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

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ABSTRACT

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

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

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

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

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

INTRODUCTION

Steatotic liver disease (SLD) affects approximately 40% of North Americans,[1] with progression to advanced stages posing a major threat to individual lives and global public health.[2,3] Common, intersecting lifestyle risk factors include at-risk drinking and weight-related behaviors, both of which are preventable.[4] In the United States (U.S.), alcohol consumption is now the leading cause of liver transplantation and liver-related deaths, with mortality rates doubling from 1999 to 2022, with an 8.9% increase since 2018.[5] This trend is worsened by a growing global presence of metabolic syndrome, which acts synergistically with alcohol use to produce cirrhosis and hepatocellular carcinoma.[6,7] Community-based interventions targeting these modifiable behaviors could save the U.S. hundreds of billions of dollars annually and save tens of thousands of lives.[8,9]

In Rhode Island (RI), the impact of intersecting risks could be devastating.[10] Two-thirds of RI adults experience overweight or obesity,[11] and the obesity rate is expected to increase 47% by 2030.[12] One in 10 Rhode Islanders have a diabetes diagnosis, and one in four report a complete lack of any physical activity or exercise outside their regular job.[13] Post-COVID-19 economic hardships have further linked food insecurity to poorer diet quality and problematic alcohol use.[14,15] On average, 367 RI residents die annually from alcohol-related chronic conditions, two-thirds of which are attributed to alcohol-associated liver disease (ALD).[16] Alcohol use disorder (AUD) diagnoses were cited for the majority of the remaining deaths (30.5%), with the prevalence of undiagnosed liver disease unknown among them.[16–19] The number of RI women dying from these conditions rose by 34.2% in just five years,[16] aligning with national trends.[20] Fully alcohol-attributable deaths from chronic conditions peaked in 2020, underscoring the potential influence of limited care access.[16]

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

RI disparities in liver health

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

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

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

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

Early detection to save livers and lives

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

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

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

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

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

CEHC partnership

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

APPROACH

Conceptual framework

The Liver Health Study at CEHC was designed as an interdisciplinary collaboration leveraging expertise in hepatology, alcohol science, biomarker discovery, and weight management. This team initiative investigated the viability of screening for MetALD at the POC in a community clinic. The key premise was that providing personalized feedback from POC diagnostics can reduce biobehavioral risk factors and prevent the progression of liver damage to advanced disease. The project also established procedures to explore a non-invasive plasma biomarker panel that predicts steatosis and fibrosis, using FibroScan® as a reference standard. A scaffolded flow of screening, risk stratification, and preventative intervention is possible through combining chart reviews, behavioral screening, and POC diagnostic testing. Moreover, immediate access to proven behavioral interventions can be aligned with the cultural and readiness-to-change needs of the patients served. This pilot initiative was approved by the Brown University Institutional Review Board.

Screening and risk stratification

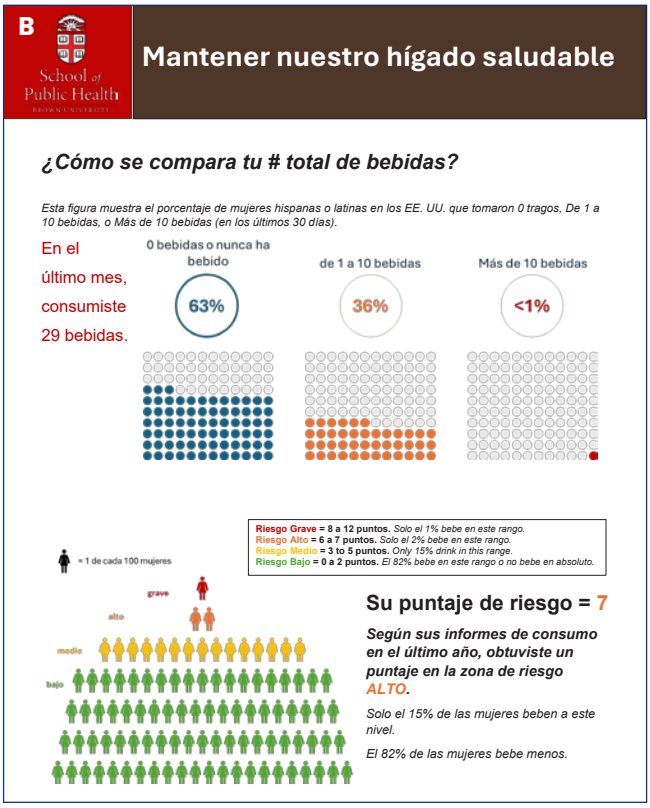
The Liver Health Study used an efficient two-stage screening process to target adults over the age of 21 with multiple health-risk factors. Review of electronic health records (EHRs) identified patients with body mass index (BMI) of 25+ and an Alcohol Use Disorder Identification Test—Consumption[45] (AUDIT-C) score of 3 for women and 4 for men, respectively.[46] Positive EHR results prompted POC behavioral screening with a semi-structured timeline followback interview to quantify recent alcohol intake[47] and diagnostic imaging using VCTE™ with FibroScan® to detect steatosis and fibrosis.[48] CADRE's ability to locally support other research teams aiming to use FibroScan® at POC offers a reproducible model for clinical partnerships throughout the state. Randomization procedures were piloted to allocate patients into either standard or enhanced brief MI lifestyle intervention. After BMI/AUDIT-C screening and Fibro Scan®-informed risk classification, the intervention was delivered by a bilingual and bicultural interventionist with doctoral-level training in clinical psychology and MI supervised by the primary researcher, an RI-licensed psychologist. The interventionist sought to ensure the nuances of cultural health beliefs and language were respected.

