President **VALARIE J. LAWSON**, "This budget is a collaborative effort that includes many of the initiatives that the Senate has worked hard on this year, particularly in the area of helping Rhode Islanders access the healthcare they need. From funding the 988 crisis prevention line, to extending the Eat Well Be Well program that enables SNAP recipients to eat healthy food to enabling the funding of the Workforce Training Center at CCRI, this budget reflects our strong commitment to bettering the lives of Rhode Islanders. I'm thankful to our Senate Finance Committee and our colleagues in the House for their hard work and cooperative effort in crafting a budget that will move our state forward."

Said House Finance Committee Chairman **MARVIN L. ABNEY** (D-Dist. 73, Newport, Middletown), "This document is a product of significant collaboration between the House, the Senate and the governor's office, where we all came together to determine how to better the lives of every Rhode Islander. The budget invests in future success while also addressing the pressing concerns facing our state and its people. Times are tough for many and this budget addresses these issues while offering the support and investment that Rhode Islanders need and deserve." ❖

Bradley Hospital study shows teen cannabis use is linked to differences in developing brain regions

EAST PROVIDENCE — A new study from Bradley Hospital researchers shows that cannabis use during adolescence is associated with differences in brain regions involved in motivation and reward, which support healthy development.

The researchers found that teens who repeatedly used cannabis showed signs of reduced dopaminerelated neurophysiology, with higher-potency products showing more pronounced effects, suggesting that cannabis may interfere with the brain's reward system at a time of crucial development. Their findings were published in Neuropsychopharmacology.

"Adolescence is a critical window for brain development," said lead study author **SARAH A. THOMAS, PhD**, a clinical psychologist and research scientist at the Bradley Hasbro Children's Research Center and an Assistant Professor of Psychiatry and Human Behavior (research) at the Warren Alpert Medical School of Brown University. "Our findings suggest that repeated cannabis use during this period has the potential to alter the dopamine system in ways that could affect motivation, reward processing and vulnerability to addiction. The next step is understanding how this may change over time."

Approximately 10 to 20% of U.S. adolescents report using cannabis in the past year. Scientists know that the developing teenage brain is more sensitive to the effects of cannabis than the adult brain. Research has also shown that teens who use cannabis are more likely than adults to develop cannabis use disorder and to experiment with other substances in the future. One possible reason is that cannabis disrupts the brain's dopamine system—the network that helps regulate motivation, learning and reward.

In adults, THC, which is the main psychoactive ingredient in cannabis, can temporarily boost dopamine production. But longterm cannabis use may have the opposite effect, reducing the brain's ability to produce and release dopamine, although findings have been mixed. While this effect has been studied in adults, much less is known about how cannabis affects dopamine-related development in teenagers.

In a National Institute on Drug Abuse-funded study with 81 participants aged 14 to 17, the researchers assessed cannabis use quantity, frequency, and problems and used MRI to measure tissue iron in brain regions with high dopamine activity. Tissue iron is a necessary factor in the production of dopamine and naturally increases during adolescence as the dopamine system matures, making it a useful indicator of healthy development.

According to the researchers, this is the first study to examine how cannabis use in teens relates to tissue iron levels in the brain—a reliable, noninvasive marker linked to dopamine activity. These results, the researchers said, add to growing evidence that cannabis use during adolescence may have negative effects on the brain and highlight the importance of understanding how early use shapes longterm outcomes. ❖

Butler's Memory and Aging program participates in Phase 2 CELIA study advancing Alzheimer's research

PROVIDENCE — The Memory and Aging Program at Butler Hospital is proud to announce its participation in the phase 2 CELIA study evaluating diranersen (BIIB080), an investigational therapy targeting tau pathology in individuals with early Alzheimer's disease. Recently announced topline results from the international study demonstrated reductions in tau pathology and signals of cognitive benefit, representing an important milestone in Alzheimer's research.

The CELIA study is a Phase 2 trial evaluating diranersen, a tau-targeting antisense oligonucleotide therapy designed to reduce production of the tau protein, a key driver of Alzheimer's disease progression. According to Biogen, the study showed robust biomarker impact and cognitive benefit in early Alzheimer's disease.

STEPHEN SALLOWAY, MD, Founding Director of the Memory and Aging Program, served on the study steering committee and helped guide the development and execution of this important clinical trial.

"Alzheimer's disease remains one of the greatest challenges in medicine, and these findings represent meaningful progress for patients and families affected by the devastating disease," said Dr. Salloway. "We are proud to have contributed to a study that advances our understanding of therapies targeting tau pathology and their potential role in slowing disease progression."

The CELIA study enrolled more than 400 participants with mild cognitive impairment due to Alzheimer's disease or mild Alzheimer's disease dementia. The study evaluated three intrathecal doses of diranersen over a 76-week placebo-controlled treatment period. Researchers from clinical trial sites worldwide collaborated to evaluate the safety, tolerability, biomarker effects, and clinical effects.

"These types of collaborative studies are essential to accelerating progress in Alzheimer's treatment," said **EDWARD HUEY, MD**, Director, Memory and Aging Program, Butler Hospital. "We are grateful to the patients and the families who participated in this research and made these findings possible."

Participation in the CELIA study reflects Butler's ongoing commitment to advancing innovative research and expanding access to cutting-edge clinical trials for patients facing neurological diseases," said **MARY MARRAN**, President and Chief Operating Officer, Butler Hospital. "Research is central to Butler's mission of improving the health and future of the community."

Biogen has announced plans to advance diranersen into further development following the Phase 2 results. ❖

VA launches MDMA-assisted mental health therapy trial

Randomized, placebo-controlled trial will take place at VA Providence Healthcare System

WASHINGTON, DC — The U.S. Department of Veterans Affairs announced in May a new clinical trial to evaluate the safety and efficacy of methylenedioxymethamphetamine-assisted therapy, or MDMA-assisted therapy, for the treatment of severe mental health disorders, including posttraumatic stress disorder and alcohol use disorder.

VA's trial, titled "A Randomized Controlled Trial of MDMA-Assisted Therapy for PTSD and Alcohol Use Disorder in U.S. Veterans," will enroll approximately 80 Veterans and compare outcomes between those receiving MDMA-assisted therapy and those receiving identical psychotherapy with an active placebo. VA is coordinating with the U.S. Food and Drug Administration (FDA) and intends to share data from the trial with FDA.

"We need an all-of-the-above strategy when it comes to improving mental health treatments, and that's exactly what VA is working to deliver," said VA Secretary **DOUG COLLINS.** "This trial represents an important step in safely evaluating new approaches and innovations to treat Veterans with severe mental health conditions."

The randomized, placebo-controlled trial of MDMA-assisted therapy will take place at VA Providence Healthcare System, and Veterans will be recruited for the trial from the Providence, Rhode Island, campus and VA Connecticut Healthcare System in West Haven, Connecticut.

The health and safety of Veterans who choose to participate in this trial is VA's top priority. Investigational treatments will be delivered in a safe, controlled, clinical setting using pharmaceutical grade drugs under careful quality controls, stringent safety protocols that were developed with FDA, and in a setting that includes structured psychotherapy.

VA is involved in 19 other active clinical trials focused on psychedelic therapies for mental health conditions that are supported by more than $23 million in external funding. All VA research, including research into psychedelics, is conducted under strict safety protocols and in full compliance with federal guidelines.

Psychedelic drugs are a class of substances that alter consciousness or awareness and can be organically or synthetically produced. The FDA has granted breakthrough therapy designation to several psychedelic substances, including MDMA, psilocybin and LSD, allowing for expedited review of these drugs. Clinical use of these therapies outside of research will only be considered by VA once FDA approval is granted.

VA strongly discourages self-medicating or attempting to replace other mental health treatment options with psychedelics or any other unprescribed substances. Proven, evidence-based treatments, are currently available at VA facilities to treat Veterans with mental health conditions. Veterans should always consult their health care providers before making any treatment decisions.

The trial is registered with ClinicalTrials.gov (NCT07118839). ❖

Reed's law leads to FDA approving the first new sunscreen ingredient in 25 years

WASHINGTON, DC — The future of American sunscreen products just got a little brighter—and safer and more effective too, thanks in part to the Sunscreen Innovation Act, a law authored by U.S. Senator **JACK REED** (D-RI) to help companies avoid needless regulatory roadblocks.

For decades, European, Asian, and Australian consumers have had access to a wide variety of innovative, popular sunscreen products that are safe, effective, and more appealing to users than many sunscreens that are approved for use in the United States.

But now, thanks to Reed's Sunscreen Innovation Act, for the first time in over twenty-five years, the U.S. Food and Drug Administration (FDA) has approved a new sunscreen ingredient —bemotrizinol, or BEMT—that dermatologists and skin care experts say is a safer option than many chemical ingredients currently in use in the United States.

The FDA's approval of BEMT brings the list of approved active sunscreen ingredients in the U.S. to 17—a number that still lags behind the 30 approved for use in Europe, which have demonstrated a strong record of safety.

"After years of work it is great to see real progress being made when it comes to new sunscreens for American consumers. This is a major step forward that could help prevent countless cases of skin cancer and better protect Americans from sun damage," said Senator Reed. "It's still up to consumers to choose which sunscreen is right for them, but I am pleased to help ensure Americans have more safe, healthy, proven options."

Reed's years-long campaign for stronger sunscreen standards and labeling was designed to address a regulatory backlog that prevented U.S. consumers from having access to advanced, effective sunscreens that are widely available in the rest of the world.

Bemotrizinol has been used safely in sunscreens across Europe and Asia since 1999 under brand names including Tinosorb® S by BASF and Parsol® Shield by DSM. The ingredient has amassed a 27-year safety track record abroad, though some of those jurisdictions have weaker data requirements than the United States.

Sunscreens with BEMT are expected to be available for sale in the U.S. and on store shelves this month. According to the Associated Press, the Dutch-based company DSM Nutritional Products LLC will be the first company in the U.S. to sell BEMT-formulated sunscreen by manufacturer, Parsol Shield. The company has an 18-month exclusivity period, after which the other manufacturers may also use and market BEMT in their products.

The Environmental Working Group, a non-profit that champions effective sunscreen regulations, praised the FDA's long overdue move and said the approval of bemotrizinol offers a "landmark decision for public health and consumer protection."❖

Key committee advances Reed's bill to renew and improve national bone marrow, cord blood programs

WASHINGTON, DC — In a big step toward enhancing patient access to life-saving bone marrow and cord blood transplants, the Senate Committee on Health, Education, Labor and Pensions (HELP) recently unanimously voted to advance U.S. Senator **JACK REED**'s (D-RI) bipartisan bill, the Stem Cell Therapeutic and Research Reauthorization Act of 2026 (S.4109). This legislation will advance medical research, improve patient outcomes, and ensure that America's bone marrow transplantation program and the National Cord Blood Inventory can continue to save lives and provide treatments and therapies derived from adult stem cell lines.

Specifically, Reed's bill would reauthorize the National Marrow Donor Program (NMDP) and the National Cord Blood Inventory (NCBI), which contracts with the U.S. Health Resources and Services Administration (HRSA). The bill would renew, through 2031, federal programs for using bone marrow and umbilical cord blood to treat diseases and conduct research. It would make up to $280 million available, over a five-year period, pending appropriations, to help individuals diagnosed with diseases such as leukemia and lymphomas, sickle cell anemia, and rare genetic blood disorders and help them find suitable bone marrow or umbilical cord blood donors. Without Congressional action, these programs would expire at the end of the current fiscal year.

Approximately $115 million would be authorized for the National Cord Blood Inventory program which has cumulatively banked more than 122,500 cord blood units to be tapped for life-saving treatments.