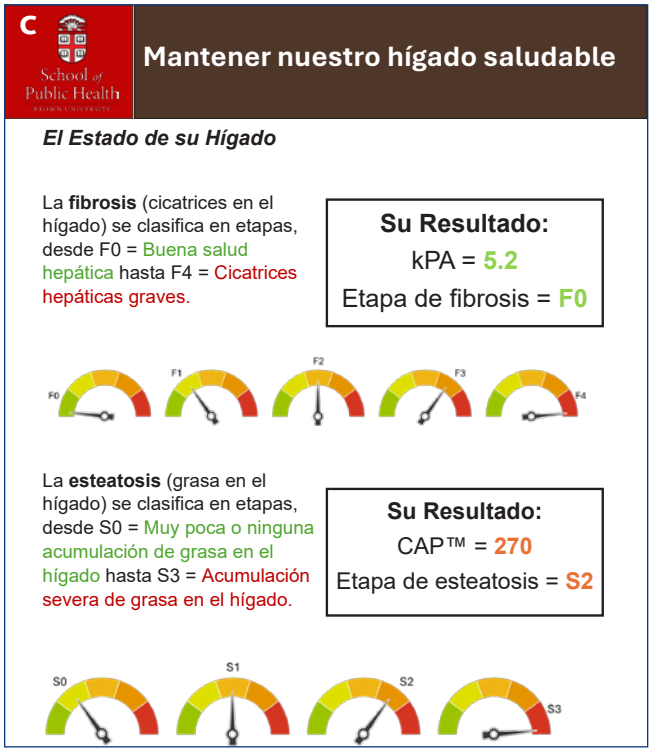
MI lifestyle intervention

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

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

Figure 1. Liver health information and personalized feedback report
[**A**] Information on lifestyle risks and the progressive course of steatotic liver disease and [**B**] personalized feedback with alcohol-consumption risk stratification, enhanced with fibrosis (kPA) and [**C**] steatosis (CAP™) scores and [**D**] liver health connections. All participants received information depicted in **A** and **D**; those randomized to the enhanced condition also received personalized feedback depicted in **B** and **C**.





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

FibroScan® integration

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

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

Community integration and infrastructure

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

Preliminary findings and clinical impact

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

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

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

DISCUSSION

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

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

CONCLUSIONS

The partnership between the CADRE and CEHC represents a shift toward strategic health promotion by providing accessible screening, early detection, and chronic disease prevention. When a patient receives a FibroScan® result showing liver fat or stiffness, they see firsthand the body's reaction to their lifestyle behaviors. Congruently, by using POC diagnostic testing and culturally attuned behavioral interventions, clinicians can detect liver disease at stages where lifestyle change is a viable solution and then provide immediate support. To save the lives of Rhode Islanders most in need, multidisciplinary teams must continue to dismantle the logistical and societal barriers to chronic disease prevention.

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