The National Marrow Donor Program, which recently celebrated facilitating its 150,000 transplant, would be authorized at $165 million over five years. Donating stem cells through the NMDP can save the life of someone battling blood cancer or another serious disorder. The program provides the infrastructure necessary to find an unrelated donor match for patients who need a bone marrow or umbilical cord transplant to treat or cure blood cancers, like leukemia or diseases, like sickle cell disease.

"Thanks to sustained federal investment, advancements in innovative research have been amazing and we want to accelerate that progress by passing this bill and funding these life-saving programs. This bill will help patients and families in their time of need as they face unimaginable circumstances. It provides

direct support to these critical institutions that do incredible research, match donors and patients, help save live lives, and improve health outcomes," said Senator Reed. "Our bipartisan bill builds upon the highly successful National Marrow Donor Program that has been a lifeline for thousands of transplant patients over the last two decades. Bone marrow and cord blood transplants continue to offer effective treatments for a number of diseases and disorders. This bipartisan bill would help expand access to lifesaving therapies to patients with conditions that can be treated and even cured with bone marrow or cord blood."

Reed's bill is cosponsored by U.S. Senators **TIM SCOTT** (R-SC), **TINA SMITH** (D-MN) and **JAMES LANKFORD** (R-OK). Companion legislation (H.R.5160) has been introduced in the U.S. House of Representatives by Congressman **CHRISTOPHER SMITH** (R-NJ).

There are three ways to donate blood stem cells: through transplants of peripheral blood stem cells (PBSC), bone marrow, and umbilical cord blood that is donated after a baby's birth.

More information about the transplant process and need for stem cell and marrow donors is available at: www.bloodstemcell.hrsa.gov

Now that the Stem Cell Therapeutic and Research Reauthorization Act has been approved by the HELP Committee, it must be passed by the full U.S. Senate and the House before it can be sent to the president's desk to be signed into law. ❖

Whitehouse and Hawley introduce bipartisan legislation to support mental health needs of firefighters and EMTs

WASHINGTON, DC — U.S. Senators **SHELDON WHITEHOUSE** (D-RI) and **JOSH HAWLEY** (R-MO) recently introduced the Lifeline for First Responders Act, bipartisan legislation to better support the mental health needs of firefighters, EMS personnel, and emergency dispatchers.

"Rhode Island's firefighters and EMTs risk their lives to keep us safe during the moments we need them most, and they see a lot in the process," said Sen. Whitehouse. "It's a privilege to introduce bipartisan legislation today to honor our first responders with high-quality mental health care and help save lives."

"Our first responders put their lives on the line every day to serve the American people and keep them safe. Because of their bravery and sacrifice, they deserve the care and resources they need to continue to do their jobs to the best of their abilities. It is time for Congress to give back and prioritize the those who always put us first," said Sen. Hawley.

First responders experience higher rates of trauma and behavioral health conditions than the general population. On average, firefighters are more likely to die by suicide than in the line of duty, and 30 percent of first responders develop behavioral health conditions like PTSD or depression. Many volunteer and rural departments lack the resources to provide the confidential, evidence-based support these first responders need.

The Lifeline for First Responders Act would establish a new grant program through the Department of Transportation's National Highway Traffic Safety Administration's Office of Emergency Medical Services to fund these evidence-based services for emergency personnel. The bill would authorize $7.5 million a year to fund suicide prevention programs, peer support, and confidential counseling. Funding would also support family services, training to identify and respond to mental health crises, and technical assistance for fire departments, EMS agencies, and 911 dispatch centers building wellness programs.

Lifeline for First Responders Act is endorsed by the Rhode Island Association of Fire Chiefs, the Rhode Island State Association of Fire Fighters, the National Alliance on Mental Illness, the National Association of Emergency Medical Technicians, the International Association of Fire Chiefs, and the International Association of Fire Fighters.

"As fire chiefs, we have attended far too many funerals and have seen good firefighters leave the profession because of PTSD and depression. Firefighters and their families must have access to counseling and psychological support. Senator Whitehouse's bill aims to do just that," said Chief **RICHARD SUSI**, Executive Director of the Rhode Island Association of Fire Chiefs. "With the help of the Lifeline for First Responders Act, departments could implement suicide prevention programs, enhanced peer support teams, confidential counseling, and family support services that our first responders desperately need."

"We are so appreciative and supportive of Senator Whitehouse's Lifeline for First Responders Act. Investing in the mental health of our nation's firefighters, first responders, and EMS workers is critical and intricately connected to the health and safety of our nation at large," said **JOSEPH A. ANDRIOLE**, President of the Rhode Island State Association of Fire Fighters. "The men and women across this nation who are called upon on a daily basis to mitigate the tragic effects of emergencies deserve the protection and support that this legislation will provide for them to remain healthy and to continue to serve."

The Lifeline for First Responders Act is cosponsored by U.S. Senators **AMY KLOBUCHAR** (D-MN), **ANGUS KING** (I-ME), **ADAM SCHIFF** (D-CA), **CHRIS COONS** (D-DE), **RICHARD BLUMENTHAL** (D-CT), **MARK KELLY** (D-AZ), **MICHAEL BENNET** (D-CO), and Jeanne Shaheen (D-NH).

Sens. Whitehouse and Hawley previously worked together to pass and reauthorize the Supporting and Treating Officers in Crisis (STOIC) Act to expand support resources for law enforcement officers.

Full text of the bill is available here. ❖

FDA approves first single-dose generic treatment for influenza

SILVER SPRING, MD — The U.S. Food and Drug Administration recently approved the first generic of Xofluza (baloxavir marboxil) tablets, the first single-dose treatment for acute uncomplicated influenza and prophylaxis in patients 5 years of age and older.

"Today's approval marks a meaningful milestone for the treatment of influenza," said **IILUN MURPHY, MD**, Director of the Office of Generic Drugs in FDA's Center for Drug Evaluation and Research. "Expanding patient access to drugs and improving their ease of use are critical public health imperatives, particularly given that influenza alone accounts for millions of illnesses in the U.S. each year."

Generic baloxavir marboxil tablets may be used for:

- Treatment of acute uncomplicated influenza in patients 5 years of age and older who have been symptomatic for no more than 48 hours, and who are otherwise healthy or at high risk of developing influenza-related complications; and
- Post-exposure prophylaxis of influenza in patients 5 years of age and older following contact with an individual who has influenza.

Baloxavir marboxil tablets are contraindicated in patients with a known history of hypersensitivity reactions to baloxavir marboxil or any of its ingredients. Baloxavir marboxil carries warnings such as increased incidence of treatment-emergent resistance in patients less than 5 years of age.

The most common side effects include diarrhea, bronchitis, nausea, sinusitis, and headaches. Healthcare providers should review the full prescribing information for complete safety and dosing information.

In the U.S., nine out of 10 prescriptions filled are for generic drugs. Increasing the availability of generic drugs helps to create competition in the marketplace, which then helps to make treatment more affordable and increases access to healthcare for more patients. Learn more about the FDA Drug Competition Action Plan.

Xofluza is a registered trademark of Genentech, Inc. FDA approved Norwich Pharmaceuticals, Inc.'s application for generic baloxavir marboxil tablets. ❖

FDA broadens access to over-the-counter Naloxone nasal spray for opioid overdose

SILVER SPRING, MD —The U.S. Food and Drug Administration (FDA) recently approved another over-the-counter (OTC) intranasal naloxone product, Rextovy, a 4 milligram (mg) naloxone hydrochloride nasal spray for the emergency treatment of opioid overdose. Consumers may directly purchase this product without a prescription in places such as pharmacies, convenience stores, and online. This action aligns with a federal effort to address the U.S.' addiction and substance use disorder crisis and coordinate the government's approach to prevention, treatment, and long-term recovery.

"Reducing opioid overdose deaths is a top priority for FDA," said **MIKE DAVIS MD, PhD**, Acting Director of the Center for Drug Evaluation and Research (CDER). "Today's approval of an additional over-the-counter naloxone nasal spray helps broaden access and offers an additional option for consumers. Empowering people without medical training to take immediate action with these products has been proven to save lives."

Naloxone is a medication that rapidly reverses the effects of opioid overdose and is the standard treatment for opioid overdose. Rextovy is an additional life-saving medication approved by the FDA to reverse an opioid overdose to be sold directly to consumers and contains the same active ingredient as other naloxone nasal sprays. The availability of multiple approved formulations expands access and market availability, encourages competition that may reduce cost, and offers alternative sourcing options.

The number of overdose deaths has dramatically decreased since the first FDA approval of an OTC naloxone nasal spray in 2023, but drug overdose persists as a major public health issue in the U.S., primarily driven by synthetic opioids like illicit fentanyl. In the 12-month period ending in August 2023, 111,451 overdose deaths were reported; in the 12-month period ending in December 2025, 68,632 overdose deaths were reported.

"Immediate access to naloxone nasal sprays is essential when a person is experiencing an overdose, and FDA remains committed to ensuring nonprescription options are widely available," said **KAREN MURRY, MD**, Director of the Office of Nonprescription Drug Products in CDER.

When using Rextovy, some people may experience symptoms when they regain consciousness following overdose reversal, such as shaking, sweating, nausea, or feeling angry. The product is safe to use even when it is uncertain whether opioids are present in the person's system. The product's packaging includes pictorial directions with five clear steps, including calling 911 after giving the first dose.

The FDA granted the nonprescription approval to Amphastar Pharmaceuticals, Inc. ❖

AMA adopts new policies to improve affordable access to obesity treatments and comprehensive care

CHICAGO — Physicians and medical students convened for the Annual Meeting of the American Medical Association's (AMA) House of Delegates recently and adopted new policies aimed at improving patient access to evidence-based obesity treatments while advancing broader efforts to address prescription drug affordability and insurance coverage barriers.

The new policies build upon longstanding AMA policy supporting affordable access to prescription medications, prescription drug price transparency, pharmacy benefit manager (PBM) oversight, and coverage parity for evidence-based obesity treatment.

Recognizing obesity as a complex chronic disease that often requires long-term management, physicians adopted policy supporting innovative payment arrangements that could help patients afford emerging anti-obesity medications (AOMs). The policy also supports pilot and demonstration programs to evaluate coverage models for obesity treatments, including glucagon-like peptide-1 (GLP-1) agonists and glucose-dependent insulinotropic polypeptide (GIP) therapies.

In addition, physicians called for long-term coverage policies that promote consistent drug pricing, formulary tier selection, benefit structures, and coverage criteria across private and employer-sponsored health plans to help reduce cost variability and treatment disruptions.

The new policy further supports equitable access to comprehensive obesity care, including disease management services, nutritional therapies, health promotion initiatives, and prevention interventions for patients with obesity and individuals at elevated risk.

"Obesity is a chronic disease that requires sustained, evidence-based treatment and comprehensive support," said AMA President **BOBBY MUKKAMALA, MD.** "As new therapies emerge, patients should not face insurmountable financial barriers to clinically appropriate care. These policies advance practical approaches to improving affordability, expanding access, and ensuring patients can receive the full range of services needed to achieve better long-term health outcomes."

The AMA also reaffirmed existing policy supporting affordable prescription drug access, greater PBM transparency and accountability, and efforts to lower prescription drug costs for patients.

In related actions, physicians also adopted additional new policies aimed at expanding access to and ensuring evidence-based obesity care that include:

Access, Affordability, and Safety of GLP-1 Receptors Agonists

The AMA will advocate for legislation and regulations for public and private health insurers to cover GLP-1 medications for obesity and type 2 diabetes at affordable prices, helping reduce patients' out-of-pocket costs. The policy also calls for appropriate screening for eating disorders, body image concerns, and weight history before these medications are prescribed. In addition, the AMA will advocate for greater pricing transparency and cost-control measures among drug manufacturers, insurers, and policymakers to improve access to evidence-based obesity and diabetes treatments.

Pairing Behavioral and Lifestyle Medicine Principles and Practices with GLP-1 and other Anti-Obesity Medications

The AMA supports insurance coverage, reimbursement, and sustainable payment models for clinician-led lifestyle intervention programs used alongside GLP-1 and other anti-obesity medications. The policy seeks to expand access for underserved, rural, and historically marginalized populations while making clear that patients should not be required to participate in a lifestyle program to receive medication coverage.

Parity in Pricing for Anti-Obesity Medications

The AMA opposes pharmaceutical manufacturer pricing arrangements that offer discounted anti-obesity medications exclusively through telehealth or online providers, citing concerns that such practices fragment care and undermine the patient-physician relationship.

Parity in Access to Evidence-Based Obesity Treatment

The AMA supports coverage parity for obesity treatment across public and private health plans, including medications, bariatric surgery, behavioral therapy, and nutrition services, while opposing insurer practices that restrict or terminate coverage based on weight-loss targets or body mass index thresholds rather than individualized clinical decision-making.

The costs for the patient and broader health care system associated with obesity, including the treatment of weight-related conditions and potential complications, can be substantial. The AMA believes it is crucial to recognize the urgency of addressing this disease comprehensively and proactively through a range of suitable treatments. The policies adopted today are an important step towards reducing barriers to the best course of treatment as determined by shared decision-making between patients and physicians. ❖

For adults with prediabetes, lifestyle intervention lowered risk of developing multiple chronic conditions

NIH-supported, long-term clinical trial found no difference between metformin and placebo

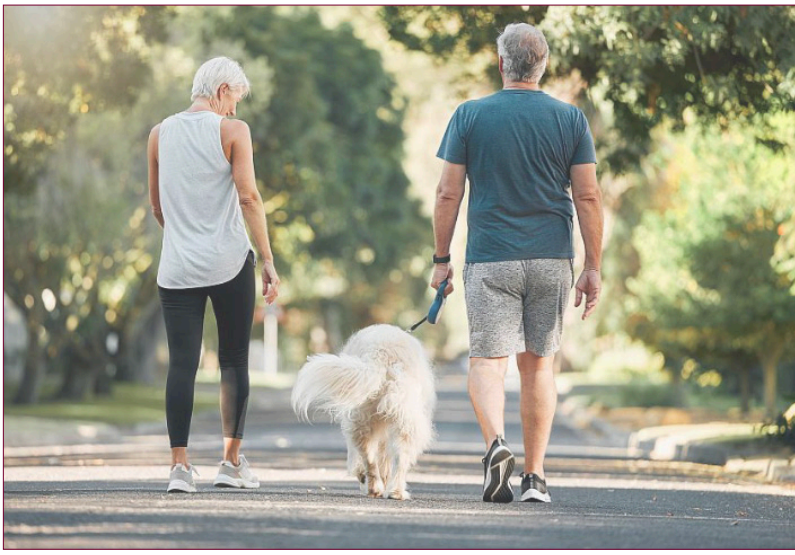
BETHESDA, MD — A clinical trial supported by the National Institutes of Health (NIH) found that adults with prediabetes assigned to a lifestyle intervention had a significantly lower risk of developing multiple chronic health conditions over time than those assigned to a placebo. This study, which followed participants for over two decades, also found that participants assigned to receive metformin did not experience a statistically significant reduction in multimorbidity risk. The findings, published in JAMA,[1] highlight the lasting benefits of lifestyle programs that may lower risk of the development of chronic conditions.

"Multimorbidity is a common issue, and few interventions have been found to prevent or delay developing multiple chronic conditions," said **MARCEL SALIVE, MD**, first author of the study, from NIH's National Institute on Aging (NIA). "Our work showing that healthy lifestyle intervention can significantly lower the burden of multimorbidity is a step forward in addressing this growing problem."

Previous research has shown that both metformin and lifestyle interventions have been successful in preventing or delaying diabetes and metabolic syndrome, but the researchers in this study wanted to determine whether these interventions could prevent or delay multimorbidity in addition to diabetes. The clinical trial was conducted in 27 sites in the U.S. and followed 1,173 participants who were at high risk of diabetes, were enrolled in Medicare, and consented to the linkage of their Centers for Medicare & Medicaid (CMS) claims. In the first part of the study, the NIH Diabetes Prevention Program (DPP), from 1996 to 1999, participants were randomly assigned to an intensive lifestyle intervention, metformin (a drug commonly used in the management of Type 2 diabetes), or placebo. They were then enrolled in the DPP Outcomes Study (DPPOS) and followed through 2021.

In the first part of the study, lifestyle participants were offered 16 individual sessions of interventions followed by monthly sessions for approximately two years. The behavior change program targeted reduced calories and fat and at least 150 minutes of physical activity a week to achieve greater than or equal to 7% weight loss from baseline. After DPP trial completion, all participants were offered the intensive lifestyle curriculum in groups during a six-month bridge period. During the outcomes study portion, all participants were offered quarterly group lifestyle sessions, and the original lifestyle participants received booster sessions twice annually.

By the end of follow-up, the researchers found that 85% of the study participants experienced two or more chronic conditions,



with 82%, 85%, and 87% experiencing multimorbidity among lifestyle, metformin, and placebo groups, respectively. Compared with the placebo group, participants in the lifestyle intervention had 21% lower risk for two chronic conditions and 25% lower risk for three chronic conditions. Participants assigned to metformin did not experience a statistically significant reduction in risk for multimorbidity. The study examined 15 chronic conditions commonly tracked in Medicare data, including hypertension, heart disease, stroke, arthritis, chronic kidney disease, COPD, cancer, depression, dementia, osteoporosis, and diabetes. These results persisted even when diabetes was taken out of the multimorbidity definition.

"These findings are highly encouraging, reinforcing that lifestyle programs focused on diet and exercise may persistently lower the risk of developing multiple chronic conditions, beyond diabetes," said **GRIFFIN P. RODGERS, MD**, Director of NIH's National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). "Furthermore, because lifestyle modifications can be safe and cost-effective, sustaining these healthy behaviors among people at risk of diabetes may help reduce not only the individual health burden, but also broader healthcare spending." ❖

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Researchers discover single-cell brain activity that underlies human speech

With neuronal data, AI models predicted grammar, meaning, and context of spoken sentences

BETHESDA, MD — By applying machine-learning models to single-cell brain recordings taken from humans in conversation, a National Institutes of Health (NIH)-funded research team identified both individual and collective neuronal activity that reflected key features of language. The work1 offers unprecedented insight into how neurons encode linguistic information, suggesting that brain activity may one day be used to infer speech-related thoughts, which could be transformative for some patients.

"This level of granularity is necessary for us to more completely understand how the brain generates speech and, ultimately, how we can develop technologies to restore it for individuals with communication disorders," said **DEBARA TUCCI**, MD, director of NIH's National Institute on Deafness and Other Communication Disorders (NIDCD).

The neuronal data came from microelectrode arrays implanted in eight patients for the separate purpose of epilepsy monitoring. The scientists, from Massachusetts General Hospital, Boston, made use of the opportunity by conducting and recording naturally flowing conversations in English, spanning a wide range of topics, with each of the study participants.

The researchers aligned transcriptions of the conversations in time with data describing the activity of hundreds of neurons in the frontotemporal cortex—a region the team previously linked to speech production. Then, wielding natural language processing models, they set out to uncover relationships between the datasets.

The authors found that neuronal recordings from just before participants spoke were predictors of many properties describing subsequent speech, across any topic of discussion. They detected a division of labor among the examined neurons, with some reflecting basic information, such as the meaning and roles of specific words, while others tackled more complex tasks including grouping phrases into structured sentences.

Their models could distinguish between similar phrases and words, suggesting the neuronal activity captured the unique context of sentences as well.

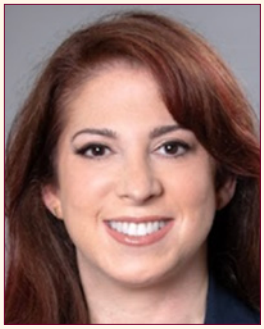
"For the first time we're describing processes not only at the regional but cellular scale that produce speech. Having identified these fundamental building blocks, we've set the table for us to begin answering some really interesting questions," said first author **JING CAI, PhD**, a researcher and instructor at Mass General.

These findings reveal how individual neurons encode language during speech, advancing our understanding of the brain's linguistic architecture. This knowledge could enable a new generation of technologies that translate neural activity into machine-generated speech beyond current capabilities. ❖

Reference

1. Jing Cai, et al. Mapping the neuronal building blocks of human language with language models. Nature. 2026. DOI: 10.1038/s41586-026-10691-5

Appointments



Heather A. Smith, MD, MPH, elected to American Medical Association Board of Trustees

CHICAGO — **HEATHER A. SMITH, MD, MPH**, an obstetrician-gynecologist from Rhode Island, was elected to the Board of Trustees of the American Medical Association (AMA), the nation's largest physician organization.

"I am honored by the trust my colleagues have placed in me to serve on the AMA Board of Trustees at a pivotal time for medicine," said Dr. Smith. "Physicians continue to face growing administrative burdens, workforce challenges, and barriers that threaten patient access to care. I look forward to working with physician leaders nationwide to strengthen our profession, improve patient care, and ensure the AMA remains a strong voice for physicians and the patients we serve."

Dr. Smith has held leadership roles in clinical practice and organized medicine at both the state and national levels where she has championed physician-led health policies to uphold the integrity of patient care

A member since 2002 of the House of Delegates, the AMA's policy-making body, Dr. Smith served as chair of the AMA Council on Legislation, helping advance federal and state policy solutions to key healthcare challenges.

A former president of the Rhode Island Medical Society, Dr. Smith led efforts to strengthen primary care, reduce administrative burden, and protect physician-led decision-making, guiding the organization through complex legislative and operational challenges.

In her clinical practice, Dr. Smith is a full-time academic OB-GYN and hospitalist at Women & Infants Hospital in Providence, RI, one of the nation's highest-volume obstetric centers, where she is director of OB-GYN quality and leads initiatives to improve health outcomes and reduce disparities in care.

Dr. Smith graduated from the University of Massachusetts Medical School and earned a master's degree from Boston University School of Public Health. She completed OB-GYN training at Brigham and Women's Hospital/Massachusetts General Hospital in Boston and the Robert Wood Johnson Foundation Clinical Scholars Program at Yale University in New Haven, Conn. ❖

Kelly E. Dooley, MD, PhD, MPH, appointed Chief of Medicine for Brown University Health and Chair of Medicine at Brown

PROVIDENCE — **KELLY E. DOOLEY, MD, PhD, MPH**, has been appointed Chief of Medicine for Brown University Health and Chair of Medicine and the Joukowsky Family Professor of Medicine at The Warren Alpert Medical School of Brown University, effective October 1, 2026. Dr. Dooley will succeed Louis B. Rice, MD.

Dr. Dooley currently serves as Professor of Medicine and Director of the Division of Infectious Diseases at Vanderbilt University Medical Center, where she has held multiple senior leadership roles. Prior to Vanderbilt, she spent more than a decade at The Johns Hopkins Hospital and Johns Hopkins University School of Medicine, serving as an attending physician, educator, and accomplished researcher focused on tuberculosis therapeutics with an emphasis on clinical trials of TB drugs and HIV/TB co-treatment.

As a widely respected leader in academic medicine and clinical research, Dr. Dooley has served numerous high-impact committees and advisory groups, including roles with the National Institutes of Health, the Centers for Disease Control and Prevention, and the World Health Organization. She is an elected member of the American Society for Clinical Investigation and serves on the Board of Directors of the American Society for Clinical Pharmacology and Therapeutics, among other professional organizations.

Her work has been recognized with multiple honors and awards for research, mentorship, and leadership, reflecting a career dedicated to advancing patient care, science, and physician development.

Dr. Dooley earned her medical degree from Duke University, her master's in public health in Epidemiology from the University of North Carolina at Chapel Hill, and her PhD in Clinical Investigation from the Johns Hopkins Bloomberg School of Public Health. She completed her internal medicine training at Johns Hopkins Hospital and is board-certified in internal medicine and infectious diseases. ❖

Appointments

Dellene Troy, DO, an interventional sports and spine physiatrist, joins University Orthopedics

PROVIDENCE — University Orthopedics announced the arrival of **DELLENE TROY, DO**, an interventional sports and spine physiatrist specializing in physical medicine and rehabilitation.

Typically treating patients 12 and up, Dr. Troy brings a patient-centered approach to diagnosing and treating a wide range of musculoskeletal and nerve-related conditions, with a focus on restoring function and improving quality of life through injections and other non-surgical options.

"As a physiatrist, my goal is to help people feel better and get back to what matters most to them," said Dr. Troy. "Whether that's golfing, swimming, or simply being able to pick up a grandchild, every patient has different goals—and I work with them to achieve those."

Dr. Troy specializes in identifying the root causes of pain, particularly in complex cases where symptoms may overlap or originate from multiple areas of the body. Patients often seek her expertise for conditions such as:

Neck pain
Back pain
Hip pain
Knee pain
Shoulder pain
Sciatica
Degenerative Disc Disease
Osteoarthritis

Her approach emphasizes minimally invasive, non-surgical treatments designed to relieve pain, restore mobility, and help patients avoid unnecessary procedures whenever possible.

"Expanding our access to advanced, non-surgical pain management is an important step in delivering truly comprehensive orthopedic care," said **EDWARD AKELMAN, MD**, President of University Orthopedics. "Dr. Troy's expertise allows us to help more patients find effective relief and, in many cases, avoid surgery while still achieving excellent outcomes." ❖

Philip Philips, MD, joins Southcoast Health

FALL RIVER, MA — Southcoast Health announced that it has welcomed nine new providers in June. Among them are **PHILIP PHILIPS, MD**, who earned his Bachelor of Arts in Biology from Brown University and his Doctor of Medicine from the Warren Alpert Medical School.

Dr. Philips completed his General Surgery Residency at Baystate Medical Center, an affiliate of the Tufts University School of Medicine. He then went on to complete his Fellowship in Laparoscopic Surgery at Rhode Island Hospital. He is a board-certified general surgeon with expertise in advanced wound care and brings decades of surgical experience to his patients.

He is committed to delivering evidence-based, patient-centered care. He believes in combining clinical precision with clear communication, education, and a strong partnership with each patient. His goal is to restore function, comfort, and dignity while helping patients understand their treatment and actively participate in their healing process.

Dr. Philips is fluent in both English and Malayalam and is dedicated to serving a diverse patient population with compassion and respect.

Outside of medicine, Dr. Philips enjoys high-fidelity audio and video, technology, movies, automotive performance, and good food. ❖

Recognition

Butler honors Steven A. Rasmussen, MD, and Providence Police Department at gala

PROVIDENCE — On Thursday, June 18, 2026, Butler Behavioral Health hosted the Together We Thrive Gala. The event raised more than $200K to support initiatives that promote the well-being of staff and enhance the overall patient care experience, ensuring that both those who provide care and those who receive it have the resources they need to thrive.

"We are grateful for the generosity of our supporters, whose investment in Butler's mission helps strengthen the foundation of exceptional care," said **MARY MARRAN**, President and COO, Butler Hospital. "By caring for the people who care for others, we are building a stronger, healthier future for everyone we serve. These funds will strengthen the well-being of our dedicated staff as well as maximize the care and services we provide to our patients and the community."

From left, **Mary Marran**, President and COO, Butler Hospital; **Dr. G. Mustafa Surti**, Executive Chief of Psychiatry and Senior Vice President, Butler Hospital; **Dr. Steven Rasmussen**, Butler Hospital; **Charles Reppucci**, Former Chair of the Butler Hospital Board of Trustees and Former Chair of the Care New England Board of Trustees.

This year, Butler honored **STEVEN A. RASMUSSEN, MD**, with the Charles Reppucci Butler Hospital Service Award. Dr. Rasmussen is the past Chair and Mary Zucker Professor in the Department of Psychiatry & Human Behavior at the Warren Alpert Medical School of Brown University. Since 1983, his research has focused on increasing our understanding of the biologic basis and treatment of obsessive-compulsive disorder (OCD). Currently funded projects include a study of harm avoidance and incompleteness in OC spectrum and anxiety disorders, developing neurosurgical and noninvasive neuromodulatory treatments for OCD, and using anterior capsular DBS and Lesions to understand the role of frontostriatal circuitry in the pathogenesis of OCD.

Dr. Rasmussen has received the Lifetime Achievement Award from the International OCD Foundation for his work, as well as the Pioneer in Radiosurgery Award from the Leksell Society. The author of over 180 peer-reviewed publications, he has been continuously funded by the NIMH for the past 30 years for his work in the treatment of OCD and neuromodulatory treatment for psychiatric disorders.

From left, Colonel **Oscar Perez**, Providence Police Chief; Mayor **Brett Smiley**, City of Providence; Commander **Timothy O'Hara**, Deputy Chief of Providence Police; **Dr. Michael Wagner**, President and CEO, Care New England Health System. [PHOTOS: CARE NEW ENGLAND]

The Lila M. Sapinsley Community Service Award was presented to the **PROVIDENCE POLICE DEPARTMENT**. One of the oldest law enforcement agencies in the United States, the Providence Police Department traces its roots to 1775, when night watchmen first patrolled the streets of Rhode Island's capital city during the Revolutionary War. The department issued its first badge in 1848, instituted daytime officers citywide in 1851, and was formally chartered in 1864—building a proud legacy that spans centuries of service.

Today, the Providence Police Department stands as the law enforcement agency covering the third most populous city in New England, serving over 190,000 residents across 20.5 square miles. Guided by the motto *Semper Vigilans*—Latin for "Always Vigilant"—the department is committed to community policing and forging strong relationships between officers and the neighborhoods they serve. Through investments in modern technology and dedicated personnel, the PPD continues to uphold its mission of protecting and serving with integrity, professionalism, and unwavering commitment to the safety and well-being of all who call Providence home. ❖

Places

Saint Anne's Hospital buries time capsule in celebration of 120 years of care

FALL RIVER, MA — Saint Anne's Hospital, part of Brown University Health, commemorated its 120th anniversary with the burial of a time capsule capturing the hospital's rich history and its ongoing commitment to the community. The capsule, set to be opened in 50 years on June 23, 2076, offers a glimpse into the people, practices, and milestones that define healthcare at Saint Anne's today.

The curated time capsule includes items representing both the hospital's past and present, including historical medical instruments such as an ECG caliper, masks symbolizing the COVID-19 pandemic, a "day in the life" reflection from physician **SHANJIN CAO, MD, PhD**, handwritten in his native language of Mandarin, and a selection of photographs, speeches, articles, and other items rich with memories and special meaning.

"This time capsule is both a tribute to those who came before us and a reflection of the extraordinary work happening here today," said **JULIE ABILHEIRA, RN, MS**, President Massachusetts Hospitals, Brown Health. "As we celebrate 120 years, we are proud of our history and even more excited about the future. The dedication of our team and our commitment to our community will continue to guide us for generations to come."

Founded in 1906 by the Dominican Sisters of the Presentation, Saint Anne's Hospital has served generations of patients and families in the southeastern coast of Massachusetts, evolving alongside advances in medicine while remaining rooted in its mission of compassionate, patient-centered care. Over the past 120 years, the hospital has grown into a leading community healthcare provider, offering a wide range of services and specialties while maintaining a strong connection to its heritage. ❖

Saint Anne's Hospital donates trauma bags to Somerset Police Department to strengthen emergency response

FALL RIVER, MA — Saint Anne's Hospital has donated 20 fully equipped trauma bags to the Somerset Police Department, ensuring that every patrol cruiser is outfitted with critical, lifesaving medical supplies. The donation reflects Saint Anne's ongoing commitment to community health and safety, as well as its support for local law enforcement.

"Police officers play a vital role as first responders," said **JULIE ABILHEIRA, RN, MS**, president of Saint Anne's Hospital. "By ensuring they have the tools needed to provide immediate care, we are strengthening the entire emergency response system and helping to protect our community."

"The Somerset Police Department is proud and thankful to be able to partner with Saint Anne's Hospital on this important initiative. With their support, essential trauma response equipment will be supplied to every frontline response cruiser at the PD. The gift of much needed equipment allows for consistency in training and response procedures between both police and medical responders who are providing critical care on the scene of traumatic events. In addition to the staff of Saint Anne's Hospital, we extend sincere gratitude to State Representative Justin Thurber for his continued support of this initiative and connecting the PD with Saint Anne's Hospital, and to The Home Depot in Somerset, MA for their generous support of this project," said Sergeant Michael Demoranville, Somerset Police Department.

This commitment is underscored by the involvement of State Representative **JUSTIN THURBER**, who facilitated the partnership.

"I was proud to connect Saint Anne's Hospital with the Somerset Police Department to equip their vehicles with trauma bags, giving our officers critical life-saving equipment when seconds matter most. I am grateful for the chance to help build innovative local partnerships that bring together outstanding organizations like Saint Anne's to solve real problems in our community without always turning to the state for answers. I want to thank both Somerset PD and Saint Anne's Hospital for their leadership and teamwork. Their collaboration shows that when local partners work together, wonderful things can be accomplished for the people we serve," he said. ❖

Obituary

NORBERTO G. CONCEPCION, MD, 92, of West Warwick, passed away peacefully surrounded by his loving family on June 17, 2026. He was the beloved husband of Florence (Burns) Concepcion. Born in Calinan, Davao City, Philippines, he was the son of the late Severino and Asuncion (Gamboa) Concepcion.

Besides his wife, he is survived by his loving sons, Marc Concepcion and his wife Anoushka, and Jude Concepcion and his wife Blake; cherished grandchildren Caden, Bryce, Sakara, and Amara Concepcion. He also leaves many brothers, sisters, nieces, and nephews.

Dr. Concepcion will be remembered for his deep compassion, quiet strength, and unwavering devotion to his family and patients. He graduated from the University of Santo Tomas Medical School in 1960 and began his surgical training at Zamboanga General Hospital. In June 1967, he came to the United States, where he continued his medical career, first working in New York City and later in Waterbury, Connecticut.

He eventually settled in Rhode Island, where he served as an anesthesiologist at Rhode Island Hospital and was one of the founding partners of an anesthesiology group, retiring in 2000. Throughout his years in medicine, he approached his work with humility, integrity, and a profound commitment to caring for others. The values he cherished most were education and hard work, a belief he carried throughout his life and instilled in his family.

He took great pride in his heritage, becoming an American citizen, and he modeled perseverance, patience, respect, and generosity. Above all, he was a loving husband, father, and grandfather who found his greatest joy in time spent with those he loved. His legacy of kindness, wisdom, and service will live on in all who had the privilege of knowing him.

Visit NardolilloFH.com for online condolences. ❖